

SOCIO-ECONOMIC BENEFITS OF NATURA 2000

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CASE STUDY ON THE ECOSYSTEM SERVICES PROVIDED BY A SUSTAINABLE CATCHMENT MANAGEMENT PROGRAMME (IN THE UK UPLANDS)

Output of the EC project

Financing Natura 2000: Cost estimate and benefits of Natura 2000

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1 EXECUTIVE SUMMARY

United Utilities (UU) is a British water and utility company. Its “Sustainable Catchment Management Programme” (SCaMP) is a flagship conservation initiative in the UK. The Initiative is a partnership between UU, the Royal Society for the Protection of Birds (RSPB), local farmers and a wide range of other stakeholders. It was formed to invest in conservation activities in 20,000ha of water catchment land in the North West of England, aiming to secure a wide range of benefits, including water quality and conservation benefits.

The SCaMP area is not entirely a Natura 2000 site, but the area does overlap substantially with Natura 2000 and other designated land. It demonstrates how, managing protected sites as part of a broader mosaic of habitats, can help secure delivery of important benefits greater than a site can deliver in isolation. Assessing the key ecosystem services and related socio-economic benefits supported by the SCaMP area could be an important step in conservation in the UK. Water companies are substantial landowners in upland areas, and can directly influence land and resource management. In addition, there is wide potential for payments for ecosystem services to other landowners, including through agri-environment payment schemes. Since the introduction of SCaMP, several other similar schemes have been mooted, but need first to be approved by the water industry regulator. To convince the regulator, clear demonstration of social and economic benefits is vitally important.

This case study sets out the wide range of social and economic benefits arising from the SCaMP case. At this stage, these can be identified qualitatively. However quantitative assessment, and by extension monetary valuation, remains elusive due to severe problems with data availability. We know that the values of the benefits involved are significant, but are unable to put firm numbers on them at present due to lack of hard data. The methodology used in this case study is very useful in this situation, because it facilitates the identification and presentation of all value types, and the use of judgement to score likely significance of values, even where monetary valuation cannot be attempted.

In fact monetary valuation of many of the SCaMP benefits would be possible, but this would require expenditure on data collection and research beyond the time and resources available to this short study. A key consideration with an ecosystem service approach is the lack of biophysical measures (or quantities) of service flows. To measure water quality changes, associated with changes to land management practises requires time series for several years. It is this challenge, of measuring changes in the flow, or delivery, of services which ecologists are only beginning to research. Nevertheless the results presented here are sufficient to demonstrate the existence and (at a very broad scale) the likely extent of different values associated with land management changes. The SCaMP case, and its widely recognised success, are strong arguments both for recognising the economic benefits that can arise from conservation activities, and for further investment in assessing and measuring these benefits.

1. INTRODUCTION

1.1 Background definitions

The SCaMP area covers 20,000 hectares of United Utilities owned catchment land in Bowland, the Goyt, Longdendale and the Peak District, of which 13,500 hectares are designated as Sites of Special Scientific Interest (SSSI)¹. 90 per cent of the land is covered by the SCaMP agreement. SCaMP will protect and enhance a number of UK BAP (Biodiversity Action Plan) habitats. Part of the SCaMP land falls within the Bowland Fells SPA (Special Protection Area) (16000ha) which is within the Forest of Bowland AoNB (Area of Outstanding Natural Beauty); SCaMP also intersects the Peak District National Park.

The Bowland Fells SPA is an extensive upland area in Lancashire, in north-west England. It forms a western outlier of the Pennines, with summits mostly in the range 450-550 m. The major habitats are heather-dominated moorland and blanket mire. It is important for its upland breeding birds, especially breeding Merlin *Falco columbarius* and Hen Harrier *Circus cyaneus*.

United Utilities is the UK's largest listed water company, with annual turnover around £2 billion, and provider of water to 6.7 million people across the North West of England. It is also a major land-owner (57,500ha, of which 17,500ha is SSSI), and holds the land with a primary view to maintaining raw water quality; UU owns 40 per cent of the water catchment land owned by the UK water industry. UU's water supply is 65 per cent from upland reservoirs, 25 per cent rivers and streams, and 10 per cent groundwater. As a regulated utility undertaker, UU has obligations to take into account biodiversity and habitat in managing the land but is not specifically funded for this.

One key hurdle faced by UU, and by others aiming to implement schemes similar to SCaMP, is the need to convince the industry regulator (OFWAT) of the legitimacy of water companies investing in such activities since OFWAT needs to approve any investment undertaken by a water company. If companies are to invest in schemes, and customers are to pay for this via water bills, OFWAT needs to be convinced that there is a direct benefit to customers. Improvements in raw water supply (quantity/quality) are clearly important here, but the role of environmental impacts is less obvious. Pragmatically, any evidence that can be harnessed to demonstrate the potential social and economic benefits to different groups in the UK, including water customers, of enhancing these ecosystem services, is likely to help further the agenda of upland conservation. An important feature of this issue is the need to compare a change in ecosystem service delivery associated with a change in land use management. Demonstrating that changing land management practises is the most cost efficient means of achieving water quality goals is a very powerful economic argument in support of conservation.

“Catchment land” is land with the capacity to collect, store, filter and transfer rainwater. Blanket bogs are particularly important catchment land in the study area, with large capacity

¹ United Utilities Conservation, Access and Recreation Report 2006/07

to store and filter water; however, degraded bogs can lead to reduced water quality, and potentially risks of flash-flooding.

Natura 2000 is an EU-wide network of nature conservation sites established under the Habitats Directive (1992). The Birds Directive requires the establishment of Special Protection Areas (SPAs) for birds. The Habitats Directive requires Special Areas of Conservation (SACs) to be designated for other species, and for habitats. Together, SPAs and SACs make up the Natura 2000 network of protected areas.

Sites of Special Scientific Interest (SSSIs) are designated by Natural England under the National Parks and Access to the Countryside Act (1949: NPACA), amended under Wildlife and Countryside Act (1981) and Countryside Rights of Way Act (2000: CRoW). They are managed by owners/manager under agreement with Natural England. It is an offence to recklessly or intentionally damage an SSSI, or to disturb animals and birds on it. Owners and managers are obliged to give notice to Natural England before carrying out any operation likely to damage the special interest feature(s) of the SSSIs. Where owners/managers refuse to manage a site, Natural England can actively manage the site and reclaim the costs (but this is rare).

All English Natura 2000 sites are also SSSIs, but not all SSSIs are Natura 2000 sites. There are 231 SACs in England, 78 SPAs, and over 4,100 SSSIs.

Areas of Outstanding Natural Beauty (AONBs) were created by the NPACA, modified by the CRoW. There are 40 AONBs in England and Wales, covering 18 per cent of the area.

The UK BAP is the UK response to the 1992 Convention on Biological Diversity. The most recent revision of the UK BAP (August 2007) identified 1,149 species and 65 habitats in the UK that need conservation and greater protection. The habitats list includes key upland habitats, found in the SCaMP area: blanket bog, native upland woodland, hay meadows, hedgerows and other boundary features.

The BAP is different from the Natura 2000 network, and from the SSSI designations, but the policies are closely integrated. Blanket Bog, a key BAP habitat, and an important feature of the SCaMP area, is listed in Annex 1 of the Habitats Directive and is a habitat for which the UK has special responsibility.

Other mechanisms for protecting and enhancing BAP habitats and species across the UK include national Habitat and Species Action Plans, local biodiversity action plans, agri-environment schemes, river basin management plans under the Water Framework Directive, forestry practice guidance, and planning policies.

1.2 Description of SCaMP

United Utilities Sustainable Catchment Management Programme (SCaMP) is an innovative conservation initiative in the north of England. It is a partnership of United Utilities (UU), RSPB, and a number of key UK stakeholders including OFWAT (water industry regulator),

Environment Agency, Drinking Water Inspectorate, Natural England, DEFRA, CCW, Forestry Commission, Peak District National Park Authority, Bowland AONB, Moors for the Future and local stakeholder groups.

As noted in Section 1.1, this case study is not about a single Natura 2000 site, but rather about conservation and management in a wider area that covers parts of sites with various different designations, including Natura 2000, SSSI, AONB, and National Park. This is a useful approach to take in a study, as it allows us to examine not only the benefits of Natura 2000 in isolation, but also the benefits within the context of the wider conservation framework, and in the context of the role in supporting ecosystem goods and services both locally and beyond the site boundaries.

The land management approach adopted by UU in the SCaMP area seeks primarily to reduce water quality risk. The SCaMP land had previously been managed by tenant farmers with no direct interference by the landowner. United Utilities, partly as a result of the development of the Water Framework Directive, introduced SCaMP in order to work with farmers and other land users to manage the land in a more sustainable manner, taking into account the impacts on water supply and quality downstream. The overall aim of SCaMP is to develop an integrated approach to catchment management incorporating sustainable upland farming which delivers:

- Government targets for SSSIs: 95 per cent of SSSI's into favourable or recovering condition by 2010;
- Biodiversity plans for priority habitats and species under the UK BAPs;
- Improved raw water quality, and
- A viable living for tenant farmers.

This is being achieved via long term agreements with tenant farmers which define farming plans compatible with the above objectives.

Although greenhouse gas regulation is not mentioned as a SCaMP objective, nevertheless the project will have a significant impact on this. In a proposed follow on to the scheme, SCaMP2, UU states an explicit objective of "Securing and improving the carbon flux management of our land". There are a range of other ecosystem services that changed land management could deliver from recreational and amenity opportunities, flood attenuation and habitat resilience.

The main activities being undertaken to achieve these aims include:

- Blocking drainage ditches to re-wet peat bogs that had previously been drained, creating new habitats for wildlife;
- Restoring areas of eroded and exposed peat and heather moorland;
- Establishing woodland by planting thousands of new trees and replacing existing coniferous trees with native broad-leaf species;
- Providing new waste management facilities to reduce run-off pollution of water courses, and

- Fencing to keep livestock away from areas such as rivers and streams and from special habitats

In an initial programme running from 2005-2010, United Utilities and RSPB are working to restore blanket bog (c 5,500ha) and to establish clough woodland (450ha planted with 300,000 trees). Most SCaMP land has seen a reduction in the number of grazing animals, and also exclusions at particular times of year, in particular to remove winter grazing on moorland, or specific areas, in particular to prevent pollution of watercourses. To these ends, 200km of fencing and nine new stock buildings have been constructed. Burning is also reduced.

The most recent assessment² states that:

- 96 per cent of SSSI in Bowland and Southern, including the Natura2000 site, are in favourable or recovering condition
- 294 ha of woodland already planted ~ 70 per cent
- 33 km of grips blocked ~ 40 per cent
- 60 ha of bare peat restoration underway ~ 30 per cent
- 9 farm buildings have been constructed ~70 per cent
- 5000 m of farm tracks improved ~ 134 per cent
- 101 km of fencing installed ~ 70 per cent
- 15 km of fencing removed ~ 65 per cent
- 1200 m of walls restored ~ 15 per cent
- 23 water troughs installed ~ 30 per cent
- Around 60 per cent of programme overall complete

The costs of SCaMP activity are split between UU funds (£9m) and public support (£3.5m); enabling expenditures such as farm buildings and fencing are £2m, while moorland restoration expenditure is £10.5m.

1.3 Why is the area of socio-economic importance?

1.3.1 Economic importance of Natura 2000 sites

In addition to contributing to conservation objectives, Natura 2000 sites provide a wide range of ecosystem goods and services. The specific details vary from site to site. In general, in addition to biodiversity conservation values, Natura 2000 sites may support significant values associated with recreational activities, cultural heritage, landscape, greenhouse gas regulation, flood regulation, and water quality and supply. Natura 2000 sites can also provide food and fibre, and in many cases they can also contribute significantly to local economies and employment.

² McGrath, 2008, United Utilities Sustainable Catchment Management Programme Update November 2008, Presentation to CAR conference

Monetary valuation of ecosystem goods and services seeks to estimate their “Total Economic Value” (TEV). TEV is intended as a framework for categorising all the different values that humans can derive from various goods and services. It is based on the concept of individual “willingness to pay” (WTP): this is an individualistic approach, but it is not limited to “selfish” values, since people frequently express their WTP for the sheer “existence” of species or special places and people also have values associated with altruism for contemporaries or “bequest” values for future generations. This is further discussed in Annexes 1 and 2.

TEV does not though, cover all possible types of value. There may also be “social” or “cultural” values associated with particular environments, or particular uses of them. Such values may not be fully taken into account in TEV – although they will partly be reflected. In this case study, we discuss TEV of ecosystem goods and services, and also discuss social values (for example local employment).

Further, the natural environment, in whole and in parts, is often considered to have “intrinsic value”, over and above any human values for appreciation, use and enjoyment of environmental resources. Although this may be true, humans have no way of assessing or measuring such values, and can take them into account only very imperfectly through moral arguments for restricting our interference with nature.

The existence of the Natura 2000 network may be seen partly as a result of such moral argumentation. That is, the network is Europe’s attempt to meet its agreed obligations to conserve wild nature. Of course this is not to say that we do not also derive human benefits from Natura 2000 sites – clearly we do, and this case study is part of a wider attempt to demonstrate some of these benefits. But it is important to note that even if these benefits were not greater than costs, this would not necessarily mean that Natura 2000 conservation were ill-conceived. Our calculations do not – indeed, could not – take into account intrinsic values. From a pragmatic perspective, Natura 2000 sites may be identified but they routinely struggle to secure financing. Understanding the range of benefits sites deliver can help make the case for supporting protected sites.

The Natura 2000 network can also be seen as a way of conserving “critical natural capital” – that is, the stock of natural assets that is fundamental to human activity and survival, and can not be traded off against man-made assets. There is a great deal of uncertainty surrounding what critical natural capital might be, and this calls for a large degree of precaution, in particular since loss of natural capital may often be irreversible, at least in the short to medium term. In assessing the benefits of conserving natural capital, economic value arguments are more to the fore, although this remains tempered by uncertainty and the need for a precautionary approach.

Finally, Natura 2000 can be seen as a way of providing ecosystem goods and services from conserved land. Here, economic value arguments are primary, and the question of interest is to compare the social and economic benefits with the designation to the social and economic benefits without designation.

All three motivations can play a role in Natura 2000, though we should recognise that the legislation underpinning the network does not allow for social and economic considerations to be taken into account – designation is an obligation if the ecological pre-requisites are met. Overall, the economic value arguments are not intended as a support for the designation process, but rather as a tool for communication – both at a high strategic level (as one additional reason for ongoing political support for Natura 2000) and for communication with users, media and the general public.

But beyond this, the techniques used for economic valuation of conservation activities may be very useful outside the Natura 2000 framework. Where the conditions for Natura 2000 designation do not apply, there may nevertheless be strong economic justification for other conservation activities and designations. The social and economic values of ecosystem goods and services from conserved areas might suggest that even more conservation should be carried out, not justified on intrinsic value grounds, or critical natural capital grounds, but simply on the human benefits arising from these sites.

For this particular case study, the economic argumentation is particularly important, because investment by water utilities in the UK (such as the UU investment in SCaMP) requires the approval of the water industry regulator, OFWAT. At present, pure “ecological” argumentation does influence OFWAT decisions whose remit is to ensure water quality. A clear description of the economic value of ecosystem goods and services, and their economic potential or impact is likely to have far greater interest for the water industry and the industry regulator. This could have far-reaching consequences beyond the SCaMP case, since there are many similar schemes under consideration in the UK, including “SCaMP 2” in the remainder of the UU landholding, where much less land is covered by SSSI designation. Currently, 70 similar schemes are under consideration in the UK. If SCaMP can conclusively demonstrate economic and ecological benefits, the overall impacts on protected sites could be profound.

The arguments and methods presented here can be applied at three distinct levels of assessment:

- To demonstrate the existence and extent of socio-economic benefits from Natura 2000 sites (to show that socio-economic benefits arise from conserved areas, though the conservation is justified in other ways);
- To help compare the socio-economic benefits of Natura 2000 sites with benefits in the absence of conservation designation (to show the benefit-cost ratio of Natura 2000 conservation);
- To compare the socio-economic benefits of additional conservation sites with benefits in the absence of conservation designation (to show the benefit-cost ratio of further conservation designations beyond Natura 2000).

1.3.2 General socio-economic importance of the case study area

The SCaMP area is mostly upland moorland, farmed primarily for sheep, with some cattle grazing. There are 45 land holdings and 21 farms. These holdings – in common with uplands

farming generally in the UK – are currently economically very marginal, and depend on agri-environment payments for economic survival.

There are also some woodland areas, which are a mixture of native woodland and some conifer plantations. Again, the financial viability of forestry activities in these areas is marginal, though the associated ecosystem goods and services of forests can be substantial.

The land also supports extensive recreational uses and much of it has high scenic value (though in degraded peat areas, this has declined). It is mostly open access land, and has been since before the Countryside and Rights of Way Act 2000 (CRoW Act); parts are extensively used for recreational purposes³. There is also upland grouse shooting.

Like many upland areas in Britain, much of the land in SCaMP consists of peaty, wet soils. These soils have sponge-like properties, retaining rainwater, filtering and cleaning it, and releasing it gradually into reservoirs and rivers. Thus, a major “use” of the land is gathering water for human consumption.

Finally, peat soils store huge quantities of carbon. This can be lost from degraded areas, while healthy peat bogs sequester carbon. Thus there are significant values at stake associated with the role of the SCaMP land in regulation of greenhouse gases. UU analysis suggests that their landholding overall is a net sink for carbon, but that the sequestration potential could be much higher; further work on this is ongoing.

So the key ecosystem services provided by the SCaMP area are:

- Water supply, including both quantity and quality regulation
- Recreation, including general outdoors activity and field sports, and associated economic activity
- Farming and associated economic activity
- Greenhouse gas regulation
- Biodiversity conservation

Other possible services include flood attenuation and enhancing ecosystem resilience in the face of external shocks, such as climate change.

³ the CRoW Act provides for public access on foot to certain types of land, amends the law relating to public rights of way, increases protection for Sites of Special Scientific Interest (SSSI) and strengthens wildlife enforcement legislation, and provides for better management of Areas of Outstanding Natural Beauty (AONB).

2. SOCIO-ECONOMIC BENEFITS OF SCAMP

2.1. Overview of SCaMP area socio-economic benefits

As discussed above, the SCaMP area provides a wide range of socio-economic benefits. Water supply and quality is a major benefit. Farming, in particular grazing livestock, is a primary activity, though economically rather marginal or reliant on subsidies. There is forestry in the area. It is widely used for tourism and recreation purposes and Bowland Fell, Natura 2000 site itself is a spectacular area for sporting activities, wildlife, walking and touring. The area has substantial landscape value and is important for conservation, as recognised via the SSSI and Natura 2000 designations. In particular there are nationally important populations of birds including the Golden Eagle, Hen Harrier and Twite. The area is also important as a test case and demonstration of sustainable catchment management, giving it significant scientific and education value, at least in the short to medium term. Figure 2.1 shows all these different values and other ecosystem services provided by the area in a scale of 0 to 5.

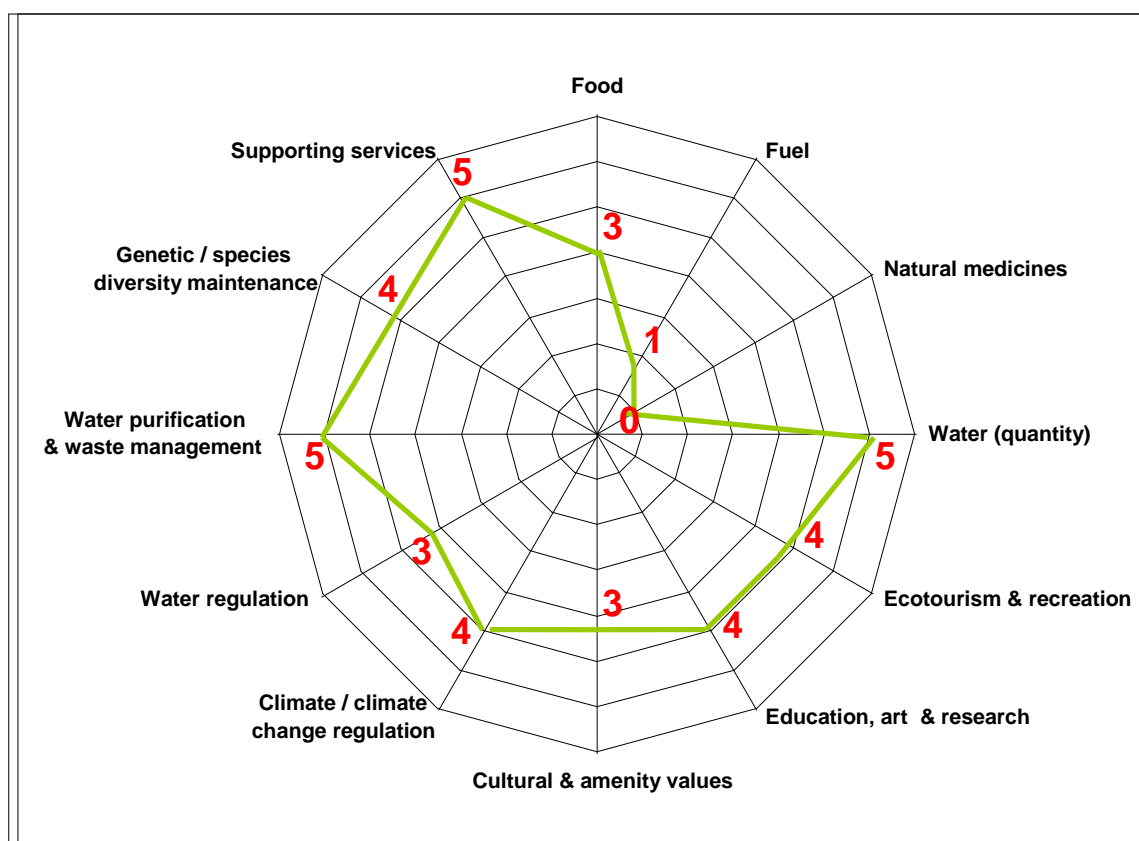


Figure 2.1: Overall socio-economic benefits provided by the site (on scale 0-5)

This spider diagram has been developed on the basis of information available and our understanding of the case. It is not based on quantitative data because these are not available for most categories. The rationale for the individual scores is presented in Table 2.1.

It is noteworthy that the main values arising from the SCaMP area are not direct provisioning services, but rather regulating and cultural services. These categories of value are rarely marketed, so they do not have clear prices, and hence are often overlooked in economic assessments. They are nevertheless extremely valuable, and again, this illustrates the importance of taking these services into account when considering landuse activities.

Table 2.1: Rationale for Spider Diagram Scores

Service	Score	Justification
Food	3	Grazing will continue, and in long run more productive. But, economically, the grazing is very marginal.
Fuel	1	Forestry in the area will provide fuel, and/or timber.
Natural Medicines	0	None identified to date
Water quantity	5	This is the main value from the area. But note that the change in water quantity will not be the main change from the base case: in terms of change, there will be little in quantity, but lots in quality.
Ecotourism/ recreation	4	The area is used for many outdoor pursuits and field sports with the Natura 2000 site a main attraction.
Education/art/ research	4	Normally would be lower, but since SCaMP is the first of its kind, the potential is more significant as it provides one of the first opportunities to actually measure service delivery from landuse change.
Cultural/amenity	3	Rather arbitrary score. Attempt to consider non-use aspects – i.e. over and above tourism which is considered above.
Climate change regulation.	4	Healthy peat soils will sequester carbon, though also emit methane. Degraded soils emit carbon and Dissolved Organic Carbon (DOC) some of which ends up as atmospheric carbon In deciding on the importance of this service, there is an issue here of dealing with “absolute” values versus changes from the base case.
Water regulation	3	For the potential impact on downstream flooding, in particular flash floods from bare peat areas
Water purification/ waste	5	For the main impact on water quality – reduced DOC – and also reduced risk of contamination from livestock.
Genetic/ species diversity	4	Rather arbitrary assumption about the role of SCaMP in biodiversity conservation. It is not the main objective but the restoration of peat and the planting of clough woodland will certainly benefit biodiversity. More generally (and again this is “total” not “change”), these areas are important to conservation, so a high score here is inevitable. Early evidence suggests that new management

		activities is beginning to benefit biodiversity.
Supporting services	5	Because the system supports all the above values. Note that these values are mostly already represented above. And that it is probably more relevant to assess the change in the values from the base case, than to ascribe a total significance to “supporting” services. One issue not covered above relates to the potential benefits if the new management regime improves the catchment’s ability to withstand external shocks or enhances its ability to adapt to them. In this sense, we could think in terms of an ‘insurance’ service, guaranteeing the supply of all other services.

2.2. Beneficiaries of SCaMP

Table 2.2 illustrates the groups who manage ecosystems to provide the relevant services and the groups of beneficiaries. Essentially, land management in the SCaMP area is very much a team activity, with several stakeholders actively involved in shaping the project. Paying for SCaMP is largely down to UU, although agri-environment payments to farmers also plays a significant role.

The main beneficiaries are UU and its customers (cleaner water leading to lower treatment costs); but the secondary / “spillover” benefits for nature conservation, recreation and greenhouse gas regulation create a wide range of “winners” from the SCaMP. It is important to take all these different values into account, both in terms of making a full assessment of the benefits of SCaMP, and also for analysis of the distribution of costs and benefits. This is particularly important given the likelihood of attempts to replicate SCaMP principles in many other catchment areas in the UK, and potential elsewhere.

Table 2.2: How is responsible of managing the benefits provided by the site and who are the different beneficiaries

Benefits “managers / providers”	Ecosystem service / benefit	Possible beneficiaries	Scope of the benefit	Examples
United Utilities RSPB Natural England	Water quantity and quality:	United Utilities	Regional	Reduced costs of water treatment. Also major funders of SCaMP

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Local authorities, Rural Futures Peak District National Park Authority Farmers / foresters Other landowners / managers	provided jointly by all actors	Customers	Regional	Improved water supply / quality and/or reduced cost. But also pay via water bills.
All of the above	“Secondary” benefits of SCaMP	Local population	Local	Improved amenity.
		Farmers	Local	Payment for reduced stocking / improvements. Improved grazing in long term
		Recreational users	Regional	More attractive landscape More diverse species
		National - Global population	National - Global	Climate change regulation Non-use values of biodiversity conservation and cultural heritage. Also pay via agri- environment schemes

2.3. Valuation of SCaMP benefits

As identified above, the most important benefits provided by SCaMP include:

- Water supply, regulation, and quality;
- Food and fibre;
- Climate regulation;
- Recreation and landscape amenity;
- Biodiversity protection, and
- Non-use values of conservation.

All these goods and services have “Total Economic Value”, and in principle this could be estimated using various techniques. This is discussed further in Annex 1. In practice, in most cases the data are not available, or the valuation exercise would require additional time and data not presently available for this case study. Further detail on each of these benefits is provided below.

Table 2.3 provides an assessment of the beneficiary and benefit typologies and what these mean for the *feasibility* of each benefit type to be valued in monetary terms. A more detailed list of ecosystem services than above is used in this table to give full coverage of the relative value potential. Note that actual economic valuation has not been attempted, because we do not yet have access to any data that would support this.

Table 2.3: A synthesis of the benefits of SCaMP related ecosystem services

BENEFIT CATEGORY	BENEFIT DESCRIPTION	POSSIBLE VALUE ESTIMATES TO BE OBTAINED				WHO ARE THE BENEFICIARIES?	WHAT IS THE CURRENT STATUS OF THE BENEFIT	IS THE IMPORTANCE OF THIS SERVICE LIKELY TO INCREASE IN THE FUTURE?
		Qualitative	Quantitative	Monetary	Relative value of this benefit at the site Authors' own estimate on scale 1-5			
Ecosystem service related benefits								
Provisioning services								
Food, e.g. crops, fruit, livestock, wild berries & fungi, game	Primarily grazing for sheep	Mushrooms, wild berries, domesticated animals, rabbits, fish.	yes	Yes	3	Farmers, consumers	Economically marginal. Grazing quality degraded	With the scheme, returns will improve in long run. However likely to remain economically marginal unless payments for ecosystem services introduced

Fibre / materials, e.g. wool, skins, leather, plant fibre, timber, cork	Wool, timber	Timber, felt from Rabbit skins, only local level use, both commercial and for domestic consumption.	yes	yes	1	Farmers/forestry owners. Consumers.	Minor	Not much.
Fuel, e.g. biomass, firewood	Firewood	Potential to supply biomass but no commercial exploitation as yet.	Yes	Yes	1	Forestry owners, consumers	Minor	Possibly
Water	Water supply	Yes, major water catchment for north west England. Significantly important	Yes	Yes, in principle	5	United Utilities, large number of customers	Major, but see below re. quality	Stay important
Cultural & social services								
Ecotourism & recreation	Walking, fieldsports, other outdoors activities	A range of visitors to the Bowland Fells site for both adventure type holidays and leisurely pursuits. Can be	Yes, visitor numbers	Yes, to some extent, from surveying visitors	4	Recreationalists, landowners, local tourism businesses	Significant benefit	Likely increased in higher quality landscape

		gauged by the presence of visitor centres and tourist enterprises and facilities in the vicinity of the Natura 2000 site.						
Cultural values & inspirational services, e.g. education, art and research	Non-use values for conservation Research values due to SCaMP being first of kind	The variety of natural and semi natural habitats resonate with different people for different reasons. But the 'look' of the place and the strong sense of place are important to local communities The site is also important for its educational potential.	Perhaps: difficult to measure the disparate values associated with sense of place. For education, visitor numbers, school trips	Difficult to measure, would require primary study	4	General public, scientists, decision makers	Significant benefit	Increasing with higher quality landscape. Science values depend on additional research and data collection expenditure
Landscape & amenity values	Mix of use and non-use values for high quality landscapes	The area is designated as an area of outstanding	Perhaps: difficult to measure. It is hard to separate individual value's	Difficult to measure, would require	4	Tourists, local populace, general public	Large benefit overall, but degraded areas reduce this	Likely to increase significantly as vegetation

		natural beauty	for this and for other cultural/existence type values.	primary study and a means of separating values for similar cultural services.				of bare areas advances and planted trees mature
Regulating services								
Climate / climate change regulation	Main impacts through reduced peat erosion and tree planting	The carbon gains from tree planting can be estimated. The benefits of rewetting need to be assessed against the methane emissions. Probably a substantial value but needs further work to understand the science.	Yes, but needs measurement and a better understanding of the science to ensure net changes are estimated fairly.	easy, if measured	4	Global population	Initially negative, now moving to positive	Likely to continue rising: tree growth and peat formation. But offset to some extent by methane.
Water regulation, e.g. flood prevention, aquifer recharge	Main impact is reduced risk of flash flooding from bare peat	Anecdotal evidence suggests better catchment management	Perhaps, if data collected over a sufficiently long time period.	Perhaps, if data collected, based on insurance	3	Local/regional downstream population; Environment Agency	Probably starting to benefit	Likely to rise substantially; may have some negative

		can moderate run off and have localised flooding mitigation benefits		premiums and probabilities or on avoided costs of mitigation measures.				impacts via low flows
Water purification & waste management	Major impact on water quality (reduced colour and DOC)	The benefits may be cosmetic (water colour) or to do with improved human health	Yes – data collected by UU. Need to know what benefits are being secured – cosmetic or health.	Yes – UU probably has this information	5	United Utilities, water customers	Previous high costs probably already lower	Costs likely to fall substantially
Erosion control	Reduced erosion of bare peat and reduced erosion from flood waters	Yes	Yes, probably, if data collected	Difficult	4	Farmers, United Utilities	Previous significant erosion already reduced	Erosion likely to fall further; peat formation likely
Storm damage control	Reduced downstream flash floods	Yes	Perhaps, again it may take time for the empirical evidence to be established	Perhaps	3	Local/regional downstream population; Environment Agency	Probably starting to benefit	Likely to rise substantially.
Fire regulation	Reduced risk of peat wildfires	Yes	Perhaps	Difficult	3	Local populations, United Utilities, farmers, global populations (climate change impact)	Revegetated peat less likely to burn	Likely to rise

Regulation of human health (physical and mental)	Via recreation and amenity	Partial understanding. Tranquilly and provision of green spaces may have physical and mental health benefits to local communities and visitors alike.	Difficult	Difficult	2	Recreational users, local populations, farmers	Probably positive already	Likely to increase
Genetic / species diversity maintenance, e.g. protection of local and endemic breeds and varieties	Key habitats and species	Yes	Yes, potentially (if data collected)	Yes, via benefits transfer or primary study	4	Global population, local to national interest groups	Probably helping key species	Likely to increase significantly
Supporting services								
Production	All these services may be captured separately but they will also be counted in estimates made of provisioning/regulatory services above	Yes	In principle	No	5	All above		Increase
Decomposition		Yes	In principle	No				??
Nutrient cycling		Yes	In principle	No				Increase

Water cycling		Yes	In principle	No				Increase
Weathering / erosion		Yes	Perhaps	No				Increase
Ecological interactions		Partly	Difficult	No				Increase
Evolutionary processes		Difficult	No	No				Increase?
Wider socio-economic benefits								
Direct employment supported by Natura 2000 site	Employment in SCaMP	Yes	Yes	Yes	Not applicable	Farmers, local population		Likely to decrease after main expenditures made
Indirect employment generated by Natura 2000 site	Via multiplier on expenditure	Yes	Potentially	Potentially		Local businesses and population		Likely to decrease after main expenditures made
Direct expenditure of the reserve	Cost of SCaMP	Yes	Yes	Yes		Local businesses and population		Likely to decrease after main expenditures made
Spending created by Natura 2000 site employees and volunteers supporting local economy		Yes	In principle	In principle		Local businesses and population		Likely to decrease after main expenditures made

Partnership benefits	Forging links among all the SCaMP partners and stakeholders	Yes	Difficult	Very difficult or impossible		All SCaMP partners, to varying degrees	Good partnership	Likely to continue, unless conflicts arise e.g. due to external threats
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3. STATUS & FUTURE TRENDS OF DIFFERENT BENEFITS

Problems of declining water quality from upland areas in the UK date back to the 1970s and the action of the Common Agricultural Policy to encourage farmers to increase productivity of the land. In upland areas, this led to widespread land-drainage of moorlands. Long drainage ditches or “grips” results in much faster movement of water through the areas, leading to several problems:

- Drying out of peat soils and blanket bog, leading to
 - Loss of biodiversity dependent on these habitats
 - Erosion of dried peat
 - Increased wild-fire risk
- Rapid drainage giving rise to:
 - Flooding downstream
 - Soil erosion
 - Loss of vegetation

The overall impact on the water supply is increasingly discoloured and turbid water. This requires greater expenditure on treatment to make it suitable for domestic consumption.

The problems are exacerbated by grazing pressure; but erosion also reduces agricultural productivity, so effective action to combat the problem can be a long-run win-win scenario. As noted in the table above, long-run returns to grazing may improve; however, agricultural activity is likely to remain dependent on subsidies.

Previous experiments in addressing these problems included United Utilities and RSPB “sustainable farm project”, involving reduced grazing pressure from de-stocking of sheep, and revegetation with wild plant species, and Moors for the Future and Peak District National Park Authority investigations of different approaches to reducing moorland erosion. It is possible that, in terms of ecosystem services, changing land management may have some short term costs (reduced stocking) which are necessary to secure long term benefits. An important feature of this ecosystem approach is the identification of these long and short term benefits to facilitate fair comparisons.

SCaMP’s vision for the region in 2010 includes: the restoration and maintenance of habitats to halt the declining population of birds; economically viable farming that helps maintain and enhance these special habitats, as well as improving raw water quality. This vision should also deliver government targets for improving sites of special scientific interest⁴.

Initial results suggest that SCaMP is starting to provide measurable water quality benefits. Turbidity and colour measured at Ashway gap pre- and post-treatment (application of geojute

⁴ Article 13 and CBI - CSR Case Study Series, September 2006

and heather brash, followed by lime, seed and fertiliser) show improvement.⁵ However it is too early to draw strong conclusions about the full extent of water quality improvements. As noted in the table above, these benefits are likely to result in significant reductions in treatment costs in the future.

The future and long term benefits of SCaMP should be:

- Restoration of important landscapes and habitats including blanket bog and heather moorland;
- Associated values for biodiversity conservation, in particular stopping decline in rare bird species in the area;
- Associated values for tourism and recreation with their values to both wildlife and tourism;
- Associated benefits of improved water quality and supply, and
- Development of sustainable farming practices to aid in maintaining the above.

Thus, as flagged in the table, the trends in SCaMP are all rather positive. The additional cultural/scientific values associated with studying SCaMP as the first project of its kind, and with its replication elsewhere, may decline over time as more and more projects like this take place. On the other hand, there is scope to maintain these benefits through long-term monitoring of conservation and other values in the area.

The SCaMP benefits could be threatened in three main ways:

- Lack of funding: SCaMP initially runs 2005-2010. The second planned phase is 2010-2015.
- Climate change: the habitats and species may be sensitive to changes in precipitation and temperatures.
- Wildfire: there is always a risk of wildfire in peatlands, although the actions of the SCaMP project minimise this risk.

These threats could impact on service provision and associated economic values. In particular, there are threats to the value of water treatment (failure of SCaMP would result in ongoing high costs of treatment) and to value of greenhouse gas regulation.

Funding is a key concern. There is always a risk that long-term funding for the ongoing needs of the project may not be possible. In principle, United Utilities can provide this funding in order to secure the water benefits, but this is dependent on OFWAT approval. In practice, SCaMP may be dependent on ongoing agri-environment payments supporting upland farmers and their ecosystem-service-sensitive management practices. Since society as a whole stands to benefit significantly from SCaMP, such ongoing support would seem to be justified.

⁵ McGrath, 2008, United Utilities Sustainable Catchment Management Programme Update November 2008, Presentation to CAR conference

The conservation values of the land are at risk in particular from climate change. Warming could result in changes to species ranges, with possible impacts on conservation values in the area. However, other species are likely to move in. Conservation needs to be understood as a dynamic process that must work with nature, and the fact that climate change influences the habitats and species present in a particular area does not necessarily imply that the conservation values will decline, and the changed ecosystems may also be worthy of conservation, and provide important ecosystem services.

Wildfire could result in high initial emissions of greenhouse gases, and short or mid-term impacts on water quality, but prompt action to restore the habitats after fire could minimise damages; in any case, as noted above, the risks of wildfire are much reduced in the re-wetted, restored SCaMP habitats than in bare peat.

4. KEY MESSAGES FOR THE FUTURE MANAGEMENT OF THE AREA

As noted in Section 1.1, this case study is not about a single Natura 2000 site, but rather about conservation and management in a wider area that covers parts of sites with various different designations, including Natura 2000, SSSI, AoNB, and National Park.

The SCaMP is a flagship project for integrated conservation and land-use for ecosystem goods and services, in this case primarily water supply. The sustainable management of the land for these benefits is certainly possible, and could enable an ongoing balance of conservation, economic, and local social benefits.

There is no obvious source of conflict between the various uses that has not already been dealt with. The key problems – overgrazing and animal fouling of water – have been addressed. Ongoing subsidy, aimed at promoting certain practices, will be required to maintain present standards and prevent future overgrazing. There may be need to manage recreation activities in such a way that conservation interests are not threatened. At present, however, this does not appear to be a significant problem.

A likely result of complete removal of subsidy would be land abandonment, with a mix of possible negative and positive consequences that we have not considered here, since it is at present a highly unlikely scenario.

There is not at present a problem of over-abstraction of water – the area is one of high rainfall and water shortage is not a problem. The issue being addressed through SCaMP is one of raw water quality. Physical/chemical treatment options exist and are at present used; the long-run benefit of SCaMP in water quality terms is the ability to reduce these treatment expenditures.

Of course, trade-off is present in SCaMP, but it is not primarily an issue of trading off ecosystem goods and services. Rather, the SCaMP is likely to lead to long-run improvements in all, or at least most, ecosystem goods and services in the area. The main trade-off is between current expenditures on conservation measures, and long-run benefits. There is an additional trade-off between agricultural productivity and conservation measures – this is addressed via agri-environment subsidies. Nonetheless, the long-term agricultural productivity of the renovated landscape will be greater with SCaMP than without it.

SCaMP can also play a role in the establishment of a functioning ecological network of protected areas in Europe. Not all of the SCaMP land is Natura 2000: some of it is Natura 2000, other parts are SSSI, and/or AoNB, National Park, and so on. In other words SCaMP links several designated areas under an additional scheme. Coordinated management across the whole SCaMP area means that some of the activities in SCaMP outside Natura 2000 sites will influence ecological/conservation benefits within Natura 2000 sites. In this context, parts of the SCaMP area might be considered in a similar light to “buffer zones” around conserved areas.

The above arguments suggest that the SCaMP is largely a win-win case. Short-term losses to individual farmers are being compensated via agri-environment schemes and direct investment from UU. Longer term, all sides appear to benefit.

This finding need not surprise us. The problem in much environmental management is one of market failure – there are goods and services that are not traded in markets, and that consequently do not have any price. These goods and services therefore tend to be treated as “free” and their values are often overlooked. This problem is closely associated with lack of property rights or other institutional frameworks within which different actors can express their costs and benefits associated with these environmental goods and services.

Where SCaMP is successful is in creating a framework within which these values can be articulated: there are key values associated with water supply and quality, and UU, as the land-owner, has been able to overcome market failure by negotiating directly with farmers and other stakeholders, and coordinating the draw-down of agri-environment payments. In effect this is rather similar to creating a market.

More generally, the win-win nature of the SCaMP case demonstrates the potential role of payments for ecosystem services and other negotiation and subsidy mechanisms in bringing about significant improvements in ecosystem goods and services and in conservation goals. Socio-economic benefits and conservation goals are not fundamentally in conflict. In fact, the value of the benefits of ecosystem goods and services has been systematically overlooked for decades, and so we should expect as a general rule that the economic and development system has tipped too far away from conservation, and that redressing this balance will in a wide range of scenarios lead to sustainable economic benefit for a range of stakeholders, in addition to the nature conservation values.

SCaMP’s success is probably in large part due to UU’s large land-holding: the link from ecosystem service to benefit is particularly clear, and the same organisation can make the expenditures and reap the benefits. In most cases, the situation will be more complex, in particular involving more landowners. Successful negotiations in such conditions may depend on stronger valuation evidence, partly to demonstrate benefits, and partly as a support for payments for ecosystem services.

UU itself has expressed an intention to roll out the SCaMP approach to other land⁶: “We want to extend SCaMP-type approaches to other catchment land we own and promote its use on other catchments which we might not own but on which we nevertheless rely for water supplies”. Other water companies are thinking along similar lines.

One of the findings of the case study is that, while it is relatively straightforward to flag up the key areas of cost and benefit, and even to identify qualitatively the likely extent of the benefits, information enabling quantified monetary valuation of benefits is sparse. Further investment in actual applications of monetary valuation techniques to the costs and benefits of conservation projects is a priority for ecosystem services research.

In summary, key messages from the case study include:

1. Natura 2000 sites, and areas covered by other conservation designations, continue to provide socio-economic benefits.
2. Socio-economic benefits can be enhanced by designation and conservation activities.
3. Natura 2000 sites provide their conservation benefits not solely within the context of the Natura 2000 conservation network, but also in the context of wider conservation policy – in the UK case, playing a central role in the UK BAPs and as key elements in National Parks, AoNBs and so on.
4. Natura 2000 sites similarly provide their socio-economic benefits within a wider landscape framework: they do not exist in a vacuum but continue to provide and support ecosystem goods and services at a range of scales: in this case study, provision of water and flood protection downstream, greenhouse gas regulation, and recreational benefits are key socio-economic benefits beyond the nature conservation benefits.
5. While socio-economic benefits of conservation activities can often be easy to identify qualitatively, severe problems with data availability mean that quantified monetary estimation is generally difficult or impossible. Further work on valuation and on data availability is important (but beyond the scope of this case study).

⁶ United Utilities Strategic Direction Statement (SDS), PR09 Regulatory settlement for 2010 - 2015.

ANNEX 1: Total Economic Value and economic valuation techniques

“Value” can have many meanings, so we need to be clear about exactly what we mean by Total Economic Value (TEV). The TEV conceptual framework is based on classifying the different sources of value to individual humans from the natural world. It splits value into “use” and “non-use” components.

- Use value
 - Direct use
 - Consumptive: personal use of resource in which the resource is used up, e.g. food and fibre.
 - Non-consumptive: personal use of resource in which resource is conserved, e.g. recreation. The boundaries may be blurred here by congestion or damage to the resource.
 - Indirect use: where the service leads to benefit by its impact on another production or consumption process, e.g. role of watersheds in reducing flood risks, or flood protection expenditures, downstream.
- Option value
 - Option value: value of keeping open option to use resource in future over and above any current and planned future use. Only exists because of uncertainty about future preferences and/or availability of the good, and risk-averse preferences.
 - Quasi-option value: value of avoiding/delaying irreversible decisions where changed technology or knowledge could alter optimal management. Particularly relevant to conservation, where possible future uses or roles in ecosystem stability and service provision are not known perfectly, and where events such as extinction, invasive species introduction or habitat transformation can be irreversible
- Non-use value
 - Altruistic: value of knowing that others can use an ecosystem.
 - Bequest: value of knowing ecosystem preserved for future generations to use.
 - Existence: value of knowing ecosystem exists, not associated with any current or future human use. This is different from intrinsic value because it is a value to humans.

These are all parts of economic value because they are all reflections of different ways in which individual humans value environments and their goods and services. Changing the level of provision of an environmental good or service results in changes in the levels of these values, or components of welfare, and the sum of these changes gives a measure of the total economic value to the individual.

We can derive an index of economic values for any given change by looking at trade-offs that an individual is prepared to make. Considering some proposed improvement in environmental quality that would result in changes to the above components of TEV for an individual, we ask, what is the most of some other good or service the individual is prepared

to give up in order to secure this improvement in environmental quality? The answer expresses, for that individual, the value of the environmental change in terms of the value of the other good or service.

The other good or service (the “numeraire”) could be anything, but to be useful as an index, should be some easily understood quantity. For reasons of convenience and comparability, money is generally used. This has several clear advantages, in particular that people in modern societies are well used to using money in a very wide range of trade-offs (buying most of their daily necessities and luxuries, selling their labour, trading-off through time via borrowing and saving, donating to charitable causes).

To the extent that individuals attempt to use their financial resources to maximise their personal welfare (and this is not necessarily the same as personal material comfort, due in particular to the inclusion of altruistic non-use values) this makes monetary value, expressed as willingness to pay (trade-off) for different goods and services, a useful index of personal welfare.

Environmental valuation techniques essentially seek to estimate the Total Economic Value. Different techniques are developed to use different types of data and hence there are three main families of valuation technique:

- **Market-based techniques:** using evidence from markets in which environmental goods and services are traded, markets in which they enter into the production function for traded goods and services, or markets for substitutes or alternative resources. Can be applied for example to food and fibre (direct markets), flood risk (production function for given level of protection), and water quality (market for bottled water).
- **Revealed preference (RP) techniques:** based on interpreting actual behaviour with both environmental and market elements. Recreational values are often assessed using RP methods, and aesthetic elements may also be valued this way. There are two main variants to these techniques: travel cost method which uses data on individuals/households travel expenditures in this context for recreational activities and hedonic property prices to estimate the implicit price paid for environmental characteristics of the area a property is in through the differences in the property prices in different areas.
- **Stated preference (SP) techniques:** based on stated willingness to pay of representative samples of respondents in a specially designed questionnaire. The techniques are very widely applicable, used for example for biodiversity, and the only techniques capable of capturing non-use values.

ANNEX 2: Valuation techniques for specific ecosystem goods and services.

Water supply and quality could be valued via willingness to pay (WTP) for water (a water demand curve) but in fact since the main impact is on the costs of treating the water, the relevant value is the change in the cost of treatment. Water discolouration and nutrient load are the main factors which impact upon treatment cost, since standard treatments (chemical or UV) for water purity are applied regardless of quality. It may be possible to identify an industry standard coagulant dose for different levels of water discolouration and therefore develop a transferable value from savings (benefit) of reduced nutrient load on end of pipe costs, but it would be preferable to use data specific to the SCaMP case.

Food and fibre is the most straightforward category to value. This should not be done simply at market values, but rather following the general rules for agricultural valuation set out in the “Multi-Coloured Manual” (MCM) (Penning-Rowsell et al., 2005) that explain how to remove the impact of agricultural subsidies.

Climate regulation can be valued using official UK guidance - although these need not be directly related to WTP estimates, nevertheless they are clearly the most suitable choice for appraisal purposes, for reasons including consistency in appraisal across the public sector and ease of application. There is new guidance (DECC, 2008) setting out in some detail (see in particular table 12, shadow price of carbon from 2007-2050) the official approach to valuing GHG regulation.

Recreation and landscape amenity can be valued in principle via travel cost or stated preference surveys, while hedonic valuation might also be used for local residents. Benefits transfer is possible given the relatively large literature on the this benefit type and location. It is necessary to deal with quality variables, in this case – we are not dealing with the creation or removal of a recreational activity, but rather with an improvement in its quality.

Biodiversity and non-use values need to be estimated via stated preference surveys. Benefits transfer may be possible, but is likely to be less accurate than an original study.