

Valuing Environmental Benefits

External Briefing Note

October 2013

How is the Environment Agency valuing environmental benefits in river basin management plans?

The Environment Agency needs to ensure public and private money is spent on activities that provide the greatest benefits to society in a transparent and efficient way. To help do this we need to weigh up both the costs and benefits of actions¹ that can be taken to improve the environment.

Economic appraisal for the second round of river basin management planning has started using new cost benefit analysis tools and the [Water Appraisal Guidance](#). This briefing note explains what environmental benefits are, why and how the Environment Agency is valuing some of the benefits.

What are 'environmental benefits'?

Since the 1990s, there has been a huge improvement in the quality of England's water environment; primarily through the implementation of domestic and European legislation which set standards for environmental quality (e.g. the Bathing Waters Directive), or for the environmental performance of specific sectors (e.g. the Urban Waste Water Treatment Directive).

While the practicalities of meeting these targets may have been challenging, the requirement to do so was usually very straightforward; if the target was met, compliance with the legislation was achieved.

The Water Framework Directive (WFD) is an evolution of **target-led** environmental improvement into a **benefits-led** approach. While the WFD sets environmental targets, Member States are allowed to consider what measures are technically feasible, and whether the benefits brought by carrying out the measures are proportionate to the costs.

So what are "environmental benefits"? Put simply, an environmental benefit is any **additional value** to people, wildlife or the economy which arises from some action to improve the environment. For example, improving the water quality and flow in a river may result in the fish population improving so that the river can be used for angling and thus deliver recreational benefits.

Benefits can be quantified in financial terms using different economic valuation techniques. The Environment Agency has developed tools and guidance so that we can compare the benefits of implementing different environmental interventions against their cost. This appraisal will help identify which measures will be included in the updated river basin management plans.



¹ Actions 'to improve the environment' are also described in this note as 'measures' and 'interventions'.

Environmental improvements bring different benefits to different people, so when assessing benefits, it is vital that the Environment Agency engages with a range of people and organisations to understand what they want for their local environment. This means that we will be talking more in terms of benefits, rather than environmental status or targets. “Good ecological status” is meaningless to most people, but almost everyone can picture a river where they and their children can walk alongside, go fishing and kayaking.

Why is the Environment Agency valuing the benefits we get from nature?



“One source of hope comes from the growing realisation that nature is essential for economic development. The message is clear: without nature the economy is nothing. That penny is beginning to drop in various important places, and could soon lead to a new era of policy-making. One in which ecology and economics go hand in hand, but only if we have the tools to build bridges between these worlds that are so alien to each other. And that is where the economic valuation of nature can come in.”
Tony Juniper, *The Guardian*, August 2012.

Figure 1. The iconic River Thames, essential to London's economic growth.

There has been contention in some environmental circles with economists and the government facing criticism for trying to put a “price tag” on nature. It is important to understand that this is not what the Environment Agency is trying to do. The Environment Agency is using economic tools and studies to understand how much people value **a change** in the non-market benefits that the water environment provides. Economic valuation, or decisions based on society’s values, can be a powerful way of supporting difficult spending decisions and tradeoffs. For example, how much do people value a change from a dirty, polluted river to one that is sparkling and clear, has trout and salmon running up it, offers opportunity for fishing and greater pleasure for living near and from walking alongside? In other words how much would they realistically be willing to pay, per year to see this change?

Following the publication of both the National Ecosystem Assessment and the Natural Environment White Paper in 2011, the concept of ‘ecosystem services’² or valuing the services that people receive from nature, is gaining a wider understanding and use in environmental organisations and more coverage in the media³. Ecosystem services can be tangible such as increased fish populations for fishing, improved water availability during drought, or more subtle, such as pollination and natural flood regulation.

The important thing to remember is that, unless a value is attributed to a benefit that people get from nature its value may not be recognised in the decision making process. The reason that benefits need to be quantified in monetary terms is in order to compare like with like (costs in £ with benefits in £). Economic appraisal encourages systematic and transparent thinking about the wider consequences of environmental decision making.

² A good summary of ecosystem services can be found in the [Parliamentary Office of Science and Technology note and the National Ecosystem Assessment \(2011\)](#) describes the current state of the UK’s ecosystem services.

³ Books such as [‘what has nature ever done for us?’ by Tony Juniper](#), while still aimed an environmentally aware audience are helping to raise consciousness of the value of nature’s services.

The Environment Agency has been looking at ways of valuing ecosystem services in order to help staff take greater account of the positive and negative impacts of our decision making on the benefits that society gets from nature. For example, constructing a man-made flood defence system may be the cheapest option in terms of initial costs for construction, materials, man power etc, to protect people and property from flood events. However, if we were to look at the wider impacts to ecosystem services of this solution, a softer engineering option such as increasing the floodplain, re-meandering⁴ and restoring upstream wetland might be a solution that initially costs more but provides more benefits for society by enhancing some ecosystem services such as wildlife watching and recreation, in addition to providing adequate flood protection.

How do we monetise environmental benefits?

Monetising surface water benefits

One of the principal methods of valuing non-market benefits is called the stated preference method. This method is based on the use of surveys asking people to state how much they would be willing to pay for an improvement in the existing environmental condition of their local rivers. This method has developed a growing credibility over the past four decades and is now commonly used to provide inputs to economic appraisals⁵.

In economic appraisals for surface waters such as rivers, lakes and estuaries the Environment Agency is using updated⁶ willingness to pay values from the 2007 National Water Environment Benefits Survey (NWEBS). The NWEBS values cover aesthetic, recreational and existence values.



Figure 2. NWEBS captures society's 'willingness to pay' for recreational services (such as fishing), aesthetic services and existence values. Existence value is the value that society gives to a resource without necessarily having the intention to visit or use it. For example, people living in the South East of England may value the Lake District in the North West with its beautiful lakes and streams, but may not actually visit it.

This work, described in more detail in ['NWEBS briefing note' \(Metcalfe, 2013\)](#) and ['An assessment of the non-market benefits of the Water Framework Directive for households in England and Wales'](#)⁷ (Metcalfe et al, 2012), is based on a [national study funded by the Defra led Collaborative Research Programme in 2007](#) which elicited willingness to pay (WTP) values from around 1,500 people for improvements in the water environment with respect to WFD.

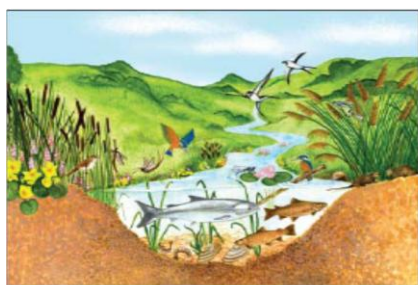
⁴ Bringing back the curves of a natural river.

⁵ P.Metcalfe (2012). Non-market valuation using stated preferences: Applications in the water sector, Thesis submitted to the Dept.of Geography and Environment, the London School of Economics & Political Science.

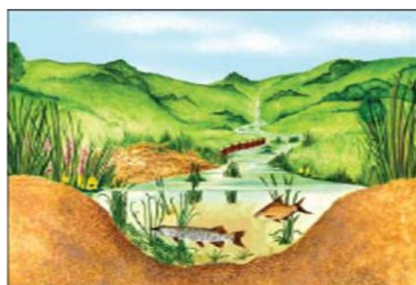
⁶ Listed as 'WAG supporting document_NWEBS values briefing note.docx' [here](#).

⁷ Metcalfe, P. J., W. Baker, K. Andrews, G. Atkinson, I. J. Bateman, S. Butler, R. T. Carson, J. East, Y. Guéron, R. Sheldon, and K. Train, (2012), An Assessment of the Non-market Benefit of the Water Framework Directive to Households in England and Wales, *Water Resources Research*, **48** (3).

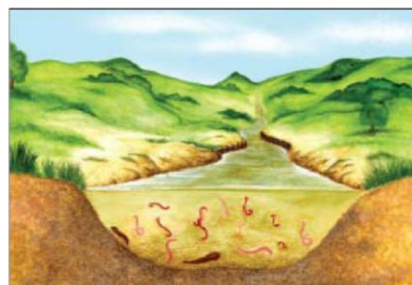
Respondents to the 2007 questionnaire considered changes to portions of rivers at 'high', 'medium' and 'low' quality nationally and locally using illustrations of rivers which included variations on the following six components: fish, other animals such as invertebrates, plant communities, the clarity of water, the condition of the river channel and flow of water, and the safety of the water for recreational contact.



High



Medium



Low

To derive monetary values for the ecosystem service benefits the WTP values are equally divided across the six components listed above and applied per km of water body improved within a catchment. For example, installing a fish pass may open up 6km of previously inaccessible trout and salmon habitat, improving 6km of river from moderate to good status for fish. The WTP value for fish in the catchment will be multiplied by the number of kilometres that will see a step change in water body status. This will provide a sum of benefits in £ for improvement to fish status within the catchment. Whether a bundle of measures⁸ applied in a catchment will cause a step change in status for any of the six ecosystem components listed above will be based on local expert judgement and the best available evidence.

Because the WTP values are national averages that are population density driven, Environment Agency staff will also collect local benefit data to better reflect the local situation using a descriptive tool called the Appraisal Summary Table.

As well as using NWEBS values the Environment Agency is also monetising the benefits arising from the creation of wetland. Where wetland could be created, as a measure to remediate issues in a catchment, the additional benefits that the area of wetland brings such as recreation, biodiversity enhancement and flood storage will be monetised and set against costs in the economic appraisal. The detail about what values are being used per hectare of wetland creation can be found in chapter 4 of the [Water Appraisal Guidance](#).

Monetising groundwater benefits

In monetising benefits for groundwater the Environment Agency needed to take a different approach to that for surface waters. The NWEBS values used for surface water cannot be used as they rely on being able to see the water body and use it for purposes other than consumption. Instead, for groundwater economic appraisal, we will use values for benefits which have been transferred from other detailed economic studies. The values for some of the benefits monetised in groundwater economic appraisals are described in the [Water Appraisal Guidance](#).

'Benefits transfer' is a standard method of using information about societal values from existing academic studies and surveys with or without adjustment to take into account local factors (including population levels, quality of change, socioeconomic factors and so on). This method is key to the practical use of environmental values in decision making and means that a wide range of values for different benefits can be used and vast resources do not have to be spent collating new data for every economic appraisal.

⁸ A 'bundle of measures' is all of the actions or measures that are required to get water bodies within a catchment to WFD 'good status'. These measures result from EA led investigations into the reasons that water bodies have been failing to meet the standards outlined in the WFD. For example, a bundle of measures may aim to improve instream habitat, reduce phosphate levels and improve opportunity for fish migration. Stakeholders will have the opportunity to influence which measures are delivered and how they are delivered through consultation on draft river basin management plans and catchment groups.

Taking a proportionate approach to valuing benefits

There is an understanding among economists that there is a trade off between the depth and detail of monetary valuation and the time and resources to undertake it.

In economic appraisal for surface waters the Environment Agency is using the NWEBS values (as discussed above) and groundwater benefits transfer values to monetise benefits in order to compare like with like (costs in £ with benefits in £). This method of valuation is a proportionate approach that monetises some of the benefits potentially resulting from applying a bundle of measures to a catchment and compares these benefits to the costs of implementing the measures. Once the resulting benefit cost ratio has been produced the users will test the result, for example by doubling the benefits and halving the costs, to see where the tipping point lies to ensure that no additional benefits which may have been overlooked in the process might tip the benefit cost ratio.

Managing uncertainties in the economic appraisal

To manage uncertainties in monetising some ecosystem services for economic appraisal the Environment Agency has built a number of rules into the economic appraisal process to ensure that benefit of the doubt is given to benefits and that schemes are not turned down because their wider benefits have not been considered:

1) **The most important non-market benefits for water environment improvements and those for which we have the most information have been selected for monetisation in the economic appraisals.** In addition to existence values and recreational and aesthetic services, the ecosystem services provided by wetland creation are also monetised for the economic appraisal.

2) **In addition to monetising some ecosystem services (as described above) further benefits will be captured in a tool called the Appraisal Summary Table.** All the benefits and possible disbenefits (negative impacts) for people resulting from a bundle of measures recommended for a catchment will be considered under the headings 'provisioning', 'cultural', 'supporting' and 'regulating' services. Benefits or disbenefits will be described qualitatively in text and where significant, their impact will also be quantified. The results from this assessment will be presented alongside the benefit cost ratio in the final appraisal report and will have equal weighting to the benefit cost ratio.

3) **Results from this proportionate methodology for economic appraisal are usually the same as more resource intensive economic appraisal methodologies which monetise more benefits.** Results from the proportionate economic appraisal methodology (described above) have been compared to results from more detailed valuations to see whether the different methodologies resulted in different statements as to whether schemes are cost beneficial or not. This study shows that the 'less information + sensitivity testing' method allowed for 94% accuracy at around 25% of the cost of the 'full information' method (Shamier, 2013).

4) **There are automated sensitivity tests built into the economic appraisal tools, which allow the users to see where the tipping point between a bundle of measures being cost beneficial, or not, lies.** Sensitivity testing allows the user to assess uncertainties in the economic appraisal data e.g. what happens if the benefits are doubled? What does the benefit cost ratio look like if the costs are halved? The sensitivity test highlights any data sets that are close to the tipping point and this information will be summarised in the final appraisal report.

