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A report submitted by ICF GHK
in association with

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Executive summary

Introduction

This report presents the findings of a research project undertaken by GHK Consulting Ltd (ICF GHK) and BIO Intelligence Service (BIO IS) for DG Environment to explore potential demand for and supply of habitat banking in the EU, and appropriate design elements for a habitat banking scheme.

The research examined the following topics:

- The **legislative framework** for addressing compensation for biodiversity loss in the EU and its Member States;
- The potential **demand** for biodiversity offsets and habitat banking in the EU;
- The **supply** of biodiversity offsets and habitat banking, and the key factors that affect supply;
- The **costs and benefits** of biodiversity offsets and habitat banking schemes;
- Key **design elements** of biodiversity offsets and habitat banking schemes; and
- **Gaps in knowledge** that may be barriers to the design and implementation of offsets and habitat banking schemes in the EU, and **priorities for further work**.

Scope and definitions

The EU 2020 Biodiversity Strategy introduces the goal of ‘no net loss of biodiversity and ecosystem services’ (Action 7). This is likely to be achieved by, among other actions, schemes to compensate for and offset biodiversity losses.

Compensation must be considered in the context of the ‘mitigation hierarchy’, which prioritises the avoidance of adverse impacts on biodiversity, calls for reduction of those impacts which cannot be avoided, and supports the use of offsets or compensation only for residual impacts that cannot be avoided or minimised. The mitigation hierarchy can and should also require that measures are taken to rehabilitate or restore affected areas before compensation is considered, although this is not always explicitly included in EU references to the mitigation hierarchy.

The term ‘compensation’ is sometimes used interchangeably with ‘offsets’, although the latter involve more formalised arrangements for delivering compensation designed to achieve a minimum of ‘no net loss’ (NNL). For the purposes of this report, we distinguish between compensation and offsets. Compensation involves general recompense for loss, and can involve a range of different measures (e.g. payments or conservation actions). Compensation does not necessarily achieve, or seek to achieve no net loss. A biodiversity offset on the other hand, can be seen as a type of compensation activity: a measurable conservation outcome which specifically seeks to achieve no net loss and preferably a net biodiversity gain on the ground.

Habitat banking is an instrument that can be used to deliver compensation by implementing and pooling compensatory measures in advance of a development, enabling developers to purchase credits from established compensation schemes (habitat banks) to offset their impacts. Credits in the context of this study may be earned through measures to conserve both habitats and species.

Legislative framework relating to compensation for biodiversity loss

The EU legislative framework

The EU 2020 Biodiversity Strategy does not define no net loss (NNL), but Council Conclusions provide a preliminary definition and working group discussions are underway. While NNL is not explicitly stated in the EU legislative framework, it is an implicit objective of the nature directives and several directives require that the mitigation hierarchy is followed (Birds, Habitats Directives) or include a reference to the mitigation hierarchy (EIA and SEA Directives). The Directives also explicitly refer to terms related to compensation, such as reference to compensatory measures (Habitats Directive), to compensation for adverse effects (EIA and SEA Directives) and to remedial measures including remedial compensation (Environmental Liability Directive (ELD), which covers accidental biodiversity impacts, among other environmental impacts).

Legal mechanisms that trigger a requirement for compensation are also clearly in place in the Habitats Directive (Article 6) to cover Natura 2000 areas and in the ELD for different types of remediation. In Natura 2000 areas, compensation is a requirement which provides a derogation to the developer so that if residual negative impacts cannot be avoided and if other conditions are met, the project can go ahead. Compensation is determined on a case-by-case basis and no clear criteria or methods to define the baseline and compare losses and compensatory gains are specified. This leaves room for interpretation and leads to differences in approaches between Member States (MS). In addition, the methods used to quantify residual loss and compensation gain may not be adequate to result in no net loss. Guidance documents for the Habitats Directive have been produced by the European Commission to harmonise and help identify requirements so that compensation measures are efficient, although these guidance documents are not legally binding. In the case of certain projects with an impact on Natura 2000 areas, there is a requirement to compensate residual impacts.>NNL, however, is not explicitly mentioned. Currently, there is a lack of tools, metrics and guidance to ensure that compensation in Natura 2000 areas is implemented coherently, and to a high standard.

Measures must be identified to compensate for negative impacts in developments covered by the EIA and SEA Directives in the EU territory (including outside Natura 2000 areas). This contributes to compensation for losses outside of Natura 2000 areas, but several gaps have been identified. In particular, the EIA Directives require identification but not necessarily implementation or monitoring of such measures (although monitoring of significant effects is required under the SEA). Under the EIA, there is also a requirement to avoid 'significant' impacts 'if possible', minimise those impacts and, lastly, provide compensation for residual impacts. This only applies to projects that undergo the EIA process, namely projects that may have 'significant' environmental effects. Thus only certain developments are covered. Cumulative impacts from several, smaller developments could also arise that may not be adequately taken into account, although there is a requirement to consider cumulative impacts when conducting a screening to determine whether an EIA is needed and during the EIA, when providing the information requested under Annex IV. Furthermore, the EIA and SEA Directives introduce what are essentially procedural rather than substantial obligations; they are not aimed at achieving compensation, but at providing information on which to base planning and project decisions. Finally, they do not cover all EU developments.

The EU has in place several financing tools that are relevant to the goal of>NNL, either by funding measures that could compensate for developments or for impacts currently uncompensated, or by ensuring that (co-)funded projects are implemented with higher standards. It is important to ensure that the polluter pays principle is respected when examining the role of EU funding, that double funding and cost-shifting¹ is avoided, and that the measures funded thus comply with the principle of additionality for compensation measures.

The ELD requires compensation with the aim to return the damaged natural resource and/or services to baseline conditions (i.e. for *ex-post* compensation; compensation under the Habitats, EIA and SEA Directives is *ex-ante* compensation). The requirements under the more recent ELD are more detailed than those specified in the Habitats Directive, including the definition of baseline conditions, compensation types (resource-to-resource or service-to-service equivalence approaches are preferred and other options prioritised) and interim losses.

Legislative Framework in the Member States

Each MS has implemented the EU requirements in different ways and with different ambition levels. Thirteen MS were investigated in this study and categorised into three groups according to the degree of development of their policies to require and implement compensation for biodiversity loss.

In general, MS are implementing the EU framework, but few MS have gone beyond its requirements. In line with EU requirements, compensation is mostly required and implemented in Natura 2000 areas, and for certain types of developments (e.g. linear transport infrastructures), but some MS are leading the way in requiring wider use of compensatory measures (and in some cases establishing systems for more formalised offsetting), developing and applying methods for measuring and compensating for biodiversity loss, and implementing or testing habitat banking. The most advanced policies are found

¹ 'Cost-shifting' refers to a situation in which governments reduce their funding allocation for biodiversity conservation because they regard private sector investment (eg through compensation) as reducing the need for public funding.

in Germany, while other Member States (e.g. France, Netherlands, Sweden and the UK) are also making progress. Compensation does not always require the delivery of conservation actions with measurable biodiversity benefits. It sometimes involves monetary compensation rather than compensation in kind, and it is not always clear that the resultant funds will be used for biodiversity projects.

Implementation issues arise when: the mitigation hierarchy is not followed, development consents do not include sufficient requirements, there are unclear or contradictory requirements in different pieces of legislation, there is a lack of control and monitoring and difficulties arise in requiring long-term commitments. Authorities and regulators are often unaware of the available requirements and methodologies for requiring compensation, which is a barrier to implementation. Where compensation does occur, its design and implementation are generally considered to be insufficient, but data and monitoring of compensation measures are lacking or insufficient to give a robust and objective picture.

Potential for EU instruments to support offsets in future

In general, compensation requirements for impacts on the Natura 2000 network are relatively well developed, even if methodologies to assess the baseline and compare losses with gains could usefully be improved. In other areas, significant gaps exist in policies that compensate for biodiversity loss, suggesting that the goal of achieving no net loss of biodiversity in the EU is dependent on the need to develop unambiguous EU and/or MS legislative frameworks.

The study identifies five main possibilities to improve existing EU instruments and their use:

- Close gaps in existing instruments, by ensuring that the mitigation hierarchy is sufficiently followed, widening the coverage of EIA/SEA requirements, or providing systems to compensate in different ways, and strengthening (long-term) implementation. The on-going review of the EIA Directive and the forthcoming review of the SEA Directive may be a relevant opportunity, and/or a specific instrument to achieve biodiversity compensation/offsets outside Natura 2000 areas could be proposed.
- Strengthen the requirements in EU funding instruments to achieve NNL, avoiding potential risks. This could be implemented by adding requirements in (co-)funding criteria.
- Continue delivering improvements in the status of EU biodiversity by supporting restoration, recreation and improvement measures, which help to achieve NNL by indirectly compensating for adverse impacts. This could be accomplished by, for instance, upgraded support through LIFE+ (e.g. supporting ecological restoration projects) and the Structural Funds, and possibly some additional measures to frame and support the role of agricultural stakeholders to implement offsets.
- Develop a policy framework to define the role of habitat banking in the EU, which could offer ecological and administrative benefits but would initially require more government involvement than *ad hoc* compensation implemented by developers. Clearer specification is needed of steps at the MS and EU level to implement banking. This should follow a discussion on *scope* (ecological, geographic and in terms of circumstances when offsets are required and can be provided through banking), *principles and standards* for habitat banking, and legal and financial instruments needed for implementation.
- Raise awareness amongst regulators and authorities (e.g. on the local and regional level) about the mechanisms currently available to them to require compensation for adverse impacts on biodiversity.

The breadth of issues at stake is large and experience shows that no net loss systems in countries with more experience in this area than the EU have evolved over a period of 10-15 years. With this in mind, demand for offsets and habitat banking are only likely to increase if robust and comprehensive frameworks and formal requirements for NNL are put in place.

Demand for offsets

The demand for biodiversity offsets depends on:

- **The extent of biodiversity and ecosystem services loss** in the EU as a result of development and other activities;
- **The degree to which compensation is required** for this biodiversity and ecosystem services loss through the regulatory requirement for offsets; and
- **The metrics that could be used to determine offset requirements** arising from biodiversity losses.

The demand for habitat banking as a means of meeting these offset requirements depends on the regulatory framework in place to implement offset requirements, as well as the relative advantages, disadvantages and costs of habitat banking compared to other means of meeting offset requirements.

Offsets demand assuming a 'no net loss' scheme

Biodiversity may be lost through a number of pressures, including:

- Direct losses through habitat conversion;
- Indirect impacts of habitat conversion affecting both habitats and species;
- Indirect impacts through degradation caused by pollution and changes in land management systems;
- Losses to global biodiversity caused by the actions of EU actors (e.g. food production, logging, mining, etc); and,
- Losses to biodiversity caused by climate change.

Direct losses through habitat conversion

Compared to other pressures on biodiversity, direct losses through land use change are the easiest impacts to identify and quantify and are an obvious starting point when considering biodiversity offsets.

CORINE data is the sole source of EU land cover data showing changes over time and has been used to assess trends in land use change. Under a 'no net loss' policy, offsets would potentially be required where changes in land cover occur as a result of human activities. The most significant human-induced changes are likely to result from developing undeveloped land and through natural disasters, where these have occurred as a result of human actions. It is unclear to what extent compensation for these losses would be required, and therefore whether they would give rise to a demand for offsets under a goal of 'no net loss'.

CORINE data suggest that approximately 114,000 ha of land were developed in the EU each year between 2000 and 2006. Excluding the development of brownfield land and the transfer of artificial surfaces back to other uses suggests that the net decline in undeveloped land was 86,200 ha per annum in the EU between 2000 and 2006. If this trend continues, this would represent the level of development that would require offsets in order to achieve no net loss of biodiversity. However, brownfield land can also have a biodiversity value and could therefore also give rise to demand for offsets if required.

The vast majority of undeveloped land used for development over this period was agricultural land, which suggests that the greatest potential demand for offsets resulting from development could be for losses of agricultural land, if there was a requirement to offset these losses (i.e. on a like-for-like-or-better basis). This was followed by losses to forests and woodland shrub, sclerophyllous vegetation and natural grasslands, which would also require offsets under a 'no net loss' policy.

These trends are based on data up to 2006 and therefore fail to take account of the economic downturn and decline in development activity that has taken place since 2008. However, an analysis of three EU land-use models developed since 2008 has helped to validate the above trends as appropriate for projecting to 2020. Based on these models and the CORINE data, a projection of

50,000 to 100,000 ha per annum is likely to be a realistic, yet conservative, forecast of the net loss of EU habitats and other greenfield land to development up to 2020.

Undeveloped land can also be lost as a result of natural or man-made disasters including forest fires. Using data from the European Forest Fire Information System (EFFIS) and data relating to the causes of forest fires in Europe suggests that more than 55 per cent of forest fires are a result of human activities. If the responsible persons or organisations could be identified, this could potentially give rise to a significant demand for offsets if it was determined that these losses would need to be compensated for in the context of a no net loss target. For example, if the offsets requirements were extended to this type of damage, this could give rise to a demand for offsets of between 110,000 and 440,000 ha per annum, with an average of 250,000 ha per annum (based only on those which are caused by human activities). Establishing legal liability for this damage would be essential, although insurance schemes are a possible solution for situations where liability cannot be identified.

Combining the estimates of undeveloped land lost to development and areas affected by natural disasters (if the latter were also required to be offset) suggests that overall land use changes totalling 160,000 and 540,000 ha per annum could create a demand for offsets under a policy to achieve no net loss of biodiversity.

Indirect impacts (biodiversity degradation) induced as a result of habitat conversion

In many situations, the direct, physical footprint of a development is just a small part of the overall impact on biodiversity. There are other potential indirect or induced impacts such as pressure from increased footfall, which can reduce a habitat's functionality even if the habitat is not completely lost or directly damaged. In such cases habitat is not converted but biodiversity losses can be large. According to the EIA Directive, indirect and cumulative impacts should be considered in impact assessment. Certainly if a policy goal is no net loss of biodiversity, such losses need to be addressed

Indirect impacts (losses) through pollution and changes in land management systems

Another form of impact that is less visible than the direct effects of clearing a forest or building on a field is the impact on biodiversity from non-point source pollution, such as the cumulative effects on freshwater and marine biodiversity from agricultural run-off. In addition, energy intensive developments (such as extractive industry projects) result in considerable carbon emissions, and climate change is a significant cause of biodiversity loss. A NNL approach would therefore potentially seek to compensate for impacts of this kind as well, perhaps through an approach akin to a scheme for payments for ecosystem services in the first case, and a system of biodiversity-friendly carbon sequestration projects in the second.

Losses to global biodiversity caused by actions of EU actors

Given a goal of achieving NNL, there is also a need to potentially consider what measures might have to be taken to address the considerable cumulative biodiversity losses caused by EU entities' operations outside the EU. Public procurement by MS and the Commission, the consumption patterns of EU residents and the international supply chains of companies headquartered within the EU all give rise to biodiversity losses.

Level of impacts to be compensated

Another aspect to consider when reviewing demand for offsets is the level (or significance) of residual impacts that would trigger the no net loss requirement. Law, policy and guidance worldwide vary as to whether approaches to NNL should focus on 'significant' impacts only, or use metrics and approaches to impact assessment that would lead to all residual impacts being addressed. It may seem onerous to require developers whose individual impacts result in residual impacts that are less than 'significant' to offset these. However, the cumulative effect of even fairly insignificant residual impacts contributes to the net loss of biodiversity. A number of different responses to this dilemma could be considered that are proportionate and fair, drawing on, for example, experience from Australia and the UK.

Demand for compensation resulting from EU legislation

The Natura 2000 network covers 95 million ha, representing 17.5 per cent of the EU territory. However, there are relatively few cases each year where compensation measures are required for

Natura 2000 sites. Analysis of Commission opinions suggests that developments on Natura 2000 sites may cause damage to 8,200 ha of habitats per annum, representing approximately 10% of the land developed in the EU each year (0.009% of the Natura 2000 network), and giving rise to demand for compensation for the loss of up to 50,000 ha. However, it should be noted that this compensation does not necessarily achieve no net loss, as there may be a need for better metrics, tools and guidance to determine the level of compensation that should be required.

The EIA Directive also creates demand for compensation. However, the analysis suggests that compensation resulting from EIAs arises for only a very small proportion of land affected by development in the EU. Moreover, there is likely to be a high level of overlap with compensatory requirements arising from damage to Natura 2000 sites.

There is a lack of evidence relating to cases brought about by the ELD. Moreover, implementation of the Directive has been slow. Altogether, this suggests that current demand for compensation resulting from the ELD in the EU is very limited, although more ELD cases are reported each year. Nonetheless, offsets and habitat banking could offer a solution to operators who may be called upon to restore biodiversity loss.

Demand for compensation resulting from MS requirements

There is a lack of data on compensation measures resulting from MS requirements. A qualitative assessment of the available evidence suggests that the strongest demand for compensation is in Germany, while there is also some demand for compensation in France, the UK, Sweden and the Netherlands, and much lower demand for compensating for environmental damage in Bulgaria, the Czech Republic, Finland, Greece, Poland, Italy and Lithuania. Demand for compensation within the Natura 2000 network is higher than for damages occurring to areas outside Natura 2000 sites, mostly due to the general lack of supporting legal frameworks.

Demand for voluntary compensation

There is also some, albeit limited, demand for compensation on a voluntary basis, driven by, for instance, companies motivated by corporate social responsibility, reputational considerations or attempts to increase the likelihood of gaining regulatory approval. Voluntary compensation is unlikely to create a substantial demand for offsets at EU level in the near future, or make a significant contribution towards an overall goal of NNL. However, there is potential for growth, and experience with voluntary approaches can inform and shape the nature of a regulated system.

The supply of offsets

The ability to supply effective biodiversity offsets depends on the interaction between four key factors:

- The types of **habitats that are being lost** through pressures that may lead to a 'like-for-like or better' requirement for compensation;
- The **condition of existing habitats** and the extent to which they are in need of activities to improve or protect their conservation status;
- The **limitations which constrain the ability to restore or recreate different habitats**. Several factors will influence whether or not it is possible or not to restore or recreate a habitat, some of which are related. These include:
 - The time it takes for a habitat to be restored / recreated;
 - The extent to which habitats are limited by geographic and ecological conditions;
 - The availability and accessibility of knowledge;
 - Land availability and legal constraints;
 - Financial constraints; and,
 - Social and administrative constraints.
- The **precision with which the requirement for 'like-for-like or better' compensation is defined**. This may differ according to the context and policy requirements, as well as the physical condition of the habitats in question.

There are, for instance, certain types of habitats that have been degraded beyond the point where restoration is feasible, and this could limit the supply of offsets. However, this is only of consequence if there is no alternative option for sourcing appropriate offsets, for instance averted risk offsets (see below) or 'trading up' to a higher conservation priority habitat which presents a 'better' offset option.

Considering all the various factors, available evidence indicates that, for instance:

- The supply of grassland and wetland habitats for restoration / enhancement / re-creation is least constrained;
- The supply of coastal, freshwater, forest, sclerophyllous and heathland habitats for restoration / enhancement / re-creation is slightly more limited; and
- The supply of dune and rocky habitats for restoration / enhancement / re-creation is the most limited.

Aside from their restoration and re-creation, the continued degradation of habitats also provides the opportunity for *averted risk offsets*, where the activity involves protecting a habitat which would otherwise be at risk of damage or degradation (instead of restoring, enhancing or re-creating a habitat that has already been damaged or degraded). Averted risk offsets can result in significant biodiversity benefits by arresting on-going degradation and losses. However, averted risk offsets may be somewhat limited in the EU given that a large proportion of European habitats whose further degradation is worth arresting are already protected at some scale. This is a topic that merits some discussion in the EU.

Although the analysis indicates that there are cases where the extent to which it is feasible for a habitat to be recreated or restored could be very limited, in practice it seems that:

- The factor which currently constrains supply the most is actually **the availability and / or accessibility of suitable land** for compensation to take place. Land suitable for the restoration or creation of required habitats may be short in supply locally because it is in demand for other purposes, because there is no clear market for providers to sell into, little awareness of this as a business opportunity, or because other land uses generate higher income for providers;
- In some cases, the **timescales** required to restore, enhance or re-create habitats present a significant barrier to offsetting;
- On the whole, however, it seems that **other factors which limit the feasibility with which certain habitats can be restored, enhanced or re-created are of less concern**, because:
 - those habitats that are inherently very difficult to restore are not the same ones being affected by development;
 - applying the mitigation hierarchy should limit losses of more distinctive and hard to replace habitats; and/or
 - constraints may sometimes be overcome by like-for-unlike (i.e. like-for-better) compensation.

Policy implications and considerations

Development is less likely to occur on habitats which are difficult to restore / enhance / re-create, if the mitigation hierarchy is followed diligently, if the value of these habitats is appropriately reflected in the chosen metrics and if 'like-for-like-or-better' compensation is required.

Habitats which are relatively straightforward to restore or re-create should present fewer challenges to find 'like-for-like' compensation and might also provide widespread opportunities for 'like-for-like or better' compensation (where 'trading up' is acceptable and where like-for-like compensation is difficult). Conversely, a like-for-like requirement will tend to discourage damage of habitats whose restoration is difficult, lengthy and/or expensive. Where the scope for restoration and/or re-creation is severely constrained and where like-for-like compensation is required, development may be shifted onto other habitats which are easier to restore / re-create and where it would, therefore, be more feasible and cost effective to offset the damage. Alternatively, it could mean that other mechanisms are sought to deliver 'like-for-like or better' additionality (e.g. through averted risk offsets rather than restoration). The metrics that are applied when calculating the offset requirements should reflect these factors.

Similarly, stipulating 'no go' areas where a habitat is highly distinctive and/or the restoration of a habitat is infeasible may also restrict development on these kinds of areas and limit development to areas where affected habitats could be more easily restored or for which their loss may be compensated.

There are potential benefits in a system which allows some flexibility in the precision of the exchange rules set to define 'like-for-like or better' compensation and a broader area for offset delivery, but there may also be potential drawbacks.

Allowing 'like-for-unlike' or, preferably, 'like-for-better', offsets can ease some supply constraints, provided this is based on a sound scientific method for defining what constitutes trading up to 'better' in a manner that does not endanger the biodiversity components affected. Similarly, allowing a broader geographical frame of reference within which offsets can be provided (i.e. a larger 'service area') can also increase flexibility and be used to deliver more strategic, joined up and connected conservation projects that are planned at the regional or landscape scale. However, this must be balanced with a potential lack of political and public acceptance for more coarsely drawn exchange rules and larger service areas. One way to bridge this gap is to plan 'composite offsets' spread across more than one location in which the amenity and livelihood values affected by the project are compensated nearby, while the more intrinsic conservation values (e.g. populations of threatened species) are compensated at a broader spatial scale. Policy decisions on exchange rules and geographical scope, as well as the nature of the policy goals themselves, will affect the extent to which supply is constrained and the extent to which these constraints may be overcome.

Costs of biodiversity offsetting and habitat banking

Biodiversity offsets and habitat banking schemes result in a variety of different costs for developers and regulatory authorities. These include:

- **Habitat management costs** - the costs of habitat creation, restoration and long term management activities designed to deliver a gain in biodiversity equivalent to the losses incurred;
- **Land costs** - the costs of acquiring the land on which this conservation activity is to take place, or of entering into a management agreement to secure a change in land management;
- **Financial costs** - the costs of financing biodiversity offsets, as well as the costs of insurance. Financing costs may be significant for habitat banking schemes, which require up-front capital investments only recouped over a period of years as credits are released to the market based on performance milestones which sometimes take many years to achieve. Other costs may include financial guarantees and/ or insurance to cover the risk of the offset failing;
- **Management and transaction costs** incurred by the developer in meeting the requirements of the policy, by the provider in managing the provision of offsets and habitat banks and by providers and brokers in organising transactions. These include the time, fees and expenses related to applications, project management, management planning, certification, administration, monitoring and reporting; and
- **Administrative costs** - The costs incurred by the authorities in administering and regulating the offsets system, which may or may not be reclaimed through fees paid by developers and/or providers. These may include the costs of receiving, assessing and granting applications, advising on requirements, conducting site visits, undertaking scientific assessments, issuing permits, dealing with disputes or complaints, maintaining records and inventories, enforcing any requirements, and undertaking on-going monitoring and evaluation.

While most national offset systems require some up-front investment by governments, it is possible to run offset systems on a 'cost recovery basis.' The various costs of providing offsets are reflected in the prices paid by developers for credits, which also include any profits made by the offset provider on the provision and sale of credits. Some offset providers (e.g. individual farmers, landowners and conservation banking companies) aim to maximise profits, while others, such as conservation NGOs and some landowners, may be driven primarily by conservation motives and be content to cover the costs incurred.

A large proportion of the overall costs involved – especially habitat management and land costs – will be common to any habitat creation or restoration scheme. However, other costs will vary according to

the type of delivery model. Habitat banking schemes will incur costs other than one-off offsets. For example, habitat banking tends to have significant financing costs (because it often involves conservation work in advance of offset requirements being identified), but should yield economies of scale which will help to reduce management and transaction costs for providers. Habitat banking may also reduce administrative costs by enabling the authorities to deal with known, certified providers with established systems and practices.

Evidence of costs

While detailed cost breakdowns are rarely available, evidence suggests that the initial costs of habitat management works may often be a small proportion of the overall costs of habitat banking and offset schemes. The costs of purchasing or securing rights to land, the administrative and transaction costs of determining offset requirements and entering legal agreements, and the allocation of funding to long term management and monitoring all add significantly to the overall costs involved.

A wide range of cost estimates are available for different countries, reflecting variations in local requirements, land prices and cost structures. Moreover, the prices for credits for habitat banking also vary widely, both between and within countries. In the US, for instance, different transactions for wetland habitat banking can involve total payments of anything between €6,000 and more than €1.2 million per hectare. Most available evidence in the EU suggests that the total (capitalised) costs of offsets are likely to range from between €30,000 and €100,000 per hectare, but could be higher than this in some circumstances. Offset costs represent only a small proportion of total development costs. Globally, the annual market for biodiversity offsets has been estimated to be worth at least \$2.4 billion and possibly over \$4.0 billion.

While no comparative data could be found, it is widely commented that habitat banking should lead to cost efficiencies over time compared to individually arranged offsets, through economies of scale and the ability to plan and implement compensatory strategies in a strategic and cost effective way.

Benefits of offsets and habitat banking

The benefits of offsets and habitat banking schemes can be measured in terms of their effectiveness in conserving biodiversity and ecosystem services. It is clear that established schemes in the US and Australia have provided many thousands of hectares of habitats to compensate for losses to development. It has been estimated that the global impact of the offset market has been to bring at least 187,000 hectares of land under some sort of conservation management or permanent legal protection per year. Most of this area is in North America, and only a small proportion is currently in the EU. While the methods employed to assess offset requirements do not always guarantee that no net loss is achieved, enhanced understanding and improvements in standards should help to enhance benefits over time. There is little evidence of the monetary value of the benefits of offsets and habitat banking schemes and arguably monetary valuation may not be a high priority where policies are driven by clear sustainability criteria (i.e. the no net loss objective, delivered through biodiversity-based metrics that establish 'like for like or better', and quantified changes in condition of biodiversity in particular areas).

The benefits of habitat banking compared to other means of delivering compensation including its support to larger conservation projects (yielding both economies of scale and conservation benefits), streamlined trading arrangements and reduced transaction costs, can be more reliable and effective where compensation is provided in advance of impacts, and can help to address cumulative impacts by providing an efficient means to compensate for small scale projects for which individual offsets would be difficult to arrange.

Risks of offsets and habitat banking

Offsets and habitat banking also present a number of potential or perceived risks. These include the potential that development of successful schemes could lead to relaxation of the mitigation hierarchy (the so-called 'licence to trash'), that offsets displace existing conservation activities and therefore fail to deliver additional benefits, that they fail to deliver the anticipated benefits and therefore to achieve no net loss objectives, and/or that they are costly and unpopular and face significant opposition from developers. While offsets will never be risk free, most of the potential risks can be minimised or reduced through careful design of offsets and habitat banking initiatives.

Design Elements

A series of key principles have been established that guide the design and delivery of biodiversity offsets and habitat banking schemes, and these have been formalised internationally through the BBOP Standard on Biodiversity Offsets.

Analysis and experience of the implementation of biodiversity offsets and habitat banking in EU Member States and internationally highlights a number of different design elements that need to be considered in accordance with these principles. These issues can broadly be divided into two groups:

- **The design of offset requirements** – issues which effectively determine the scale and type of demand for offsets and habitat banking schemes.
- **Arrangements for implementing offsets and habitat banking** – issues which determine arrangements for the supply of offsets and habitat banking, and how these arrangements are regulated.

Design of Offset Requirements

Objectives of schemes compensating for biodiversity loss may vary in terms of the delivery of no net loss (e.g. US wetland mitigation), net gain (e.g. for native vegetation in some Australian states and for impacts on critical habitat under IFC Performance Standard 6) or more loosely defined compensation requirements (e.g. in South Africa). The BBOP Standard states that there is a spectrum of compensatory activities and that only those designed to deliver no net loss or net gain should be defined as biodiversity offsets. They may form part of an overall no net loss policy or be designed to offset damage caused by particular projects. Similar variations are apparent in the EU. For example, offsets and habitat banking contribute to a formal no net loss policy in Germany and are being trialled to enhance the delivery of existing compensatory requirements in England. However, in Sweden compensation schemes can have more general objectives that do not necessarily deliver no net loss of biodiversity (e.g. communities can be compensated for biodiversity loss through improvements in local amenities which deliver cultural or recreational services). Schemes may also vary in the extent to which they focus on compensation for losses of habitats or species, take account of wider ecosystem functions and services, or address the loss of biodiversity-related benefits to local populations.

Implementation of the mitigation hierarchy is widely emphasised in offset policies and guidance, to ensure that the provision of offsets does not lead to a relaxation of efforts to avoid or minimise losses. Most offset schemes require that compensatory measures should only be used to offset adverse residual effects arising from an activity, once other avoidance and mitigation measures have been taken. However, clear guidelines about how to ensure adherence to the hierarchy and how far to pursue each step along it are often lacking. Policies in Australia, Canada, South Africa and the US stress the avoidance or minimisation of impacts on habitats of higher significance, which are unlikely to be suitable for offsets. The regulatory and planning authorities have a key role in ensuring adherence to the mitigation hierarchy, while the BBOP Standard on Biodiversity Offsets highlights the importance of Biodiversity Offset Management Plans in documenting how the hierarchy has been applied. Effective adherence to the mitigation hierarchy should limit the demand for offsets, and this has been noted in parts of the EU (Germany, the Netherlands and Sweden).

Conditions and thresholds for the application of offsets vary between schemes, both internationally and in the EU. Germany requires the widespread use of offsets for residual biodiversity losses, not only in protected areas or for protected species. But in most Member States compensation tends to be required only in particular circumstances, for example where protected areas or other important sites are affected. These circumstances are often ill-defined – for example planning policy in England requires compensation for ‘significant harm’ to biodiversity but provides only general guidelines about the definition of significance - relying on the judgement of local planning authorities to determine when compensation is required.

Mandatory and voluntary approaches to offsetting have been applied both internationally and in the EU. Both approaches may be designed to achieve no net loss of biodiversity, but only mandatory requirements can address the residual impacts of a sufficient proportion of projects to make a significant contribution towards no net loss. Mandatory schemes are in place in the US, Australia, Brazil, Canada and South Africa. Compensation is mandatory for impacts on Natura 2000 sites throughout the EU, as it is for impacts on other categories of biodiversity in Germany. England is

piloting a voluntary approach to biodiversity offsets (beyond compliance with EU Directives) in order to test whether they can enhance effective compensation delivery under the planning system. Initiatives in the Netherlands have sought to promote the wider adoption of voluntary offsets at the national level. Offsets are increasingly being applied by companies on a voluntary basis in developing countries, a trend largely driven by the need to demonstrate no net loss or a net gain of biodiversity to satisfy changes in project finance conditions.²

'Like-for-like or better' compensation for biodiversity losses is required to varying degrees of precision by biodiversity offset and habitat banking schemes. 'Like-for-like' or 'in-kind' offsets involve similar habitats, functions, values or other attributes to those affected by the project, while 'trading up' allows for compensation of different kinds of higher conservation value biodiversity. There is a general presumption worldwide in favour of 'like-for-like or better' offsets. In some cases, particularly where the biodiversity affected is not especially vulnerable or irreplaceable it may be beneficial to allow the flexibility to 'trade up' to conserve biodiversity of a higher conservation value than that affected. The more vulnerable and irreplaceable the affected biodiversity, the tighter becomes the 'like for like' requirement. In cases where the biodiversity affected is extremely vulnerable or irreplaceable, it would be impossible to offset the impacts concerned. In this case, 'no go' areas should be considered. There are some examples of 'very unlike' compensation arrangements, such as in Sweden where the objective of compensating local people for losses may be delivered through a wide range of options, even including investments in cultural or recreational assets, although at this level of disparity it becomes unclear to what extent the compensation is contributing to a goal of no net loss, if at all.

Metrics to assess offset requirements are an important element in any offset scheme. Good quality metrics endeavour to ensure equity in type, space and time of biodiversity. Key elements of metrics are: biodiversity counts and measures (what is being exchanged, or lost and gained); a currency constructed from these data (how much of what is being exchanged); an accounting model defining offset specifications (how much of what is needed); and separately from the metrics themselves, spatial information to identify potential offset locations. Different approaches have been applied internationally, ranging from using area with a simple multiplier (or ratio) as the metric for compensation actions, to the use of fairly subjective professional judgements by experts, or more sophisticated metrics based on particular assessment methods. Current good practice is to use an approach that reflects not only the area affected but changes in condition or quality of the biodiversity lost or gained (e.g. the use of 'habitat hectares' in Victoria, Australia). As more sophisticated modelling methods are developed and more data on species' abundance, condition and persistence become available, it may be possible to develop metrics based on combined data for changes in many species' populations in the same area. For now, simpler approaches based on area and condition of habitats, supplemented with information on particular species of concern, are more feasible. On top of the basic metric, it is common to apply multipliers to take into consideration factors such as uncertainty in offset success, particular national or regional conservation targets and rare / threatened biodiversity components, time preference and dealing with out-of-kind offsets. In many countries, including some EU MS, offset schemes have been criticised for a lack of uniform, objective and/or transparent methodologies for assessing the equivalence of gains and losses.

Additionality is a widely agreed principle that underpins offset and habitat banking schemes – offsets should result in additional conservation outcomes to what was expected in their absence. Criteria to assess additionality include allowable conservation actions (such as habitat restoration and/or averted risk) and the basis for funding these actions. In some countries mere protection of biodiversity may not qualify as an activity that can be included in offset schemes, while in others it may be eligible subject to certain criteria (e.g. that it protects sites otherwise at significant risk and does not contribute to the fulfilment of existing regulatory requirements). The ability to verify additionality may be an essential prerequisite for regulatory approval, giving providers the certainty to invest in offset or banking schemes prior to a project taking place. In England, providers are required to develop approved Biodiversity Offset Management Plans that demonstrate the additionality of the compensation provided.

Locational requirements vary between offset schemes, with most placing some geographical limit on where compensation can be provided relative to the impacted site (often known in conservation banking terminology as the 'service area'). The 'service area' may be set geographically, often with

² For example, IFC PS6 and Equator Banks' project finance conditions

reference to the watershed or within an ecologically defined region, or it may be set by default by defining biodiversity credits with such precision that the same credit types will most likely only be found within that region. Local offsets are normally preferred (in terms of confidence in ecological equivalence given the uncertainties inherent in quantifying no net loss, and in terms of fairness so that those affected by the project benefit from the offset). A highly local approach may not be effective in some cases, however, in terms of benefits for biodiversity and ecosystem services or availability of land. Contrasting approaches are evident in the EU; Sweden normally requires compensation to take place very locally, to compensate the population affected, while England's approach emphasises the use of local strategies for biodiversity offsetting – often spanning the area of several local authorities – to maximise conservation benefits through the delivery of larger initiatives at the landscape scale. Trans-boundary offsets may sometimes be beneficial on both ecological and economic grounds, but raise potential challenges with regard to political acceptability and regulatory enforcement. They may offer particular opportunities to further the conservation of migratory species.

Timing of provision of compensation is also a significant consideration in the design of biodiversity offsets and habitat banking schemes. While project impacts cause immediate and certain losses, the conservation gains of an offset are often uncertain and may require many years to achieve. Habitat banking schemes may address these concerns to some extent, by demonstrating progress in delivering conservation gains prior to the impact taking place. However, most habitat banks release at least some of their credits at an early stage when significant uncertainties about future outcomes still remain. Given the time taken to establish effective habitat banking arrangements, a requirement for compensation to be fully operational prior to a project taking place may be unduly restrictive, especially in the case of new offset policies for which there may not be an established supply of offsets or habitat banking arrangements. The issue of time preference can also be addressed through use of metrics to discount future benefits, and to allow for risk and uncertainty. Such an approach is being applied in the English biodiversity offsets pilots, where time discounting (using a 3.5% discount rate) requires an offset multiplier of 3:1 to be applied for compensation projects that take 32 or more years to reach maturity.

Arrangements for Implementation of Offsets and Habitat Banking

Institutional arrangements need to be effective and based on clearly assigned responsibilities. These can take many different forms, as there are a variety of approaches and institutional roles. Most offsets and habitat banking schemes involve a transaction between a provider and a developer, approved and overseen by a regulator. Brokers can also play an important role. Many systems allow offsets to be implemented by the developer themselves, which can be done voluntarily (e.g. the Road Agency in Sweden) or through case-by-case requirements stipulated by local authorities (e.g. the UK). In these cases, there may be very little formal involvement from nature conservation authorities. A range of government bodies can also be involved, including national and local planning bodies and authorities, national policy makers and environmental agencies, which can make for a complex institutional structure. Public authorities and agencies can play an important role not just as regulators, but can also potentially act as a provider of offsets (subject to additionality), and as a broker, buyer or seller. Other stakeholders can also play a critical role in managing and monitoring the offset, including communities, conservation organisations, NGOs or independent consultants. The evidence suggests that where it exists, offsetting activity in the EU is still quite basic (where a developer often undertakes conservation actions to offset the impacts of its own project) compared to a more sophisticated system whereby offset credits are banked and/or traded and a larger range of stakeholders are therefore involved.

Regulators have a very important role to play in offsets and habitat banking schemes through establishing enabling frameworks and/or property rights which stimulate demand, ensuring fair and transparent monitoring and enforcement to ensure that requirements are properly met and adhered to, and defining standards and performance indicators. Although a public nature conservation or environmental authority can play the main regulatory role, statutory functions can also be split between more than one public sector body. In the EU, different public authorities are involved in different roles, and are responsible for different aspects depending on the context. Public nature conservation or environmental authorities rarely seem to play a significant role except to provide overall guidance and support, although they are the main organisation involved if the case relates to compensation in a protected area (e.g. Sweden). Offsets are normally the responsibility of local or regional authorities (e.g. the Netherlands and the UK). In the US, on the other hand, the regulatory

authority acts as a 'check' on the process to ensure that guidance and standards are followed. Regulators may also appoint independent agencies to oversee the licensing of habitat banks and their operations (e.g. Germany). Overall, the evidence is clear that without a strong regulator, offsets and habitat banking are likely to be unsuccessful, or limited to isolated 'hotspots' of voluntary action.

Instruments and models available for delivering offsets vary considerably, for example, from individual negotiated agreements to habitat banking schemes in which offset requirements are met through the purchase of credits. Experience in the EU seems to be largely based on a principles-based approach, which means that existing mechanisms have to be used through, for instance, the planning system. This kind of approach means that detailed guidance is especially important. The most common approach is to include requirements for compensation as conditions attached to a planning permit, which are then legally binding. These can be quite weak, however, where they relate to compensation outside Natura 2000 sites, and are not always fully enforced. There are some cases where separate legally binding agreements can also be made which can provide greater scope for involving different stakeholders and have the potential to include a wider variety of terms and conditions (e.g. Section 106 agreements in the UK), although these agreements can take much longer to negotiate. Management plans can also be developed (e.g. Biodiversity Offset Management Plan (BOMP) in the UK, which are assessed and need to evidence that a project is capable of delivering the conservation outcomes envisaged). There are some examples of well-developed market mechanisms in the EU (e.g. Germany's compensation pools and a habitat bank in France) although these are rare. In the case of habitat banking (e.g. in the US), habitat banking agreements, or memoranda of understanding, are developed which cover all necessary components (e.g. duration, management actions, rights and responsibilities, monitoring, reporting and auditing requirements, contingency plans and performance standards).

Land availability and accessibility is often cited as a factor hindering the implementation of offsets and compensation more generally in different Member States. A range of options are available, including purchase of the site, leasing of the area, or other models based on management arrangements with the landowner. However, the lack of formal or established mechanisms that enable land to be acquired or accessed for compensation purposes tends to make this a lengthy and drawn out process. Land can also be more forcibly acquired by requiring that the area be included in the protected area network (e.g. Sweden), or agencies can be established that have pre-emptive rights on land for different uses (e.g. France). In addition to a Biodiversity Offset Management Plan, BBOP points out that several systems use covenants, easements or other rights that can be attached to land in perpetuity, to ensure that benefits are maintained in the long term.

Standards and performance criteria play an important role in ensuring implementation is effective, establishing the benefits expected of compensation schemes and providing a benchmark for monitoring. In the US, evidence that wetland mitigation projects were not being effective led to the development of new standards. Performance standards need to be specific, measurable, achievable, realistic and timetabled. Important standards that have been developed are the BBOP Standard on Biodiversity Offsets and the International Finance Corporation (IFC) Performance Standard 6 (PS6). The latter defines a set of circumstances in which companies need to achieve no net loss or even a net gain of biodiversity, using biodiversity offsets, where necessary, as the last step in the mitigation hierarchy. PS6 is a requirement for clients seeking project finance from the IFC and from over 70 banks that have adopted the Equator Principles. In the US, administrative and ecological performance standards are included in mitigation plans. The ecological performance standards are linked to credit release schedules. In Germany, quality standards have been developed for habitat banks to follow. Evidence from the rest of the EU indicates that performance standards are typically decided on a case-by-case, *ad hoc* basis. The lack of a consistent and standardised approach in many cases reflects a lack of detailed guidance as well as limited delivery experience.

Certification and accreditation help to build confidence in offset provision, particularly for providers intending to engage in a multitude of transactions, for example through habitat banking. There are also benefits to the developer and/or provider, in terms of its license to operate and/or reputational advantages, particularly where they are undertaking offsets voluntarily or to access project finance, and not in compliance with detailed national regulatory frameworks. Certification is used in some settings and is beginning to be explored more broadly as an option. In Germany, for instance, compensation pools and agencies are certified if they fulfil a series of nature conservation criteria. The use of a certified pool can reduce the amount of compensation required. Compensation certification is

not evident in other EU countries, although there are some indicative steps towards accreditation (e.g. France). A range of mechanisms are available to implement certification. Accreditation can also occur either in the form of certifying a habitat bank (e.g. Germany) and/or the consultants involved in designing and implementing the offset (e.g. Australia).

Monitoring and reporting are essential to ensuring compliance and transparency, enabling management to be adapted if circumstances change (i.e. adaptive management) and contributing to the evidence base. BBOP recommends that monitoring should cover implementation performance (i.e. the process, covering inputs, activities and outputs) as well the impact performance (i.e. ecological and biodiversity impacts). Monitoring is a key element of some international systems (e.g. Australia). In the US, federal guidelines require ecological performance standards and monitoring requirements to be included in mitigation plans. In Canada, however, consistent offset monitoring and evaluation is often lacking. In the EU, monitoring requirements are often implemented on an *ad hoc* basis. In some cases (e.g. the UK) these systems are largely ineffective whilst in others (e.g. Germany) they are working relatively well. Monitoring may be carried out by the regulator (e.g. Australia), a third party, or by the developer in addition to, or instead of, monitoring by the regulator (e.g. Sweden). Offsets that are independently monitored, verified and audited are regarded as more trust-worthy than those that are monitored and verified by the developer itself. The costs are normally carried by the developer (e.g. Spain). There is considerable scope for other types of stakeholders to be involved in monitoring (e.g. communities and NGOs). Whilst monitoring in itself is important, it is also crucial that the results are shared to develop the knowledge and evidence base associated with offsets.

Compliance and enforcement are required to ensure that actions are appropriately and effectively carried out, particularly where they are a condition of planning approval, permits or project finance. The ability for relevant bodies to discharge their enforcement obligations is linked to the efficacy of legislation and the financial and resourcing capacity of regulating bodies. Experience from the EU indicates that mechanisms to enforce conditions are not always included, and there are rarely penalties for non-compliance. In other countries (e.g. Sweden), this element of the system works relatively well, in that developers are held accountable for the outcomes of the compensatory measures. In Australia and the US, enforcement of conditions is also more prevalent. In Australia, for instance, all tiers of government allocate resources for compliance and enforcement activities. Moreover, financial penalties and criminal convictions can be imposed.

Long term management and contingencies for failure are important to ensure that the measurable conservation outcomes are actually delivered and that they endure over the long term and preferably in perpetuity. This can be ensured through, for instance, the use of endowment funds for on-going management, performance-based payments, easements (e.g. in the US) or other legal restrictions on land use and the inclusion of the terms on the land title deeds which are then included in the Land Registry (e.g. Australia, Germany). These safeguards are largely lacking in the EU, partly because systems are less developed and/or tend to rely on general compensation requirements rather than a more formalised offsetting system. Contingency plans, which would come into play if the project fails, are also rarely incorporated into the agreement or planning conditions, in contrast with the US where a 15 – 25% contingency fund is normally set aside for additional work in case a project fails to deliver. Provisions for bankruptcy are also rare, although there are guidelines in the US on how to avoid financial failure.

Conclusions

Biodiversity offsets have an important potential role to play in delivering the NNL objective of the EU Biodiversity Strategy, by requiring measurable compensation for residual losses of biodiversity, following avoidance, minimisation and restoration or rehabilitation. Habitat banking has the potential to facilitate the delivery of offsets in an ecologically- and cost-effective way. However, the demand for offsets and habitat banking is largely driven by requirements to compensate for biodiversity losses. These are currently variable; there is currently no consistent or comprehensive framework in the EU to drive the need for offsetting or habitat banking.

It is clear that the current legislative framework in the EU and its Member States is inadequate to deliver no net loss of biodiversity. While compensation is required for damage to Natura 2000 sites, it is not known whether this results in gains equivalent to the losses. Outside the Natura 2000 network, requirements for compensation for biodiversity losses are limited. Whilst current demand is difficult to

quantify, it is well short of what would be needed to actually offset the estimated biodiversity losses in the EU each year.

While biodiversity offsets have the potential to compensate for many of these losses, a number of technical, ecological, geographical and economic constraints mean that offsets are not possible or appropriate in all circumstances. Where the components of biodiversity affected are particularly vulnerable and/or irreplaceable, it may not be possible to achieve no net loss, and in these circumstances, questions arise as to whether the development should go ahead (perhaps because there are overriding reasons of public interest), or be dropped. Where no net loss is possible but biodiversity is still fairly vulnerable and/or irreplaceable, 'like for like' offsets are advisable. By contrast, where the biodiversity affected is not particularly vulnerable or irreplaceable, 'trading up' to conserve higher conservation priority biodiversity may be the best outcome.

In order for habitat banking, and offsetting more generally, to be successful, there is a need for a strong regulatory framework to create demand, establish basic standards, and drive the process forward. The framework should clearly define roles and responsibilities, including robust mechanisms for monitoring, enforcement, compliance and safeguarding against potential risks and uncertainties to ensure that benefits are sustained in the long term (i.e. contingencies for failure).

It is crucial that a knowledge base is developed which takes into account the wide range of experience which is growing both internationally and, increasingly, within the EU. European experience with compensation and habitat banking is still relatively limited, so information should be shared as widely as possible, particularly with countries that are well advanced in their systems, such as Australia and the US, in order to help improve, inform and develop systems through iterative learning. Building networks between countries (both in terms of those that already have experience as well as those who are interested in offsets as a potential tool to address biodiversity loss) could therefore prove very useful.

Evidence gaps and further research needs

Key evidence gaps and research needs apparent from the analysis include:

- **Defining the policy framework and the role for offsets and habitat banking:** Within the context of the EU's No Net Loss Initiative, there is a need to identify and appraise potential options at the EU and MS level capable of ensuring implementation of the mitigation hierarchy including through offsets and habitat banking. A key issue is the extent to which policies are defined at EU and at MS level. Another important element is defining the role for offsets and habitat banking in compensating for biodiversity which occurs outside the Natura 2000 areas (i.e. for which compensation is not yet required under EU policies). Research could identify potential policy options for both MS and the Commission, and analyse the pros and cons of each, using a range of criteria such as ecological effectiveness, political acceptability, legal feasibility, economic efficiency and coherence with existing policies.
- **Developing a common understanding of terms:** given the different ways in which aspects of offsetting and habitat banking have developed across Member States, there may be value in additional research to understand how terms have evolved and what they may mean in different contexts and to different stakeholders in order to establish a baseline or frame of reference for further work and future policy developments. For instance, it is clear that some stakeholders have different interpretations of words such as 'compensation' and 'quality hectares', as well as of what qualifies as a 'habitat bank' and 'market mechanism'. Efforts to address this issue are already being made as part of the NNL Working Group.
- **Assessing and mapping biodiversity condition:** there is a need to better understand the type and quality of biodiversity in the EU, especially outside protected areas, as well as current rates of biodiversity loss and the drivers and pressures causing these losses. Many Member State assessments of habitats and species indicate a lack of data and/or knowledge on the state of biodiversity, which makes it difficult to understand the baseline against which a no net loss initiative, and specifically a habitat banking scheme, could work. This could tie in with Action 5 of the Biodiversity Strategy which aims to improve knowledge of ecosystems and their services within the EU.

- **Understanding the level of demand resulting from indirect damage to habitats following developments:** Gathering data on indirect impacts in order to estimate overall demand for offsets in the EU is difficult, but a short study could explore the significance of indirect and direct impacts in several cases and form the basis for an exercise to extrapolate and create plausible scenarios for the level of demand for offsets.
- **Further analysis of design elements for biodiversity offsets and habitat banking:** While this report has identified a number of key design elements that need to be considered in implementing biodiversity offsets and habitat banking schemes, a number of key issues merit further research (e.g. to develop a comprehensive guidance document or toolkit). In particular, it would be helpful to explore in more detail issues such as:
 - **The design of metrics** (i.e. methods to evaluate biodiversity losses and gains) to ensure no net loss in the EU context and balancing requirements for scientific robustness, practicality and cost effectiveness. Further research could examine best practice in Australia, the US, the EU and elsewhere, and assess its applicability in addressing biodiversity losses in Europe.
 - **The scope for offsets and habitat banking schemes to operate across Member State borders**, and the key political and regulatory barriers that might need to be addressed.
 - Potential barriers that might inhibit the growth of offset provision and the development of habitat banks in the EU, and how these might be addressed in order to facilitate the supply of offsets and habitat banks in an ecologically- and cost-effective way.
 - The scope for EU schemes to facilitate effective **delivery of offsets and habitat banking arrangements**, for example through common guidance, standards and performance criteria.
 - Potential **initiatives to promote voluntary offset schemes** to address the impacts of EU businesses on biodiversity outside the EU.
 - Potential **options for land to be acquired, accessed and/or secured into the future** for compensation purposes, and the ways in which habitat banking could affect both land availability and prices.
 - **Mechanisms which are available to secure long term benefits and possible safeguards against risks and uncertainties** (drawing on, for instance, experience in the financial and insurance sectors with regard to bankruptcy and financial assurances). A better understanding of what mechanisms are available, and how these may be limited in different Member States (e.g. the use of easements, endowment funds, performance bonds, etc.) could be useful.
- **Understanding the supply constraints of habitats and how these may vary across Member States:** this study was not able to go into detail with regard to the constraints on, and condition of, the different habitats within different Member States. Instead, only a very general, aggregated assessment was possible. There is potential value in undertaking a more detailed assessment in order to understand how supply constraints may vary across different habitats and across Member States in order to develop a clearer and more detailed picture of the extent to which habitat banking may be constrained in different areas and contexts. One discrete area worthy of study is whether and in what circumstances averted risk offsets (i.e. offsets which prevent future risks of harm to biodiversity from occurring) are applicable and appropriate in an EU context.
- **Understanding the costs and benefits of biodiversity offsets and habitat banking:** The review undertaken for this study found that evidence on the costs and benefits of offsets is patchy. Gaps in the evidence base make it difficult to assess the potential costs of introducing offset requirements at EU level, or to identify the most cost effective options for the design of offsets and habitat banking schemes. More detailed analysis would help to inform further policy design and impact assessment work.
- **Understanding and developing the necessary capacity and institutional structures:** Given the limited experience with biodiversity offsets and habitat banking schemes in many parts of the EU, it is likely that their development could be hampered by a shortage of knowledge, skills and experience, and by limitations in capacity and institutional arrangements. Research to understand the key elements for the effective implementation of offset initiatives would therefore be beneficial. Pilot projects in some Member States – such as France and the UK – are improving understanding of the practicalities of implementing offsets and habitat banking schemes in these countries, and could helpfully be extended to other parts of the EU.