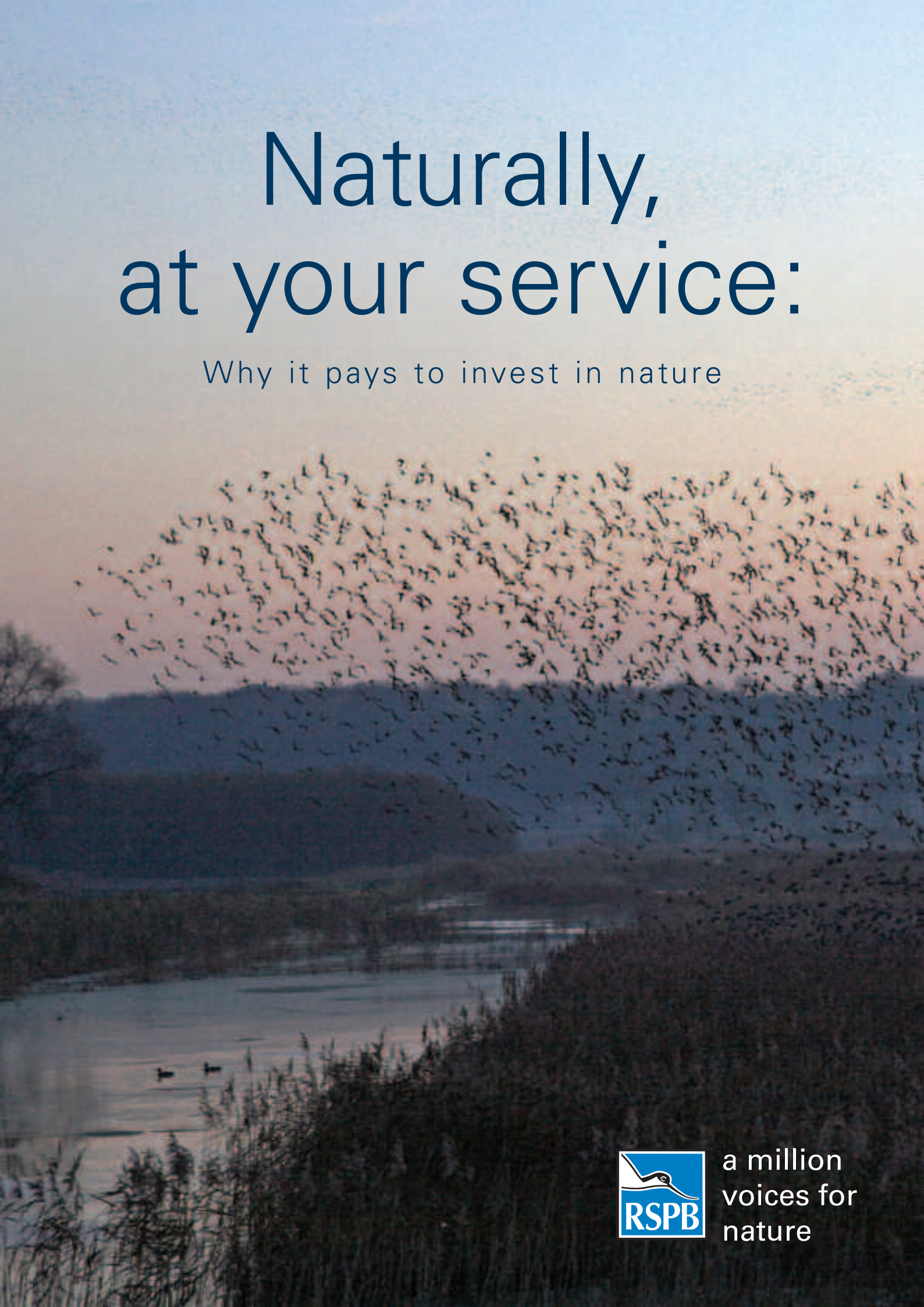
Naturally, at your service:

Why it pays to invest in nature



RSPB

a million voices for nature

Ben Hall (rspb-images.com)

Contents

Foreword

A healthy natural environment supplies us with a multitude of life supporting and life enhancing benefits. Conservation is therefore a practical necessity. These so called 'ecosystem services' range from the complex biological processes that create soil and clean water, to providing inspiring landscapes or amazing wildlife spectacles. They represent the bridge that links the natural world to human wellbeing. The RSPB has long recognised that a more natural environment benefits both wildlife and people. We are committed to actions that will contribute to their delivery, particularly where this complements our conservation goals.

In the run up to the 2002 World Summit on Sustainable Development, we felt it was timely to assess what progress had been made to better value and protect the Earth's ecosystems over the 10 years since the Earth Summit in Rio de Janeiro. We assembled a group of international experts who compared the loss and degradation of natural habitats with the benefits of conservation. The conclusion was that, in spite of conservation actually making greater economic sense, the loss of biodiversity had continued unabated. The research found that financing an effective global programme for the conservation of remaining wild nature would yield an estimated benefit one hundred times greater than the cost.

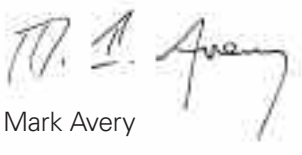
This conclusion fits in with more recent findings from 'The Economics of Ecosystems and Biodiversity' (TEEB) project. Initial estimates in phase one of this project estimated that, by 2050, the costs of not halting biodiversity loss would be equivalent to a staggering US $14 trillion per annum, or 7 percent of global GDP. So, if protecting nature makes such good sense, why are we destroying it at an accelerating rate? A large part of the answer lies in the failure to account for the values of ecosystem services in everyday decision-making.

As our understanding of the scale and imminence of the twin dangers of climate chaos and the catastrophic loss of biodiversity grows, so the need to find effective solutions becomes ever more urgent.

If the concept of ecosystem services is to be of practical use, we need to demonstrate the value of nature at appropriate scales and find the means to integrate these values into everyday decision-making. To this end, the RSPB, supported by the Centre for Social and Economic Research in the Global Environment, Natural England and Defra, convened two further international workshops in 2006, to explore how an ecosystem services approach can be made operational and embedded in policy processes. This publication draws heavily on the findings of that research and presents a new approach that we feel is necessary if the concept is to be made workable.

We believe the concept of ecosystem services provides a strong economic case for conservation and a powerful means to achieve a more sustainable economy. From a conservation viewpoint, we must understand better the trade-offs and opportunities for aligning conservation goals and the delivery of valuable ecosystem services.

Economic valuation can provide a powerful reason to conserve. There are though, other compelling reasons. Many people, like us, believe conservation of the natural world to be a moral imperative and believe in the intrinsic right of other species to co-exist on this planet. We have a duty to protect them even if they are neither beautiful, nor seem to do anything useful. Nature's value, in economic terms, is immense but, for these reasons, a purely economic valuation will always be an underestimate. To succeed, the concept of ecosystem services must complement, not replace, ethical and scientific justifications for conservation.



Mark Avery

Key messages and recommendations

Nature provides a myriad of services, which are not only essential for human life, but also enrich it. Conserving it often makes sound economic sense. Yet, in spite of this, we continue to destroy ecosystems' ability to deliver critical services, like flood mitigation, soil formation, water purification, and climate regulation.

In our current planning and economic systems, **decisions about land and resource use tend to focus on the short-run delivery of one service,** without adequate consideration of the impacts on the full range of services over time.

The ecosystem service approach helps us balance the competing demands we place on our natural environment, helps us understand why growth today, at the expense of ecosystem health, will be short lived and outweighed by future, longer lasting, climatic and ecological costs.

Ecosystem service valuation can serve to embed and make operational the principles of sustainable development. **It provides the rationale for taxing damaging externalities and for paying for the delivery of valuable, non-marketed benefits, consistent with the 'polluter pays' and 'provider gets' principles.** Key to this is that valuation should be based on all ecosystem goods and services, and not simply those that can be traded.

Valuing ecosystem services is just a first step in making an ecosystem services approach operational. A necessary second step is to **establish the means of recognising or capturing these values in real, private and public sector decision-making processes.**

To apply ecosystem service thinking, we will also need science that helps us quantify where synergies and trade-offs lie in the management of ecosystems for biodiversity and for other ecosystem services.

Governments, at all scales, have a central role to play if we are to move from theory to practice. While ecosystem service thinking is reflected in important new policies, such as the new marine legislation and the Water Framework Directive, considerable work needs to be done to adapt policy and planning across government.

We recommend that the UK Governments:

- Lead on developing suitable tools and guidance through the Treasury's Green Book, for example, and other major appraisal processes to ensure an ecosystem service approach underpins all resource use decisions
- Develop spatial planning regimes that reflect the scale and interconnectedness of ecosystems
- Promote collaboration across decision-making tiers and regions
- Adopt adaptive management approaches, incorporating feedback systems, to account for any uncertainties or lack of full scientific information where appropriate
- Re-orient green fiscal strategies, based on the ecosystem service framework, to reflect the 'polluter pays' and 'provider gets' principles
- Invest in protecting globally important ecological infrastructure, such as tropical forests, wetlands, and other valuable habitats
- Broaden national accounting frameworks to reflect the status of our ecological as well as financial health, by accounting for the value and benefits of ecosystem services
- Provide funding for scientific research that develops a better understanding of how ecosystems provide services

1. Ecosystem services and sustainable development

Wildscape (Alamy)

> “The question of the century is: how best can we shift to a culture of permanence, both for ourselves and for the biosphere that sustains us?”
>
> *Edward O. Wilson*

Ecosystem services refer to the vast and varied ways that the natural world supports and enriches our lives. Recognising their value is key to sustainable development, which requires the integration of economic, social, cultural, political, and ecological factors in decision-making.

Nature contains stocks of capital resources, such as forests and peatlands, which yield a flow of valuable goods or services. Together, the stocks of natural capital and the services they support underpin economic activity and comprise the earth's life-support system. Traditionally we have valued resources like timber and coal, but have failed to recognise the full array of other services, such as soil formation or water quality regulation. In recent years, recognition of these ecosystem services has changed the way that we think about the interaction between our economy and the natural world. This recognition has led to the development of an ecosystems approach to environmental management which is designed to promote conservation and sustainable use in an equitable way. The concept of ecosystem services is integral to, but distinct from, the broader ecosystems approach[1]. Key characteristics of the ecosystem services concept are that it:

- makes people an integral part of ecosystems
- incorporates economic valuation of nature's services
- illuminates trade-offs in natural resource management and helps us identify winners and losers of land and marine use decisions
- recognises multiple interests and points towards integrated land, marine and resource management
- requires varying spatial and temporal scales to be taken into consideration when deciding on resource management options

The ecosystem service concept is consistent with the principles of sustainable development in that both:

- focus on people, emphasising what is fair and equitable
- focus our minds on the wellbeing of future generations, given that many changes today alter the flow of services for many years to come
- require consideration of local to global dimensions and interactions
- highlight the interconnectedness and interdependence of nature and economies
- recognise the existence of environmental limits. Natural capital can be depleted, but not always increased if ecosystems are irreparably damaged or species go extinct.

The concept is potentially a very valuable tool but, for it to be widely accepted and deployed, we need to know how it fits in with existing policy and decision-making frameworks, like spatial planning or cost-benefit analyses, or to understand what amendments we will need to make to those frameworks. We also need to know what research will help most to make the approach operational. **Adopting an ecosystem service approach can then serve to strengthen the scientific underpinnings of the environmental dimensions of sustainable development.**

This publication is divided into two parts. The first part, containing sections one to seven, outline the RSPB's thinking about ecosystem services. It also summarises findings from RSPB sponsored research, commissioned to examine how we translate theory into policy and practise. The second part of this publication contains a series of examples illustrating how the concept of ecosystem services is informing our own conservation practice at a variety of scales and in a variety of places.

[1] In referring to an ecosystem service approach or concept, we mean the process of identifying, quantifying and valuing ecosystem services. The ecosystems approach, as elaborated by the CBD and Defra, is a broader management approach based on a set of principles that recognise intrinsic values and include other value judgments not inherent to an ecosystem service approach.

2.The big picture – redefining progress

Adrian Sherratt (Alamy)

> “That which seems to be wealth may in verity be only the gilded index of far-reaching ruin”
>
> *John Ruskin*

Currently, global economic growth is neither broad based nor sustainable. The concept of ecosystem services helps us understand why growth today, at the expense of ecosystem degradation, will be short lived and outweighed by future, longer lasting, climatic and ecological costs.

The global economy is configured to deliver growth in the hope that it will meet our aspirations to eradicate poverty and provide a better life for all. It is a sobering thought that economic growth today may actually be making us all poorer in the future. The economy is part of an ecological world that is characterised by thresholds exemplified by the dangers of atmospheric greenhouse gases, the damage done to the ozone layer and the collapse of some ocean fisheries. In conventional economics, the mainsprings of development are human ingenuity and technical invention but however ingenious we are, there are limits to the extent that we can find substitutes for the services the environment fortuitously provides. A healthy natural environment is fundamental to human existence.

The world's ecological systems have always experienced a degree of change and periods of disturbance, but we are living through a period in which ecosystems are being degraded and biodiversity is being lost at rates not seen in human history. That was a conclusion of the Millennium Ecosystem Assessment (MA), which found that over half of the world's ecosystem services are being degraded or used unsustainably. This matters both because current rates of species extinction are much higher than natural extinction rates and because, combined with climate change, global consumption, and population growth, this loss means an impoverished future for all, with many regions in the world risking catastrophic environmental disruption.

This degradation of ecosystems and their services is seldom wilful or wanton. It happens mainly because people can sell some services, like food, fish or tourism, but not others, such as landscape beauty or clean air. This selectiveness of markets is not arbitrary; it simply reflects the fact that **not everything that has value can be traded.** Such problems, of market failure, have often been compounded by policy failures, like perverse subsidies. Together, these encouraged unsustainable agriculture, fossil fuel dependency and led to the depletion of some fisheries.

The major drivers of biodiversity loss are essentially economic at heart. Forests are felled and converted to oil palm because, with today's markets, it is profitable; invasive species are spread through international trade; and climate change is essentially a consequence of the way we produce the things we choose to consume. **The depletion of environmental resources in pursuit of short-term economic growth is akin to living off capital rather than income.** The diversity of life and the formation of our natural capital have been millions of years in the making. There is nothing to justify this raid on what should be the inheritance of future generations.


Mark Sisson (rspb-images.com)

So how can ecosystem service thinking help us move away from a fixation solely on economic growth and towards prosperity and a sustainable economy? First comes valuing the services we need from land and sea. Acknowledging the value of ecosystem services in decision-making, together with understanding the fundamental role of biodiversity in underpinning services, helps balance the many competing demands placed on our natural environment. Secondly, it can help us to establish appropriate limits on the use of natural resources. Thirdly, it provides us with a tool for greening our economic accounting frameworks, redefining what progress means and refining our measures of prosperity.

3. Making an ecosystem service approach operational

Ben Hall (rspb-images.com)

> “Earthworms, though in appearance a small and despicable link in the chain of nature, yet, if lost, would make a lamentable chasm... worms seem to be the great promoters of vegetation, which would proceed but lamely without them...”
>
> *Gilbert White (1789)*

As is apparent from the quotation above, the existence and importance of some ecosystem services have been well known for centuries. The value of some services, particularly food, fibre and recreational opportunities, are clearly valued and already influence the way we use our land and seas. What has been lacking is a systematic approach to identifying and valuing the full range of nature’s services. The idea of ecosystem services is intuitively appealing as it mirrors a production process linking natural capital with human well-being. If the concept is to shape policy, we need to acquire the right kind of evidence regarding service delivery and then develop the appropriate decision support tools. This section describes some of the key considerations we need to address in making an ecosystem service approach operational. One of the case studies, presented later, Valuing the Arc, shows how the thinking described in this section is beginning to be applied in practice.

3a. Defining ecosystem services for practical uses

An appropriate definition and classification system of ecosystem services depends on the decision or policy-making context in which an ecosystem services approach is being used.

The Millennium Ecosystem Assessment classification of ecosystem services

Provisioning Services	Regulating Services	Cultural Services
Products obtained from ecosystems eg	Benefits from regulation of ecosystem processes eg	Non-material benefits obtained from ecosystems eg
Food	Climate regulation	Spiritual and religious
Fresh water	Disease regulation	Recreation and ecotourism
Fuelwood	Water regulation	Aesthetic
Fibre	Water purification	Inspirational
Biochemicals	Pollination	Educational
Genetic Resources		Sense of place
		Cultural heritage
Supporting Services Services necessary for the production of all other ecosystem services eg soil formation, nutrient cycling, primary production		

There is no one correct definition or classification system of ecosystem services. To date, most definitions of ecosystem services have been general by design to embrace their broad and disparate nature. The best known classification comes from the MA and is summarised in the table above.

The MA approach effectively illustrates the range and nature of services and is extremely useful for auditing the trend in services. To enable ecosystem services to be integrated into economic accounts, and for enabling us to estimate monetary values, a different approach is needed. Specifically, we need to distinguish between the quantities of service flow (which relate to ecological processes) from the value people decide to place on them. The starting point for economic valuation is to understand both who benefits from a service and in what ways they benefit. So, to enable us to value services most effectively, we believe the following definition of ecosystem services is appropriate:

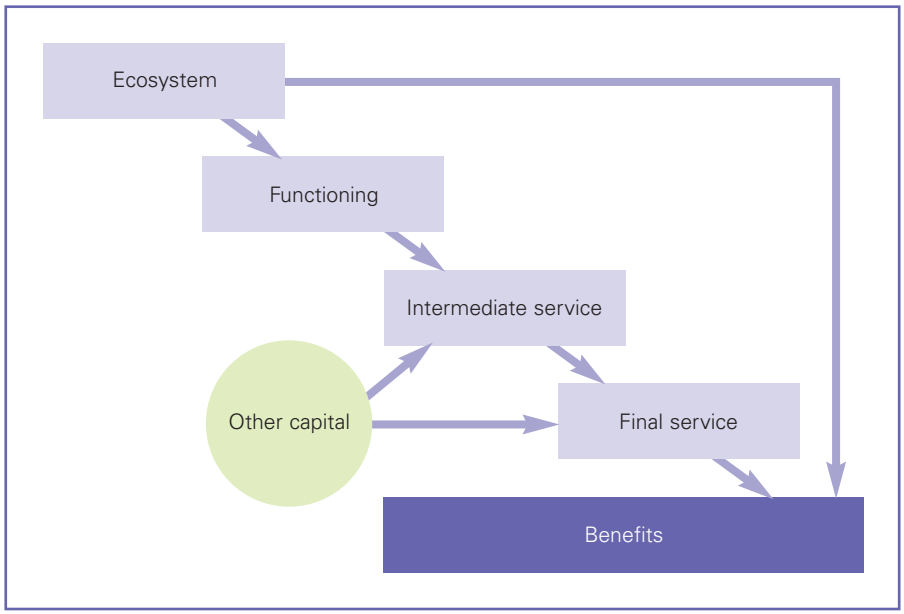
> “Ecosystem services are the aspects of ecosystems utilized (actively or passively) to produce human wellbeing.”

Diagram 1 (see page 10) illustrates this approach to ecosystem services.

This definition does not conflict with other definitions or classification systems. The distinction however is not merely semantic. It is necessary to help us identify and value appropriately the benefits of nature and therefore fundamental to making the concept of ecosystem services operational.


Andy Hay (rspb-images.com)

Diagram 1. Conceptual framework for decision-making



Here we have an **ecosystem**, or biophysical structure, perhaps a forest or pond. This ecosystem may itself deliver final ecosystem services if it contains species or attractive views that people value. This ecosystem, will support a number of ecological **functions** or processes that involve such things as decomposition or nutrient cycling. When these processes have beneficial outcomes for people, they become services such as fish, crops, clean water, and scenic landscapes.

For valuation purposes, we need to distinguish between **intermediate** and **final** services. Pollination, for example, is an intermediate service while the apples and almonds we eat are the final service. Clean drinking water is a final service of water provision. In turn, water provision is a function of intermediate services such as nutrient cycling and soil retention. This distinction, between intermediate and final service, is essential to avoid double counting when it comes to adding up the benefits from an ecosystem.

It should also be noted that, under this approach, services are purely ecological in nature so exclude cultural or spiritual phenomena. **Benefits** relate to the subjective values people place on nature's services. They describe the variety of ways human wellbeing is improved from utilising services. Distinguishing benefits from services is necessary if we are to value ecosystem services appropriately. A key implication of this approach is that some services can be intermediate for some benefits but final for others. Water purification might be one example. This is a final service to people who value clean drinking water but it is an intermediate service to people who value clean water for the impact it has on fishing or birdwatching.

A final point to note from the diagram is that the benefits of ecosystem services are commonly generated in combination with other inputs and forms of capital such as human knowledge or equipment. Fish may be gifts of nature but the landed value of a catch includes the labour, boats, fuel, and nets used to catch and transport them.

Ernie Janes (rspb-images.com)

> “The economy is a wholly owned subsidiary of the environment”
>
> *Senator Gaylord Nelson*

3b. Valuing ecosystem services

Economic valuation represents a powerful means of influencing decision-making and is core to the ecosystem service approach. It must, however, be used judiciously. There are limits to economic valuation and some ecosystem service benefits lend themselves more successfully to monetary valuation than others. Additionally, some reasons we value nature, notably moral or spiritual motivations, cannot be captured using economic techniques.

Water is vital for life so somewhat more useful than diamonds. Diamonds command much higher prices than water. This ‘paradox of value’ was well known to the pioneers of economics. Economic growth is only a measure of the monetary value of goods and services bought and sold in markets. It is not a good measure of wellbeing. Sustainable development really requires consideration of the ‘true’ importance of the goods and services which our decisions deliver or extinguish.

In reality, we have market prices to show us what things are exchanged for, but few ways to gauge the true value of anything. For this reason, many people remain sceptical about valuing some aspects of nature while others believe the intrinsic values of nature require rights-based approaches to environmental management. Strong cases have been articulated for non-monetary approaches and much environmental management is delivered through legislation. However, it is our failure to value ecosystem services, which means they are routinely assigned a low or zero value in the majority of decision-making contexts that determine resource use.

Given the pervasive use of cost-benefit criteria in both public and private realms, valuing ecosystem services can help us make substantially better decisions.

The MA identified four causes of value that reveal the broad range of ways we benefit from nature.

- **Direct use values.** These include the benefits we get from eating food, fish, using timber or enjoying outdoor recreational activities.
- **Indirect use values.** These include the processes that contribute to the production of goods and services like soil formation, water purification and pollination.

- **Non-use values.** Many people derive pleasure from simply knowing a resource exists or because they wish to bequeath it to future generations.
- **Option values.** Despite the fact that people may not currently be gaining any benefits from them, many ecosystem services still hold value for preserving the option to use such services in the future either by the individual (option value) or by others (bequest value)[2].

Taken together, these values comprise what economists refer to as Total Economic Value (TEV). Economists have tools, of varying credibility, to assess all these values.

Valuation is central to embedding the ecosystem service concept but, on its own, it is not appropriate for all environmental management decisions. Examples where valuation is not appropriate or will have a limited role include:

- **Marginality.** Valuation is appropriate for small changes; where many decisions are taken. It makes sense to value the change in service flow from conversion of a hectare of forest but not from conversion of the world's entire forests. The only sensible answer to the costs of losing the world's forests would be infinity.

- **Threshold effects.** These occur when a reduction in biodiversity to a certain level causes a sudden collapse in an ecosystem's ability to deliver services. The demise of some of the world's most profitable fisheries, such as the Grand Banks cod fishery off Newfoundland Canada, is an example of a threshold change in a once thriving population. For potentially large but uncertain environmental changes, or where an ecosystem or service is deemed susceptible to large reactions from further change, economics should be subordinate to scientific evidence.

- **Complexity.** The ability to accurately value services is limited by the complexity of nature itself. Accurate quantification of service provision is seldom easy, let alone measuring the change in service delivery associated with different land or marine use options.

- **Undervaluation.** The TEV of a system will always be less than the Total Systems Value. TEV does not capture the infrastructure value associated with the underpinning, life support functions of healthy systems. Additionally, TEV excludes intrinsic values and, for practical reasons, we can only ever estimate values for a subset of services.

- **Moral considerations.** As noted, the TEV framework does not include intrinsic values and some decisions, for example one which may commit a species to extinction, are beyond the bounds of economics.

In addition to science and economics, effective environmental management is determined by broader political, cultural, and historical factors and will always require the use of a number of additional tools beyond valuation. **Where valuation is used it should generally be one component of a broader decision-making framework.** This indeed is the advice of the UK Treasury, which recommends the use of multi-criteria decision analysis when faced with a combination of monetary measures and qualitative data.

[2] A related kind of value is quasi option value. This represents the value of avoiding irreversible decisions until new information reveals whether certain ecosystem services have values that are currently unknown to us.

3c. Winners and losers

Environmental management changes entail costs and benefits to different people, from the global to the local level. The focus on human wellbeing within an ecosystem services approach leads to a greater consideration of the distribution of these costs and benefits. This itself should be considered integral to an ecosystem service approach.

Economics is largely about how we make trade-offs between alternative options. A farmer may increase profits by converting a forest to a wheat field. What if that conversion decreases the supply of services that may be of equal or greater importance to others, such as pollination, recreation, clean water, fuel wood or carbon sequestration? Striking the right balance between competing interests requires an understanding of the full array of services associated with alternative land or resource uses, as well as who will benefit and who will lose out from the different options both now and in the future.

Identifying the range of people affected, both positively and negatively, by resource use decisions is a key step for valuation. In the example above, if the farmer retains the forest, he will lose the potential profits from conversion. Within a cost benefit framework, what matters is the net costs or benefits between different potential options. There have been several hundred ecosystem service valuation studies done to date but only a handful have sought to compare benefits associated with alternative resource management options.

There is, therefore, a major question of equity in addressing biodiversity loss and in how the costs for benefits foregone of land or resource management, should be shared. The 'polluter pays' principle is widely accepted in economics and environmental law. **An ecosystem services approach, in identifying a range of non-marketable benefits suggests a corollary principle that the 'provider gets'.** In Europe, this principle can provide a rationale for agri-environment payments related to ecosystem service provision. At the global level, where biodiversity rich areas are delivering valuable global public goods, such as carbon storage and biodiversity conservation, the global beneficiaries should be helping to meet the costs of conservation as well as the opportunity costs forgone by local people through conserving resources. Doing this could mean establishing incentive structures working in favour of conserving rather than felling tropical forests or draining wetlands. The issue of payment distribution and how payments reach those that should benefit from them is a critical issue, particularly in countries where governance, local capacity, knowledge and communication on these issues may be poor.

Niall Benvie (rspb-images.com)


David Tipling (rspb-images.com)

3d. Ecosystem services deliver benefits over different time and geographical scales

Understanding how different services are actually provided is important for environmental management and planning. In relation to geographic scale, consideration of service delivery may lead us to interventions within larger, landscape-scale management approaches.

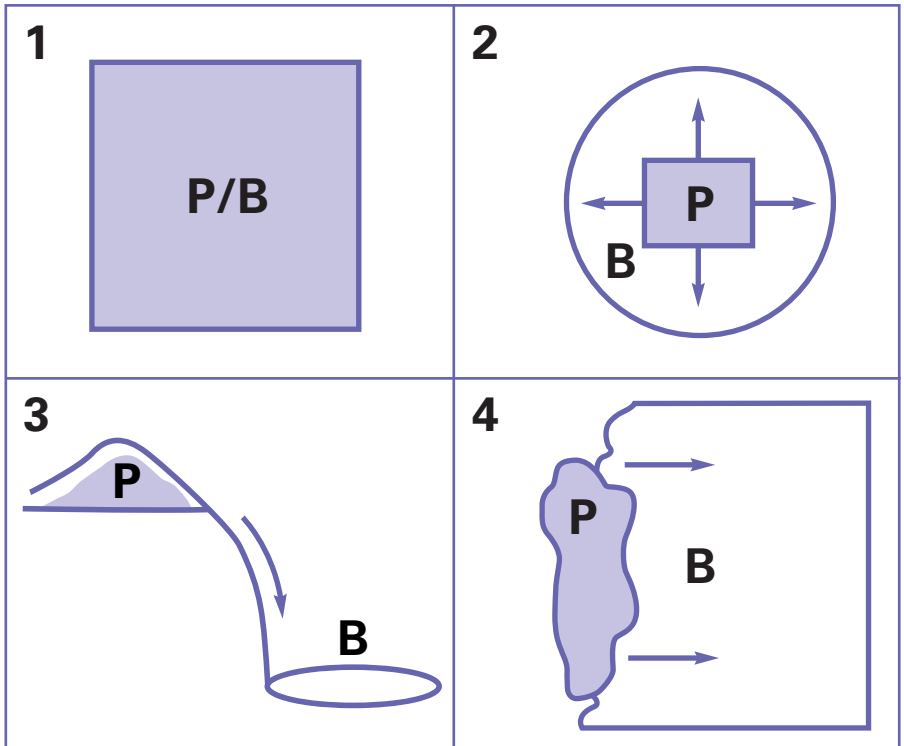
Two key features of the ecosystem service approach are that services only exist if somebody benefits and that those beneficiaries include future generations. On the latter point, tropical forests today provide the benefit of maintaining a liveable climate for future generations. In terms of geography, services deliver over multiple spatial scales. Identifying and valuing them depends on knowing how the services are supplied and where the beneficiaries are located. The benefits of some services can only be realised in the same place they are generated. Other services provide benefits, at various scales, beyond their point of production. For example, the flood mitigation services provided by saltmarshes benefit communities adjacent to the marsh, pollination may have local or regional benefits while carbon sequestration and biodiversity protection generate benefits globally. These possibilities are shown in the illustration to the right.

For management, it is also important to know how site-specific services are. Some services, like food production or recreational opportunities, can be delivered at varying scales and in different locations. Many regulatory and supporting services, on the other hand, rely on complex ecological processes so the scale and location cannot be easily influenced. For example, the maintenance of water regulatory services requires a landscape and land-use management approach across an entire watershed. Such services pose particular challenges for planning, given their immovability and the fact that their provision will seldom match existing political boundaries.

A similar challenge arises from ecosystem degradation or potential restoration. Rarely will solutions respect political boundaries or be achievable over short time horizons. Establishing rules, rights and responsibilities at the range of spatial and temporal scales at which ecosystem services deliver is a major challenge. **Effective management requires a spatially explicit approach, working across boundaries.** Success will depend on collaboration at several levels, from the local to the global.

For environmental management, knowing what services regions provide and how they flow over the landscape is necessary to balance the different demands – food, energy, climate change mitigation and adaptation, water reliability, flood risk management or conservation – we place on our land and seas. Knowing how and where services are delivered is also important for identifying potential opportunities for developing payment schemes for ecosystem services or effective means of capturing the benefits.

Diagram 2. The delivery of ecosystem services



Possible spatial relationship between service production areas (P) and service benefit areas (B). In panel 1, both the service provision and benefit occur at the same location (e.g. soil formation, provision of raw material). In panel 2 the service is provided omni-directionally and benefits the surrounding landscape (e.g, pollination, carbon sequestration). Panel 3 and 4 demonstrate services that have specific directional benefits. In panel 3, services provided in uphill areas, for example water regulation services provided by forested slopes, deliver benefits down stream. In panel 4, the service provision unit could be coastal wetlands providing storm and flood protection to a coastline. *(Reproduced from Fisher et al. 2008)*

> “Conservation is usually seen as a chore. But conservation is not a drain on the economy, it's a source of benefit…the economic argument for conserving the environment was not getting a hearing, although the economic arguments against conservation are always emphasized”
>
> *Geoffrey Heal*

3e. Capturing the values of ecosystem services

Recognising the benefits of ecosystems and their values is just a first step in making an ecosystem services approach operational. Establishing the means of incorporating these values in real, private and public sector decision-making and ‘capturing’ the non-marketed benefits, is a necessary second step. Achieving this will depend on broad political and institutional changes. The challenges are significant. It will undoubtedly be hard, for example, to get people to pay for services they have traditionally been receiving for free. Public attitudes matter because they underpin behaviour and affect value judgments on what changes are deemed acceptable. However, values can be changed and ecosystem service thinking can help demonstrate just why nature is so important to us all.

If private decisions are to coincide with what is socially optimal it will be critical to put a price on the environmental costs and benefits, which currently evade markets. Underlining this point, the Stern Review on the Economics of Climate Change highlighted avoiding deforestation as one of the most cost-effective means of reducing current carbon dioxide emissions. Yet, the rate of global deforestation cannot be expected to change unless the financial returns to forest owners, for sequestering and storing carbon, exceed the financial returns of converting forests. We, the global beneficiaries must be prepared to actually pay for the carbon benefits tropical forests offer.


Eleanor Bentall (rspb-images.com)

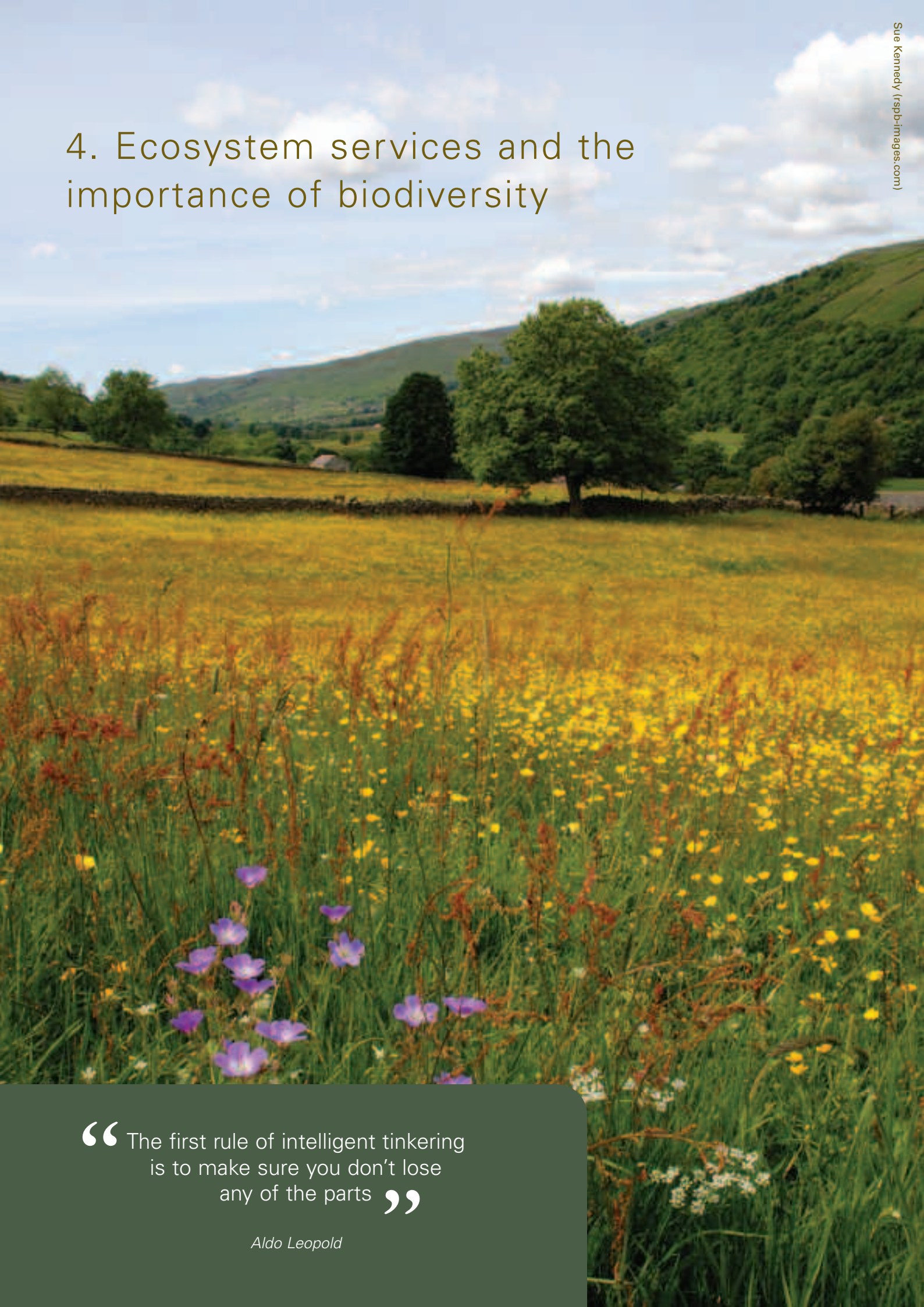
Because many ecosystem services are, to varying degrees, public goods, their provision will generally need to be stimulated by public actions or charitable funds. There will always be a major role for government intervention to ensure an appropriate level of supply. This can be done through traditional regulatory approaches, fiscal interventions, or innovative approaches like cap and trade schemes or conservation auctions. Governments, at all tiers, will need to play a part. For the UK, the planning system principally operates at a local scale, and is not currently set up to manage services which deliver over broad scales. Collaboration will be essential.

Encouragingly, the private sector is beginning to play its part. Around the world, many innovative payment schemes for ecosystem services have been developed, particularly for carbon sequestration, water quality and biodiversity. The core idea of such schemes is that service beneficiaries make direct payments to local landholders in return for adopting land management practices that secure ecosystem conservation or restoration. A small number of schemes have been purely private sector initiatives driven by cost efficiency. The Perrier bottled water company, for example, pays fees to landowners in watersheds upstream of their springs to retain forests, guaranteeing a clean, reliable water source. Other schemes have developed innovative approaches to deliver multiple objectives. In South Africa, the 'Working for Water' project removes invasive alien plants from watercourses with the aim of improving biodiversity and water services and creating jobs for the poor.

The private sector has also developed a number of other approaches designed to internalise environmental benefits into markets. Eco-labelling is one example where consumers pay a 'green premium' on top of the market price for production methods that are certified to be environmentally benign.

However welcome these initiatives are, scaling up will require governments to do much more to align economic and financial incentives with service delivery and ecosystem stewardship. Governments must help lay the foundations for developing formal and informal markets in which a fuller range of the beneficiaries of ecosystems contribute to the costs of their maintenance. Without government intervention, nature will continue to be undervalued and overexploited.

4. Ecosystem services and the importance of biodiversity



Sue Kennedy (rspb-images.com)

> “The first rule of intelligent tinkering is to make sure you don’t lose any of the parts”
>
> *Aldo Leopold*

Ecosystem services focus on the link between ecological processes and human wellbeing. The link between *biodiversity* and these processes is equally important in terms of nature conservation, but the relationship is, as yet, poorly understood.

Biodiversity – the variety of life on earth – can be considered an ecosystem service in its own right because beautiful or inspiring species and living communities are valued by people for their sheer existence. Biodiversity also has value for the resources it harbours, which we have yet to study or exploit. The existence value of wildlife is amply demonstrated by the RSPB campaign to protect albatrosses, which has, since 2005, raised over one million pounds from people, most of whom have never, and will never, actually see an albatross.

Biodiversity also provides people with large cultural benefits. The millions of people who visit the countryside or coast to 'experience nature' demonstrates this. Wildlife in gardens and parks is also an important source of inspiration and provides recreation and relaxation. These benefits are clear to our million members and the many more who visit our reserves.

However, biodiversity is about more than just the cultural services or charismatic species and inspiring landscapes. Less glorified elements of biodiversity, such as earthworms and soil microbes, are instrumental in shaping nature's structure and processes. In this, biodiversity plays a fundamental role in providing the whole array of services.

But what level of biodiversity, in the broader sense of richness of number of species and number of individuals, is important? The relationship between the overall diversity of species in an area or system, and the ecosystem processes, stability and provisioning services that result, is complex and poorly understood. Some species can apparently be lost without major impact on wider processes – or at least no impact that is immediately evident to people. Other species, however, clearly have keystone ecological status and their loss leads to cascading and even catastrophic ecosystem effects. We cannot yet tell which species are critical to system processes in any general or reliable way. For this reason alone, humanity must always strive to prevent extinctions.

Some evidence suggests that ecosystems with greater biological diversity might be more adaptable and resilient to stress, disease or external shocks. However, other evidence does not support this. The picture is far from simple and it is not possible to generalise. Our understanding of dynamic ecosystem processes, and how myriad species interact to produce them, is profoundly incomplete.


David Tipling (rspb-images.com)

Any assumption that the delivery of regulatory and supporting services will automatically deliver nature conservation objectives is a dangerous folly, which is likely to lead to the loss of many species and habitats that do not offer immediate and direct benefits to human wellbeing.

We must improve our understanding of the relationships between species, diversity and ecosystem services through research. In the meantime, we must not fail to conserve and enhance the living diversity that pervades and comprises these systems.

5. Do biodiversity and ecosystem service hotspots overlap?

David Gregs (Alamy)

> “Our observation of nature must be diligent, our reflection profound, and our experiments exact. We rarely see these three means combined”
>
> *Denis Diderot*

If global efforts to conserve biodiversity are to deliver broader economic benefits to people, it is useful to know how biodiversity and ecosystem services overlap spatially. Identifying regions, that are important for both nature conservation and ecosystem services production, could benefit spatial planning processes and sustainable development.

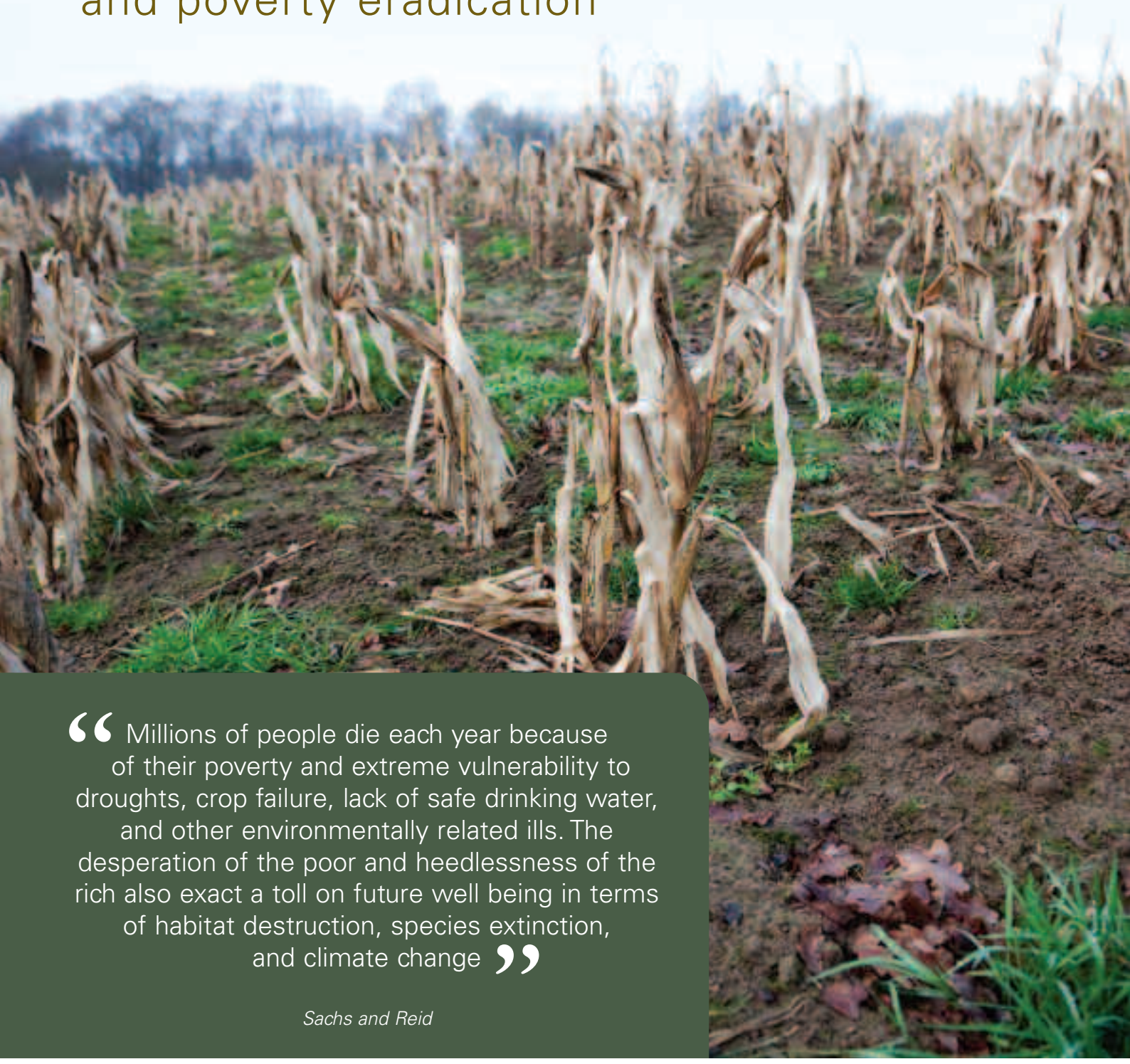
Global data exists on the ranges of certain species, but we have very little information on the location of ecosystem service provision. This is unsurprising given the limited means we have of actually measuring services. In 2006, as part of its research programme, the RSPB organised a workshop to map the relationship between areas of high global biodiversity and high ecosystem service value. Global maps of four ecosystem services were developed and compared with maps of global distributions of conventional, species-based targets for conservation. Preliminary results from this research show that regions selected to maximise biodiversity conservation are no better at providing ecosystem services than regions chosen randomly. There was also little correlation between different services.

Conclusions may differ for different services or at other spatial scales but, however preliminary this research, these findings are a caution against generalisations regarding relationships between biodiversity and ecosystem service provision. Exploiting an ecosystem service approach will only benefit conservation where there is overlap between important locations for biodiversity and ecosystem services and if there is congruence in the particular land or marine uses that best delivers both. More generally, research on general patterns of congruence in ecosystem services and biodiversity may ultimately prove less informative for decision-making than a more focused regional approach.

Despite this note of caution, it is clear that 'win-win' locations, and ecosystem categories, exist. Tropical forests appear to be one of the prime examples, largely due to their carbon storage function. For an ecosystem services agenda to be used in support of conservation, it is important to understand where such synergies, or trade-offs, between biodiversity conservation priorities and ecosystem service values exist. For policy purposes, this again stresses the need for multi-scale decision-making, so as to reflect both local conditions and broader-scale priorities.

Niall Benvie (rspb-images.com)

6. Ecosystem services, development and poverty eradication



Peter Austin (iStockphoto)

> “Millions of people die each year because of their poverty and extreme vulnerability to droughts, crop failure, lack of safe drinking water, and other environmentally related ills. The desperation of the poor and heedlessness of the rich also exact a toll on future well being in terms of habitat destruction, species extinction, and climate change”
>
> *Sachs and Reid*

The economies of most developing countries will need to grow to meet the United Nations' Millennium Development Goals (MDGs) and eliminate poverty. However, it is now widely recognised that this growth needs to be environmentally sustainable and fair otherwise any gains will be transitory and inequitable.

The MA concluded that any progress achieved in addressing the goals of poverty eradication, improved health, and environmental protection, is unlikely to be sustained if most of the ecosystem services on which humanity relies continue to be degraded. Many regions facing significant problems of ecosystem degradation, such as sub-saharan Africa, Central Asia, some regions in Latin America and Southeast Asia, are also facing major challenges in achieving the MDGs. While it is predominantly the rich who have benefited from the over-exploitation of nature, the poor will be hardest hit by resource shortages and severe environmental degradation.

Unlike the rich, the rural poor are highly dependent on the integrity of their local environment; they have few alternatives and limited options for buying-in substitutes for local ecosystem goods and services once they fail. Environmental degradation can exacerbate poverty, lead to human migration and conflict. Of the 1.2 billion people living in extreme poverty, approximately 900 million live in rural areas, where biodiversity and ecosystem services contribute to food security and nutrition and provide the raw materials that underpin health systems and livelihoods. Those in urban areas also ultimately rely on environmental goods and services for their basic needs, just less directly.

Protecting biodiversity and maintaining ecosystem function can benefit livelihoods and potentially help increase poor people's resilience and adaptive capacity to natural and economic shocks, including climate change.

In this context, economic valuation can help demonstrate that biodiversity, and the ecosystem services it provides, forms the basis of sustainable development and poverty eradication. It can help decision-makers find environmentally sustainable and inclusive growth and development options.

Ecosystem service arguments *per se* are not, however, automatically pro-poor. Some level of biodiversity and service supply is absolutely necessary for human survival, rich and poor alike, and ecosystem services can be exploited in ways that make poor or marginalised parts of society worse off. For example, poor people, who currently receive services, like water, for free, could be expected to pay, or they could find their resources being expropriated when hidden values are revealed and made marketable, for example forest carbon.

Managing ecosystem services in an equitable manner will depend on broader political, governance and institutional considerations. A key component of any ecosystem service valuation process should be engaging effectively with all stakeholders, including poor or marginalised peoples, and ensuring that any benefits are fairly distributed.

Sachs and Reid (2006)[3] called on the rich donor countries to establish a Millennium Ecosystem Fund to give poor countries the wherewithal to incorporate environmental sustainability into national development strategies. Many decision-making frameworks at the national level, such as poverty reduction strategy papers and national development plans, fail to systematically incorporate environmental considerations[4] and the role of local civil society in national decision-making is often limited[5].

The UK Department for International Development (DFID) has recently announced a new international initiative on valuing natural capital that builds on 'The Economics of Ecosystems and Biodiversity' (TEEB). This should help countries incorporate environmental values into economic decisions and will support wider efforts to build countries' capacity for environmental management, including climate change adaptation and development plans[6]. This has the potential to improve the prospects for countries to achieve poverty eradication ambitions in ways that do not ultimately undermine their economies through environmental degradation.

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[3] Sachs J, Reid W, (2006) I*nvestments towards sustainable development*, science Vol 312 p1002.

[4] Bojo J, et al (2004) *Environment in Poverty Reduction Strategies and Poverty Reduction Support Credits*. World Bank Environment department Paper No: 102 Washington DC

[5] Bird N, Caravani A (2009) Environmental sustainability within the new development agenda. ODI UK

[6] Department for International Development, *Eliminating World Poverty: Building Our Common Future,* July 2009

7. Embedding an ecosystem services approach

Andy Hay (rspb-images.com)

> “The difficulty lies not so much in developing new ideas as in escaping from old ones”
>
> *John Maynard Keynes*

Thinking around ecosystem services is at an early stage and we still have a lot to learn. To embed the approach we need to understand the policy contexts for using the approach and undertake the right kind of research to provide the right kind of evidence to support policy. However, great strides have already been taken. Agri-environment payments, the new marine legislation and the requirements of the Water Framework Directive, now contribute to a more integrated approach to resource management. Defra's Ecosystems Approach Action Plan, launched in 2007, embodies ecosystem service thinking. At the English regional level, progressive Development Agencies are developing 'green infrastructure' initiatives, which recognise the broad benefits of nature. At the European level, the Commission has set an aim of halting the loss of biodiversity by 2010 and its Communication on Biodiversity (2006) is couched explicitly in the language of ecosystem services. Globally, the G8+5 have commissioned research into 'The Economics of Ecosystems and Biodiversity', and funding agencies worldwide are exploring the potential for developing payment mechanisms to 'capture' ecosystem service values, notably carbon and water trading.

Two virtues of the ecosystem service concept are its accessibility and utility. In terms of accessibility, the concept requires us to rethink land management to reflect its potential multiple uses but does so in a language and concepts that the majority of people, especially land managers and users, can intuitively understand. **An ecosystem service approach should not be seen as an additional management approach, but rather as a tool that can support everything from integrated spatial planning to adopting an ecosystems approach.** It can be incorporated within existing decision-making and support tools, like cost benefit analyses, risk assessments or environmental impact assessments.

To scale up ecosystem service approaches, we need improved scientific understanding. Outstanding research goals include:

- developing a better understanding of how ecosystems provide services
- developing tools to better measure and extrapolate service provision to facilitate more robust monitoring of state and trends in service provision
- understanding dependencies between ecosystem services and biodiversity and relationships between service provision and particular conservation actions
- developing tools to identify how to optimise provision across a range of services
- developing tools for transferring estimates of service provision to alternative locations or times.

For policy and planning, adopting ecosystem service thinking requires us to deal with the uncertainty inherent in quantifying service flows. This necessitates an adaptive approach to management which, in turn, requires feedback systems that do not just inform, but can mould and change policy as new evidence comes to light. We also need to pilot solutions based on existing, imperfect knowledge to take proven solutions through to policy implementation. Finally, we need to communicate effectively to the public at large, the vast and varied ways we all benefit from nature.


Danny Green (rspb-images.com)

Case Studies

The following case studies highlight examples of our work, both domestically and internationally, where explicit consideration is being given to ecosystem service delivery. Probably the best known services our work delivers relate to the recreation, educational and health benefits our reserves provide. These are not discussed here but are described in our other publications available on the web[7]. Many of the insights from our research are reflected in the decisions we have taken to best achieve our conservation objectives. The first case study presented here, **Valuing the Arc**, has explicitly incorporated elements of the thinking described in section 3.

One of the major challenges we face is the delivery of multiple services. We need ecosystems to deliver ever more goods and services at an ever increasing rates. Population growth and economic aspirations mean we want more food, fuel and fibre from a landscape that we need to be resilient to drought, provides us with clean water and accommodates floodwaters. On top of that, we will need land use that mitigates, or facilitates, adaptation to climate change for ourselves and wildlife. It is clear that most land will need to play more than one role[8].

For land, the RSPB considers that the UK should provide a mosaic of the following:

1. Land wholly managed for a single productive service
In our highly modified and varied landscape, with so many pressures on land, it is inevitable that some land will be required to provide just one productive service to the detriment of others.

2. Land primarily managed for other uses but not actively detrimental to biodiversity
This includes land managed primarily for production but not to the detriment of biodiversity. **The Hope Farm case study** illustrates how this is possible.

3. Multi-benefit land use managed with biodiversity in mind
This includes productive landscapes (eg agriculture and forestry),that are managed to provide other ecosystem services, and sympathetically for wildlife. Management of **the UK's Uplands** is increasingly recognising the potential to deliver a range of valued services. For conservation such considerations are also increasing the scale of interventions as demonstrated by the **Wallasea Island** project. In considering multiple services, it will inevitably be the case that some will not be compatible with conservation goals. **Insh Marshes** and the **Ouse Washes** represent two contrasting examples from the UK's wetlands. **Freiston Shore** provides an interesting example where a cost-effective means of defending a coastline also delivers biodiversity benefits.

4. Land where biodiversity is the primary land use objective
Globally, and in the UK, we believe there are some regions of critical biodiversity importance, where management must be focused primarily on biodiversity conservation objectives. **Harapan Rainforest,** in Indonesia, is one example where biodiversity conservation is the clear goal, but where conservation management can deliver important co-benefits.

While most thinking about ecosystem services is habitat based, individual species themselves can deliver important services to people. This is demonstrated by the case studies on **charismatic bird species** in the UK and **vultures** in India.

These case studies reflect the broad range of services our work delivers, given the variety of actions we undertake, and the different scales at which we operate. The studies also demonstrate some of the benefits and challenges of incorporating ecosystem service thinking into practical resource and land management.

[7] Our publications and related weblinks are listed inside the back cover

[8] Similar challenges exist for the marine environment

Valuing the Arc

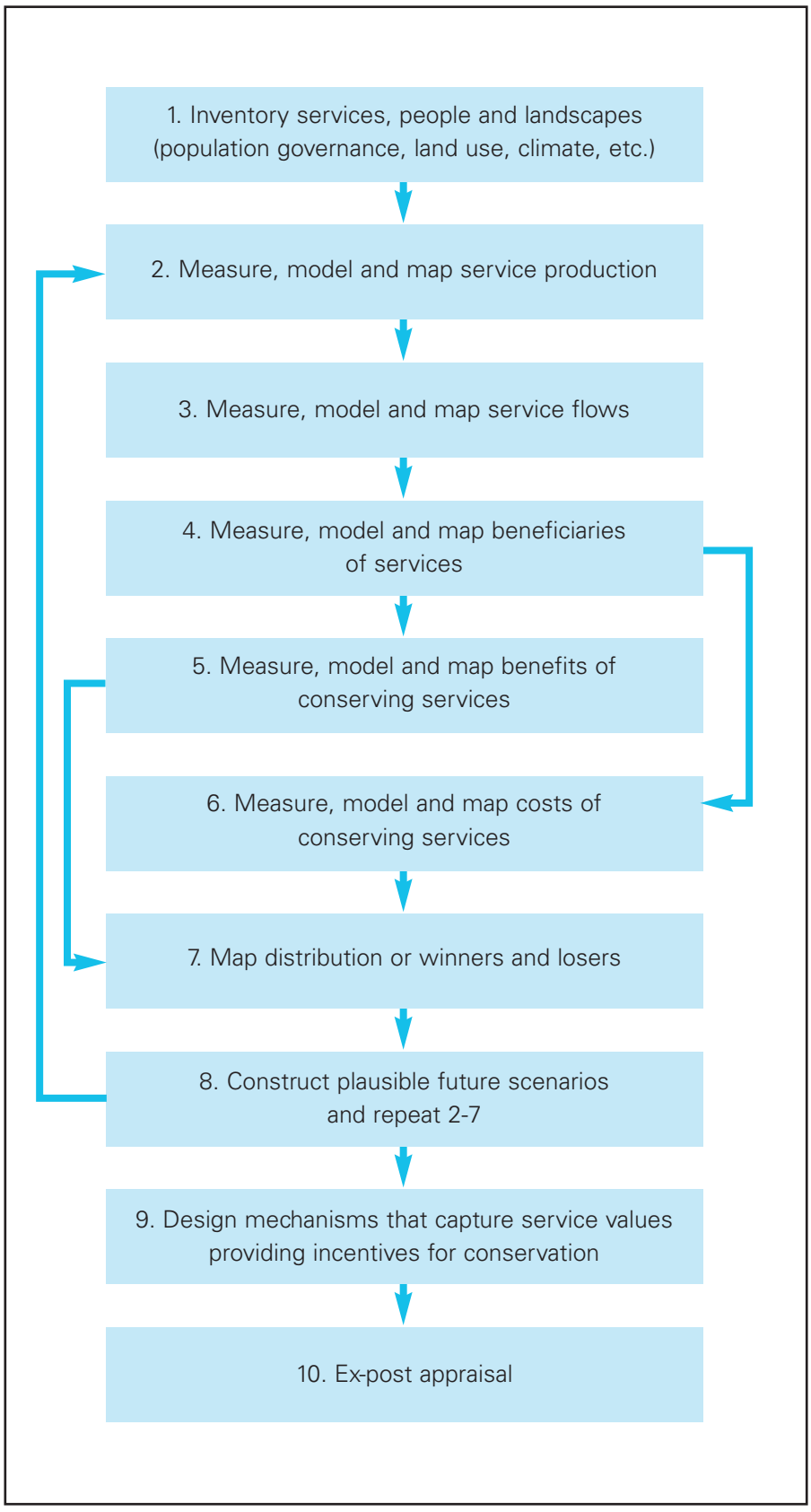
The ecosystem service approach forms part of the blueprint for a major five-year research and policy program in Tanzania's Eastern Arc Mountains. These mountains provide a variety of services to millions of beneficiaries.

The programme is focused on quantifying, mapping and valuing key ecosystem services, that flow from the mountains. These include clean water provision, carbon, timber, non timber products and tourism opportunities. Exploring the means of capturing ecosystem values in decision-making is also a core component of the work.

The diagram (right) illustrates the practical steps involved in applying an ecosystem service approach.

Using this approach to map and value ecosystem services will help clarify links between nature and human wellbeing. It should also help target payment schemes for ecosystem services, and help align goals of conservation, economic development, and poverty alleviation. Overall, this five-year programme represents a globally important case study, testing this systematic approach in one of Africa's biodiversity hotspots. Further details of this project can be found at: http://valuingthearc.org/

Diagram 3. Implementing an Ecosystem Service Approach



Case Studies – Hope Farm

Hope Farm

Hope Farm demonstrates how land, managed primarily for food production, can also deliver biodiversity benefits. The farm acts as a test bed for ideas to help protect our birds and other wildlife.

Over the past 30 years, the UK's farmland birds have suffered appalling losses, partly due to changing agricultural practices. In 1999, the RSPB bought a working lowland farm in Cambridgeshire to explore wildlife-friendly ways of farming on a typical arable property.

Run as a commercial enterprise, Hope Farm is cropped in a pattern following those of other farm businesses on similar soil types. Yields are comparable to other farms in the area and financial returns have increased.

Between 2000-2007, the numbers of farmland birds doubled on the farm whilst numbers in the wider UK landscape dropped by around six percent. This has been due to simple, cost-effective, measures that increase the insect and seed rich habitats on the farm, as well as nesting sites.

Today, a critical challenge facing farmers is how to mitigate, or adapt their businesses to climate change. Farming contributes eight percent of the UK's greenhouse gas emissions. In order to understand Hope Farm's impact on the climate, the RSPB commissioned research to assess the farm's carbon footprint. The biggest contribution to our farm carbon footprint arises from fertiliser use. We also discovered that emissions vary significantly between the crop types grown. Interestingly, environmental options designed to benefit wildlife, such as grass margins, are able to store carbon. The RSPB is currently investigating how farming operations can be adapted to reduce the footprint of the farm, whilst maintaining high yields and biodiversity.

The work at Hope Farm demonstrates that, even where food production is a priority, it is still possible to have more than one valuable ecosystem service produced from the same area.

Andy Hay (rspb-images.com)

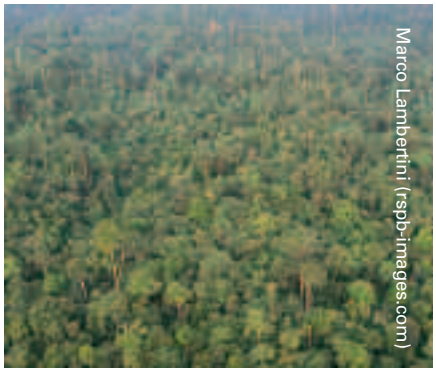
Harapan Rainforest, Indonesia

Harapan Rainforest is managed for conservation but has the potential to deliver other valued services, especially greenhouse gas regulation. Curbing deforestation is a highly cost-effective way of reducing emissions.


Dieter Hoffman (rspb-images.com)

Tropical forests have long been known to hold the planet's richest terrestrial biological diversity and thanks to the Stern report, their cost effective carbon storage and sequestration potential is increasingly recognised. Together with the Indonesian NGO Burung Indonesia and BirdLife International, the RSPB is involved in one of the largest rainforest restoration initiatives in the world, Harapan Rainforest.

Harapan contains about one-fifth of the surviving area of Sumatran dry lowland forest, which is amongst the richest and most threatened habitats on Earth. This habitat type has been reduced by some 97 percent over the last century, and the remaining three percent is being destroyed very rapidly. The project consortium has worked with the Indonesian Government to create an entirely new type of forestry licence, permitting 'ecosystem restoration' within production forests.


Marco Lambertini (rspb-images.com)

The Harapan Rainforest project involves both the prevention of deforestation and forest restoration. When compared to the alternative land uses, the biodiversity benefits are considerable. Harapan Rainforest is a critical site for a wide range of forest-dependent wildlife, including all nine of Sumatra's hornbill species, the agile gibbon, the Asian elephant and the critically endangered Sumatran tiger.

The net carbon credit potential of the project will vary from year to year, but preliminary estimates indicate that, when compared to conversion alternatives, the benefit could be several hundred thousand tons of CO_2 per year.

Apart from adding to climate change, conversion would impact indigenous people living in and around the project site. Traditionally, most local communities used the rainforest for gathering products such as rattan, resins, and honey for their own use and for trade. Conversion would reduce the availability of non-timber products and destroy their traditional way of life. Few forest-dependent people in central Sumatra are now able to follow a traditional way of life. Conservation and restoration also offer the potential for developing educational and recreational opportunities.

Case Studies – The UK Uplands

The UK Uplands

nature conservation, and multiple services.

SCaMP

The impact on water quality of land management practises in water catchments provides one of the clearest examples of where what is good for nature is good for people.

Peatlands provide a variety of ecosystem services, such as habitat for biodiversity, carbon sequestration, recreational opportunities, as well as regulating roles in water supply and purification. In many instances these services can be provided simultaneously. The Sustainable Catchment Management Programme (SCaMP) is developing an integrated approach to catchment management within two key areas of Bowland and the Peak District. Both areas comprise largely upland, open ground habitats, such as rough grassland and heather moorland. They are part of the water catchment area serving the North West. The SCaMP project is being undertaken by United Utilities, in partnership with the RSPB. Its objectives are to:

- deliver government nature conservation targets
- enhance biodiversity
- ensure a sustainable future for the company's agricultural tenants
- protect and improve water quality

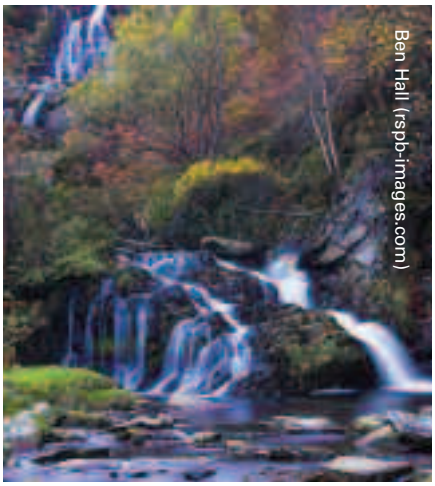
Additionally the project will look at the carbon stored in the peat soils to assess the potential for SCaMP restoration work to impact positively on the carbon flux.

Enhancing landscape and wildlife offers valuable recreational and aesthetic benefits to residents and visitors. Working with farmers to promote sustainable land management techniques reduces environmentally damaging diffuse pollution. We are testing whether benefits to water quality include improved microbiology, reduced soil erosion, and water colour. This should reduce the need for "end of pipe" water treatment and save water consumers money. SCaMP demonstrates that managing for ecosystem services and biodiversity can be a win-win situation for all involved.

For land owners, the extnernal benefits, in terms or ecosystem services, of farm management provide a justification for agri-environment payments based on the 'provider-gets' principle.

Lake Vyrnwy

The Lake Vyrnwy catchment is a nature reserve, tourist destination, education resource, a source of clean water, and a farm producing fine organic lamb and beef. European Commission funding is currently being used to carry out restoration of blanket bog on a landscape scale.



This restoration work involves re-instating the water tables by blocking moorland drains. This aims to halt habitat degradation.

The project is monitoring water run-off rates, discharge times, and the 'flashiness' of upland streams. Initial results from the project suggest that drain blocking reduces the peak flow rates and lengthens the lag between rainfall and peak flow. These findings may have implications for reducing downstream flood risk. A number of water quality measures are also being taken during the project. Preliminary results suggest that total water colour declines following drain blocking.

Case Studies – The UK Uplands

There is enormous interest in the ability of peatlands to sequester and store carbon, the degree to which this property can be compromised by drainage, and whether this can be remedied by restoration. Academics are capitalising on the restoration activity at the site to measure and compare the greenhouse gas emissions from intact, drained and restored peat.

The reserve at Lake Vyrnwy is also the largest organic farm in England and Wales. Owned by Severn Trent Water, and managed by the RSPB, the farm demonstrates that it is possible to run a profitable, efficient farm while benefiting local wildlife and people, and protecting an important source of drinking water.

By considering how management can better deliver a range of ecosystem services, Lake Vyrnwy exemplifies an ecosystem approach to land management.

Cuilcagh Mountain

The upland blanket bog of the Cuilcagh Mountain, which straddles the international border between Northern Ireland and the Republic of Ireland, is one of the best and most extensive peatland areas on the island.

In the late 1980s, the blanket bog suffered unsustainable pressure from peat extraction, overgrazing, uncontrolled burning of surface vegetation and the damaging use of all-terrain vehicles. This damage reduced the bog's ability to retain water, resulting in flooding and abnormally high water levels in the caves downstream. This, in turn, reduced tourist activity at the Marble Arch caves, a major attraction in County Fermanagh with over 53,000 visitors in 2007.

In 1997, a European Commission funded project to protect the blanket bog in Northern Ireland and


Chris Gomersall (rspb-images.com)

Scotland was approved. In Northern Ireland, the project was a partnership between the Fermanagh District Council and the RSPB. This led to the restoration of 28 hectares of cut-over blanket bog on Cuilcagh Mountain. The ecosystem services provided by the restored peatland will help to maximise the future tourism potential of the Marble Arch caves as well as conserving an important habitat that supports a wealth of wildlife, including the hen harrier and golden plover.


David Wootton (rspb-images.com)


Andy Hay (rspb-images.com)

Case Studies – Wallasea and Freiston

Wallasea Island

Wallasea Island represents Britain's biggest coastal wetland restoration project designed to deliver multiple benefits. The RSPB's plan for Wallasea will see three-quarters of the island restored to saltmarsh, creeks, and mudflats.

The project involves long-term, landscape scale restoration and represents an innovative managed re-alignment scheme. It is designed to achieve significant wildlife benefits and to sustainably manage the estuary to ensure delivery of other valuable ecosystem services. Sound management can provide grazing marsh habitats, flood defence, and enhance fishery and recreation opportunities. It also has the potential to increase carbon sequestration, nutrient cycling and water quality.


Ben Hall (rspb-images.com)

The Wallasea project also represents a large-scale demonstration of a practical solution to the impact of climate change-related sea level rise for low-lying and easily erodible coasts. It will involve significant land use change, reducing agricultural production on the island, although this would be lost eventually when the sea defence fails.


Andy Hay (rspb-images.com)

Freiston Shore

Managed coastal realignment enhances biodiversity and recreational opportunities, so frequently represents a cost-effective solution to coastal flood defence. Freiston Shore, in Lincolnshire, is a prime example.

Economic analysis suggests that realignment at Freiston Shore, has a higher net present value than maintaining hard flood defences. This outcome is achieved without even taking into account the significant environmental benefits gained from creating 65 hectares of intertidal habitat. Another additional benefit of realignment is the improved recreation value of the site. By 2008, almost 60,000 people were visiting Freiston shore each year compared with approximately 11,000 people before the realignment. The nature reserve on the site supports an estimated six full-time-equivalent jobs in the local community and also provides a valuable place for local people to exercise and relax[8].


Sue Tranter (rspb-images.com)

[8] Environmental Futures (2006) *Economics of managed realignment in the UK.*

UK Wetland

Wetlands can deliver multiple services from recreation to flood mitigation. Sometimes these benefits are compatible with conservation, other times not.

Ouse Washes

The Ouse Washes represent an interesting example in habitat management for multiple benefits. However, where for many years flood mitigation services, conservation and recreational use were complementary, it increasingly appears that they are at odds.

The Ouse Washes form the largest area of washland (grazing pasture that floods in the winter) in the UK. They are an essential element in the flood control management of the East Anglian fens and beyond. They allow for drainage of large areas of arable land, protecting nearby towns and, in the process, have created a haven for wildlife, notably wintering wildfowl and breeding waders.

Traditionally, the site has provided a number of valued services. It is located on rich peat soil, is grazed by livestock and provided flood mitigation and recreational opportunities associated with its wildlife spectacles and ancient fen landscape.

Since the mid-1970s however, a combination of factors has led to more regular spring and summer floods, the nesting season for internationally important waders and other ground-nesting birds. Continual spring and summer inundation jeopardises the site's wildlife value.

Engineering solutions will be required for the Ouse Washes to continue protecting people and property, but retaining its flood defence properties limits the management interventions available to protect its conservation interest. The site can no longer deliver both. Strengthening flood protection will still enable the site to retain its importance for winter migrants but not for summer breeding waders. There is now a need to create alternative breeding habitat for waders if the conservation importance and recreational value of the overall site is to be maintained.


Andy Hay (rspb-images.com)

Insh Marshes

Unlike the Ouse Washes, Insh Marshes is an example of a wetland delivering both conservation and multiple services.

The RSPB reserve at Insh Marshes is the largest floodplain mire in Great Britain covering 1,000 hectares at the foot of the Cairngorms in Scotland. Its diverse habitats contain birds and insects of international importance. Recreation on the floodplain also helps to support the regionally vital tourism economy, with over 12,000 people estimated to visit each year. The services provided by the floodplain support a range of economic benefits each year, including:

- Spending by visitors and tourists
- Outdoor recreation and tourism amenities
- Educational facilities at the RSPB's Insh Marshes reserve
- Local agricultural enterprises, which utilise the floodplain
- Fishing on the floodplain and downstream on the river Spey
- Flood defence benefits to Aviemore, and other settlements and farmland downstream. Constructing and maintaining engineered flood defenses for Aviemore could cost over £83,000 a year.
- Potential improvements to water quality

Case Studies – Vultures in India

The loss of vultures in India

While most ecosystem services are associated with habitats, some species play a critical role in directly sustaining human wellbeing. This case study is an exemplar of instances where the failure to understand the environmental impacts of economic decisions leads to costly, unforeseen outcomes.

Since the 1990s, the populations of three species of South Asian vultures have declined from many millions to just a few thousand. Collapses of this rapidity and geographical extent are unprecedented and all three species are now critically endangered having once been incredibly common. The RSPB is currently involved, with a range of partners, to halt this decline and eventually re-establish sustainable populations.

The cause of the collapse has been the widespread use of the drug diclofenac which, since the early 1990s, has been used to treat livestock ailments. Put simply, vultures die when they feed on livestock carcasses that had been treated with diclofenac.

However, by efficiently cleaning the bones of dead animals, vultures have played a major role in environmental health and in supporting industries like tanning, gelatine and fertilisers, that are based on animal by-products. Without the vultures, livestock carcasses now rot for days, causing all kinds of problems. Municipal authorities and villages must accept the disamenity of the stench and the increased disease risks, or pay for carcass disposal. Skinners and bone traders, amongst India's oldest and poorest occupations, already face higher costs to obtain their skins and bones. Burying carcasses would deny livelihood opportunities to the poorest of the poor.

The rotting carrion now supports booming populations of feral dogs, the main source of rabies in humans in India. Their populations have increased substantially in parallel with the vulture decline. The potential human health impact of both dog bites and rabies, associated with the vulture decline, is potentially very significant.

The loss of the vultures has also affected the funerary rights of an ancient religion. For millennia the Parsee communities of India relied on vultures to dispose of their dead as their religion forbids burial or cremation.

David Tipling (rspb-images.com)

Case Studies – Wildlife recreation

Wildlife recreation and charismatic species

The presence of charismatic species, such as birds of prey or seabird colonies, frequently provides recreational opportunities, which generate significant economic benefits to regions where they can be seen.

Wildlife related tourism is big business. According to government research, the value of the tourist trade attracted by a high quality natural environment in the UK was estimated at £5 billion in 2003, with that spending supporting the equivalent of 92,000 full-time-equivalent jobs[9]. On Mull, for example, white-tailed eagles generate over £1 million worth of income to the island every year through tourism[10].

A recent study has been done on the impact of red kites[11]. Between 2004-2009 red kites were re-established in the north east of England after an absence of some 170 years. By 2008, it was estimated that 100,000 people per year were seeing red kites in the lower Derwent valley, and that from visitor spending activity alone, the kites added over £160,000 per year to the local economy. Over its lifetime, the Northern Kites Project has supported 12.5 full-time equivalent jobs and generated at least £1.7 million in economic activity, the majority of which has filtered through to local companies and business people.

The project also provided many social benefits through its community outreach and lifelong learning programmes. Between 2004 and 2008, 260 Northern Kites events were organised engaging over 58,000 people (including 6,500 families). During the project, 107 schools in the region (over 50 in Gateshead alone), adopted red kites as part of the Northern Kites 'Adopt-a-Kite' scheme and over 36,000 children were engaged in its lifelong learning programmes. The study found that the Northern Kites project inspired local people to become more aware of wildlife and the environment, and also to take part in physical activity and become more involved in their own community.

[9] *Revealing the value of the natural environment* GHK (2004) title for Defra

[10] Further details are contained in *Watched Like Never Before* (2006) RSPB.

[11] Frederick S. Milton, 2009, *Taking Flight: An Evaluation of the Economic Benefits of Using Red Kites Milvus milvus for Environment-led Regeneration.*

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Cover image: Common starling flock flying to night roost at sunset Ham Wall, RSPB Reserve by Mike Read (rspb-images.com)