



The Natural Capital Initiative

Towards no net loss and beyond

**Designing a system to offset for the
residual impacts of terrestrial
development on ecosystem service
provision**

*A one day inter-disciplinary workshop
organised by the Natural Capital Initiative*

SUMMARY REPORT
FOR POLICY MAKERS

Workshop held on Tuesday 7th December 2010
at Charles Darwin House, London

Natural Capital Initiative (2010) *Designing a system to offset for the residual impacts of terrestrial development on ecosystem service provision*. Summary report for policy makers of the third 'Towards no net loss, and beyond' workshop, 7th December, 2010. 22p.

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The Natural Capital Initiative (NCI)

The NCI aims to support the development of UK science, policy and practice aligned with the ecosystem approach; a way of looking at whole ecosystems in decision making and for valuing the goods and services they provide. In relation to this aim, NCI is:

- Providing an independent and inclusive forum for debate;
- Identifying gaps in science, policy and its implementation and facilitating the debate about how to address these gaps;
- Liaising with, and informing, key government, Research Council and other initiatives, and
- Engaging the public and inspiring the next generation.

NCI is a partnership between the [British Ecological Society](#), the [Centre for Ecology and Hydrology](#) and the [Society of Biology](#).

Connect A

The Natural Capital Initiative would like to acknowledge the support of the Natural Environment Research Council towards the running of the second and third in the '*Towards no net loss, and beyond*' workshop series, through the [Connect A](#) funding scheme.¹ Connect A facilitates and promotes new partnerships between universities and research institutes and public/private sector science users (industry, business, commerce or public sector agencies).

¹ (NE/I529390/1 to CEH (Howard/Hails)).

Summary

This report summarises the views and ideas expressed during a workshop to design a system to offset for the residual impacts of terrestrial development on ecosystem service provision. The event involved 33 participants from a wide range of organisations. It was organised by the Natural Capital Initiative; an independent forum for discussion of policy and practice aligned with the ecosystem approach.

‘Biodiversity offsetting’ means the delivery of measurable conservation outcomes to compensate for the residual ecological impacts of development. It applies where all means of avoiding impacts, and reducing their severity, have been utilised. Biodiversity offsets can potentially be applied to development in terrestrial, freshwater, coastal or marine environments. They can take the form of ‘case by case’ (site-specific) offsets, habitat or species banking, or can proceed via *in lieu* fees. Increased biodiversity offsetting could be a contributor to the protection and enhancement of UK biodiversity, especially at sites not already protected by law for their biodiversity value. The reports of the earlier two workshops in the Natural Capital Initiative’s ‘Towards no net loss, and beyond’ series should be consulted for further discussion regarding how a system, or systems, of biodiversity offsetting might be implemented in the UK.

Whilst many countries have developed biodiversity offsetting schemes, notably Australia, the United States and Germany, offsetting for the impacts of terrestrial development on the provision of ecosystem services (the benefits that people gain from the environment) is less well developed. Some examples do exist but these are few. The aim of the Natural Capital Initiative in convening this workshop was to explore an emerging area of discussion, providing a synopsis of key issues for policy-makers to inform thinking on this topic.

Key messages were derived from the workshop:

1. Developing offsets for ecosystem service provision should not be at the expense of the short-term delivery of mechanisms to increase the use of biodiversity offsetting. Current knowledge and data are sufficient to allow biodiversity offsetting to begin in the UK.
2. Once biodiversity offsetting schemes have been implemented in the UK, monitored and evaluated, these could be extended to encompass ecosystem services explicitly.
3. Greater research is needed to increase scientific understanding of the complex relationships between biodiversity and ecosystem services specifically in the UK context, as well as how to manage, monitor and restore ecosystem service provision.
4. The data which exist in the UK are not sufficient to allow comprehensive offsetting for ecosystem services. Data collection must be augmented to encompass ecosystem services, and existing data brought together.

5. The capacity of stakeholders, including local authorities, to deliver ecosystem service offsetting must be improved. Guidance should be developed to support those delivering ecosystem service offsets.
6. Strengthened policy frameworks and guidance could help to stimulate schemes for effective compensation for the residual impacts of development on ecosystem services. A degree of flexibility should remain, however, in order to enable business to innovate.
7. Communication across a range of stakeholders will be important to ensure the delivery of schemes to offset ecosystem service provision.

Each of the key messages is described on Pages 11 to 14. These are not listed in any order of priority.

Introduction

This report

This report has been prepared by the Natural Capital Initiative (NCI) as a summary of the views and ideas expressed by participants at a workshop on 7th December 2010, to consider how a system to offset for the residual impacts of terrestrial development on ecosystem services could be designed and established, either as a stand-alone system, or incorporated into existing proposals for biodiversity offsetting in the UK. The event involved 33 participants representing 25 organisations across a spectrum of stakeholder groups; from academia, NGOs, central and local government, agencies and business.

The NCI is an independent forum. Therefore, omission or inclusion of a view or idea in this summary report should not be used to infer any judgement on its value, or any position of the NCI. The views and ideas expressed are not necessarily those of all individuals or organisations present at the workshop.

This report has been prepared to assist policy-makers evaluating proposals to introduce large-scale biodiversity offsetting in the UK. The report aims to highlight where current proposals for biodiversity offsetting encompass and compensate for residual impacts on the delivery of ecosystem services and where additional compensatory measures may be needed.

Biodiversity offsetting

Biodiversity offsetting is an approach to the provision of compensation for the ecological impacts of development in cases where avoidance of impacts, or reduction in their severity, is not possible.² It has been defined as follows:

Measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from development plans or projects after appropriate prevention and mitigation measures have been taken.

Source: [Business and Biodiversity Offsets Programme](#).

Biodiversity offsets can take the form of 'case by case' (site-specific) offsets, habitat or species banking, or can proceed via *in lieu* fees. They can potentially be applied to development governed by the planning system in terrestrial, freshwater, coastal or marine environments, for which there is the potential for biodiversity loss.

Policy-makers are actively exploring the development of a system of large-scale biodiversity offsetting as a means of delivering 'no net loss' of biodiversity in England. The first two workshops in the NCI's 'Towards no net loss and beyond' series, explored this topic, and the contribution of biodiversity offsetting mechanisms towards biodiversity goals has also been

² The 'mitigation hierarchy' still applies – see DCLG (2006) *Environmental Impact Assessment: A guide to good practice and procedures. A consultation paper*. 90p.

discussed in other forums. For a fuller explanation of biodiversity offsetting, including a list of useful literature, and how this has been applied in the UK to date, please see the reports of the earlier NCI workshops in this series, available from the [Natural Capital Initiative's website](#).

Ecosystem services

An 'ecosystem' comprises the complex interactions between living and non-living components of the natural environment, acting as a functional unit. Some of the interactions both between organisms, and between organisms and their biophysical environment result in ecological processes that interact at different scales to deliver ecosystem services.³ The Millennium Ecosystem Assessment defined ecosystem services as 'the benefits people obtain from ecosystems' and identified four major categories of services:⁴

- *Provisioning services*: the products obtained from ecosystems, including food and water, timber and fibre.
- *Regulating services*: The benefits obtained from the regulation of ecosystem processes, including air quality regulation, flood alleviation, climate regulation and carbon storage.
- *Cultural services*: The non-material benefits people obtain from ecosystems, such as spiritual value and recreational access to green spaces.
- *Supporting services*: Necessary for the delivery of all other ecosystem services, including nutrient cycling, soil formation and photosynthesis.

Organisms are a fundamental component of ecosystems, underlying the services which these systems deliver. However, the relationship between biodiversity and ecosystem services is complex, and remains relatively poorly understood by ecologists. A recent analysis by Worm *et al.* (2006) suggested that marine ecosystems with high diversity provide more ecosystem services with less variability, with services increasing with diversity (measured as species number and abundance) on a linear scale, within the range studied.⁵ In contrast, a later review of grassland biodiversity experiments by Hector and Bagchi (2007) found that although delivery of multiple ecosystem services required a greater number of species, as species number increased further the relationship between the two began to plateau—indicating that some species are redundant in delivering the services studied.⁶

Despite complexities and controversies in understanding these relationships, it is possible to conclude that generally both the quality and quantity of biodiversity are important for maintaining the ability of ecosystems to provide services on which society depends, whilst the importance of biodiversity varies greatly between services. For example, there is evidence that the availability of a diverse pool of organisms providing pollinating services (a 'regulating' ecosystem service) increases crop yields. In contrast, biodiversity is much

³ Parliamentary Office of Science and Technology (2007) [Ecosystem Services](#). POSTnote 281.

⁴ Millennium Ecosystem Assessment (2005) [Ecosystems and Human Well-being: General Synthesis](#). Island Press, Washington, DC. 137p.

⁵ Worm, B. *et al.* (2006) Impacts of Biodiversity Loss on Ocean Ecosystem Services. *Science*, 314: 787-90.

⁶ Hector, A. and Bagchi, R. (2007) Biodiversity and ecosystem multifunctionality. *Nature*, 448: 188-191.

less important for the delivery of another regulating service; protection from natural hazards.⁷

Offsetting for ecosystem service provision

A number of countries worldwide have implemented biodiversity offsetting schemes, most notably Australia, Germany and the United States. In contrast, offsetting for ecosystem service provision is rare and thinking in this area is still in its infancy.⁸ In conducting scoping research for the workshop, the Natural Capital Initiative could find only one example of an active project, the [North Carolina Ecosystem Enhancement Programme](#), which involves restoring ecological functions in watersheds to offset unavoidable environmental impacts associated with transportation-infrastructure and economic development.

There is however, an increasing focus within environmental policy upon ecosystem services. One example is the Convention on Biological Diversity's Aichi Targets (2010), most notably Strategic Target D, 'Enhance the benefits to all from biodiversity and ecosystem services', which calls for restoration and safeguarding of areas which provide essential ecosystem services.⁹ The European Union's Environment Council also agreed a new long-term vision and headline target for biodiversity in the EU in March 2010, explicitly recognising ecosystem services in calling for Member States to 'halt the loss of biodiversity and the degradation of ecosystem services in the EU by 2020'.¹⁰

The complexity of the relationship between biodiversity and ecosystem services could mean that a focus on offsetting the residual impacts of terrestrial development on biodiversity will result in failure to offset the impact on the ecosystem services currently delivered by that site. Discussions at the NCI workshop on 7th December explored to what extent and under what circumstances, current proposals for biodiversity offsetting will deliver offsets for ecosystem service provision, and to what extent policy-makers may need to consider refining proposals to ensure compensation for impacts on ecosystem service provision.

'Towards no net loss, and beyond' workshop series

This series of workshops was organised by the NCI to address some of the biggest cross-cutting challenges for the potential large scale implementation of biodiversity offsetting in the UK.

1. Practical challenges for the further implementation of biodiversity offsetting (22nd June, 2010).

⁷ Fitter A., *et al.* (2010) 'An Assessment of Ecosystem Services and Biodiversity in Europe'. In: Hester, R.E. and Harrison, R.M. (eds) *Issues in Environmental Science and Technology*, 30, *Ecosystem Services*. Royal Society of Chemistry. 28p.

⁸ Crowe, M. and ten Kate, K. (2010) [Biodiversity offsets: policy options for government](#). Business and Biodiversity Offsets Programme. 41p.

⁹ Convention on Biological Diversity COP-10 Decision X/2: [The Strategic Plan for Biodiversity 2011-2020 and the Aichi Biodiversity Targets](#).

¹⁰ Council of the European Union, Brussels, 16 March 2009. [Information Note: Biodiversity: Post-2010 EU and global vision and targets and international ABS regime- Council conclusions](#).11p.

2. Addressing scientific and environmental information challenges for biodiversity offsetting in the UK (29th September, 2010);

3. Designing a system to offset for the residual impacts of terrestrial development on ecosystem service provision (7th December, 2010).

The workshops were intended as a contribution to these challenges by bringing together individuals with a broad range of expertise and perspectives.

Workshop 3 – designing a system to offset for the residual impacts of terrestrial development on ecosystem service provision.

The aim of this workshop was:

To assess the potential to offset for the residual impact of development on ecosystem services alongside biodiversity.

The workshop programme and a list of participants are provided in **Annexes A** and **B** of this report.

Design and structure of the workshop

The NCI approached published expert authors and representatives of public bodies (central government and local authorities), research institutions, business and advocacy groups, outlining the aims of the planned workshop, with an invitation to participate. We aimed for a balance of different types of organisation, perspective and expertise to be present at the event. A briefing document was sent to all participants, summarising the concept of biodiversity offsetting, current literature and key issues.

The workshop was conducted under the [Chatham House Rule](#). Short briefing presentations (summarised in **Annex C**) set the context for group discussion of questions (**Annex D**), informed by a number of case-studies, which are available to view on the Natural Capital Initiative website. Participants were assigned to one of three groups to ensure balanced representation of different types of organisation and areas of expertise. Each group was led by an expert facilitator, with discussions recorded by a scribe. Dr Penny Anderson, President of the Institute of Ecology and Environmental Management, chaired the plenary sessions. The notes of both plenary and discussion group sessions informed production of this report. Facilitators assisted with the ‘Task and Finish’ discussion groups that formed part of the workshop.

The following key messages are not listed in any order of priority.

Key messages

- 1. Developing offsets for ecosystem service provision should not be at the expense of the short-term delivery of mechanisms to increase the use of biodiversity offsetting. Current knowledge and data are sufficient to allow biodiversity offsetting to begin in the UK.**
 - a. Offsetting for biodiversity will not necessarily compensate for all losses in ecosystem service provision through development. Therefore, policy-makers and other stakeholders should endeavour to find practical ways to compensate for the residual impacts of development on ecosystem service provision.
 - b. The development of a system for ecosystem service offsetting should not delay the delivery of biodiversity offsetting. The knowledge and skills exist to deliver biodiversity offsetting schemes, and the need to work towards established biodiversity targets provides a reason to start now. The evidence and strategy required to deliver ecosystem service offsetting is less well-developed.
 - c. However, those delivering biodiversity offsets should be mindful of ecosystem function and service provision when doing so. If the delivery of ecosystem services is not considered when selecting sites for biodiversity offsets, there is a risk in the medium term that in the absence of full knowledge and data biodiversity offsetting may lead to a loss of ecosystem service provision.
 - d. As a priority, biodiversity offset pilot projects should be assessed for biodiversity and for ecosystem service outcomes. There is a need for long-term monitoring of biodiversity offsets for a range of ecosystem service outcomes. This will reveal how biodiversity offsetting can be complimentary to ecosystem service provision.

- 2. Once biodiversity offsetting schemes have been implemented in the UK, monitored and evaluated, these could be extended to encompass ecosystem services explicitly.**
 - a. Pilot projects will be needed as a first step in developing ecosystem services offsets. Flood defence, water quality, air quality, carbon storage and bioremediation could form an initial focus for pilot schemes.¹¹

¹¹ Thames Basin Heaths (TBH) is a Special Protected Area (SPA) designated for internationally important populations of three bird species: the Dartford warbler, nightjar and woodlark. Analysis by Natural England suggested that recreational access by local householders, particularly dog-walking, had contributed to habitat deterioration. A number of Local Authorities have formed the TBH Joint Strategic Partnership, concerned with the delivery of new homes and the long-term protection of the SPA. One aspect of the framework to protect TBH is through the provision of 'Suitable Alternative Natural Greenspace' (SANG), paid for through tariffs levied on built developments within 5km of the SPA. The provision of SANGs

- b. In the absence of definitive ecological knowledge regarding the relationship between biodiversity and ecosystem services, a risk-based approach should be adopted in developing ecosystem service offsetting, based on available evidence and using expert judgement.
 - c. Long-term, post-project monitoring will be required, informing adaptive management of offset sites for ecosystem service delivery.
 - d. The UK Government has signaled its intention to use ecosystem services to underpin management of England's environment.¹² Offsetting for ecosystem service provision would build on this ambition, assist the UK in meeting targets under the Convention on Biological Diversity and contribute to the European Union's 2020 biodiversity target.^{9,10}
 - e. The Ecosystem Approach should inform the development of ecosystem service offsetting.¹³ It is important to recognise that there will be trade-offs in offset creation. Ecosystem services should be viewed holistically; offsets should not focus on one service at the expense of another.
- 3. Greater research is needed to increase scientific understanding of the relationships between biodiversity and ecosystem services specifically in the UK context, as well as how to manage, monitor and restore ecosystem service provision.**
- a. The relationship between biodiversity and ecosystem services is highly non-linear and complex.^{5,6,7}
 - b. Scientific knowledge regarding how to restore ecosystem services, necessary for offset creation, is still developing. Identifying and assembling a target community to deliver particular ecosystem services is challenging and the time taken for a community to reach a target state can be generations. A recent meta-analysis showed that whilst restored systems demonstrated greater ecosystem service provision than degraded sites, ecosystem service provision at these sites was lower than at reference, pristine ecosystems.¹⁴
- 4. The data which exist in the UK are not sufficient to allow comprehensive offsetting for ecosystem services. Data collection must be augmented to encompass ecosystem services, and existing data brought together.**

for recreational use is recognition of the importance of this cultural ecosystem service to local residents. Further information is available from the ['Law and Your Environment' website](#)

¹² Defra (2010). [An Invitation to shape the Nature of England: Discussion Document](#). 21p.

¹³ The Ecosystem Approach is a strategy for the integrated management of land, water and living resources that promotes conservation and sustainable use in an equitable way. See the [Convention on Biological Diversity, COP 5, Decision V/6](#) for guidance and principles.

¹⁴ Rey Benayas, J.M., Newton, A.C., Diaz, A., and Bullock, J.M. (2009) Enhancement of Biodiversity and Ecosystem Services by Ecological Restoration: A Meta-Analysis. *Science*, 325: 1121-1124

- a. Data sets on biodiversity and ecosystem function need to be brought together, with the aid of GIS, to ensure that offsets are targeted effectively.
 - b. There are a wide range of mapping and modeling tools to assist in targeting offsets, but in the medium term these need to be further developed to account for the entirety of ecosystem services and their value.
 - c. In the longer-term, a greater amount of information on ecosystem service delivery should be gathered at the local scale: offsetting for ecosystem services will need to account for a great deal of local complexity.
 - d. Local Records Centres could play an important role in collecting and storing information on ecosystem services, including locally specific ecosystem service provision. This information would provide a vital tool for local planners.
 - e. The National Ecosystem Assessment (NEA) could provide a starting point for the development of both national and locale-specific data sets on ecosystem service delivery. There is a need to build on existing knowledge, including the NEA, to develop an aspirational 'road map' regarding how the UK uses its ecosystem services into the future. Following its publication in spring 2011, the NEA could be updated regularly to maintain the knowledge base on ecosystem service provision in the UK.
- 5. The capacity of stakeholders, including local authorities, to deliver ecosystem service offsetting must be improved. Guidance should be developed to support those delivering ecosystem service offsets.**
- a. Support and guidance is needed for those who will develop and deliver ecosystem service offsets, both local authorities and consultants, based on the best available scientific evidence and expert judgement. Local authorities will vary in their readiness and capacity to deliver offsets for ecosystem services, particularly as many lack in-house ecological expertise.¹⁵
 - b. To develop ecosystem service offsetting effectively, standards must be put in place to evaluate offsets, with offset providers accredited and assessed.
- 6. Strengthened policy frameworks and guidance could help to stimulate schemes for effective compensation for the residual impacts of development on ecosystem services. A degree of flexibility should remain, however, in order to enable business to innovate.**
- a. The legislation exists to enable biodiversity and ecosystem service offsetting in the UK, but must be strengthened. Doing so could enable greater use of offsetting, as

¹⁵ Natural Capital Initiative (2010) *Addressing practical challenges for biodiversity offsetting in the UK*. Summary report for policy makers on the first 'Towards no net loss, and beyond' workshop, 22nd June 2010. 19p. Recommendation 5 (page 7 of 19).

planning officials and developers are controlled primarily by their obligations under law.¹⁶ Existing policy guidance focuses primarily on biodiversity, so there is a need to incorporate ecosystem services explicitly when re-drafting this documentation. For example, an 'Ecosystem Impact Assessment' could be incorporated into the EU Environmental Impact Assessment Directive (85/337/EEC).

- b. Some participants expressed the view that, whilst policy guidance should be tightened, there should remain the flexibility to allow business to innovate. Some businesses are leading the development of biodiversity offsetting and could lead similarly for ecosystem service offsetting. Minimum standards could be set, based on the best available evidence, with businesses meeting these through innovation. Incentives for business, such as award schemes, could help to drive innovative responses.

7. Communication across a range of stakeholders will be important to ensure the delivery of schemes to offset ecosystem service provision.

- a. Scientists have a responsibility to communicate to policy-makers the value and importance of ecosystem services. Communication at the science-policy interface will be vital in order to build the necessary political, policy and public will behind the concept of 'ecosystem services'. In communicating with the public, a new language may be needed to express the ecosystem service concept clearly.
- b. The involvement of land-managers throughout the design of any mechanisms to offset for ecosystem services will be important, not least because of their potential as providers of offset credits. The perspective of insurers is also needed. Consultants have a vital role to play in communicating the value of ecosystem services to local authorities.
- c. In developing and delivering schemes for both biodiversity and ecosystem service offsetting, Defra must work with other Government Departments to ensure cross-Government support. Engaging the Department for Communities and Local Government (CLG) will be important. Both Defra and CLG could play a role in enabling further discussion between stakeholders as offsetting develops.

¹⁶ *Ibid.* Recommendation 4 (page 6 of 19).

Annexes

Annex A – Workshop programme

Session	Start / end	Activity	Speaker / lead
	09.30 – 10.00	Registration, with coffee and pastries	
Introduction & briefing talks			
	10.00 – 10.05	Welcome and purpose of the day	Dr. Bruce Howard (Natural Capital Initiative)
	10.05 – 10.10	Chair's introductory remarks	Dr. Penny Anderson (Institute of Ecology and Environmental Management)
	10.10 – 10.25	Overview of biodiversity offsetting (10 mins + 5 mins questions)	Dr. Stewart Thompson (Oxford Brookes University)
	10.25 – 10.30	Five key messages from 'Towards no net loss, and beyond' Workshops One and Two	Dr. Bruce Howard (NCI)
	10.30 – 10.50	Overview of built development in the UK – how are environmental impacts taken into account? (15 mins + 5 mins questions)	Jon Grantham (Land Use Consultants)
Task and Finish group start-up			
	10.50 – 11.30	Task and Finish group introductions – framing the question to be addressed	Task and Finish group facilitators
	11.30 – 11.40	Re-grouping	
Task and Finish group briefing talks			
	11.40 – 12.00	The links between ecosystem services and biodiversity (15 mins + 5 mins questions)	Prof. Dave Raffaelli (University of York) ¹⁷
	12.00 – 12.20	Restoration of ecosystem services in practice (15 mins + 5 mins questions)	Prof. James Bullock (NERC Centre for Ecology

¹⁷ Professor Raffaelli was unable to attend and Professors Jim Harris and Rosie Hails led a discussion on this topic in Professor Raffaelli's place.

Session	Start / end	Activity	Speaker / lead
			and Hydrology) ¹⁸
	12.20 – 12.40	Provision of ecosystem service information at the local level (15 mins + 5 mins questions)	Prof. Jim Harris (Cranfield University)
<i>Lunch</i>	<i>12.40 – 13.20</i>	<i>Lunch</i>	
Task and Finish Groups			
	13.30 – 14.40	Group 1	Task and Finish group facilitators
		Group 2	
		Group 3	
	<i>14.40 – 15.00</i>	<i>Refreshments</i>	
	15.00 – 16.00	Return to groups to complete the task	
	<i>16.00 – 16.10</i>	<i>Re-grouping</i>	
Concluding discussion			
	16.10 – 17.00	Plenary feedback – structured report back for 10 minutes x 3, with 20 minutes discussion	Led by Chair, Penny Anderson
	17.00 – 17.15	Chair’s summary and close	Penny Anderson

¹⁸ Professor Bullock was unable to attend and Professor Hails delivered Professor Bullock’s presentation in his place.

Annex B – List of participants

First Name	Surname	Organisation
Penny	Anderson	Institute of Ecology and Environmental Management
Laura	Bellingan	Natural Capital Initiative/ Society of Biology
Bruce	Blaine	Peter Brett Associates
Francesca	Booker	Natural Capital Initiative
Louise	Clarke	CIRIA
Joanna	Drewitt	Scottish Government
Helen	Dunn	Defra
Mark	Everard	Environment Agency
Martina	Girvan	AECOM
Jon	Grantham	Land Use Consultants
Annelisa	Grigg	Global Balance
Rosie	Hails	NERC Centre for Ecology and Hydrology/ NCI
Richard	Handley	Environment Agency
Jim	Harris	Cranfield University / NCI
David	Hill	The Environment Bank
Bruce	Howard	Natural Capital Initiative
Pippa	Howard	Flora and Fauna International
Adrian	Jowitt	Natural England
Frances	Kirwan	Defra
Paul	Leonard	Independent Consultant/ Natural Capital Initiative
Philip	Martin	NERC Centre for Ecology and Hydrology
Diane	Mitchell	National Farmers Union
Diana	Mortimer	Joint Nature Conservation Committee
David	Pape	Hampshire County Council
Delia	Shannon	Aggregate Industries
Matthew	Simpson	Wildfowl and Wetlands Trust
Stewart	Thompson	Oxford Brookes University
Gregory	Valatin	Forestry Commission
Massimiliano	Volpi	Natural Environment Research Council
Bill	Watts	Environment Agency
Jonathan	Wentworth	Parliamentary Office of Science and Technology
Nick	White	Natural England
Linda	Yost	Institute of Ecology and Environmental Management

Annex C – Summary of the introductory and briefing talks, as provided by the speakers

Overview of Biodiversity Offsetting

Stewart Thompson, Oxford Brookes University

The UK has missed the 2010 biodiversity targets; the EU has developed a new vision and targets for biodiversity and ecosystem services, to meet by 2020. The precautionary principle and requirement for ‘no-net-loss’ of biodiversity apply to sites and species afforded strict protection through the EU Birds and Habitats Directives, implemented through strict sequential tests, mitigation and compensation.

Appropriate mitigation and, in some cases, compensation, are required where impacts on biodiversity are identified in association with built development. When considering biodiversity impacts the first principle of the ‘mitigation hierarchy’ should be to avoid impacts, the second to minimise the impacts, and the third to adopt appropriate mitigation to restore what has been lost or degraded. Residual damage once the mitigation hierarchy has been applied can be “offset.”

Biodiversity offsetting could be voluntary (not required by law, but undertaken by businesses because of perceived competitive advantage). Alternatively, offsetting could be required by law for certain impacts or activities. Developers could initiate the implementation of offsetting, on a case-by-case basis; an in-lieu fee system could be implemented, with a developer paying a fee linked to biodiversity impact. Both of these systems would come into effect once damage had occurred.

Finally, offsetting could proceed through ‘banking’, with a developer purchasing credits from the bank- which are then used to fund the creation and/or management of an ecological or environmental resource. Credits from a range of development schemes could be pooled and used to create large sites. Such a market-based system would be established in advance of damage.

A number of principles should be employed in developing any biodiversity offsetting system: it should provide additional long term conservation outcomes; should be based on sound science; there should be clear limits as to what can and cannot be “banked” and there should be appropriate stakeholder participation. All of the above lead to questions regarding how biodiversity offsetting could be regulated.

Challenges to address include: what biodiversity is encompassed by an offsetting system; how ‘no net loss’ and gain is defined; the offset types which should be employed and where offsets should be located. Other concerns surround the robustness of standards, and the capacity of organisations, such as local authorities, to deliver offsets. Perhaps most importantly, consideration is needed as to whether offsetting represents the best financial mechanism for biodiversity enhancement.

Overview of built development in the UK – how are environmental impacts taken into account?

Jon Grantham, Land Use Consultants

In 2008/09, 570,000 planning applications were submitted, the vast majority for housing developments, with many of these granted. 15,210 of the planning applications were for major infrastructure developments, with 311 of these triggering an Environmental Impact Assessment.

Development pressure in the UK is expected to increase further, with a step change in infrastructure provision. The National Infrastructure Plan 2010, developed by HM Treasury, outlines priorities for energy, transport, digital communications, flood management, water, waste and intellectual capital – the development of which all have spatial implications.

Planning is not a barrier but a means to deliver land-use change sustainably. Threats to this ability are posed by the demise of Regional Spatial Strategies, and the loss this represents of a reference point for built development. Weak wording in policy guidance can also present difficulties to securing mitigation for the impacts of development on biodiversity.

The restoration of ecosystem services in practice

Professor James Bullock and Professor Rosie Hails, Centre for Ecology and Hydrology

The restoration of biodiversity is quite simple conceptually, even if there are problems in achieving restoration targets. But ecosystem services raise a whole number of issues; not only whether we can restore them, but what we are aiming at and what problems arise in aiming to restore multiple services as well as biodiversity. If we want to aim at restoring ecosystem services, what should be our targets? For biodiversity, this is a simple question, and the aim is usually a reference ecosystem of biodiversity value. For services, we might use the same approach and want the service, or services, of a reference ecosystem. Or we might have simpler aims and just want as much as possible of a target service, such as carbon sequestration. This choice is critical; it determines restoration methods and criteria for success.

Using the target ecosystem criterion, we know that restoration projects have enhanced ecosystem services. We reviewed 89 restoration projects from across the world, covering terrestrial, freshwater and marine systems in tropical, temperate and boreal biomes.¹⁴ A wide range of regulating and supporting services were, on average, greater in restored than in the original degraded systems. However, compared against the pristine target ecosystems, the restored systems had lower services. So, restoration improves service provision, but the target is rarely achieved. We might expect that the restored ecosystems will develop and that services improve over time. So if we wait long enough, will we achieve the target? This is certainly possible, but there is evidence in some systems that the wait may be very long and that target will often not be achieved for many decades.

Other restoration programs have been targeting specific services. For example, various projects around the world are planting trees to combat climate change by sequestering

carbon. Is this limited focus a problem? If we can restore multiple services and biodiversity together, then no problems arise. In our global analysis of restorations we found that the changes in services were correlated with those in biodiversity, suggesting that restoration actions could enhance services and biodiversity in tandem. However, it is likely that there will be conflicts and trade-offs in trying to restore multiple services and biodiversity, although these have been very little studied. Examples include, tree planting to reduce soil erosion which also decreases water availability in arid areas, or forest restoration for biodiversity which increases insect pest problems.

Certain restoration actions might enhance particular services and biodiversity, but not others and alternative approaches can have very different impacts. One approach to solving such conflicts is to consider restoration over larger scales. Different actions in different locations may allow certain services to be enhanced in some places and other services elsewhere. We may also be able to reduce certain negative effects and enhance synergies by the relative placement of different actions.

Provision of ecosystem service information at the local level

Professor Jim Harris, Cranfield University

The linkages between human wellbeing and ecosystem services are complex, as is the relationship between biodiversity and ecosystem services. It is likely that some elements of biodiversity are redundant in the delivery of ecosystem services. It is important to note that many of the landscapes in the UK are cultural constructs and although having high biodiversity, are not delivering ecosystem services vital for human wellbeing.

Spatially explicit planning tools can assist developers in understanding the impacts of built infrastructure on ecosystem services. Such tools are currently lacking. An analysis of soil sealing in Cambridge, UK, using remote sensing, revealed that 50% of the land in the area is sealed. Using this information it is possible to create maps of amenity value and green space, including an analysis showing that residential property located closer to green space has higher financial value. The maps can form the basis of models illustrating how organisms, for example butterflies, move through the urban landscape. A butterfly is a significant psychological cue to urban dwellers, representing their contact with nature. Developers could include these considerations when planning conurbations and the proximity of people to green space – which has been shown to have positive benefits for physical and mental health.

There is a need to provide planning tools which encompasses ecosystem service information, bringing together maps of soil, geology, topography and climate. This information exists to some degree but there is a need to collect further data. Developers could test their proposals against these tools, for example online, searchable maps of ecosystem service value. The values placed on the environment by stakeholders should also be encompassed, with the tool updated regularly as information is refined (for example from climate change models).

Annex D – Questions discussed by the Task and Finish Groups

1. Which ecosystem services would be retained and which lost if the biodiversity offset outlined in the case-study went forward?
2. What can we do to make a start?'
3. How can these 'make a start' proposals be incorporated into existing options for biodiversity offsetting?
4. If not, what could be designed to offset for ecosystem service provision?