ASSISTANCE IN THE IMPLEMENTATION AND MONITORING OF THE ENVIRONMENTAL COMPONENTS OF THE EUROPEAN NEIGHBOURHOOD POLICY (ENP) ACTION PLANS TO COVER SMALL CAPACITY BUILDING AND PROGRESS MONITORING ACTIVITIES

Task 2: Benefits Methodology

Final Version

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ACRONYMS

BOD..... Biological Oxygen Demand
CH4 ..... Methane
CO ..... Carbon Monoxide
CO_2 ..... Carbon Dioxide
COD..... Chemical Oxygen Demand
E. coli..... Escherichia Coli
ENP ..... European Neighbourhood Policy
GDP ..... Gross Domestic Product
IEEP ..... Institute for European Environmental Policy
NMVOCs..... Non-Methane Volatile Organic Compounds
NOx ..... Nitrogen Oxides
NPV ..... Net present Value
PM_{10} ..... Particulate
PPP ..... Purchasing Price Parity
SO_X ..... Sulphur Oxides
SO2 ..... Sulphur Dioxide
VOCs ..... Volatile Organic Compounds
VOLY ..... Value of Life Years
VPF..... Value of Prevented Fatality
VSL ..... Value of Statistical Life
WHO..... World Health Organisation
WTP..... Willingness To Pay
WTA..... Willingness to Accept

BENEFITS OF ENVIRONMENTAL IMPOVEMENTS IN ENP COUNTRIES

Benefits Assessment Methodology

1 INTRODUCTION

1.1 Aim

The aim of Task 2 of the present study is to develop a method for assessing the benefits deriving from the improvement of the environment in European Neighbourhood Policy (ENP) countries [3] (see figure 1). Benefits studies are helpful to do as they:

- Help make explicit the benefits of policy;
- Offer numbers on the benefits and the value of these benefits – hence reaching a wide audience in a language that they understand;
- Can contribute to 'levelling the playing field' in environmental policy where there is usually much more talk on how much a policy will cost rather than how much it will help (health, society, the economy);
- Offer additional arguments to Ministries of environment to argue for funding and argue for priority to be given to environmental issues (see also Box1).

Box 1: Who are benefits studies useful for?

Improving the environment – air and water quality, management and disposal of waste and protection of nature - leads to a range of important benefits to societies and economies. Understanding these benefits helps clarify the importance of ensuring that legislation is in place, that the needed investments are made, and funds available for this, and legislation enforced. This is therefore important for a range of different perspectives:

- The country as a whole - as understanding what the benefits of (policy) action to improve the environment are, should help lead to greater action – domestically and potentially also through bilateral or multilateral cooperation.
- National ministries of environment – as it creates additional arguments to help secure funding for environmental policy implementation and help defend policies and targets to improve the environment.
- National ministries of health, labour and consumer protection - as avoided health impacts reduce the need for treatment and days lost employment.
- Regional authorities looking to build on the natural capital – for example using landscape and nature as a pole of attraction for tourism.
- For municipalities – again as it makes clear the benefits of addressing urban transport, enforcing (air, water and waste) emissions legislation and quality standards and investing in needed environmental infrastructures.
- For inspectorates/enforcement agencies – as it creates an argument to ensure that they have resources to enforce legislation; without enforcement many of the benefits would not be realised in practice.

[3] See also http://ec.europa.eu/world/enp/index_en.htm

This document, prepared by the Institute for European Environmental Policy (IEEP)[4], is a general methodology guide for benefits assessments for potential use in the ENP countries. It was tested in a Ukraine benefits text case[5] and subsequently adapted.

Figure 1: Countries in the ENP and strategic partner (Russia)

Source: European Commission

This work builds on the benefits study approaches for the EU candidate countries (see lessons from past benefits studies in Chapter 2), but is adapted to the different status of the ENP countries.

The environmental challenges facing ENP countries are in essence the same as those of the EU, though there will be different priorities and different scale of challenge. Although occurring in various degrees, industrial pollution, drinking water contamination, emissions to air, biodiversity loss, floods, droughts, desertification etc are issues arising throughout all these countries.

[4] This task is one of three within the overall project led by Ecologic (D) and with collaborators: the Stockholm Environment Institute (SEI).

[5] Internal working document.

Unlike acceding countries though, neighbours are not expected to implement the legislative acquis. Potential targets and timelines for ENP countries are obviously not constrained by the obligations of the EU environmental legislation. However their relationship with the EU builds upon a mutual commitment to common values, like democracy and human rights, rule of law, good governance, market economy principles and sustainable development. That being said, and as will be discussed later in the methodology, the targets and requirements within EU environmental legislation, together with other international agreements and others ad hoc targets, can be a useful benchmark for ENP countries' legislative reform, in order to assess suitable potential environmental improvements and their related benefits.

In light of that, the differences between the previous studies on (formerly) acceding countries and the present work on neighbouring countries will be taken into consideration. Potential targets and timelines for ENP countries are obviously not constrained by the obligations of the EU environmental legislation. Furthermore, some neighbour country may have to deal with very specific issues, such as nuclear contamination in Belarus and Ukraine. The methodology adopted in previous EU enlargement related benefits studies therefore, although largely applicable to the ENC cases, will need to be adapted to specific issues related to the neighbourhood countries' legislation and practice.

Box 2: 'Benefits' of improving environmental policy and legislation

The implementation of the improved environmental policies and legislation will lead to a wide range of benefits, including health benefits, eco-system benefits, and broader benefits such as benefits to natural resources (e.g. fisheries or agriculture), social benefits and also general economic benefits (e.g. attracting tourism or eco-efficiency gains).

It is, however, important to clarify up front what we mean by benefits and how we calculate them. Many of the benefits discussed in this report are in fact avoided damage. This is the case notably for health benefits and other environmental benefits such as eco-system benefits. In other words, the benefit is calculated on the basis of understanding what the impact or level of damage is and how this will be reduced with improved environmental regulation. This leads to estimates for reductions in the incidence of respiratory diseases for example, the reduction in the number of poor quality rivers, or the reduction in agricultural losses from pollution deposition.

Other benefits are more 'common sense' benefits, i.e. where improved regulation leads to actual improvements rather than just a reduction of damage. For example, the social benefits of increased learning and awareness of environmental impacts and increased involvement in solving environmental problems is this type of benefit. Another example is the issue of improved access to clean drinking water. Also, improved environmental policy may lead to enhanced competitiveness and new job opportunities, eg by promoting environmental technologies and innovation.

1.2 Structure of this document

This document is structure as follows:

Chapter 2 presents some useful lessons learnt from previous benefits studies, which are to be taken in mind when developing the analysis;

Chapter 3 describes in details the method to be used for the benefit study;

Chapter 4 clarify the assumptions behind the methodology.

Chapter 5 looks at implications for benefits assessment in other ENP countries.

2 BACKGROUND TO METHOD: LESSONS FROM PAST BENEFITS STUDIES

Methodological Considerations: Rules of Thumb

The following points provide some general advice about how to do a benefit study, on the basis of the lessons learnt from previous studies. This builds on, inter alia, the ECOTEC (2001) Benefits of Compliance Study, the Ecolas and IEEP (2005) Croatia study and the recent Cost of Policy Inaction (COPI) study[6]. These rules of thumb will be borne in mind when developing this research:

- **Be realistic about what can be said in what terms and to what audience.** Overplaying what can be said with the results can undermine the whole work.
- Always remember and note explicitly that **less can be said in monetary terms** than can be said quantitatively or qualitatively**, even if monetary terms speak louder.** It will be important to present the results in the right perspective. The key messages may not always be at the monetary level – and it is the key messages that should be given the prominence.
- There are also problems of identifying and allocating causes - in that there are often **multiple causes** for a given environmental change (e.g. exposure to pollution) that lead to changes in cost. It is important to be clear as to what the inter-linkages are and not try to untangle issues beyond a point at which they can be untangled. The choice is to either take bigger issues, or to take specific issues but note the inter-relations with other issues.
- Some areas can be **monetized**, others may prove much too tricky for that level of analysis – do not attempt to monetize something that will be too difficult, especially if one can say sensible things elsewhere. One weak or exaggerated area can lead to suspicion as to the quality or good analysis elsewhere and hence undermine the work.
- There is a need for a **practical framework**; simple is often better. Any decision requires (convincing) explanation, and failing that the whole work can get undermined - hence important to set a simple defensible framework.
- Take into consideration **budget constraints**. Be realistic as to what can be done with the given budget and focus the research on the most important issues rather than engage on a wide but superficial analysis.

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[6] Ecotec, 2001: The Benefits of Compliance with the Environmental Acquis for the Candidate Countries

Ecolas and IEEP, 2005: The benefits for Croatia of Compliance with the Environmental Acquis

Bakkes J.A. (MNP), Bräuer I. (Ecologic), ten Brink P. (IEEP), Görlach B. (Ecologic), Kuik O.J. (IvM), Medhurst J. (GHK), 2006: Cost of Policy Inaction - Scoping study for DG Environment

see also

ten Brink P, C Monkhouse and S Richartz Promoting the Socio-Economic Benefits of Natura 2000. Background Report for European Conference on "Promoting the Socio-economic Benefits of Natura 2000" Brussels 28-29 November 2002 IEEP 2002, www.ieep.org.uk

Kettunen, M. & ten Brink, P. 2006. Value of biodiversity- Documenting EU examples where biodiversity loss has led to the loss of ecosystem services. Final report for the European Commission. Institute for European Environmental Policy (IEEP), Brussels, Belgium. 131 pp.

- Be aware that in some countries data may not be easily available or can be not exiting. It is important to identify areas in which **data availability** is poor and how this can constrain the analysis. If appropriate, include in the final recommendations a reference to lack of data and possible key areas where data improvements are needed.

Practical considerations on the analysis framework

A core issue is to set the basic analysis framework. This can be done by:

- Understand the state of environment 'now' – chose a **reference year** for which **data exists**. In practice this may be one to three years into the past.
- Understand **business as usual developments** (e.g. future transport growth, agricultural outputs, demographics, tourism levels, water demand) – important to understand **modelling availability**, robustness, assumptions and implications as well as existing **scenarios** as their qualifications.
- Understand the existing and committed plans for policies and policy instruments affecting the issues as well as external issues (economic growth, changes in likely exposure levels etc) – and what implications their use or non use would have – e.g. new pollution levels. This can be used for the business as usual or for policy scenarios. **It will be important to check whether the business as usual already integrates (the expected effects of) existing policies and policy instruments**.
- Understand relationship between issue and impact, e.g. the causal connection/pathway. For example, for air pollution and impact we need to know the dose response functions. Dose response functions are better known for air than for other areas. Other tools can be valuable for other types of problems (e.g. willingness to pay[7] estimates needed for amenity value; hedonic pricing is useful to estimate benefits of location quality, e.g. access to green areas). The field is quite fast developing (new ones come out all the time) and a fast improving 'science'. **Obtain the latest data/results and see which of them are suitable for the question being addressed.**
- When estimating likely impacts (e.g. calculating the number of cases of bronchitis by multiplying the number of people exposed by the dose response function and by the level of pollution exposure) it is important to **make clear what the uncertainties are**, and to give ranges for the answers.
- For monetization, it is often helpful to use **transfer values** (see also Box 6), and build in external cost estimates. Time and budget constraints, in combination with a wide angle of the study, would make it inevitable to draw on the results of existing valuation material – though beware that externality cost is not a clear science and developing. E.g. climate costs estimated now are larger than those estimated a few years ago. The transfer of existing values (benefits transfer) comes with its own pitfalls and problems. Again make sure that assumptions and insights on the level of accuracy are noted and where relevant explore the sensitivities.

[7] Or willingness to accept compensation (WTA) in case of loss of environmental capital.

- Exploring the implications of assumptions can be done through the use of **suitable scenarios and sensitivities** and cover potential 'realities'. It will be important to explore different time scales discount rates, value of loss of life, different economic growth forecasts.

Presenting the results in practice

Not only do useful results have to be obtained, but they have to be presented properly:

- Note **ranges** – these are valuable to give honest answer. Do not pretend that figures are more accurate than they are.
- Given uncertainties, it is important to explore insights using both **lower and higher estimate** and if the lower estimate already gives a clear message, then start with that one so as to avoid being accused of choosing the higher options.
- It is important to underline **what is covered and what is not.**
- It is important to remember that in the event that monetary values in one area are smaller than in another, does NOT necessarily mean that costs or benefits are smaller. Certain impacts are more easily quantified and monetized than others; some impacts – especially on human health – are more likely to yield large cost figures. **Methodological and data limitations** therefore need to be understood and clear. Air pollution issues are better understood – there are more and better dose response functions. It is therefore likely that numbers will be higher for air than for areas where less can be said, e.g. waste. Monetisation comes especially to its limits in the case of irreversible changes. Hence, if some kind of irreversibility should emerge, this has to be directly addressed in non-monetary units.
- Note that costs or benefits types are different and hence **not easily comparable**. (Monetization helps to make effects comparable by expressing them in one common unit, but at the price of masking the uncertainty inherent to the estimates).
- Changing the **way quantities are expressed** can help in **comparability** – e.g. per capita or per GDP can help put big numbers in context and allow comparison across countries.
- **Irreversible changes** (loss of environmental stocks) need to be made explicit, even if monetized results take such changes into account.

Interpretation of results in practice

It is valuable to provide insights to help readers understand what they see:

- The money value for the benefits is **not** the final measure of these benefits;
- The aim of the monetary value is to identify the **choice** that people want and to demonstrate that there are **real benefits** to improve the state of the environment;
- No single figure can be given due to data limitations, and **broad ranges** are needed for an honest analysis;

- However, the **meaning of the range** can be taken seriously and the reader should be aware that the true value may be outside the range given here;
- Given the uncertainty in the numbers, it is important to focus first on the **lower value** when drawing conclusions regarding implications of the study and then double check with the upper value.
- Use whichever combination of (appropriately robust) qualitative, quantitative and monetary data/arguments needed to present the 'story'.
- Be aware that results, especially the 'One Single Big Number', tend to get quoted out of context and take on a life of their own. This tendency can be counteracted only so much by attaching many warning signs to the presentation of the results.

3 OVERVIEW OF METHOD FOR ENP BENEFITS ASSESSMENTS

3.1 The benefits of an improved environment

As in previous work assessing the benefits of compliance with the Acquis, this study will measure the benefits of improving the environmental policy and legislation in the ENP countries in terms of:

- **Health benefits**: direct benefits to public health, e.g. a reduction in the cases of illness and the avoidance of early mortality, notably from respiratory diseases.
- **Resource benefits**: benefits to parts of the environment used commercially, e.g. forestry, agriculture and fisheries.
- **Ecosystem benefits**: benefits to the natural environment with no commercial component, and ecosystem service benefits (where the ecosystem provides services for water supply and purification, carbon storage or flood control). The disruption of these can lead to the loss of important resources and hence lead to often significant, additional expenditure. See Box 3 and also Appendix D.
- **Social benefits**: benefits to the society at large, including the safeguarding of, and access to, the natural and cultural heritage (avoided pollution damage to historic buildings or the destruction of historic landscapes), recreational opportunities (e.g. fishing and bathing), social cohesion due to support for employment, social learning and the development of civil society (due to increased information provision, consultation and involvement).
- **Wider economic benefits**: knock-on benefits beyond the immediate economic exploitation, including local and regional development (attracting investment). Benefits include increased employment through environmental investments, eco-efficiency gains, the development of new and existing industries/sectors of the economy, balance of payments and trade effects (reduced imports of primary material as more waste is reused and recycled), and economic benefits from natural resources (e.g. tourism benefits of beaches recognised to be clean, and eco-tourism).

Box *1*: Eco-system service benefits (example from biodiversity)

Biodiversity includes species diversity, genetic diversity and habitat diversity. Each of these are inter-linked and together form the wealth of ecosystems. They offer a range of different ecosystem services and the benefits that stem from ecosystems can be classified as:

1. **provisionary services**, such as food, fibre, fuel and water;
2. **regulating services**, ie benefits obtained from ecosystem processes that regulate the environment, such as the regulation of climate, floods, disease, wastes, and water quality;
3. **cultural services** such as recreation, aesthetic enjoyment and tourism; and
4. **supporting services**, ie services that are necessary for the production of all other ecosystem services, such as soil formation, photosynthesis, and nutrient cycling.

This typology follows the Millennium Ecosystem Assessment (MEA) classification[8].

In general, improvements of the environmental conditions can lead to one or more of these benefits. For instance, the improvement of ambient air quality as emissions from power stations, large industrial works, and vehicles are reduced, leads undoubtedly to health improvements. An improved access to clean drinking water, bathing water and rivers can also benefit health, as well as lead to significant social benefits (bathing, fishing) and stimulate tourism. Major improvements in waste management usually lead to fewer problems with landfill sites, to reduced methane emissions, lower levels of leachate penetration of groundwaters and improved incinerators, each with resulting health and environmental benefits. Finally, the implementation of the Habitats and Birds Directives, should lead to the extensive protection of the biodiversity resources.

The interactions between the environment and economic activity (see Table 1) are usually two-way. Investment in economic sectors can lead not only to greater economic efficiency of the sector, but can improve environmental performance, for example through new more efficient capital stock. Similarly, improved environmental quality (e.g. application of clean processes, or savings through appropriate pollution and natural resource management mechanisms) can lead to economic savings, support competitiveness and subsequently further investment and productivity. These latter benefits can apply to the enterprise itself or to a larger set of players. Where for example, the surface water quality improves due to reductions in emissions, there is a lesser need for pre-treatment and associated pre-treatment costs. Furthermore, the increased availability of clean natural resources and availability of an efficient environmental infrastructure can improve the locational quality of a locality or region and hence attract investment, whether local, national or foreign.

The final effect clearly depends not only on what the money is spent on, but also on what the money is no longer spent on, and it is the challenge of development planning to ensure that the net effect of the investment choice, as guided by policies, planning and incentives encourage a move toward more sustainable development and sustainable economic growth. It would be too simplistic to argue that environmental

8 Millennium Ecosystem Assessment (MEA, 2005). Ecosystems and Human Well-being: Biodiversity Synthesis. World Resources Institute, Washington, DC. 100 pp.

expenditure leads to economic and regional development benefits and not take the adverse impacts of decisions into accounts. However, a full assessment is not possible here. Nevertheless it is important to underline the potential for a positive effect on the economy, as this is a real potential benefit from appropriately planned environmental expenditure.

Table 1: Indication of the significance of the relationship between economic sectors and key environmental themes

	Priority Industrial Sectors				
Environmental Theme	**Energy**	**Transport**	**Industry**	**Agriculture**	**Tourism**
1. Climate Change	***	***	**	**	*
2. Air Quality	***	***	***	◊	◊
3. Water	**	*	***	***	**
4. Nature and Biodiversity	*	**	*	***	*
5. Landscape	***	***	*	***	*
6. Soil /Land Quality	*	◊	***	***	◊
7. The Urban Environment	*	***	*	◊	*
8. Noise	*	***	*	◊	◊
9. Waste Management	***	**	***	*	**

Source: adapted from European Environment Agency

Key: *◊ Nil or insignificant; * Some impact ; ** Quite substantial impact; *** Very substantial impact*

3.2 The environmental areas that can be analysed

Benefits assessments can be focused either narrowly (eg air pollution in cities, or water pollution in a particular river basin) or widely (eg covering all environmental acquis, or wider yet and include environmental aspects of other sectoral policies too).

In the past, studies have focused on air, water, waste and nature chapters of the acquis Communautaire and with different levels of analysis, pending data and resource availability (see below). Chemicals and nuclear/radiation are also important environmental issues, though for a range of reasons less a focus historically. Chemicals is becoming more accessible for assessment now that the REACH legislation has been passed. Furthermore, natural hazards management was also historically excluded (the flood directive is relative recent), but an increasing challenge with climate change.

Generally benefits assessments for ENP countries will focus on at least the four key areas, which are the same areas explored in previous studies:

- **Air** – reduced emissions, improved air quality, reduced pollution loading, reduced exposure to pollution and hence health impacts;
- **Water** – improve connection rates to water and waste water, improved water quality (drink, rivers, bathing) and associated benefits;
- **Waste** – improved landfills and reduced associated impacts, more recycling, lesser need for landfill, reduce need for primary materials, methane capture; and
- **Nature** – increase areas and level of protection of nature sites, ecosystems and biodiversity, with due benefits.

There is scope for analysis in each of these areas in all ENP countries. Natural hazard management will also be important, but non trivial as well as different in nature from the other foci of benefits studies, as often not a legislation based benefit, but more of an investment decision based benefit.

3.3 Type of analysis

The benefits arising from improved environmental quality in the four areas can in principle be analysed under three main stages:

- A **qualitative** review of the potential effects (type of benefits) for *air, water, waste* and *nature* – helping make explicit the types of effects and examples of where these occur in the country to help understanding of the issues
- A **quantitative** appraisal of the effect in terms of changes (reduction) in pollution and/or damage, for selected directives (often grouped together) - for *air, water, waste* and *nature*;
- The **monetisation** of changes in pollution and damage, where data and scientific methods allow, for *air* and *water*

Other areas, such as nuclear safety, GMOs, chemicals, are more difficult to treat and historically given project constraints have been left out of the analysis, and will generally only be discussed in a broad preamble.

The experience with the earlier Benefits of Compliance studies have underlined that quantitative benefits (such as numbers of avoided respiratory diseases, avoided early mortality) and benefits in billions of Euro are particularly effective at communicating the message that benefits are real, that discussion should not only focus on costs, that budget allocations for environmental improvements should be significant and that timely action is required.

While identifying benefits in a *qualitative* way though can be relatively intuitive in all the four areas under analysis, *quantifying* those effects can in some cases be more difficult. Quantitative analyses therefore will likely focus on a narrower set of benefits.

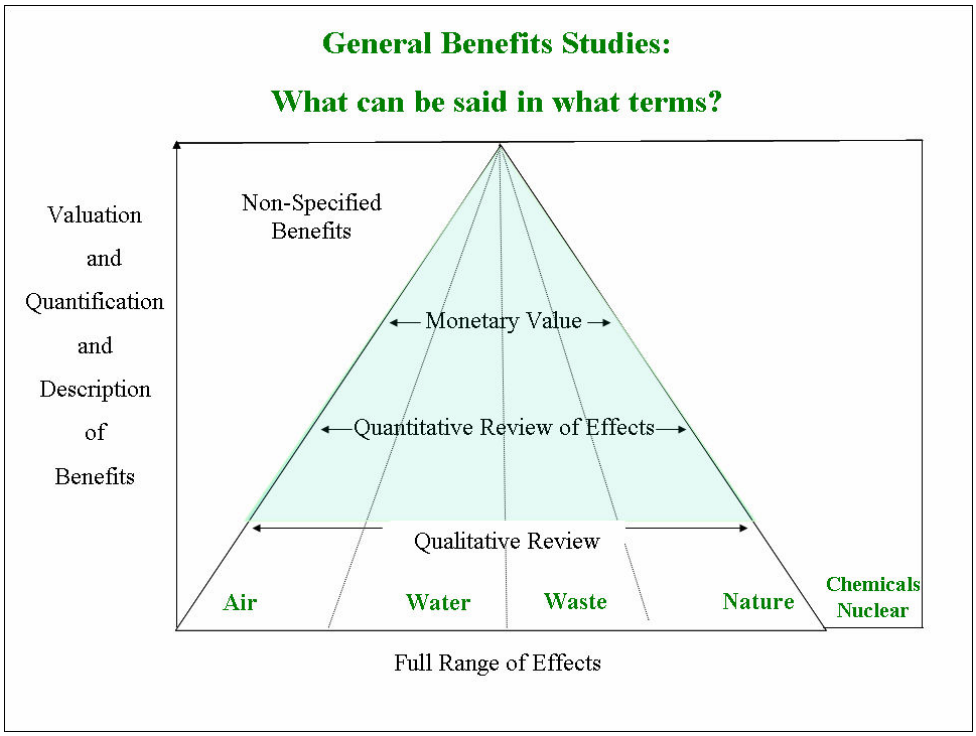
In addition, given the difficulty of attributing monetary values to benefits (and in some cases this is impossible), the economic estimates necessarily cover fewer benefits than the other two steps in the analysis. For instance, in previous benefits studies the monetisation of waste benefits proved to be particularly difficult, as the damages related to global warming from methane emissions from landfills and the

savings from recycling, reduced packaging, etc. are more difficult to communicate and quite time consuming. Monetary figures can therefore tend to underestimate the entity of the improvements in the field of waste. In order to avoid misleading information, this study will thus investigate monetary values only in the field of air and water quality. Other aspects will be analysed only in qualitative and, whenever possible, quantitative terms.

It is therefore especially important to look at each level of the analysis (qualitative, quantitative and economic) as offering valuable insights in itself and not only regard the qualitative as a step towards the quantitative which in turn is a step towards the monetary evaluation. Focusing only on the monetary analysis would be losing part of the richness of the analysis and indeed the value of benefits analysis.

This process can be presented as a 'pyramid' of benefits, with monetary estimates at the top, followed by the quantitative analysis, a broad qualitative review, and the full range of benefits in principle available from the improvement of environmental quality and protection at the basis (Figure 2).

Figure 2: Benefits pyramid



Source: Ecotec et al, Benefits of Compliance study for DG Environment

3.4 Data sources

For ENP Benefits studies, data should be obtained though:

a) *Literature review* - eg statistical yearbooks, ministry and institute publications, European Commission funded studies (e.g. Phare and DISAE) etc

b) *Questionnaires* – to be circulated among national and local authorities of the neighbour countries. Separate questionnaires (part B,C,D and E) have been

developed for each of the four key areas, while an additional general questionnaire (part A) will be used to collect basic national information (eg GDP, number of households etc). The full questionnaires are attached in annexes to this document. Note that these contain a full set of questions and only a subset will be explored for the Ukraine pilot.

c) If possible (eg if enough budget available), *interviews* to country experts, national public officers, NGOs, Commission experts etc

Box 2: How the methodology was used for the Ukraine scoping study

The Ukraine case study tested the methodology to allow further development of a benefits methodology for future ENP benefits studies. The Ukraine scoping study was only be a partial analysis with a limited budget – for example there are no provisions for missions to the Ukraine and interviews with country experts, or indeed hiring local experts to fill out questionnaires. The study was more a desk study using own internal resources. Hence will include:

- Literature review
- Data search from suitable web pages
- Questionnaires – to structure own data search. The annex contains questionnaires - these have been set up as full questionnaires for ENP benefits studies. In the scoping study we would look at a subset of those questions for geographic area for which data is available – this is discussed in the environmental media specific chapters.

3.5 Policy Package

In order to assess what the benefits stemming out from an improvement of environmental legislation are, it is important to define a certain 'policy package' of measures/targets to be used as benchmark.

The coverage of EU environmental Directives was an important issue in the earlier studies as the requirements in these helped to define the areas where benefits were possible and also helped in the development of the target – eg the scale of the changes in pollution levels, infrastructure expansion etc. While in practice different pieces of legislation need to be 'bundled', as the final effect on the environment comes from the combination of different efforts, benefits studies on (former) acceding countries identified some major legislative drivers for benefits: the Large Combustion Plants Directive, IPPC, Urban Waste Water Treatment Directive, Bathing Waters, Discharge of Dangerous substances and Nitrates Directives.

In the neighbourhood countries the EU environmental acquis obviously assumes less relevance. When assessing the potential benefits of environmental improvements, it will be wrong to assume that ENP countries will adopt EU standards, as they are not required to do so.

Furthermore, in previous benefits studies it has proved very difficult to identify separate benefits emerging from each single Directives, as they largely interacts and often regulate different aspects of the same receptor. What would be realistic to assess is the benefits stemming out of a general improvement of the environment. Therefore it is important to define a certain 'policy package' of measures/targets to be used as benchmark and to identify the targets that needs.

Table 2: Indicative Guide to the Bundling of Pollutants by Directive

EU Directives	Air												Water									Soil		Waste			Bio-Diversity
	SO2	NOx	Particulate	VOCs	CO2	CO	Heavy metals	Dioxins	Ammonia	Halogens	Ozone	CH4	BOD	COD	pH	Nitrogen	Phosphoru	Heavy metals	Dioxins	Fluoride	E. coli	Heavy metals	pH	Domestic	Industrial	Inert	
Air Quality																											
Large Combustion Plants	x	x	x																								
IPPC Directive	x	x	x		x	x	x			x															x	x	
National Emissions Ceilings Directive	x	x		x					x		x																
Emissions from Mobile Sources	x	x	x		x	x	x				x																
Ambient Air Quality Directves - SO2 and Particulates, Nitrogen Oxides, Lead, Benzene et al	x	x	x	x							x																
VOC Emissions from Storage and Transport of Petrol				x																							
VOC-Solvents Directive				x																							
Waste Incineration Directive	x		x			x	x	x	x	x																	
Hazardous Waste Incineration Directive	x	x	x		x		x	x	x	x																	
Waste																											
Landfill Directive												x			x			x		x				x	x	x	
Hazardous Waste Directive							x	x		x								x							x		
Waste Incineration Directive	x	x	x	x	x	x	x	x		x								x									
Titanium Dioxide													x	x	x	x		x							x		x
Packaging and Packaging Waste																		x						x	x	x	

EU Directives	Air												Water									Soil		Waste			Bio-Diversity
	SO2	NOx	Particulate	VOCs	CO2	CO	Heavy metals	Dioxins	Ammonia	Halogens	Ozone	CH4	BOD	COD	pH	Nitrogen	Phosphoru	Heavy metals	Dioxins	Fluoride	E. coli	Heavy metals	pH	Domestic	Industrial	Inert	
Waste Oils																									x		
Disposal of PCBs and PCTs																									x		
Batteries and accumulators containing dangerous substances																		x						x	x		
Sewage Sludge used in Agriculture													x		x	x	x	x				x	x		x		
Water																											
Urban Waste Water Directive													x	x		x	x										
Drinking Water Directive													x	x	x	x	x	x	x								
Nitrates from Agricultural Sources Directive																x											x
Dangerous Substances Discharges																		x									
Groundwater Directive													x	x	x	x	x	x	x								
Bathing Water Directive													x	x	x						x						
Nature Protection																											
Habitats Directive																											x
Wild Birds Directive																											x
Protection of Forests against Atmospheric Pollution																											x
Trade in Endangered Species																											x

EU legislation can be used as a good 'reminder' of what are the areas where regulation is needed (eg drinking water quality, protection of biodiversity, etc) , what are the most pollutant factors (eg CO_2, NO_X, SO_X, PM_{10} etc affecting air quality), what are he infrastructure that can improve environmental conditions (eg methane treatment facilities for landfills) and so on. Key factors are discussed in more detail in chapter 3.5.1.

Once established these key factors, it will be necessary to identify possible targets to improve environmental quality and protection. As these targets can no longer be based, as in the previous benefits studies, on the implementation of the EU Acquis, it is necessary to rely on some 'artificial' targets or alternative benchmarks in order to asses what the benefits/avoided costs will be. These targets could also be usefully compared with national targets, if existing.

In order to identify the scale of the potential benefits many approaches are possible (see also the figure). It is useful to have a combination:

a. **A 100% reduction of pollution** – this is a simple approach, clearly not realistic in terms of achievable improvements, but it would give an idea of the full cost of pollution, and therefore of the cost of policy inaction, COPI (how much the 'business as usual' will cost). This is an important policy tool – the COPI tool – that has been gaining prominence recently (eg with the publication of the Stern Review[9])

b. **Assuming a 50% reduction of pollution:** although arbitrary, a 50% reduction is relatively simple to calculate and will give an idea of the benefits of introducing some environmental improvements

c. **Policy targets – using the EU Acquis targets to set the reduction targets as an indicator**: although ENP countries are not required to implement the Acquis, EU targets can be considered quite realistic (in the sense that they can eventually be met) – given the long experience of implementation behind them and the fact that they reflect techno-economically achievable targets. Note that for ENP countries a target date of 2020 or 2025 for legislation that the EU MS have to achieve in 2005 (in most cases) means that they have 15 to 20 years more time for innovation, learning and economic growth to take place and make what could appear impossible to become possible. Looking at it this way renders it a useful benchmark. Note that arriving at the conclusion as to what EU legislation means in terms of emissions reduction etc is itself in some cases a non trivial piece of the work. Policy targets could also be set using conventions or protocols as targets.

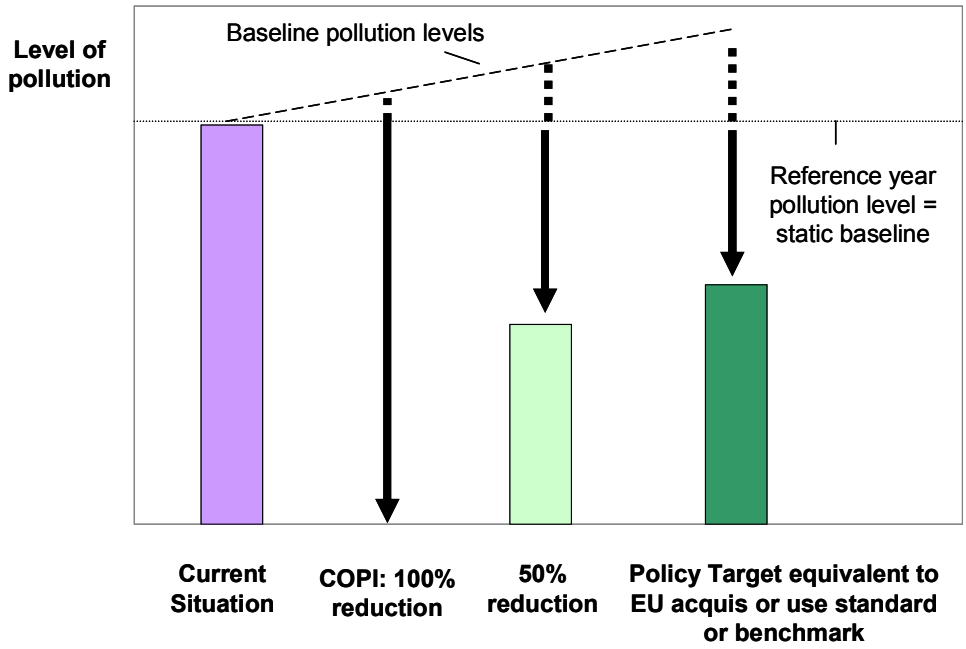
d. **Targets set by objectives or standards– eg world health organisation ambient air quality standards.** These do not have to be based on legislation and can be simply applied**.** Some of these are final state indicators so can be helpful to get around complicated causal pathways with multiple causes (eg air

[9] *The Stern Review: The Economics of Climate change*. This 700 page report has proven to be of great political and policy significant; it underlined that the costs of non addressing climate change far outweigh the costs of addressing climate change. In other words the benefits of action are much greater than the cost of inaction.
see http://www.cambridge.org/us/catalogue/catalogue.asp?isbn=0521700809 and
http://news.bbc.co.uk/1/shared/bsp/hi/pdfs/30_10_06_exec_sum.pdf

pollution from both point sources (installations) and mobile sources (Eg transport).

e. **Benchmarking Targets – eg comparison to performance in other countries whether for average or leaders.** These can be politically useful as countries do compare with each other - eg CO2 per capita, or national average leakage rates, or water supply connection rates. This requires a suitable benchmark to be available. One can either use averages – eg meet the EU average or OECD average by year X – or use the 'top-runner' approach – eg meet the best current performance by year Y.

Figure 3: Possible targets for environmental improvements – pros and cons



3.5.1 Key factors for targets

In the identification of targets it is important to note that the elements to be taken into consideration in each of the four areas can be very broad, and measuring all of them can be difficult, also given the likely lack of data in the neighbourhood countries. It is important therefore to focus on the key factors, eg the most important pollutants or infrastructures, in order to have an overall picture of the most sensitive areas and to draw a broad brush calculation of the main benefits.

A list of these elements is provided in Table 3. These are mostly inspired by the main issues disciplined by the EU environmental legislation in the field of air, water, waste and nature. Although this will not be an exhaustive list, it is assumed that these are the most important substances affecting the environment, and also those for which data could be more available. A subset of these will be analysed in the Ukraine case study, in order to test the methodology.

It is understood that they do not necessarily represent all the factors influencing environmental quality, but they can be used as a good and realistic simplification to assess the benefits of environmental improvements.

	100% reduction Cost of Policy Inaction	50% reduction	EU Acquis targets	Use of Other Standards	Use of national Benchmarking
Pros	➢ Easy approach ➢ Based on previous study on cost of inaction ➢ Clear picture of full benefits ➢ Strong message of the current burden and hence need for action	➢ Easy approach ➢ Understandable ➢ More realistic	➢ Based on previous benefit studies ➢ Targets tested on EU countries	➢ Pragmatic, ➢ Clearly understandable ➢ Can get around complex causal chains	➢ Pragmatic, ➢ clearly understandable ➢ Can get around complex causal chains ➢ Engages sense of competition ➢ Builds on what countries do anyway in policy processes
Cons	▪ Not realistic – might be disregarded by some ▪ Oversimplified	▪ Oversimplified – some might reject as not linked to policies and hence not policy relevant	▪ More difficult approach ▪ May give wrong political message (as ENP countries do not need to comply)	▪ Not binding and might not have a lot of 'weight' in county concerned ▪ Policy instruments might be upstream and not targeted at the same issue (hence does not help practical target setting for subsequent legislation)	▪ Not binding ▪ National situations not always helpfully comparable or useful to compare (eg water consumption or leakage for different climate conditions)

3.5.2 Practical targets

While additional research is required for the given (ENP) country as to what the policy targets should effectively be, experience with part benefits studies suggests that a number of pragmatic impact effects can be used as equivalent to targets. Some examples of targets that could be used in the study are provided below:

- **Air quality** – cities meet world health organisation (WHO) air quality standards by 2020.
- **Water** – 100% connected to water supply by 2020 at potable quality
- **Waste water** – 100% connected to sewage and cities over 20,000 inhabitants covered
- **River quality** – all rivers up one grade or all rivers fair or good status.
- **Waste** – no illegal non sanitised landfills by 2020
- **Waste** – full methane capture by 2020
- **Recycling** – 50% recycling of paper, glass and metals by 2020
- **Nature conservation / biodiversity** – at least protect against reduction in protected areas and halt biodiversity loss by 2020; though the areas covered (including new ones – which is important for some countries) require specific analysis.

These would be complemented by specific targets that could link, for example, to conventions, protocols (even if they are not signatories) and legislation – and this will require specific study for each country concerned.

Note that some areas are quite complicated and assumptions need testing - for example air quality is complicated by the mix of emission from point sources (eg industrial installations that can be modelled) which can be modelled and non point sources (eg cars), which become increasingly important source of air pollution and more difficult to model.

The greater the benefits study resources the more nuanced can be the selection of targets and sensitivities and causal pathways.

Table 3: Main issues for ENP benefit assessment and Ukraine case study

	Air	Water	Waste	Nature
Main issues - ENP benefit assessment - Ideal coverage *(in practice not all will be possible; depends and data availability and scale of the study)*	*Main pollutants:* ➢ SO2 ➢ NOx ➢ Particulates (PM10) ➢ VOCs ➢ CO2 ➢ CO ➢ Heavy metals ➢ Dioxins ➢ Furans ➢ Halogens ➢ Ozone ➢ CH4	*Main pollutants:* ➢ BOD and COD ➢ pH ➢ Nitrogen & Phosphorus ➢ Heavy metals ➢ Dioxins ➢ Fluoride ➢ E. coli *Main data:* Connection to water supply and waste water systems and level of waste water treatment. Quality of rivers (classification x km) Number of aquifers polluted (nitrates or pesticides)	*Main pollutants:* ➢ CH4 *Main data:* ➢ Tonnes of Domestic, Industrial and Inert waste ➢ Population served by the collection system ➢ No. of existing and planned facilities (landfills, incineration plants, recycling) and collected material ➢ No. of illegal dump sites and quantity of waste	*Main data:* ➢ Ha and % of protected areas ➢ No. of species
Selected issues for Ukraine case study	➢ SO2 ➢ NOx ➢ Particulates (PM10) ➢ CO2 ➢ CO	➢ BOD ➢ COD ➢ Nitrogen ➢ Phosphorus *Main data:* Connection to water supply and waste water systems and level of waste water treatment. Quality of rivers (classification x km)	➢ CH4 ➢ Tonnes of Domestic, Industrial and Inert waste ➢ Population served by the collection system ➢ No. of existing and planned facilities (landfills, incineration plants, recycling) and collected material ➢ No. of illegal dump sites and quantity of waste	➢ Ha and % of protected areas ➢ No. of species

3.6 Assessing benefits

In order to assess the benefits of improved environmental regulation it is necessary to understand how the pollutants (or other issues regulated) relate to the receptors under consideration. Various models exist to determine such impacts and the quantitative assessments later in this report draw upon these.

3.6.1 Qualitative assessment:

The qualitative assessment will provide a clear description of the benefits that specific environmental improvements may generate, and examples of where these will provide clear benefits in ENP countries. Some examples of the range of benefits are listed below and see also Table 6 :

- Better public health as exposure to pollution is reduced and, as a result, the number of respiratory diseases and premature deaths decreases.
- Less damage to forests, buildings, fields and fisheries through a reduction of acid rain and other forms of pollution – leading to wider economic benefits (increased yields) and reduced costs (building façade works).
- Lower risk of (irreversible) damage to natural resources such as groundwater aquifers.
- Better protection of natural ecosystems and (endangered) species.
- Promotion of tourism as a result of a cleaner environment (forests, rivers, nature reserves).
- Reduced risk of water-related illnesses and improved taste of water as a result of better bathing water and drinking water quality.
- Increased economic efficiency and higher productivity as a result of modern technology, supporting competitiveness of industry.
- Lower production and maintenance costs through availability of cleaner water, reducing pre-treatment needs.
- Lower consumption of primary material as a result of a more efficient use and higher levels of reuse and recycling.
- Support for employment and benefits for local and regional development.
- Company culture benefits through improved awareness of environmental risks and approaches to minimise risks and respond to eventual events.
- Social benefits through greater learning, awareness, involvement and responsibility with regard to environmental matters (e.g. social responsibility and involvement in separation of waste and recycling).

The range and relative importance of the benefits will clearly vary across neighbour countries, depending on the state of their environment, economic structures and pollution activities, consumption patterns and existing standards.

Benefit Type	Air	Water	Waste	Nature
Health	Reduction in Respiratory diseases and early mortality	Households benefiting from connection to (improved) quality water	Reduced share of population at risk of exposure to contaminated water/hazardous substances/odour/explosion (methane)	Benefits from access to nature
Resource	Reduced damage to building stock, crops etc	Reduction of contaminants in surface water	Reduced primary inputs through recycling, energy recovery, etc	Forest products (non-market and market)
Eco-systems	Reduced pollution stress to terrestrial and aquatic ecosystems (acidification, eutrophication and ground-level ozone)	Likely changes in river and lake water quality	Avoided leachates, methane emissions	Protected areas, species, eco-system services
Social	Quality of life by clean air	Confidence in drinking water	Reduced discrimination by fewer low income households living close to unprotected landfills etc	Recreation, cultural value, education, social engagement (volunteers)
Wider	Employment in air pollution control equipment, increased locational quality	Employment via tourism relates to water recreation	Employment for recycling etc	Employment in nature parks and other eco-tourism.

For benefits studies it is useful to mention explicit examples to make the issues more concrete. Note, however, that the selection of any case example will elicit the question of 'why this one' and hence important that either the most important ones are taken or balances range across regions to avoid one part of the country feeling 'singled out' for particular criticism.

3.6.2 Quantitative assessment

The quantitative assessment should identify, where possible, the physical environmental changes attributable to the reduction in pollution and promotion of environmental protection. Quantification of benefits, can, for example, be done using dose-response functions - where the dose is the level of pollution and the response is the impact on health and materials

On the basis of the experience gathered from previous benefit studies, the quantitative assessment can be done following three steps:

Step 1. Use judgements to approximate physical environmental **status**. This includes an assessment of the nature and scale of the receptors (number of households, length of rivers, area of building surfaces) affected. The existing literature, web search and, provided sufficient budget is available, questionnaires, interviews and advice from national experts are meant to help collect this type of information.

Step 2. Identify **changes** in specified receptors, resulting from changes in pollution and environmental protection identified in step 1. Key receptors include people (health and safety), buildings, agricultural, fisheries and forestry production, and species diversity. Where possible, 'dose-response' relationships linking changes in receptors to environmental changes should be used.

Step 3: Analysis of **implications**: When possible, some key non-environmental benefits should also be quantified, such as the number of jobs generated from the capital and revenue expenditure, and the benefits to industry of new investment in lower emissions technologies and products. The employment impacts constitute an important aspect of the benefits valuation, though the results need to be seen in the context of data availability and methodological assumptions.

Some examples of benefits (or avoided costs) quantified in previous studies are provided in
Table *7*.

Table 7: Benefits Quantified across Media

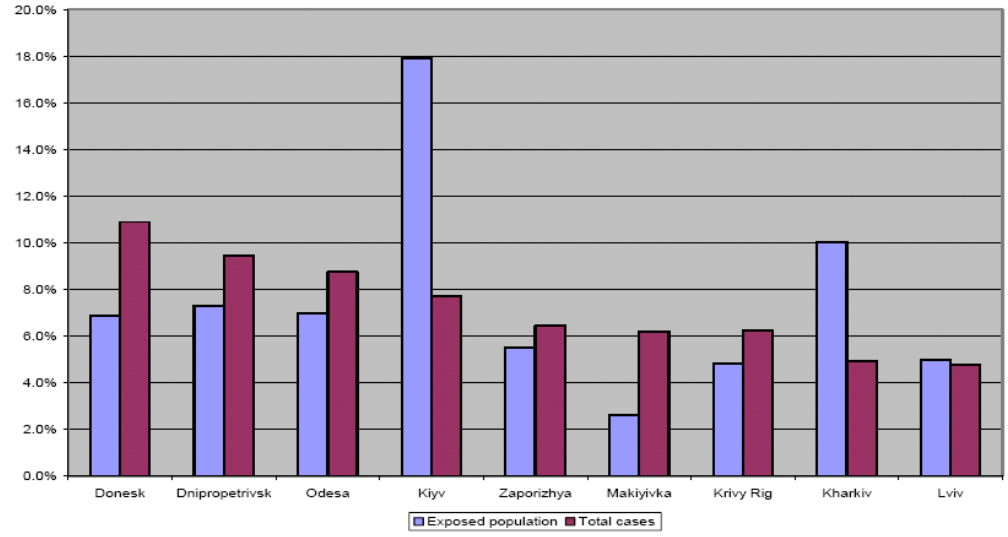
Benefit Type	Air	Water	Waste	Nature
Health	Respiratory diseases	Number of households benefiting from improved water quality	Generally not quantified – possible to have population at risk of exposure to methane / odour explosion	Not quantified
Resource	Building stock; Crops	Reduction of contaminants in surface water	Reduced primary inputs through recycling etc	Forest products (non-market and market)
Eco-systems	Global climate	Likely changes in river water quality	Avoided methane emissions	Protected areas, species, eco-system services
Social	Quality of life by clean air.	Confidence in drinking water	Reduced discrimination by fewer low income households living close to unprotected landfills etc	Eg education, social engagement (volunteers)
Wider	Employment	Employment	Employment for recycling etc	Employment in nature parks and other eco-tourism.

Box 3: Quantification in the Ukrainian case: Cases of death and bronchitis due to air pollution in Ukraine

The range of air pollution related deaths in Ukraine is estimated to be in the range of 22,000 to 27,000 annually.[33]

On the basis of the background bronchitis morbidity provided by the Ministry of Public Health, it was estimated that he number of cases of chronic bronchitis attributable to air pollution is 13,000 per year in 30 urban areas. The data though could be underestimated, since many cases are not reported. An alternative approach (Ostro, 1994) reveals that there may be up to 90,000 cases per year. Hence the range is 13,000-90,000.

Figure 4: The share of exposed population and health end-points in the most and least polluted cities in Ukraine (for cities with the pollution load more 5%)



Source: Strukova E., Golub A., and Markandya A., 2006: Air Pollution Costs in Ukraine

3.6.3 Monetary assessment

Knowing in qualitative terms the benefits arising from the environmental improvements does not directly lead to an ability to quantify the benefits. Furthermore, even in the cases where one is able to assess the extent of the benefits, not all benefits are amenable to having monetary values attributed to them. Part of this is due to lack of data, part is due to methodological limitations and limitations of scientific knowledge, and part due to the difficulty of attributing a benefit to a particular cause, as often there are multiple causes for a benefit. Having said that, monetisation will be undertaken whenever possible, according to data availability and budget constraints.

The basic valuation framework will seek to capture the savings in damage costs to different 'receptors' (people, buildings, eco-systems, etc.) due to reductions in pollution and improvements in environmental management This monetisation can be done following one of these three approaches (according to data availability):

I. The application of **unit pollution damage costs** to estimated reductions in given pollutants *(unit damage per unit pollutant multiplied by avoided units of emission leads to avoided damage, in other words, benefits)* – in previous benefits studies this is the approach applied to the estimation of benefits from waste regulations improvements;

II. The application of **unit receptor damage costs**, to estimated reduction in damage to given receptors or receptor valuation of 'damage' *(e.g. damage to building surfaces from air pollution for the former and the value of clean water per households for the latter, using willingness to pay analysis)*;

III. The calculation of completed '**dose-response' function**, relating pollution changes to effect, for particular receptors, capable of valuation in monetary terms *(multiply the dose (level of pollutant concentration), by the number of receptors (e.g. population), multiplied by the probability of illness/mortality (the DRF) and multiplied by the unit cost (e.g. of a range of illness such as bronchitis and asthma, the number of restricted activity days, hospital admissions, and premature mortality)* – this has been for instance s the approach applied to the estimation of health benefits from air quality improvements.

The estimates of the willingness to pay (WTP) values, the dose response functions, and the unit cost values are often based on existing analysis of benefit in the EU or USA, where there is the longest history of such analysis. There are only rare examples of complete benefits valuations carried out for ENP countries. Hence, it could be necessary to apply the technique known as 'benefits transfer', where the benefits assessed in one country are transferred to other countries, by weighting them by the relative per capita purchasing price parities

Table 4 summarises some of the benefits for which it has been possible to attribute monetary values in previous benefits studies, complemented by information on value of biodiversity and eco-system services carried out in other domains. Future inclusion of biodiversity related benefits are important to include in benefits studies to avoid the loss of natural heritage. More details on the monetisation approach are given in Appendix C.

Table 4: Benefits monetised across media

Type of Benefit	Air	Water	Waste	Nature
Health Benefits	Avoided early mortality and respiratory illness	Willingness to pay for clean drinking water'	Through external costs of emissions	WTP for access to nature
Resource Benefits	Avoided damage to buildings and crops	Willingness to pay for clean bathing water	Reduced primary materials use	Sales of local products
Eco-systems	Avoided global warming	Willingness to pay for improvements in river quality	Avoided global warming	Water purification, flood control, carbon storage
Social Benefits	Not monetised	Willingness to pay for recreation - eg angling benefits	Not monetised	Recreation and cultural value (via WTP)
Wider Development	Not monetised	Tourism (revenue) benefits from use of natural capital	Not monetised	Attracting tourism

Box 4: Monetisation in the Ukrainian case: Cost of health impacts caused by air pollution in Ukraine

The burden of health impacts is converted to monetary terms by valuing mortality and morbidity. Valuation is based on willingness to pay studies that quantify the value of human health risk reduction, through a benefit transfer approach. It was estimated that in Ukraine health impacts cost around 13 billion grivnas ($2.6 billion), or 4 percent of GDP. By any standards this is a significant cost.

Table 5: Estimated Annual Cost of Health Impacts (Billion Grivnas)

Health categories	Total Annual Cost	Percent of Total Cost
Mortality	12.3	94.2%
Morbidity:		
Chronic bronchitis	0.13	1.0%
Hospital admissions	0.05	0.4%
Emergency room visits/Outpatient hospital visits	0.13	1.0%
Restricted activity days (adults)	0.38	2.9%
Lower respiratory illness in children	0.06	0.4%
Respiratory symptoms (adults)	0.00	0.0%
Total cost of Morbidity	0.75	5.8%
TOTAL COST (Mortality and Morbidity)	13.05	100 %

Source: Strukova E., Golub, A. and Markandya, A. (2006):Air Pollution Costs in Ukraine

3.7 Summary: methodological steps

In light of the method described in the chapters above, the main steps of the analysis are summarised below, presenting the issues that each step should address.

The benefit studies for the ENP countries should investigate:

1. What the *state of the environment* is – in terms of key indicators (emissions levels, air quality levels etc) – and what the state of the general impacts of pollutions and resource overuse is – this is important to define the reference point.
2. What the *historic developments/trends* and expectations of future developments have been – ie general economic and environmental trends – this can help clarify the future trends and hence baseline.
3. What the *current policies / legislation* are, what can be said about the level of compliance, and how these compare to the state of the environment
4. What the possible *legislative/policy commitments* in the different environmental areas are – eg key conventions, strategies etc - that can help define a possible target.
5. Chose/develop a *policy package* of targets and assess which have to be seen together (eg in a bundle – eg where a range of different targets from different legislation interact / work together) and which separate, and arrive at composite targets (note that some will be effects – eg status of river quality that responds to a range of actions).
6. *Compare* the targets to current reference point and, if available and relevant, to the baseline to see what environmental improvements can be obtained (in qualitative, quantitative and monetary terms when possible).

It is also possible to take an approach that is less closely linked to existing policies and targets - as this can depoliticise the work, which can be helpful. For Example, one could focus on steps 1 and 2 to get the understanding of the state of the environment, and then do a cost of policy inaction (COPI) assessment (to clarify the costs of the current pollution levels) and/or a benefits assessment based on WHO standards, general improvements (eg river quality improvement, water connection rates etc), or country benchmarking – without making close links to national policies or potential policies.

4 METHODOLOGICAL ASSUMPTIONS

A benefits assessment methodology will need to chose values for the following assumptions:

- The **timescale** over which improved environmental policies and legislation will be implemented. This has to be a realistic time scale for the improvements and at the same time sufficiently near to the present to engage people. Setting a 2050 timescale is not helpful. Realistically a 20 year timescale is the maximum[10].
  - **Useful Working assumption**: 2020 or 2025depending on the country. Generally use 2020 for full implementation and the period to 2025 for the benefits period
- **The reference year** – this requires a recent year with good data and could vary across countries.
  - **Useful Working assumption:** for studies launched in 2007/8, a suitable reference year could be 2004 or 2005 as these are most likely to be the most recent year for which complete information is available. Nevertheless, another year can be used if data are not available for these. It will be important to note carefully the reference year used, and that this is the same for all (or most) data collected within the same countries, in order to make national data comparable. Ideally the most recent year for which full data is available should be used.
- The **baseline** against which changes are estimated –
  - **Useful Working assumption:** for the sake of pragmatism, this would normally be the current status quo, or in some pre-defined reference year. Where there are more resources or clearly defined baseline (eg agreed formal growth expectations and investment forecasts) the use of a dynamic baseline can be used. This can be important when it comes to economic growth, household income and affordability developments, population changes, household composition changes, foreign direct investment, and tourism development in fast growth tourist destinations.
- The **rate of change in policies** –
  - **Useful Working assumption:** other methodologies have assumed a linear improvement from the reference year to the full implementation year. This would likely be the case also for the neighbourhood countries.
- The **discount rate** to be used
  - **Useful Working assumption:** the same should be used as the base case as for the past analyses, ie 4% real and 0% real. – although this may require some further thinking on a case by case basis, as it may be that higher discount rates are appropriate in countries with significantly higher interest rates than those in the EU.

[10] In any case with any significant real discount rate, anything beyond 20 years becomes relatively insignificant in today's money terms.

- **Import/export of benefits** – improving environmental policies in one neighbourhood country will lead to benefits not just in that country, but also in neighbouring states, where the pollutants are non-local ones. The methodology will need to address this. Single country studies (e.g. on Croatia) have focused on benefits within country, but transboundary pollution cannot be ignored in the EECCA countries in particular, so the methodology will need to address this, where relevant.

  - **Working assumptions:**

    - Ideally for air pollutants one would use a dispersion model (eg EcoSense)[11];
    - A pragmatic solution for the Ukraine could be to obtain information on expected share of pollution that is cross-border based on literature – if available. (eg there may be Espoo convention or UNECE Gothenburg protocol related studies);
    - If not available, then one would focus on domestic issues. Note that the major transboundary issue that was quantifiable and monetisable in part studies concerned air pollution. Transboundary water issues, while important (pollution, flooding etc), are less easy to develop benefits estimates for.

- **Benefits transfer assumptions** : the literature on complete benefits valuations carried out for ENP countries is not vast. Therefore some information (eg monetised benefits to consumers, etc) may need to be 'borrowed' from other benefits analysis. It will therefore be necessary to make use of other countries' values and weight them to allow transfer to this situation (so called 'benefits transfer' – see also Box 6). Transfer-value based benefits can be conservative, but expected to still be high enough to make the point that benefits are high.

  - **Working assumptions:** for ENP countries it will be necessary to make use of EU and OECD values and weight them to allow transfer to this situation. This will be done by weighting benefits (e.g. benefits of avoided mortality, benefit of clean river for angling etc), by the PPP GDP per capita ratio of a country to EU (or OECD, or UK, depending on where the first analysis comes from.

- The **number of sensitivities** – this is always important in principle, as one can explore the sensitivity of the result (Eg to date of full implementation, different discount rates, different implementation pathways[12]) and show that they are robust under a range of assumptions. However, having too many in the analysis takes considerable time and money. Generally the impact of the assumptions are pretty clear when thought through, so the value lies in benefits for robustness and addressing potential critical parties and the number of

[11] This is not always feasible as it depends on model coverage and resources. It was not possible for the Ukraine pilot

[12] For example, the landfill directive can be implemented by different options – eg more incineration or more composting. These have different health and social impacts (composting is more labour intensive and incineration more capital goods intensive)

sensitivities has been limited in earlier studies. For full benefits studies options include:

- *Discount rate* – Generally useful to test different discount rates. Core assumption: 4% and 0% real. Other variations (eg 2% and 6%). For Ukraine: no sensitivities analysis, just focus on the core assumptions.
- *Implementation period* – can chose a longer period to underline that benefits are lost if implementation is delayed. Leave consideration for later, pretty obvious what the results are. For the Ukraine: propose 2020-2025 as the target date (though with the scale of the improvements to be decided) – in addition we propose to do a 'full benefits of avoiding environmental burdens' assessment – in other words what would be the scale of the benefits if all pollution were completely reduced. This is effectively the existing pollution burden, and while not achievable, creates a useful benchmark and indicator.
- *Implementation rate* –implementation can start slow, finish fast or other alternatives. The team does not think that this would add a great deal for ENP countries. It was also not used in past benefits studies and only helpful if a really detailed policy specific analysis were to be carried out.
- *Implementation pathways* – eg for waste treatment a country can choose between landfill, incineration, composition and different combinations. The choice as to which to prioritise will have importance implications for the development of the waste sector (eg the number and quantity and quality of jobs) as well as implications for the environment. While this is important, we do not think that we have much to gain from doing additional analysis here that would be time consuming – the lessons from the past benefits study still hold – recycling/composting is better than incineration. Comment in the text on the influence, no need for explicit analysis. This type of assessment only makes sense if there is a specific waste policy related aim (eg trying to help in the development of appropriate policies).
- *Values used to benefits/preferences* etc- the method requires a use of different core numbers or assumptions – for example the willingness to pay (WTP) for access to clean drinking water or WTP for cleaner rivers. This has to be based on WTP estimates and in most cases these will have to be 'borrowed' from studies abroad and 'transfer values used'. There are many estimates for WTP for clean water and clearly the results of any benefits assessment depends on which ones are chosen. Hence to be balanced and transparent, it is important, if there is not a clearly most correct one, to use a range. Similarly, different assumptions/interpretations are possible as to the effects of legislation (eg on gross river quality) and hence ranges are possible there to demonstrate the breadth of the range of value (eg all rivers go to good standards or simply that no rivers end up bad quality, and one has but a good and fair quality mix).

Table 6: Summary of key assumptions for ENP benefits studies

Issue	Assumptions	Sensitivity
Timescale	2020- 2025[13]	None
Reference year	2004 if and where data available, and note year if other than 2004.	None
Baseline	Status quo – ie use reference value (unless very clear reason to do otherwise that can be quantified)	Where an issue: tourism levels as this key for benefits studies Apart from that: None, unless significant budget for wider analysis[14].
Implementation rate	Assume linear improvements from reference year to full implementation year.	None
Discount rate	4 % real	0%, 2% 6% real

[13] During the test in the Ukraine we will reflect as to which of 2020 or 2025 is the more reasonable

[14] In ENP countries we can expect a dynamic baseline in: car ownership, income and affordability, economic growth (inc. GDP/capita). In some cases there might be demographic changes, or clear potential for change – eg tourism numbers.

5 APPLYING THE BENEFITS ASSESSMENTS IN OTHER ENP COUNTRIES

ENP countries have a range of different environmental situations, challenges and ambitions to improve the state of the environment. The approaches to improve the environment sometimes builds on international protocols, sometimes borrow from legislation in other countries – depending on the issue and national interest. In this context EU legislation has proven useful as an example to look to and borrow from – for EU neighbours and much farther afield.

In other cases a benchmarking approach is used, with the country comparing its standards or its state of the environment to a range of others, and in light of the comparison, choosing targets.

For the range of ENP countries it would also be expected that a range of approaches are taken, pending on the environmental domain, national interest and benefits or not of building on EU targets or standards.

The ENP countries also have different levels of data available that can influence the approach taken and type and level of results obtainable.

For a benefits assessment different approaches are useful as tools. These include:

- A full cost of policy inaction (COPI) assessment. While simply looks at the full costs to society of the environmental burden. As it is clearly impossible to move to a case of no environmental burden (eg no urban air pollution) in the foreseeable future, it can be helpful to look at 50% of COPI. Ie if we were to address half of the environmental burden what would the benefits be?
- Different use of targets pending issues and data availability. Some of these do not have to be legislative norm based. We can expect the following to generally work:
    - Bottom up approach re urban air pollution - impacts on health. Use WHO standards or benchmark other countries' performance as a target.
    - Benefits of water supply – connection and quality. This is just related to the number of households benefiting.
    - Benefits of improving river water quality and indeed bathing water quality. This can be a broad analysis, and ideally combining domestic and international tourists, where there is an important tourism sector.
    - Benefits of water leakage reduction. This can be a win-win-win,
- It can be useful to link certain targets to conventions or protocols - eg for air pollutant emissions – or linked to other standards such as WHO standards.
- Country benchmarking can also be helpful, with different sensitivities (a) eg going for the EU or OECD average by year X, and (b) going for top 10% of EU by Year Y. The latter translates into 'what would be the benefits to our country of us doing in 20 years time as well as the best in Europe do now?'
- Countries themselves can carry out benefits assessment for specific policy proposals. This in any case is good practice that should be encouraged.
- It will be valuable to carry out benefits assessment of eco-system services for biodiversity – to help underline the importance of natural capital to societies

and economies. This can be complex, and a sensible approach is to select a subset of areas, or benefit types and demonstrate the benefits (eg role of biodiversity in water purification, or benefits for recreation and tourism, or carbon storage).

In all cases it will be important to be clear about assumptions, clear about what can and cannot be said and how to interpret the results. One obviously wrong number can undermine a well thought through analysis. The separate methodological summary document presents a range of further insights on method.

For ENP countries, there will be different items that are valuable to focus on given the state of the environment (pollution levels, natural capital), state of infrastructure and wider economic context and hence the potential motivations for looking at benefits studies. These factors need to be taken into account in benefits studies – as where tourism is an important revenue source, due focus here could be helpful; where there are severe water constraints, a particular focus on water would be useful. Ideally a benefits study would cover all issues - air, water, waste and nature - at a certain level and specific issues at a more in-depth manner, pending national specificities.

- National ministries of environment – as it creates additional arguments to help secure funding for environmental policy implementation and help defend policies and targets to improve the environment.
- National ministries of health, labour and consumer protection - as avoided health impacts reduce the need for treatment and days lost employment.
- Regional authorities looking to build on the natural capital – for example using landscape and nature as a pole of attraction for tourism – or building on natural capital to reduce risks of natural hazards (flooding, fires, drought).
- For municipalities – again as it makes clear the benefits of addressing urban transport, enforcing (air, water and waste) emissions legislation and quality standards and investing in needed environmental infrastructures.
- For inspectorates/enforcement agencies – as it creates an argument to ensure that they have resources to enforce legislation; without enforcement many of the benefits would not be realised in practice.

The studies also create a useful basis of facts and insight upon which to build a dialogue between the European commission and ENP countries and to help identify where co-operation could be most useful.

Without studying the ENP countries it is not possible to suggest what specific focus the benefits studies for the different countries or country grouping could usefully have. Clearly, however:

- Urban air pollution is important for all countries and a growing issue for many countries as car ownership rises.
- Air pollution emissions from stationary point sources also of importance to many countries.
- Water pollution and benefits of water and waste water infrastructures will be a common issue.

- Waste challenges will vary significantly as the amount of land available to landfill varies significantly across the countries as does the levels of waste arisings and current state of waste infrastructures.
- Contaminated land issues will vary significantly across countries and will the issue of hazardous substances.
- Natural hazards will vary across the region – with water scarcity and forest fires being less important for the eastern ENP countries – with flooding being issues in only certain regions too.
- The state of biodiversity also varies significantly as does the potential for tourism to build on this and other issues (nature, landscape, bathing areas) in the near future.

As regards the scale of analysis this will need to be determined case by case for the ENP countries. There should, however, be caution about either going for the too simple route or the too detailed route. A too simple approach will not be convincing. Furthermore, there is no point in carrying out a too detailed assessment as it is impossible to get a benefits answer that will be able to foresee all future changes and incremental benefits will not be worth the additional resources. There is no 'right benefits answer or number' that will prove itself robust over time, it is however, possible to get 'the right message' supported by the right facts that should prove robust over time. A benefits assessment needs to have enough information and have a sufficiently solid foundation in facts to be taken seriously and play the role as basis for dialogue between the EU and the ENP country.

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Appendix A: Additional Methodological insights from the Ukraine Case

It proved possible to do a benefits assessment of improved environment for the Ukraine. Particular noteworthy insights include:

- Pragmatic and often simple **assumptions** are often needed to have a manageable benefits assessment; the high level messages will not be overly influenced by a number of nuances. The important issues to select are (a) targets for improvements; (b) over what timescale will the improvements be obtained; (c) number of people affected; (d) for illness/mortality cases – what the 'dose-response functions' are, (e) for other areas what suitable willingness to pay values are; (f) weighting factors to take into account differences across countries and (g) discount rate, where one is interested in benefits over a whole period rather than annual benefits. Items that can be useful for detailed studies, but less important for the 'big picture' analysis include demographic trends, GDP growth rates.
- **Data availability** was fairly good in the Ukraine and broadly sufficient for benefits assessment, though some numbers need to be treated with some caution (see next point). There were also a number of data gaps.
- **Data quality:** In some cases formal data need to be complemented by expert advice or seen in context to ensure that they are used and interpreted correctly. Data checking can be a time consuming exercise, and sometimes politically sensitive.
- For air pollution target setting a 'bottom-up' approach was feasible – using WHO standards for urban air pollution. Here the 'current' air quality is compared to WHO standards and it is assumed that over a defined time period (20 years) the government would introduce measures to meet the WHO standards. This is an alternative approach to the top-down approach of emissions reductions from power plant, dispersion modelling to see what implications there are for air quality and then a dose-response function to see implication for health.
- For water supply connection it is possible to derive monetary benefits estimates too, combining a mixture of benefits of new connections and benefits of (confidence in) improved water quality.
- For river water quality, again it is possible to do an analysis even at a very pragmatic level. This can be for all rivers, or simply for some sample rivers (eg the 5 largest, as done in the Ukraine) to communicate the message of benefits.
- A full benefit analysis should ideally identify a range of concrete specific benefits, eg related to specific areas/cities, ecosystems, species, economic sectors etc. This requires resources and careful selection to address the issue of why one area was singled out and not another.
- A full benefits assessment should ideally compare estimates of health impacts with official statistics of illnesses, days lost from work etc. Making these links will help in understanding, checking, and communicating the impacts. Outsiders will fell more confident in the result if there is a link to such statistics.
- It is easier to do a benefits assessment for air and water than for waste and nature, or indeed chemicals. This does <u>not</u> mean that improvements in the air and water sectors are more important. Care should be taken in how to present the results. It is important to have results presented in qualitative, quantitative and monetary terms.

Appendix B: Review of water related valuation studies

Study	Location / technique	Effect valued	Euro (1999)	Data needed for aggregation
Hanley (1989)	East Anglia, UK: CVM	WTP to benefit from a guaranteed reduction in the nitrate levels of the drinking water supplies to 50mg/l. East Anglia is one of the counties, which suffers most from excess nitrate problems in the UK. The questionnaire presented information about both the reason for payment (the existence of treatment costs) and of the then existing situation (that of water supplies occasionally in breach of the 50mg/l limit).	25.2 / household / year	Number of households affected by a change in nitrate levels of water
Jordan and Edwards (1993)	USA: CVM	WTP to guarantee clean drinking water from groundwater sources	845 - 1135.7 / household / year	Number of affected households
Schultz and Lindsay (1990)	USA	WTP to avoid contamination of groundwater resources used for public water supply including personal use values, option and bequest values.	361.6 / household / year	Number of affected households
Edwards (1988)	Cape Cod, Massachusetts, USA: CVM	WTP to provision of potable groundwater for personal use and use by future generations which is treated to the government health safety limits.	619.7 - 3090.4 / household / year	Number of affected households
Power (1991)	USA	WTP to avoid water contamination	69 / household / year	Number of affected households
Mitchell and Carson (1986)	USA	WTP to avoid water contamination	4.1 - 64 / household / year	Number of affected households

Zylicz et al (1995)	Poland: CVM	The two samples of respondents were given information about the state of water quality in the Baltic Sea and the causes of pollution. They were asked to state their WTP in the form of a tax (in the first sample a tax to be paid by all Baltic States) to finance the pollution control effort with the result of continued bathing along the shores and protection of endangered plant and animal species. The results are • Sample representative of adult population in Poland • Beach surveys with visitors (recreationalists) only	19.9 / adult / year 97.5 / visitor / year	Number of affected population Number of visitors
Mourato (1999)	Lake Balaton, Hungary: CVM	Lake Balaton is the largest lake in Europe. The respondents (nationally representative sample) were given information about the current state of water quality at the Lake and asked for their WTP to finance a clean-up programme which involved a set of measures to regulate the discharge of pollutants into the Lake. The respondents were told that without the clean-up programme, the water quality would deteriorate over the following 15 years.	22.5 / person / year	Number of visitors annually
Goksen et al (2000)	The Bosphorous Istanbul, Turkey: CVM	A statistically representative sample of the national population was given information about the level of pollution in The Bosphorous and asked for their WTP towards a clean-up project which will bring about visible improvements to the water quality.	4 / person / year	Number of affected population

Loomis (1996)	Elwha River, Washington State, USA: CVM	Elswha and Glines Canyon dams were built in 1913 and 1927, respectively, without any fish passage facilities and block 70 of the Elshwa River's 75 miles to migrating salmon. Most of the River flows through a National Park and hence is not subject to other pressures. Therefore, the removal of the dams would result in substantial increases in salmon and steelhead populations. Three representative samples were asked for their WTP for such a dam removal project in the form of increased federal taxes for the next 10 years. The results were reported separately for • Local households (Clallam County) • Households in the rest of the state (Washington State) • Households in the rest of the USA	62.1 / household / year 75.7 / household / year 71.2 / household / year	Number of households in the local area Number of households in the county Number of households in the rest of the country
Hanneman et al (1991)	San Joaquin River, CA, USA: CVM	WTP to increase Chinook salmon population in the San Joaquin River	205.9 - 383 / household / year	Number of households affected by the change
Olsen et al (1991)	Columbia River Basin, USA: CVM	WTP to double salmon and steelhead runs in the Columbia river including both existence and use value	56.9 / household / year	

Sanders et al (1990)	Rocky Mountains, Colorado, USA: CVM	WTP to preserve the undammed portions of three rivers in the USA, thereby preserving their fisheries. Recreational use value included that for fishing, hunting, camping, sightseeing etc. Also included but not disaggregated are option, existence and bequest values.	61.1 / household / year	Number of households affected by the change
Green and Willis (1996)	UK: CVM	WTP of anglers for improvements in water quality: • new relatively poor coarse fishery • new good coarse fishery • new good trout fishery Non-use value for improvements in (local) river water quality: • from poor to medium • from medium to good The definition of 'poor', 'medium' and 'good' is based on the statutory definitions used by the UK Environment Agency.	5.2 / angler / visit 9.4 / angler / visit 25.2 /angler / visit 0.008 / household / km / year 0.003 / household / km / year	Number of anglers and Number of visits per angler per year or total number of visits Number of households close to the stretch of river (km) affected

Study	Location / technique	Effect valued	Euro(1999)-	Data needed for aggregation	Source
Stiglitz (2004)	USA:CVM Latvia	SURVEY: *Water quality issues in developing countries* Values for improved fishery benefits range, depending on the exact improvement, the location, etc. (Olsen, *et al*, 1994; Sanders, *et al*, 1991; Hanemann, 1991)(One study from Olsen already included in previous benefits study report) (p.17) Benefits from making the Gauja River suitable for swimming and fishing were estimated at €5.7 per person per year (Ready, *et al,* 2002) (p.18)	Between €60 and €380 / household / year €5.7 / person / year	Number of households	http://www.dse.unibo.it/seminari/markandia.pdf

Loomis (1998)	USA: CVM Lower Snake River Reservoir Upriver of Lewiston, Idaho	SURVEY: *Recreation use benefits* • WTP for recreation and angling; the average net WTP per trip of reservoir fishing (p.3) • The average net WTP or net benefit per day of non-angling reservoir recreation such as boating and water-skiing (p.3) • Anglers in Central Idaho (Snake River Basin) had an average net WTP (p.3)	$29.23 / trip of reservoir fishing $71.31 / trip $37.68 / trip	Number of trips Number of trips Number of trips	http://www.nww.usace.army.mil/lsr/REPORTS/recreation/recreation.pdf
Helvoigt and Montgomery (period 1996-2002)	USA, Oregon:CVM	*SURVEY: Trends in Oregonians to pay for Salmon (p.9)*	A graph with distribution for WTP		http://www.masonbruce.com/wfe/4B2_Ted_Helvoight.pdf
Söderqvist and Scharin (2000)	Sweden, Stockholm Archipelago: CVM	SURVEY: *The regional willingness to pay for a reduced eutrophication in Stockholm archipelago:* WTP for a reduced eutrophication (p.19)	SEK 747/person		http://www.beijer.kva.se/publications/pdf-archive/artdisc128.pdf

Georgiou, Langford, Bateman, Turner (1996)	UK: CVM Great Yarmouth beach (failed to meet the EC Bathing Water Quality Directive standard) Lowesoft (passed to meet the EC Bathing Water Quality Directive standard)	SURVEY: *Determinants of individuals to pay for reductions in environmental health risks: A case study of bathing water quality* – WTP for reductions in environmental health risks of bathing water quality(p.15) • All Sample • Holidays makers • Day Trippers • Local residents • All Sample • Holidays makers • Day Trippers • Local residents	£ 12,64 / person £ 14,16 / person £ 10.24 / person £ 9.33 / person £ 14.32 / person £ 14.49 / person £ 14.53 / person £ 13.50 / person	Number of holiday makers, Day trippers and local residents	http://www.uea.ac.uk/env/cserge/pub/wp/gec/gec_1996_14.pdf
Alberini, Rosato, Longo, Zanatta (2004)	Italy Island of S. Erasmo in the Lagoon of Venice: CVM	SURVEY*: Information and Willingness to Pay in a Contingent Valuation Study: The Value of S. Erasmo in the Lagoon of Venice* WTP for a public program for the preservation of lagoon, beach and infrastructure (p.22)	€65 / person / program (at the average income per family member € 6000)		http://www.feem.it/NR/rdonlyres/9BE02151-30B9-499A-B648-11E44D85D437/1208/1904.pdf

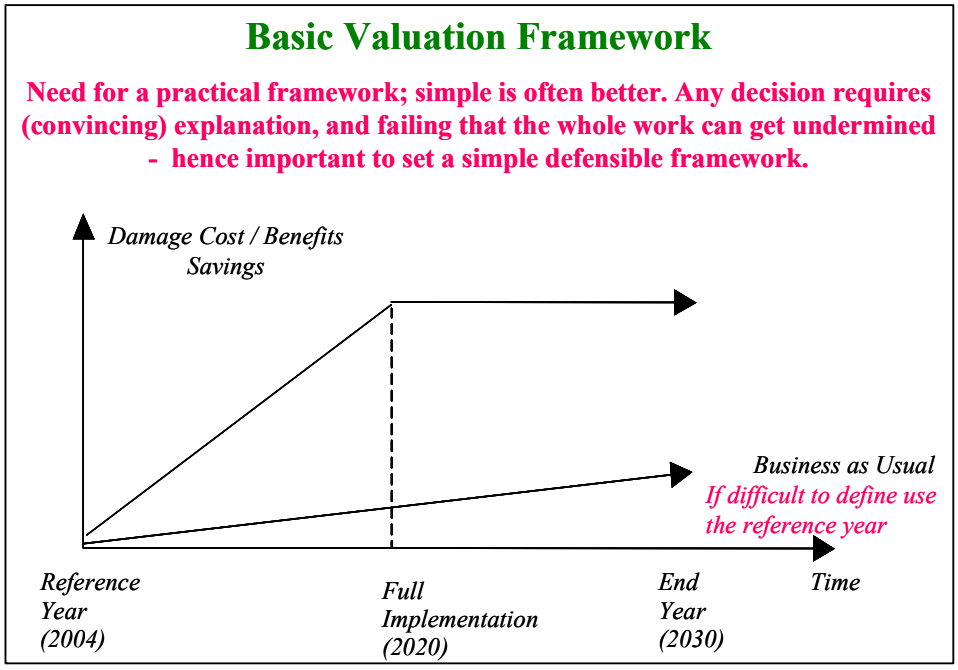
Scatasta (2004)	EU: Finland, Italy, France, Irland: CVM	SURVEY: *The Role of respondents' Experience in Contingent Valuation Analysis: The Case of Harmful Algal Blooms (HABs) and European Union Coastal Tourism:* WTP to achieve a 25 percent reduction in HABs and a 50 percent reduction in the risk of getting shellfish poisoning between (p.2)	€ 29.8-77.4 / person / year		http://eaere2004.bkae.hu/download/paper/scatastapaper.doc

Appendix C: Valuation of Benefits - Method of Approach

The basic valuation framework (*Figure 5*) seeks to capture the savings in damage costs to different 'receptors' (people, buildings, eco-systems, etc.) due to reductions in pollution and improvements in environmental management resulting from the improved environmental conditions.

The valuation of damage cost savings begins at a reference year, and reflects the increasing savings as environmental improvements proceeds, (assumption of 2020 - the present value of benefits after this date becomes small due to the effect of discounting).

Figure 5: Basic Valuation Framework



Source: IEEP

The savings are calculated as the net savings, using the level of pollution and damage in the reference year as the baseline for analysis (i.e. no business-as-usual savings), where no robust data on alternative developments was available. Since in some cases this represents an over simplification, where there is available data on prevailing trends in pollution and damage, which can be used to suggest an alternative 'business-as-usual' baseline, attempts will be made to predict a more realistic change from 'business-as-usual' net damage cost savings.

The benefits are therefore calculated against a baseline based on the levels of pollution and damage in the reference year. Damage cost savings can be calculated both as an annual value (with results given for the year of full implementation) and as the discounted sum of the annual damage cost savings over the study analysis period. The annual damage cost savings are to be calculated by apportioning the estimated maximum benefits from full compliance to each of the previous intermediate years. This apportionment should be made on a linear basis, i.e. damage cost savings are assumed to increase directly in proportion to elapsed time.

The benefits are calculated as the net present value (NPV) of the benefits accruing over the period, using a core discount rate of 4% (real) and a number of selected discount rates for sensitivities (0%, 2%, 6%) to allow the sensitivity of estimated benefits to the discount rate to be tested. The general nature of the impact is clear – a discount rate lower than 4% would mean that the benefits under the sensitivity would be higher and with a higher discount rate the benefits over the full study period would be lower.

To simplify: any benefit in year 2020 (2025) is worth the same in today's money terms if one uses a real discount rate of 0%. It will, however, be worth little (less than 10% of 2020 value) in today's terms with a 4% discount rate and very little (around 1% of 2020 value) with a 6% real discount rate.

This monetisation is based on three approaches:

I. The application of unit pollution damage costs to estimated reductions in given pollutants *(unit damage per unit pollutant multiplied by avoided units of emission leads to avoided damage, in other words, benefits)* – this is the approach applied to the estimation of benefits from waste directives;

II. The application of unit receptor damage costs, to estimated reduction in damage to given receptors or receptor valuation of "damage" *(e.g. damage to building surfaces from air pollution for the former and the value of clean water per households for the latter, using willingness to pay analysis)*;

III. The calculation of completed 'dose-response' function, relating pollution changes to effect, for particular receptors, capable of valuation in monetary terms *(multiply the dose (level of pollutant concentration), by the number of receptors (e.g. population), multiplied by the probability of illness/mortality (the DRF) and multiplied by the unit cost (e.g. of a range of illness such as bronchitis and asthma, the number of restricted activity days, hospital admissions, and premature mortality)* – this is the approach applied to the estimation of health benefits from air directives.

Box 5: Willingness to Pay Analysis (WTP): an explanation

In many cases the public would be willing to pay a certain amount for a service (e.g. new water supply), or willing to pay for access to clean bathing waters. These represent important consumer preferences. To be able to assess what the WTP is, an extensive survey of consumers is needed to ascertain the value they would attribute to the issue in question, whether clean water, cleaner beaches, reduced risk of bronchitis etc. It is a standard environmental economics tool – known as contingent valuation.

The WTP exercise has now become quite a mature instrument in environmental economics, growing out of market analysis techniques. It is regularly used to assess potential charge rates for water supply across the world, and also used to estimate the value of cultural heritage and bio-foods. It has also been used together with the willingness to accept (WTA) compensation application of the same methodology, as a basis for evaluation required compensation payments, for example with regard to oil spills.

To carry out the analysis, the insights on the changes in the level of pollution or environmental impacts needs to be complemented by an estimate of the value of the

changes to the consumers, affected parties, or affected materials and sectors. Information on the latter element is often based on existing benefits analysis of benefit in the EU or USA, where there is the longest history of such analysis. At the moment there are not many benefits valuations carried out for ENP countries. Hence it may be required to apply a technique known as 'benefits transfer', where the benefits assessed in one country are transferred, with appropriate weightings to other countries (See Box 6).

Box 6: Benefits transfer and the use of purchasing price parities (PPP)

For the analysis most of the willingness to pay (WTP) values, the dose response functions, and the unit cost values will be based on scientific literature from the EU (ExternE work of DGResearch), EU Member States and the United States. Only few values are expected to be calculated specifically for the candidate countries. Hence a benefits transfer approach will be used – the accepted method in valuations.

Within the benefits transfer analysis, the study team will took the unit values and weight them by the relative per capita purchasing price parities. In other words where an EU (US, OECD) value for willingness to pay (WTP) for clean water will be used, this will be weighted according to the relative PPP of each candidate country and the EU (Us, OECD). This will lead to the willingness to pay for clean water to be lower in the ENP countries than in the EU, as could be expected. With no PPP weighting one assumes that the willingness to pay for clean drinking water is the same for all countries independent of income levels and purchasing powers. This would suggest PPP weightings make the results more sensible.

This approach becomes more delicate when talking of WTP for avoided illnesses (as surely the actual benefit of an avoided bronchitis is the same independent of whether it concerns a British or a Ukrainian) – though had an actual WTP survey been carried out in different countries, the one would expect the actual WTP to be different. This basically highlights the problem that if one tries to attribute money values to health impacts, then this leads to ethical debates and problems. This debate is even more controversial when discussing premature mortality. In these instances it is important to bear in mind that the aim of a monetary evaluation is to highlight the importance of the problem, and not to suggest that the money value is an equivalent worth to the premature mortality.

Given the above ethical concerns on the use and meaning of monetary valuations, the PPP approach could be complemented with a benefits analysis using non-weighted values. This will lead to significantly higher benefits estimate than the PPP approach. As the agreed approach to benefits analysis is to ensure that benefits are weighted to PPP (in benefits transfer exercises), and given concern that using non-weighted values would overestimate the benefits, the core results presented will be those calculated using PPP weightings.

The measurement of the health effects has been shown, from many previous environmental benefit estimations, to be the most significant factor. It is therefore important to recognise the continuing debate concerning the most appropriate way of estimating the monetary value of health and death. We summarise the issues in Box *7*.

Box 7: Valuing Life

Significant controversy surrounds the valuation of impacts to human health, and particularly mortality. This relates to two principal issues: the 'moral' issues of 'valuing life', and the methodology by which values for health impacts are calculated. Much of the reaction to the monetary valuation of mortality stems from the unfortunate choice of terminology, such as 'the Value of a Statistical Life'. This does not mean the 'value of life' as used in everyday language, but is simply a convenient way to summarise information about people's willingness to pay for small reductions in risk. This makes it easier to compare the benefits of measures designed to reduce risks with the associated costs if the aggregate WTP and the number of lives saved are known.

Because of the high percentages of total benefits attributed to improvements in health, the methodologies and assumptions by which these benefits are calculated are of fundamental concern. A principal area of concern is the value placed on changes in the risk of premature mortality. In previous benefits studies the approach taken has been to adopt VPF (Value of prevented fatality)[15], given the concerns regarding the use of the alternatives: the Value of Life Years (VOLY) approach.

The values used for the assessment in previous studies for candidate countries ranged between 0.7MEUR to 2.5 MEUR with a central value of 1MEUR. Given that it is important to use a range to avoid suggesting an unrealistic precision in the result, the study analysis has used the 0.7MEUR and 2.5MEUR values for the lower and upper bound calculations.

Life values can be weighed by the relative per capita purchasing price parity rations in the core analysis, and used without any weighting in a sensitivity analysis.. The implications on the numerical value of the results are clear, with using EU incomes, the benefits would be much larger. In the ENP report the analysis will be focused on weighted values; this will gives a more conservative estimate, but should be seen in the context of the ethical interpretation.

On the other hand using the PPP weighting means, for example in the context of health benefits, or biodiversity, that the value of a statistical life or an ecosystem will be less in the ENP countries than in the EU. This is acceptable in neo-classical economic theory but raises difficult ethical choices in the use of the benefit estimates. It is important to reiterate that the aim of the analysis is to highlight the importance of avoiding pollution caused illness and early mortality. The VSL is therefore an indicator and not a statement of the worth of life.

An example of statistical value attributed to life in Ukraine is provided in the table below:

Table 7: Estimated Value of Statistical Life in Ukraine

	US $	**€**
Average VSL in high-income countries	2,000,000	2,634,755
Average GDP/capita in high-income countries	30,000	39,521
GDP per capita in Ukraine (2004)	1,360	1,792
Estimated VSL in Ukraine	90,500	119,223

[15] VPF is the term increasingly used. It represents the same value as VSL (Value of Statistical Life, sometimes known as VOSL), but adopts a different nomenclature.

Source: Strukova E., Golub A., and Markandya A., 2006: Air Pollution Costs in Ukraine – IEEP elaboration (exchange rate 12 March 2007: 1 USD = 0.759084 EUR)

The calculation of benefits in monetary terms should be based on the reference year prices, expressed in Euro. The benefits have to be calculated to take account of the difference in per capita incomes (proxied by per capita GDP) and the purchasing power in the ENP countries compared to the EU or the USA, where the estimates of pollution damage costs have generally been made. ***Table 8*** presents some examples of the GDP/capita purchasing power parities used to convert between EU and candidate countries in previous benefits studies.

Table 8: Population, GPD and GPP/Capita/Purchasing Power Parities (PPPs) – Examples for candidate countries

	Population	GDP	GDP/Capita/Purchasing Power Parities		
Candidate Country	Million (1999)	Million Euro (1999)	EU15	UK	USA
Bulgaria	8.2	11,600	0.30	0.22	0.15
Cyprus	0.7	8,500	0.75	0.79	0.53
Czech Republic	10.3	49,800	0.39	0.58	0.39
Estonia	1.4	4,600	0.43	0.34	0.23
Hungary	10.1	45,400	0.42	0.50	0.33
Latvia	2.4	5,700	0.43	0.27	0.18
Lithuania	3.7	10,000	0.43	0.29	0.19
Malta	0.4	3,400	0.75	0.65	0.43
Poland	38.7	144,700	0.48	0.36	0.24
Romania	22.5	31,900	0.25	0.26	0.18
Slovakia	5.4	17,700	0.39	0.46	0.30
Slovenia	2.0	18,700	0.75	0.69	0.46
Turkey	64.3	182,700	0.46	0.29	0.19

Source: Calculated from Eurostat estimates of population, GDP and PPPs

Notes: Separate PPPs have been calculated for the UK and the USA because a relatively large number of the estimates of the willingness to pay for avoided damage have been estimated in these countries.

The GDP/Capita/PPPs are used to adjust damage cost estimates to take account of relative incomes and purchasing power. For example an EU estimate of the value of a statistical life would be multiplied by 0.3 to convert to an equivalent value in Bulgaria.

Appendix D: Examples of the Scale and Importance of Ecosystem Services

This is from IEEP (2007) integrated in GHK, CE and IEEP (2007) *Environment and Economy links.* A report for DGENV.

Studies analysing and quantifying ecosystem services are not widely available though this is an area of growing interest. More recently the need for evidence based policy making and the growing appreciation of monetary figures by decision makers is increasing the need for quantifying biodiversity related values.

Table AD1 and AD2 below presents some examples of values of ecosystem services and values of ecosystem service losses respectively.

Table AD1: Examples of Monetary Benefits Arising from Biodiversity and Related Ecosystem Services[16]

TOURISM		
Example	**Estimated value and/or potential/occurred loss**	**Reference**
Reintroduction of sea eagles, UK	Revenue from sea eagles related tourism 2.13 -2.48 million EUR / year	Dickie I, Hughes, J., Esteban, A. 2006. Watched like never before – the local economic benefits of spectacular bird species
Tourism in Muritz National Park, DE	Revenue from the tourism 12 million EUR / year, supporting ~ 628 jobs	Job et al. 2005. Ökonomische Effekte von Großschutzgebieten
Whale watching, Scotland	Revenue from whale watching tourism ~ 11.7 million EUR / year; ~12% of total tourism income	Warburton et al. 2001. Whale watching in West Scotland
RIVER / FLOODPLAIN ECOSYSTEMS		
Example	**Estimated value and/or potential/occurred loss**	**Reference**
Elbe river, DE	Value of nitrates pollution reduction by restoring floodplains 585 EUR / hectare; Potential total value of restoration (water quality & species conservation) 162 – 278 million EUR / year	Meyerhoff, J., Dehnhardt, A. 2004. The restoration of floodplains along the river Elbe.
River Bassee floodplain, FR	Value of flood control services 91.47 – 304.9 million EUR / year	Agence de L'eau Seine Normandie, Ministry of Ecology and Sustainable Development.

[16] Building on cases from Birdlife, 2007. *Wellbeing through wildlife in the EU* and other source

Saltmarshes in Scotland	Input of saltmarsh to the shellfish industry a marginal value of 1087 EUR / hectare / year	Coclough et al. 2003. The potential for fisheries enhancement associated with management realignment.
Inland fisheries, UK	Total value of inland fisheries in England and Wales 4,854 million EUR	Murray, M. and Simcox, H. 2003. Use of wild living resources in the United Kingdom: a review.
FOREST ECOSYSTEMS		
Example	**Estimated value and/or potential/occurred loss**	**Reference**
Value of trees in NY city, US	NY City's street trees provide benefit ~ $122 million / year $ 5.60 benefits / $ 1 dollar spent on trees	NY city Park Department (2007) (http://www.env-econ.net/2007/04/measuring_the_v.html)
Natural forests in Bavaria, DE	Value of provisioning good quality water 500 million EUR / year	Natur ist Mehr-Wert, Ökonomische Argumente zum Schutz der Natur. BfN Skripten 154 (2005)
Woodlands, UK	Total value of environmental and social services 42,924 million EUR	Willis et al. 2003. The Social and Environmental Benefits of Forests in Great Britain
Forest ecosystems, FI	Value of forest ecosystem services 2,690 million EUR / year (period 1995 – 2000)	Matero & Saastamoinen. 2007. In search of marginal environmental valuations — ecosystem services in Finnish forest accounting. Ecological Economics.

Table AD2: Examples of the Economic Losses Due to the Loss of Biodiversity Related Ecosystem Services

CASE STUDY	ESTIMATES OF LOST VALUE
Case 1. Decline of European crayfish populations	✓ 40 per cent decline in native crayfish populations in France during the last 6 years; ✓ 95 per cent decline in native crayfish populations in Sweden since ~1900
Case 2. Modification of Danube river ecosystems	✓ Value of restored river fisheries ~US$16 million in the Danube delta; ✓ Value provided by restored habitat in the Danube delta for nitrogen and phosphorous absorption and cycling ~US$112.5 million and ~US$18.2 million respectively per year; ✓ Value of tourism in the Danube delta resulting from restored wetland habitat ~US$16 million per year
Case 3. Modification of Lake Karla ecosystem (Greece)	✓ Loss of entire fish catch in Lake Karla (Greece) of 80kg per hectare; ✓ Restoration of the lake has started at a cost of around €150 million
Case 4. Depletion of the North Sea resources	✓ Cod spawning stock biomass in the North Sea declined from a peak of 250,000 tonnes in the early 1970s to less than 40,000 tons in 2001
Case 5. Destruction of peat bogs in Finland and the UK	✓ Restoration of peat bogs in the Northwest England is expected to help improve drinking water quality and provide benefits between €1.8 and 3.6 million/year
Case 6. Agricultural changes in Portugal	✓ During 1980-2004 fires burned around 2.7 million ha of forest in Portugal; ✓ Costs arising from the loss of primary production due to forest fires ~€300 million per year (2000-2004) ✓ Investments in fire fighting and prevention amounted to €479 million (€17,8/hectare per year) (2000-2004)
Case 7. Eutrophication of the Swedish coast	✓ Estimated overall benefits of increased water quality would amount to €6 – €54 million per year; ✓ Annual costs of removing dead algae are €8119 per km of beach; ✓ Costs of mechanical harvesting of algal mats ~€7145/year
Case 8. Recovery of ospreys in the UK	✓ Osprey tourism is estimated to bring additional expenditure of £3.5 million per year to local economies
Case 9. Reintroduction of beavers in Germany	✓ Increased revenues from tourism in the area of reintroduction can total up to ~€0.55 million per year; ✓ Estimated additional retention of 2800 kgN per annum in the river and of 1900 kgN per annum in the floodplains
Case 10. Unsustainable clam fishing in Italy	✓ ~40 per cent decline in the clam catch between 2000 and 2001 due to decline of stocks

Source: (Kettunen & ten Brink 2006)

Annex 1: Background: European Neighbourhood programme

This Annex presents a background on the ENP, which has been useful for the study team and for those external who will see this draft documents but who are new to ENP.

Background on ENP

After years of accession talks, recently 12 countries joined the European Union. Countries who had been neighbours now became integrant part of the EU, shifting the EU's external borders. There have long been programmes of cooperation with countries further afield, such as those along the Mediterranean and the Former Soviet Union. In an attempt to **rationalize and refocus external relations** with its sixteen neighbouring countries (see map), the EU developed the European Neighbourhood Policy, or ENP.[17]

Figure 6: Countries in the ENP and strategic partner (Russia)

Source: European commission

[17] This chapter borrows from an earlier IEEP work - J Anderson et al (2006)

The ENP is a **work in progress** – the groundwork is laid in the 'Wider Europe – Neighbourhood' Communication (COM (2003) 104), which has been followed by a series of documents and plans. The key tool of the policy are country-by-country Action Plans, bilateral agreements establishing mutual commitments in a wide range of areas, currently agreed with 12 countries. Furthermore, the ENP draws together and synthesises the political processes of various programmes and creates a new financial instrument to help support the implementation of the Action Plans – the European Partnership and Neighbourhood Instrument (ENPI).

The primary principle of the ENP is that the EU should enhance neighbourly relations with countries on its border, furthering '**social cohesion and economic dynamism**,' developing a 'zone of prosperity and a friendly neighbourhood – a ring of friends – with whom the EU enjoys close, peaceful and co-operative relations.'[18] Among other principles, the ENP aims at grappling with the geographic finalité of the EU by establishing a realistic relationship alternative to EU membership with old and new neighbouring countries across the Mediterranean and to the East. The ENP therefore represents an element of the EU overall security policy[19], offers a framework in which to deal with migration issues, promotes trade in and with the neighbourhood region, helps spreading values such as freedom, democracy, enhance the security of key resources, such as oil and gas, and can address cross border problems, including environment issues.

Another key aspect of the ENP is that **not all countries are handled equally**, given the large differences between partners in term of political and economic situations, needs and aspirations. This differentiation 'has to remain at the heart of the policy', as stated in a recent Commission Communication[20]. Furthermore Russia, although being a neighbour, holds a separate status as 'strategic partner', and its relation with the EU is developed through a Strategic Partnership covering four 'common spaces' (an economic space; a space of freedom, security and justice; a space of co-operation in the field of external security; and a space of research and education). Also, the Mediterranean neighbours have already had a formalized multi-sectoral relationship with the EU through the Barcelona Process for several years[21]. As the **European Neighbourhood Policy Strategy Paper** (COM (2004) 373) notes, 'The ambition and the pace of development of the EU's relationship with each partner country will depend on its degree of commitment to common values, as well as its will and capacity to implement agreed priorities.'

European foreign policy is dominated by Member State actions, and hence the ENP, like the existing programmes it will synthesize, is operating on a level where the EU as an entity has influence. This means cross-border issues like enhancing the internal

[18] European Commission, 'Wider Europe – Neighbourhood' Communication (COM (2003) 104)

[19] See, for example, 'A Secure Europe in a Better World – The European Security Strategy' 12 December 2003, http://ue.eu.int/cms3_fo/showPage.asp?id=266&lang=en&mode=g

[20] European Commission (2006): Communication from the Commission to the Council and the European Parliament on Strengthening the European Neighbourhood Policy. COM(2006) 726 final

[21] see http://europa.eu.int/comm/external_relations/euromed/

market, particularly with relation to opening access and harmonising standards and regulations; it is a planning, dialogue and financing platform operating within the constraints of the EU's mandate and power.

In spite of the shared, and still developing, foreign policy competencies of the EU, there are several attractive **inducements the EU can offer** neighbours to improve relations and leverage change:

- Extension of the internal market and regulatory structures
- Preferential trading relations and market opening
- Perspectives for lawful migration and travel (balancing concern over illegal migration with easier visa rules)
- Cooperating to prevent security threats (terrorism, organised crime, people smuggling, drugs, money laundering, etc.)
- Conflict prevention and crisis management
- Promoting human rights, cultural cooperation and mutual understanding (research education, culture programmes, city twinning, etc.)
- Integrating into transport, energy and telecommunications networks
- Investment promotion and protection
- Support for WTO membership
- Enhanced assistance (economic, legal, social cooperation)
- New sources of finance (both EU funds and funding from the EBRD, EIB, etc.)

A recent Commission Communication[22] also points out that, despite the importance of bilateral agreements, some issues may benefit from common debate, action and cooperation between the EU and all or most ENP partners. Among these issues, energy transport, the environment and rural development are mentioned. For this purpose the Commission is keen to enhance multilateral and bilateral dialogue with ENP partners in key sectors. The EU intends to consider, for instance, additional multilateral agreements in energy and transport, while strengthening existing ones, and work for the extension of the EU transport and energy networks to neighbouring countries. The participation of neighbours in relevant Community agencies and programs will also be encouraged.

[22] European Commission (2006): Communication from the Commission to the Council and the European Parliament on Strengthening the European Neighbourhood Policy. COM(2006) 726 final

Annex 2: ENP Benefits Questionnaires

ASSISTANCE IN THE IMPLEMENTATION AND MONITORING OF THE ENVIRONMENTAL COMPONENTS OF THE EUROPEAN NEIGHBOURHOOD POLICY (ENP) ACTION PLANS TO COVER SMALL CAPACITY BUILDING AND PROGRESS MONITORING ACTIVITIES

Methodology

WORKING QUESTIONNAIRE

QUESTIONNAIRE: INTRODUCTION

The following questionnaire has been designed to provide useful data and insights for an ideally full benefit study. It is meant to be completed by country experts, who should be able to gather the available information from local/national authorities, interested parties (eg waste companies, waster service suppliers etc) and other local sources (eg not-English literature). The questionnaire is inspired by the information used in previous benefit studies, and also gains from an ongoing project on the benefits of South Eastern Europe countries[23]. It is made of a general part and of four separate sub-questionnaires, one per each area of the analysis be answered separately by the related competent authorities. The questionnaire therefore has the following structure:

- Part A: GENERAL
- Part B: AIR
- Part C: WATER
- Part D: WASTE
- Part E: NATURE

A short guidance is provided at the beginning of each part, which is meant to give the country officers and experts of each sector an overview of the scope of the study, and to help them focus on the key issue for each area.

It has to be noted that, given budget constraint, in the Ukraine scoping study it will not be possible to make use of country experts, nor to circulate the questions among the competent authorities. The case study though will test some of the questions to check if they are useful, coherent and applicable to ENP countries, and to get an idea of data availability. A RED font has been used to identify the selection of questions to be answered for Ukraine.

[23] IEEP and ECOLAS (2007): Benefits for FYRoM and other countries of SEE of compliance with the EU Environmental Acquis. A study for DGENV of the European Commission

Questionnaire part A – GENERAL

The aim of the study is to identify the likely benefits that ENP countries can obtain from higher environmental quality and protection, by improving their legislation and policy, in the areas of:

- Waste
- Water
- Nature
- Air

In each of these areas, we are looking to understand the main benefits that are likely to derive in terms of:

- Health benefits: direct benefits to public health – e.g. lesser exposure to air pollution
- Resource benefits: benefits to parts of the environment used commercially – e.g. reduced need for new landfills given reduction of waste production and alternative treatment.
- Ecosystem benefits: benefits to the natural environment with no commercial interests and to ecosystem services – e.g. improved river and marine eco-systems
- Social benefits: benefits to the society at large, including natural and cultural heritage – e.g. improved quality of life and access to clean potable water; access to amenities (bathing, fishing) etc
- Wider economic benefits: knock-on benefits (on employment, trade, etc) including local and regional development – e.g. greater tourism potential from improved nature quality, landscapes and clean waters

Specific questionnaires have been developed for air, water, waste and nature – i.e. Parts B to E of this questionnaire.

Note that clearly in some countries more data is available for some items than others. Please focus efforts on the readily available data so that time is available to look at each of air, water, waste, and nature. It is also useful noting where the main data gaps are, so that recommendations can be made for finding new data for the future. Also please note references and web links for all data.

General questions

Indicator	Most recent year (ideally 2004)[24]
Population in your country and growth rate	
Population size per settlement (cities,	

[24] Please specify year

major towns) in your country	
Population size by region	
GDP (ideally 2004 money terms)	
GDP per capita	
GDP growth rate – past and projections	
Number of households	
Country surface area	
Purchasing Power Parity	

Furthermore if you have any information on past amounts or information on future expectations please also note.

In all cases please specify sources, related definitions and if possible include web links.

Literature:

Please provide us with a copy (only if available in English) of the most recent:

- State of the Environment Report
- Statistical Yearbook
- National Environmental Action Plans
- National Sustainable Development Strategy
- Other reports of relevance

Questionnaire part B: AIR

The aim of the study is to identify the likely benefits that ENP countries can obtain from higher environmental quality and protection, by improving their legislation and policy, in terms of 5 benefits types. Here we note some examples for air related benefits:

- Health benefits: direct benefits to public health – e.g. lesser exposure to air pollutants
- Resource benefits: benefits to parts of the environment used commercially – losses from agriculture due to reduced air pollution
- Ecosystem benefits: benefits to the natural environment with no commercial interests and to ecosystem services – improved river and marine eco-systems / diversity due to reduced pollution stress
- Social benefits: benefits to the society at large, including natural and cultural heritage – lesser damage to cultural heritage (E.g. building surfaces)
- Wider economic benefits: knock-on benefits (e.g. on employment, trade, etc) including local and regional development – greater tourism potential from clean air

The collected data will be helpful to provide a picture of the current situation in the sector of air quality and, whether possible, of past trends and future scenarios.
This picture should help answering the following key questions:

- **What is the current state of emissions and exposure of the population to polluted air and hence likely respiratory diseases – and hence what benefits are possible from reducing exposure through reduced emissions?**
- What is the contribution of emissions from point sources (industry and energy) and from non point sources (transport) and what are the likely trends?
- What benefits from your country's action lead to domestic benefits and which to neighbouring countries?

It is recommended to answer the key questions after filling in the rest of the questionnaire, which is meant to help collect the data to allow a complete analysis. It is important though for the national expert to keep in mind the key questions to keep the analysis focussed.

Note that clearly in some countries more data is available for some items than others; please focus efforts on the readily available data so as to keep resources available so that all time is available to look at air, water, waste, and nature. It is also useful noting where the main data gaps are, so that recommendations can be made for finding new data for the future. Also please note references and web links for all data.

General questions

1. What is the level of pollutant emissions in your country – NOX, SOX, CO, particulates (PM10, PM2.5), NH3 and NMVOCs (most recent year, ideally 2004) – if possible identify source (industry, energy production, transport etc)
2. Note historic and likely future trends if possible.
3. **What is the level of air quality in main urban areas (cities and major towns) - NOX, SOX, CO, particulates (PM10, PM 2.5), NH3 and NMVOCs – ideally in terms of air concentration? Note also the population associated with these cities[25]**
4. **What data are available on the respiratory illnesses/diseases in your country? (cases of acute and chronic bronchitis, asthma, etc.)**
5. What targets has your country signed up to as regards national emissions and as regards urban air quality?
6. Is there an air monitoring infrastructure in place? Please provide summary data

Other Questions

7. Please provide us with a copy (only if available in English) of the most recent studies of relevance – e.g. Dose response functions for exposure to air pollutants.
8. Is there any air related data that we didn't ask for, but you think it might be relevant and important for the sake of the study?
9. Is there any particular problem/issue related to air that you think is relevant and important for this study?
10. What are the main data gaps that need addressing?

Finally, in light of your investigation of air related issues and given the information collated above please try to answer the key questions listed in page 1 of this part.

[25] Note for Ukraine this will be done for one or two main urban areas

Questionnaire part C: WATER

The aim of the study is to identify the likely benefits that ENP countries can obtain from higher environmental quality and protection, by improving their legislation and policy, in terms of 5 benefits types. Here we note some examples for water related benefits:

- Health benefits: direct benefits to public health – e.g. lesser exposure to polluted water - for drinking and for bathing/recreation
- Resource benefits: benefits to parts of the environment used commercially – reduced water pre-treatment costs
- Ecosystem benefits: benefits to the natural environment with no commercial interests and to ecosystem services – improved river and marine eco-systems / diversity and intensity of fresh and salt water life
- Social benefits: benefits to the society at large, including natural and cultural heritage – quality of life and access to clean potable water; access to amenities (bathing, fishing)
- Wider economic benefits: knock-on benefits (e.g. on employment, trade, etc) including local and regional development – greater tourism potential from clean waters

This part of the questionnaire is specifically designed to collect information on the water sector. The type of information required are both qualitative (state of rivers and water, waste water infrastructures, existing problems etc) and quantitative (share of population with access to potable water, length of rivers, waste water treatment levels, pollution emissions etc). The collected data will be helpful to provide a picture of the current situation and, whether possible, past trends and future scenarios.
This picture should help answering the following key questions:

- **What is the current state of population access to (clean) water supply and to sewage network and hence what is the potential for new connections and improved water quality / service?**
- **What (risks of) environmental and health impacts from polluted waters are there and are likely to be reduced? What are the causes of the problems? (e.g. untreated sewage leading to polluted water and stomach upsets/disease)**
- What is the current state (size and quality) of the rivers, lakes and (where relevant) coastal waters? What is compromising quality (where applicable) and what is the potential for improvement?
- What are the potential recreation / amenity and tourism benefits from improved water quality and provision?

It is recommended to answer the key questions after filling in the rest of the questionnaire, which is meant to help collect the data to allow a complete analysis.

It is important though for the national expert to keep in mind the key questions to keep the analysis focussed.

Note that clearly in some countries more data is available for some items than others (obviously the section on coastal areas is not relevant to all!). Please focus efforts on the readily available data so that time is available to look at air, water, waste, and nature. It is also useful noting where the main data gaps are, so that recommendations can be made for finding new data for the future. Also please note references and web links for all data.

Drinking Water

1. **What is the current status of drinking water connection in your country (by county if available) (% connection rates – as a % of population or as a percentage of households connected in total and connected to networks where quality is good)?**
2. Are there periods of time at which interruption in the water supply occurs?
3. What is the quality of drinking water:
    - Are there any drinking water standards and what are they?
    - What is the current quality of drinking water in your country – is it regarded as fine, or needs to be improved (compliance to standards chemical/biological standards)?
4. Is there monitoring of quality? If so please provide main data
5. What is the impact of tourism on drinking water resources and does this impact on availability (short or long term) on other parts of the population or economic activities?

Rivers

6. **What is the total river length in your country (in km)?**
7. **What is the quality of the rivers? Please refer to any actual classification if existing**
8. Are there river water quality improvement objectives?
9. Are there any views already present or plans on how river quality will improve and what length of rivers will be affected?
10. Please note which specific rivers are already regularly used for recreation and tourism and which areas you could expect an increase in recreation and tourism if the quality were to be improved
11. What is the incidence of flooding and which are the areas most exposed? Please note flood risks and if possible maps. For flooded areas is there potential to reduce the risk and if so how? What mitigating measures are already in place and which others could be considered for the future?

12. Are there any data with regard to rivers' sensitivity to eutrophication? Are data available on environmental harm caused by eutrophication?
13. Is there any evidence of loss of eco-systems and reduction in species numbers in rivers due to water quality issues?

Inland waters – lakes

14. What are the number and area of lakes in your country?
15. What is the quality of the lake waters and are they suitable for bathing?
16. Which specific lakes are already regularly used for recreation and tourism and in which areas you could expect an increase in recreation and tourism if the quality were to be improved?
17. Is there any evidence of loss of eco-systems and reduction in species numbers in lakes due to water quality issues?

Expenditure

18. What level of tourism revenue is there in your country? What is its share in the total revenues?
19. Is there any information on what types of recreational activity tourists undertake or could you make an estimate? In particular we are interested in numbers, length of stay and expenditure for (a) rivers/lakes and (b) nature
20. How many fishermen/ fishing licences are there? Is recreational fishing important in your country?

General section on Quality of waters

21. Are data available about nitrates in spring water?

22. Are data available about pesticides in spring water?

23. Are any data available on the occurrence of water related illness and fatalities (eg fatal cases of dysentery)?

Bathing water

24. Are there designated bathing waters, if so how many?
25. Are there any bathing water quality standards?
26. Are there any monitoring data available for the quality of bathing waters? (chemical / biological). If so please describe the quality of bathing water
27. Are bathing waters extensively used by tourists?

Ground water

28. Does a groundwater quality classification system exist and if so, which classification criteria are used?
29. Are there any cases of salt water intrusion into ground water aquifers?
30. Is there any information available on the ecological status of surface fresh waters and groundwater? Are there any known threats to these waters?
31. Is there any information on threats to wetlands, aquatic habitats or freshwater fish?
32. Are data available on the concentrations of substances in groundwater, indicating anthropogenic pollution?

Coastal issues (if applicable)

33. What is the length of the coastline (km)?
34. Is the coastal sea-shore region sensitive to eutrophication?
35. What is the quality of the coastal sea water (ecological condition and trophic level)? Please provide a map is possible.
36. Is there any legislation in place that regulates beach water quality standards?
37. Are monitoring data of beach water quality available? If so, please represent as numbers of beaches monitored and percentages meeting the bathing water standards
38. What is the relevance of bathing areas along the coast? Do they have a long history of extensive tourist use? Are there any data on the number of foreign and domestic tourists annually visiting the coastal areas?

Waste Waters and Waste Water Treatment

39. Which data are available on waste water treatment infrastructure?
    - **What is the connection rate to sewerage systems (eg in term of % per capita, or number of households connected over total) ?**
    - **What is the connection rate to waste water treatment infrastructure?** If possible distinguish between mechanical treatment plants, mechanical/biological treatments plants and mechanical/biological/nutrient removal treatment plants
    - **Installed capacities of water treatment plants (in population equivalents).** If possible distinguish between mechanical treatment plants, mechanical/biological treatments plants and mechanical/biological/nutrient removal treatment plants, number of plants out of operation

40. Could you provide (or estimate) data on nitrate and phosphate discharge in your country?
    - amount of N-tot and P-tot in raw sewage per capita per day
    - discharge of N-tot and P-tot by wastewater treatments plants
    - discharge from households not connected (as far as it concerns towns with > 2000 inhabitant (equivalents))
41. Is a geographical representation (map) available of the installed water treatment facilities, distinguishing between the type of treatment?
42. I there any future strategy on water treatment infrastructure, investments planned, etc.?
43. Does a classification system with regard to waste water treatment requirements exist as to delimit sensitive areas - for example distinguishing between areas in which waste water discharge is forbidden, areas in which the discharge of wastewater is permitted with tertiary treatment, areas in which wastewater discharge is permitted with appropriate treatment level?

Other Questions

44. Please provide us with a copy (only if available in English) of the most recent
    - Existing willingness-to-pay studies done for new connections (E.g. to drinking water network) or for water quality improvement (drinking water, bathing-recreational water, non-use benefits use of water) - what are the main results?
    - Are there any other studies of relevance – e.g. dose response functions for exposure to water pollutants?
45. Is there any water related data that we didn't ask for, but you think it might be relevant and important for the sake of the study?
46. Is there any particular problem/issue related to water that you think is relevant and important for this study?
47. What are the main data gaps that need addressing?

Finally, in light of your investigation of water related issues and given the information collated above please try to answer the key questions listed in page 1 of this part.

Questionnaire part D: WASTE

The aim of the study is to identify the likely benefits that ENP countries can obtain from higher environmental quality and protection, by improving their legislation and policy, in terms of 5 benefits types. Here we note some examples for waste related benefits:

- Health benefits: direct benefits to public health – e.g. lesser exposure from landfill gases risk of accident
- Resource benefits: benefits to parts of the environment used commercially – due to increased recycling, reduced need for primary raw materials and hence lesser import costs
- Ecosystem benefits: benefits to the natural environment with no commercial interests and to ecosystem services – lesser damage to groundwater aquifers
- Social benefits: benefits to the society at large, including natural and cultural heritage – lower disamenity from living near landfills or illegal waste dumps
- Wider economic benefits: knock-on benefits (e.g. on employment, trade, etc) including local and regional development – employment in recycling and compositing facilities.
-

This part of the questionnaire is specifically designed to collect information on the waste sector. The types of information required are both qualitative (state of infrastructures, existing problems etc) and quantitative (tonnes of waste collected, capacity of waste facilities etc). The collected data will be helpful to provide a picture of the current situation and, whether possible, past trends and future scenarios.
This picture should help answering the following key questions

- **Can there be a reduced demand for waste to landfill – e.g. from dealing the packaging, use of composting, recycling etc - and hence reduced demand for more landfill capacity?**
- **What (risks of) environmental and health impacts from landfills are likely to be reduced (eg due impact from methane emissions, potential leachates, etc)?**
- To what extent can greenhouse gas and other emissions from landfills be reduced?
- To what extent can the pollution to groundwater and soil (illegal dumping) be reduced? This includes how many illegal dumps could be closed down?

It is recommended to answer the key questions after filling in the rest of the questionnaire, which is meant to help collect the data to allow a complete analysis.
It is important though for the national expert to keep in mind the key questions to keep the analysis focussed.

Note that clearly in some countries more data is available for some items than others; please focus efforts on the readily available data so as to keep resources available so that all time is available to look at air, water, waste, and nature. It is also useful noting where the main data gaps are, so that recommendations can be made for finding new data for the future. Also please note references and web links for all data.

Waste management

1. Please fill in the table with the available information (and ensure data references and web links noted as footnotes; thank you).

Table 9 – Waste management and collection

Indicator	Most recent year (ideally 2004)[26]
Total waste generated (t/year)	
Total municipal waste (t/year)	
Municipal waste generated per capita (kg/inhabitant/year)	
Coverage of waste collection system (% of population covered)	
Type of treatment (% landfilled, recycled, incinerated, etc)	
Quantity of waste illegally dumped (t/year)	
Quantity of waste imported/exported (t/year)	

Furthermore if you have any information on past amounts or information on future expectations please also note.

2. Have national priorities been set in waste management?
3. Have targets been set (eg % recycling, composting, incineration, capture of methane emission/lechate from landfills, etc)
4. Is there any information available on illegal disposal sites and the waste types present at those sites?
5. Is there any major problem concerning waste management and collection?

Recycling

6. Please fill in the table with the available information. (See instructions for table 1)

[26] Please specify year

Table 10 – Waste recycling

Indicator	Most recent year (ideally 2004)[27] (200x)
Total municipal waste recycled (t/year) – detail if available (e.g. paper, metal, glass, etc)	
Number and capacity (t/day) of recycling facilities	
Amount (t/year) and share (%) of biodegradable waste produced	
Amount (t/year) and share (%) of biodegradable municipal waste composted	
Number of composting facilities	
Capacity of composting facilities (t/day)	

Furthermore if you have any information on past amounts or information on future expectations please also note.

7. Is there any major problem concerning waste recycling? If so, please describe.

Landfills

8. Please fill in the table with the available information. (See instructions for table 1)

Table 11 – Waste landfilled

Indicator	Most recent year (ideally 2004)[28]
Total municipal waste landfilled (t/year)	
Number of (official/legal/permitted) landfills	
Capacity of (official) landfills (t/day)	
Methane emissions from landfills (please note amounts and share of released and captured emissions)	
Number of illegal landfills / waste dumps	

Furthermore if you have any information on past amounts or information on future expectations please also note.

9. **If possible, what is the condition of the sites in qualitative terms of the official landfills? (% good, % bad)**

[27] Please specify year

[28] Please specify year

10. Is there any major problem/issue concerning landfills?

Incineration of waste

11. Please fill in the table with the available information. (See instructions for table 1)

Table 12– Waste incineration

Indicator	Most recent year (ideally 2004)29
Total waste incinerated (t/year) – detail if possible type of waste	
Number of incineration facilities	
Capacity of incineration facilities (t/day)	
Energy recovered annually	

Furthermore if you have any information on past amounts or information on future expectations please also note.

12. Are there private waste incineration facilities (e.g. industry, hospitals, etc)?
13. Is there any major problem/issue concerning waste incineration?

Hazardous waste

14. Please fill in the table with the available information. (See instructions for table 1)

Table 13 – Hazardous waste

Indicator	Most recent year (ideally 2004)30
Total hazardous waste generated (t/year) and collected (t/year) – detail if possible type of waste	
Total hazardous waste treated(t/year) – detail if possible type of waste	
Number and capacity (t/day) of hazardous waste treatment facilities	
Number and capacity (t/day) of hazardous waste disposal facilities	

[29] Please specify year

[30] Please specify year

Furthermore if you have any information on past amounts or information on future expectations please also note.

15. Does co-disposal of hazardous and non-hazardous waste occur or is it separate (data if available)?
16. Have cases of illegal transboundary movements of hazardous waste been recorded?
17. Is there any major problem/issue concerning hazardous waste?

Other Questions

18. Literature: if existing/available, please provide us with a copy (only if available in English) or web link of the most recent:
    - National waste management strategy
    - Any other document you think is relevant for this study in the field of waste
19. Are there any waste related data that we didn't ask for, but you think it might be relevant and important for the study?
20. Is there any particular problem/issue related to waste that you think is relevant and important for this study?
21. What are the main data gaps that need addressing?

Finally, in light of your investigation of waste related issues and given the information collated above please try to answer the key questions listed in page 1 of this part.

Questionnaire part E: NATURE

The aim of the study is to identify the likely benefits that ENP countries can obtain from higher environmental quality and protection, by improving their legislation and policy. The study will analyse 5 types of benefits: health, resource, ecosystem, social and wider economic ones. For instance, the EU Natura 2000 network can bring several socio-economic benefits by protecting land and therefore its associated ecosystems services (e.g. food and fibre provided by the land, flood prevention via water regulation, ecotourism etc). Therefore ecosystems services can provide benefits related to all the 5 categories: Some examples[31] for nature related benefits are provided below:

- Health benefits: direct benefits to public health – e.g. access to clean air and water and recreation possibilities
- Resource benefits: benefits to parts of the environment used commercially – reduced water pre-treatment costs as quality water available, forest products (mushrooms, wood etc), and sustainable agriculture.
- Ecosystem benefits: benefits to the natural environment with no commercial interests and to ecosystem services – protection of species, habitats and ecosystems,
- Social benefits: benefits to the society at large, including natural and cultural heritage – quality of life from access to nature and services (Recreation) also identity from landscape/historic natural areas etc.
- Wider economic benefits: knock-on benefits (e.g. on employment, trade, etc) including local and regional development – water retention/flood control, tourism related to nature (Eco-tourism specifically), employment in nature conservation and agri-tourism and sustainable agriculture/forestry.

This part of the questionnaire is specifically designed to collect information on the nature sector. The types of information required are both qualitative and quantitative, and while we are not looking to do a full monetary assessment, some monetary data will be helpful. The collected data will be helpful to provide a picture of the current situation and, whether possible, past trends and future scenarios.
This picture should help answering the following key questions:

- **What are the most important ecosystems? Which are under threat/stress? What are the benefits from these ecosystems, and what improvements can be possible?**
- **What is the status and trends in the level of biodiversity and what are particularly 'valuable' species (e.g. rare, endemic, of national importance**

[31] See also Kettunen, M. & ten Brink, P. 2006. Value of biodiversity- Documenting EU examples where biodiversity loss has led to the loss of ecosystem services. Final report for the European Commission. Institute for European Environmental Policy (IEEP), Brussels, Belgium. 131 pp.

(E.g. linked to national identity)?

- **What are the endangered species / habitats and what pressures are they exposed to?**
- Is the current protected areas network sufficient to ensure the long-term existence of the natural habitats and species in the country, e.g. in the context of climate change?
- What improvements are possible through the implementation of additional measures?
- What are the current (and expected future) threats and potential losses if nothing new is done?
- **What is the state and coverage of existing protected areas and how can this be expected to develop (areas covered and level of protection)?**

It is recommended to answer the key questions after filling in the rest of the questionnaire, which is meant to help collect the data to allow a complete analysis.
It is important though for the national expert to keep in mind the key questions to keep the analysis focussed.

Note that clearly in some countries more data is available for some items than others; please focus efforts on the readily available data so as to keep resources available so that all time is available to look at air, water, waste, and nature. It is also useful noting where the main data gaps are, so that recommendations can be made for finding new data for the future. Also please note references and web links for all data.

General

1. Please fill in the table with the available information (and ensure data references and web links noted as footnotes; thank you).

Indicator	Most recent year (ideally 2004)[32]
Share (%) of agriculture in the GDP	
Share (%) of forestry in the GDP	
Surface area covered by forest (% and thousand hectares)	
Surface area covered by agriculture (% and thousand hectares)	
Surface area covered by protected areas (% and thousand hectares)	
Number of tourists per year	

Furthermore if you have any information on past amounts or information on future expectations please also note.

2. Does you country face significant flooding, fire, drought/water shortage or avalanche/mud flood risks? Also, is the fragmentation of landscape a big/increasing problem in your country?
3. Are forests a key habitat? Are they a key economic resource? Are they important for regional employment?
4. Are agricultural lands a key habitat for species in your country? Are they a key economic resource? Are they important for employment?
5. Is land abandonment a key issue for agricultural lands in your country and if so what are the consequences?
6. Are there any products typical of the local cultural identity that make use of natural resources? (E.g. Wooden handicraft) Are there any examples that in some areas nature would play an important role in terms of branding, tourism etc?
7. Has sustainable tourism or eco-tourism received any attention so far? Please also specify, if possible, the number of tourists to nature parks in recent years

Nature protection

8. **Please give an overview of the state of both biological and landscape diversity in your country – land coverage, number of (threatened) species etc. Which are the main individual ecological systems in your country (forest, grassland and arable land, wetlands and water, etc), what are the**

[32] Please specify year

main statistics (area, specific number for different clarifications) and what is their status?

9. If possible please provide a map of your country which presents the protected areas (electronic).
10. Are there any objectives on the percentage of land area to be included in protected areas?
11. Have activities been carried out with the aim of improving environmental protection and meeting international environmental requirements in your country? Please specify.
12. Are national laws into force, which protect endangered species in your country? Are these laws effective?
13. **Does your country host species that are no longer common throughout Europe, or unique endemic species? If so, please specify. Are those species protected under international agreements/national legislation?**
14. **Are there any threatened habitats in your country and are any of these unique?**
15. Are large carnivores and/or birds at risk due to reasons such as illegal hunting activities or fragmentation?
16. Is your country situated on migration corridors and does it provide important resting or breeding grounds – for birds and other species?
17. Is your network (of sites/habitats) a real network - in other words is there a real connectivity between sites and are measures in place to ensure this? And, are there any important threats to connectivity (E.g. causing fragmentation of the network)?
18. How is your network (of sites/habitats) linked to networks of neighbouring countries?
19. Do cross-border ('adjoining') areas of conservation exist between EU/candidate countries and your country? If so, please specify the area and the border location
20. Nature management – how many people are employed in nature conservation activities (specific in full time equivalents). Is there a significant of involvement of unpaid volunteers? Are there expectations that the level of employment will increase?
21. Is there a growing interest in organic farming and animal rising in your country? What about the participation of farmers in mowing and nature maintenance activities?
22. Is pollution and over fishing of rivers an issue? If so, please specify

Regional development and natural capital

23. It is useful to think of benefits also from the perspective of regional development. Here, a useful tool used by regional planners is a SWOT analysis – an analysis of strengths, weaknesses, opportunities and threats.

    Strengths: What are the biodiversity strengths - for biodiversity and for the wider benefits for the region – e.g. what ecosystems services it provides? In which way it can stimulate regional development?

    Weaknesses: Are there any fragile ecosystems that could come under threat by changes (e.g. climate change, land abandonment etc)? Are there any critical trends or thresholds (e.g. where an ecosystem changes irrevocably) close to being breached?

    Opportunities: Are there any opportunities for protecting the biodiversity and related services?

    Threats: Which are the major direct threats to biodiversity and related ecosystem services in your country (e.g. habitat loss and fragmentation due to urbanization, infrastructure and development and extraction of natural resources, hunting and poaching / trade with endangered and protected species, etc)? Please specify/describe the situation/problem
    Which are the major indirect threats to biodiversity in your country (e.g. pollution, tourism, low public awareness, etc)? Please specify/describe the situation/problem

Other Questions

24. If and where available, please provide us with a copy (only if available in English) / web-link of
    - Biological and Landscape Diversity Strategy and Action Plan
    - National Biodiversity Strategic Action Plan
    - Red list of threatened plants and animals
    - Other relevant documents
25. Are there any nature related data that we didn't ask for, but you think it might be relevant and important for the study?
26. Is there any particular problem/issue related to waste that you think is relevant and important for this study?
27. What are the main data gaps that need addressing?

Finally, in light of your investigation of nature related issues and given the information collated above please try to answer the key questions listed in page 1 of this part.