

Innovative mechanisms for financing biodiversity conservation

Experiences from Europe

Illes, A., Russi, D., Kettunen, M. and Robertson M.



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Abbreviations and Acronyms

AB-AEM	Action-based agri-environment measures
AEM	Agri-environment measures
BBOP	Business and Biodiversity Offset Programme
CAP	Common Agriculture Policy
CBD	Convention on Biological Diversity
CDC	Caisse des Dépôts et Consignation
CIRAD	French Agricultural Research Centre for International Development
DEFRA	Department for Environment, Food and Rural Affairs
DG	Directorate General
EAFRD	European Agricultural Fund for Rural Development
EC	European Commission
EFR	Environmental fiscal reform
EFT	Ecological fiscal transfers
EIB	European Investment Bank
ELD	Environmental Liability Directive
ES	Ecosystem service
IEEP	Institute for European Environmental Policy
IFM	Innovative financing mechanisms
ILF	In-Lieu Fees
IMR	Impact Mitigation Regulation
IP	EU Partnership Instrument
LCA	Life cycle assessment
LIFE	EU Fund for the Environment
MPBC	Marketed products for biodiversity conservation
MS	Member State
NCFF	Natural Capital Financing Facility
NGO	Non-governmental organisation
NLL	No net loss
PES	Payments for ecosystem/environmental services
RB-AEM	Result-based agri-environment measure
RDP	Rural development programme
SCaMP	Sustainable Catchment Management Programme
WTR	Westcountry Rivers Trust

Preface

This report is an outcome of the project “Innovative Financing Mechanisms for Biodiversity in Mexico” financed by the EU Partnership Instrument (IP)¹. The objective of the project was to support the implementation of the European Biodiversity Strategy to 2020 that emphasises the opportunities related to the use of innovative financing mechanisms for biodiversity conservation, both within and outside the EU. In particular, the project aimed to promote the development and use of innovative financing mechanisms for biodiversity in Mexico through the review and exchange of experiences and collaboration between Mexican, European and other regional experts.

The final purpose of the project was to derive lessons from best practices across the Atlantic and provide recommendations on the ways forward in mobilising resources to support the conservation of biodiversity and ecosystems services, with particular focus on Mexico.

The project was coordinated by IBF International Consulting and carried out by French Agricultural Research Centre for International Development (CIRAD), Institute for European Environmental Policy (IEEP) and Universidad Iberoamerica. The project consisted of literature reviews carried out by the project team both in Mexico and the EU and the organisation of workshops, bilateral meetings and a final conference, all designed to support dialogue on and sharing of best practices.

The events forming a core part of the project included:

- Kick-off seminar and bilateral meetings with key Mexican and Latin American stakeholders on innovative financing for biodiversity in Mexico City, 19-20 April 2016
- Expert workshop with Mexican and European experts in Brussels, 5 July 2016
- Final seminar with Mexican, European, Latin American and American experts in Mexico City, 20 January 2017

The project identified the most promising and mutually interesting areas of focus for the use of innovative financing mechanisms in the EU, Mexico and Latin America and established a community of practice between the EU and Latin America.

The project resulted in three stand-alone outputs with complementary insights including two analytical reviews of innovative financing mechanisms in Mexico and the EU and an executive synthesis reflecting and comparing the insights from both sides of the Atlantic, with recommendations for future developments. See the inside cover of this report for references to these outputs.

This report summarises some selected representative public and private examples of interesting innovative financing mechanisms found in the EU - it is by no means a fully comprehensive analysis or even an exhaustive listing in an area under rapid development.

¹ http://ec.europa.eu/dgs/fpi/what-we-do/partnership_instrument_en.htm

Executive summary

While threats to biodiversity conservation are increasing due to climate change and the exploitation of land and natural resources, traditional sources for financing biodiversity protection – largely supported by public spending and private donations – are becoming increasingly inadequate. In the EU, increased pressures on public budgets due to spending cuts, slow recovery of the economy and calls to improve the efficiency of public spending have highlighted the need to mainstream more innovative approaches and mechanisms for financing biodiversity conservation. In particular, there is a need to leverage further funding from the different sectors that drive biodiversity loss.

Innovative financing mechanisms, such as payments for ecosystem/environmental services (PES), mechanisms for biodiversity offsetting (e.g. habitat banking), integration of biodiversity into existing fiscal instruments and different mechanisms for leveraging private funding, provide an opportunity to help to bridge the widening gap between financing needs and capacities to address these needs.

This report presents a review of the state-of-play of innovative financing instruments for biodiversity conservation in the EU, resulting to the following conclusions:

PES: PES are increasingly used to finance nature conservation around the world, including the EU. Most PES schemes in the EU are financed by public bodies with key focus on agricultural water catchments and water quality. A number of PES schemes financed by the private sector can also be found across the EU. Even though these schemes are purely financed by private actors, the role of public bodies has been key to their success. There are also a few examples of hybrid PES schemes, establishing collaboration between public and private sector. Finally, agri-environmental measures (AEM) under the EU Common Agricultural Policy (CAP) can be formally considered as PES, with result-based AEMs representing the most recent innovation in these payments. Result-based AEMs linking the payment to the provision of a desired environmental outcome, rather than to prescribed management activities, are of increasing interest. Result-based AEMs are a suitable option when proxy indicators for biodiversity conservation are available and there is a clear link between conservation practices and provision of an environmental outcome.

Offsetting: Under the EU legislation, the EU Member States are commonly compensating for residual impacts of land use changes on the EU network of protected areas (Natura 2000 network). In addition, a number of countries including France, Germany, Sweden and the UK have national or regional initiatives in place taking the offsetting approach beyond the EU level requirements. In general, ensuring the delivery of benefits through offsetting continues to be widely debated across the EU. Experiences both in the EU and internationally have showed that only mandatory requirements can address adequately the residual impacts on biodiversity and ensure that no net loss of biodiversity is achieved. The effective implementation of the mitigation hierarchy is considered to be one of the most crucial building blocks of any offsetting schemes.

Innovative use of fiscal instruments: Many biodiversity-relevant taxes and fees are commonly in use in Europe. However their impact greatly depends on whether the revenues are directly used to fund conservation activities (i.e. ear-marked for biodiversity conservation). While some examples exist where earmarking is applied, this is not often the case and therefore the biodiversity benefits delivered by fiscal instruments in the EU are limited. Ecological fiscal transfers (EFT), as currently in place in Portugal, provide a pioneering example of how ecological indicators can be integrated into intergovernmental fiscal transfers, with a view to make such transfers a mechanism to recognise the conservation efforts (or burden) at municipal level.

Private sector financing: One of the main difficulties for the private sector to invest in projects which have a positive impact on biodiversity is the lack of experience and track-record on biodiversity conservation actions in the form of a financial investment. To address this, the EU together with the European Investment Bank (EIB) launched the Natural Capital Financing Facility (NCF), with a view to reduce the risk of private investors in biodiversity impact investment via direct lending or intermediated investments (See box below). While a promising number of projects are in the pipeline, one of the main lessons learnt so far is that biodiversity projects still have a lot to learn in terms of developing a strong enough business case for the investment sector.

As regards business involvement, while there seem to be multiple pro-biodiversity business opportunities within various sectors in the EU (e.g. agriculture forestry, fisheries, ecotourism etc.) there is only a limited number of initiatives and projects in place that seems to be generating financial returns as well as conservation benefits at a larger scale. The Mondelēz's Harmony initiative, covering a range of EU countries and a relatively large area of agricultural land, offers some insights for mainstreaming and scaling up business involvement in the future (See box below).

In general, given the current level of application and identified needs for further developments, it is unlikely that the uptake of innovative financing mechanisms on its own would bridge the existing financing gap for biodiversity in the EU or its Member States, at least in a short term. However, continued efforts to mainstream the use of innovative mechanisms hold potential for improving the overall instrument mix for financing biodiversity conservation, both in terms of helping to increase the total funding available, and improving the effectiveness of funding and participation of stakeholders in (certain) conservation actions.

Up until recently the EU and its Member States have focused on promoting the use of innovative mechanisms in a pioneering and ad hoc manner, focusing on exploring the feasibility of different instruments and/or sharing interesting examples. With an increase in the number of innovative instruments, a more systematic approach to the uptake and scaling up of these instruments is required, both at the EU and national level. Such an approach should focus on the joint application of instruments - rather than promoting individual instruments – identifying the different roles funding instruments could play in the mix and key drivers for their uptake. For example, fiscal instruments such as taxes and tax incentives can help to protect the “no net loss” baseline whereas PES schemes can help to generating concrete funding for conservation measure.

The European Investment Bank's Natural Capital Financing Facility

In 2014, the European Commission, together with the European Investment Bank (EIB), launched the Natural Capital Financing Facility (NCF), a blended financing mechanism which combines grant funding from the European Commission's LIFE programme and the EIB's financing to support projects focusing on nature and biodiversity conservation (and to a lesser extent on climate change adaptation).

The NCF investments were foreseen to support the following four main types of projects:

- Green Infrastructure, such as investments in green roofs, green walls and ecosystem-based rainwater collection and water re-use systems;
- PES schemes;
- Biodiversity offsets and compensation which are beyond the current legal EU requirements; and
- Pro-biodiversity and adaptation businesses, such as sustainable forestry, agriculture, aquaculture and eco-tourism.

The pilot phase of the NCF was planned to last until 2017. However, there are discussions between the EIB and the Commission about a potential extension of the first phase. In total, EUR 125 million was made available for investments. The NCF provides funding in two ways: direct lending or setting up funds (intermediated investments). A range of financing options are being made available, including debt and equity financing. In addition to the EUR 125 million, a further EUR 10 million is provided for technical assistance in the form of a Support Facility, with a limit of EUR 1 million per operation.

Further eligibility criteria for the NCF projects include the following:

- Projects must be exclusively located within the EU 28 Member States.
- The terms of the debt and equity instruments were foreseen to be typically up to 10 years plus potential extensions.
- For debt financing the NCF finances up to 75% of the total project costs but a single commitment to an operation cannot exceed EUR 15 million. For equity, the maximum support from the NCF is 33% of the total operation costs.

The main aim of the NCF is to prove the market and potential investors that investments into biodiversity (and climate change adaptation) projects can be financially attractive and are bankable project, which can be revenue-generating or cost-saving. The NCF also aims to tackle the current lack of experience and track-record of business cases for biodiversity conservation actions. While there has been a promising number of projects in the pipeline of the NCF, many of the proposed projects were found to be immature from a business case perspective requiring dedicated efforts in capacity building.

Source: See Chapter 5 of this report

The Harmony Initiative of Mondelēz International

In 2008, after conducting a life cycle analysis which concluded that 70% of the company's environmental impact comes from raw materials, Mondelēz International – Europe's largest biscuit producer - launched the Harmony initiative. The initiative focuses on sustainable agriculture and biodiversity protection by targeting its own wheat supply chain. The headline target of the initiative was to have 75% of their Western European biscuits to be made with Harmony wheat by the end of 2015, which was achieved.

The initiative builds on the aim of Mondelēz International to be closely involved in the ways in which wheat is produced and how it gets from the farmers to the factories. The cornerstone of the initiative is the Harmony Charter, which is a list of 51 sustainable agricultural practices with which farmers wanting to be part of the initiative need to comply with.

The charter focuses on the following four principles:

- **Partners:** close partnerships are being made with the farmers and millers;
- **Practices:** farmers are required to apply the 51 sustainable agricultural practices, which include amongst others choosing more resistant wheat varieties, soil management, limiting the use of pesticides and fertilisers and sustainable managing water resources;
- **Biodiversity:** 3% of all Harmony field is set aside and dedicated for growing flowers that attract and support bees and other pollinators;
- **Traceability:** each field where Harmony wheat is grown has an individual Crop Sheet, which provides information on the field's location, the previous crops which was grown on it, the wheat variety that was chosen to grow now and a record of any sort of intervention on the field, including for instance the use of pesticides. Both farmers and millers are also audited: 10% of the farmers are audited randomly by third party auditors for all of the 51 Harmony practices and 100% of the millers are checked for their compliance with traceability.

The initiative started in France with 68 farmers and now it also covers Spain, Italy, Belgium, Poland and the Czech Republic, with more than 2000 farmers involved in total in Europe, which translates into 40,000 hectares of land. In terms of the main results, in France (where the initiative has been in place for the longest) on average pesticide use was reduced in 2016 by 22% and for the 2016 harvest 14.5 million bees have been observed on Harmony wheat fields.

The farmers and the farmer cooperatives get a premium per tonne of wheat for complying with the Charter. Nevertheless the premium price is not translated into an increased consumer price of the Mondelēz International products. In order to improve the marketing image of the Harmony initiative a label is put on each of the Harmony products, which has proved to drive growth in some of the Harmony products

The Harmony initiative is described in more details and its results are analysed in a case study on private sector engagement in Europe, which was also developed as part of this project.

Source: See Chapter 6 of this report

1 Introduction

Background

While threats to biodiversity conservation are increasing due to climate change and the exploitation of land and natural resources, traditional sources for financing biodiversity protection – largely supported by public spending and private donations – are becoming increasingly inadequate. Innovative financing mechanisms, such as payments for ecosystem/environmental services (PES), mechanisms for biodiversity offsetting (e.g. habitat banking), integration of biodiversity into existing fiscal instruments and different mechanisms for leveraging private funding, provide an opportunity to help to bridge the widening gap between financing needs and capacities to address these needs.

In the EU, increased pressures on public budgets due to spending cuts, slow recovery of the economy and calls to improve the efficiency of public spending have highlighted the need to mainstream more innovative approaches and mechanisms for financing biodiversity conservation. In particular, there is a need to leverage further funding from the different sectors that drive biodiversity loss.

Several examples of innovative financing for biodiversity are already in place and operating in the EU, with a range of studies carried out to assess their development, current status and success. The existing literature at the EU level on the effectiveness of these instruments – mainly related to PES and offsetting schemes - highlights a range of aspects affecting the conservation outputs and cost-effectiveness of innovative schemes including, for instance, methodologies used to determine the payment levels, measure and monitor biodiversity losses and gains (see Kettunen et al. 2017 and references within). The instruments are also known to have socio-economic impacts and legitimacy issues, with payments resulting in the redistribution of benefits and/or access to ecosystems which in turn can have implications on how the payment schemes are received by stakeholders (e.g. Corbera et al. 2007; Pascual et al. 2010, 2011). Furthermore, designing and implementing innovative schemes cannot take place without consideration of the institutional environment and the previously existing instruments (i.e. the entire policy-mix) (e.g. Ring et al. 2011).

The above factors determine the overall success of an instrument and, reflecting these key insights, this report focuses on synthesising the status, uptake and experiences learned to date on implementing innovative financing mechanisms for biodiversity in the EU, with a dedicated view to support cooperation between the EU and Mexico by exchanging experiences on the use of such mechanisms.

Scope and structure of report

This report presents the outcomes of a review of innovative financing instruments for biodiversity in Europe.

Part I, supported by Annex I, outlines the results of the literature review, including a range of case boxes outlining existing examples of innovative financing in Europe.

Part II provides an in-depth description and assessment of two selected European case studies on mobilising private financing for biodiversity.

Chapter 1 provides information on the methodology used in the development of the report while Chapter 7 summarises and discusses the key insights.

Methodology

The main objective of this study was to support cooperation between the EU and Mexico by exchanging experiences on the use of innovative financing mechanisms for biodiversity conservation. Against this backdrop, the primary focus of the work at the EU level was to provide useful insight on key issues, advantages and challenges as regards the use of innovative mechanisms to finance biodiversity conservation in the EU and identify good practice examples of interest to Mexico. This was achieved through three steps presented in Figure 1.1.

First, a literature review was carried out in order to understand the EU's current experience with payment for ecosystem/environmental Services (PES), biodiversity offsetting and other financing mechanisms, including initiatives in the public sector on environmental fiscal reform and private sector involvement in biodiversity financing. This exercise was not foreseen to deliver a fully exhaustive and systematic review but rather to build on the results of key available literature reviews, in order to support the identification of best practices of mutual interest.

Based on the results of the literature review, as well as the review of innovative biodiversity financing in Mexico by the Mexican team, and reflecting the outcomes of two stakeholder workshops (Mexico City and Brussels in April 2016 and July 2016, respectively) the most interesting examples of innovative financing mechanisms in the EU to support biodiversity conservation were selected to be further studied and analysed. Based on this selection, an in-depth case study, presented in Part II of this report, focusing on two specific initiatives on innovative financing for biodiversity conservation in the EU was developed. This case study was based on the review of publicly available documents and undertaking interviews with key stakeholders.

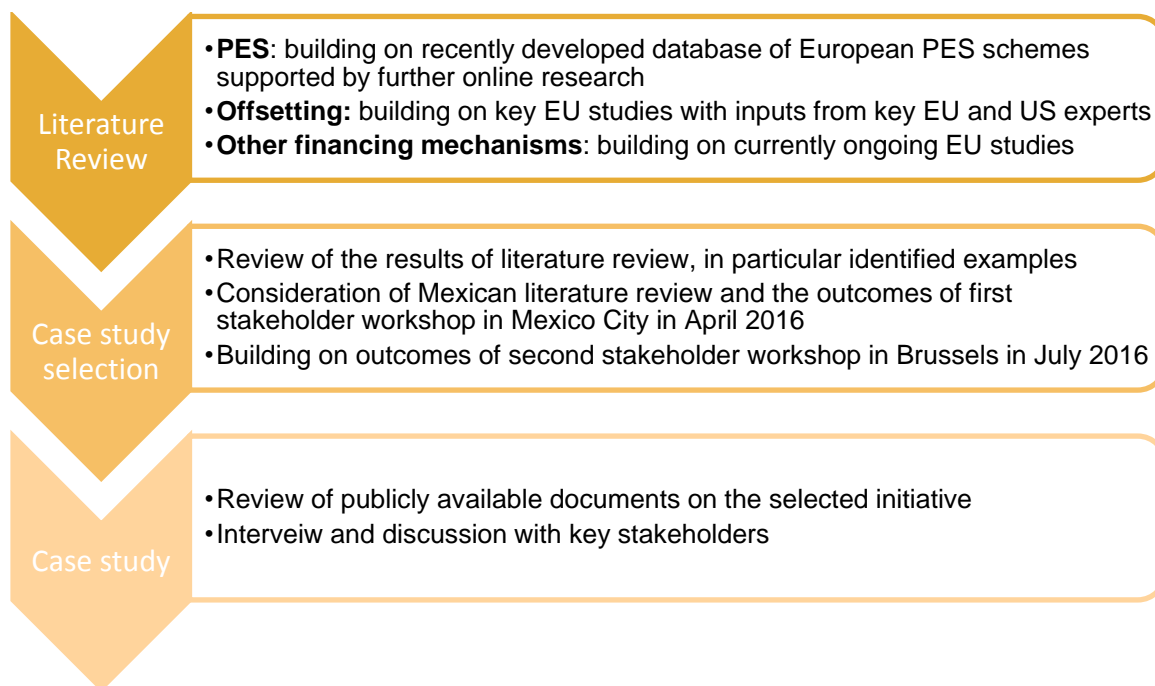


Figure 1.1: Process and key methodological steps

Literature review

The literature review focused on three key areas: PES, biodiversity offsetting and other financing mechanisms, including public sector initiatives on environmental fiscal reform and the involvement of the investor and business sectors in financing biodiversity conservation actions.

In order to assess and draw lessons from the existing practices, the aim of the PES review was to identify specific examples of PES schemes within the EU which were already in place; PES schemes currently under development were not included in the review. The literature review built on the results of three key systematic analyses of PES schemes in the EU, including a recently developed database of European PES schemes (DEFRA, 2013; Matzdorf et al, 2014; EY & Biotope 2017). The review was complemented with further online research and checking of publicly available databases, including the Watershed Connect database² and the Ecosystems Marketplace database³. The identified operational PES schemes were categorised into three groups: 1) PES schemes financed by public bodies, 2) PES schemes financed by private companies, and 3) PES schemes financed by public-private partnerships (hybrid schemes). The main characteristics of these identified PES schemes were then further analysed and key information, including on the country in which they operate, scale, type of the addressed area, primarily targeted ecosystem services and information on the service users and providers were recorded. An overview of the review is provided in Annex 1 with the most interesting examples studied in more detail are presented in case boxes in Chapter 2.

The biodiversity offsetting review's objective was to assess offsetting programmes in place in those EU Member States who aim to go beyond the basic EU level requirements (see Chapter 3). Previous assessments had determined that only a limited number of such examples were currently in place in the EU (Conway et al, 2013; Rayment et al, 2014; Tucker et al, 2014) and therefore this review focused on understanding and presenting the European insights as to the key success criteria of effective biodiversity offsetting schemes. This exercise was primarily built on a number of key EU studies looking at the EU's No Net Loss Initiative and biodiversity offsetting in Europe (e.g. Tucker et al, 2014). Two Member State initiatives were further studied in detail (Chapter 3). Finally, given its importance and history, the wetland banking system of the United States was discussed and in further detail in order to compare it with the EU experiences⁴.

The remaining identified key European innovative financing mechanisms for biodiversity conservation were categorised into two main groups: 1) public sector actions, primarily related to environmental fiscal reform and 2) private sector actions by the investment sector and businesses. The former included the assessment of the EU's current application of environmental taxes, fees and charges, and tax incentives which can deliver funding and benefits for biodiversity conservation. Furthermore, a less well-known instrument – environmental fiscal transfers – were analysed in more detail. Specific Member State examples were selected based on their effectiveness and were presented in case boxes (Chapter 4). This work primarily built on two on-going studies, one of which developed an inventory of environmental taxes, fees and charges currently operational in Europe (Watkins, Withana and ten Brink 2017) and the other analysed new innovative ways of providing funding for biodiversity conservation to complement financing from the EU budget (Kettunen et al. 2017).

The private sector's involvement in financing biodiversity conservation was built on a general literature review (Bishop et al, 2008). This review was divided into two sections: 1) actions by the investment sector

² <http://www.watershedconnect.com/>

³ <http://www.ecosystemmarketplace.com/>

⁴ Morgan Robertson (University of Wisconsin-Madison, US) - was invited to summarise the US experience on offsetting and discuss the main differences between the EU and the US.

and 2) the involvement of businesses. Interesting examples within these two categories were searched based on available literature, on-going studies and discussions within the study team. As in other chapters, the most interesting cases were studied in more details and were presented in case boxes (Chapter 4).

Case study selection

Building on the results of the literature review and reflecting the outcomes of Mexican and European workshops, the most interesting and promising types of financing in Europe were selected to be further analysed in a case study. This selection process was further supported by the literature review of Mexico's experience with innovative financing mechanisms for biodiversity. Reflections from the Mexican literature review and feedback from the participants of the Mexican workshop helped to align the European findings with the interests of Mexican stakeholders, while the European workshop provided insights into some of the most interesting and successful practices within the EU. The participants in both workshops included public sector actors, academics and experts in the field, NGOs, business and international organisations.

In Europe, the review and stakeholder engagement revealed that there is an emerging interest from the investor sector to get involved in impact investing in biodiversity conservation, with some interesting examples of business activity in the area. Leveraging private funding for biodiversity conservation was therefore selected as the key in-depth focus area in Europe. Two specific initiatives, which were also presented in the EU stakeholder workshop, were found to provide interesting insight into this field: the European Investment Bank's (EIB) Natural Capital Financing Facility (NCFF), a financing instrument for natural capital financing, and the Harmony initiative of the food and beverage company Mondelez International, which focuses on sustainable agriculture and biodiversity protection by targeting its wheat supply chain.

Developing the EU case study

In parallel with the case study selection process, a methodology for the analysis of the European and Mexican case studies was developed with a view to provide a systematic assessment of the insights while reflecting the availability of information.

The case study methodology built on a recent study led, which provided an EU-wide assessment of the effectiveness of the EU's overall financing framework for biodiversity conservation (Kettunen et al. 2017). The four key criteria for the analysis, generally considered to be relevant for the success of biodiversity financing, included: 1) conservation effectiveness, 2) cost-effectiveness, 3) social impacts, perceptions and legitimacy, and 4) broader institutional context and the role of the instrument in the broader policy mix.

For both selected EU initiatives a general description was provided, including the historical development of the instrument, the list of relevant actors and whether monitoring and sanctioning mechanisms are in place. The two initiatives were then assessed against the four success criteria based on publicly available documents about the initiatives and complemented with interviews and discussions with representatives of the EIB and Mondelez International.

Part 1 – literature review

2 Payments for Ecosystem/Environmental Services (PES)

Definition

Payment for Environmental/Ecosystem Services (PES) programmes are increasingly used to finance nature conservation around the world. They remunerate land owners or managers for the provision of ecosystem services (ES), i.e. benefits humans derive from nature (Millennium Ecosystem Assessment, 2005)⁵. In this report we will use the acronyms PES and ES to refer to both ecosystem services (i.e. benefits provided mainly by natural ecosystems) and environmental services (i.e. benefits underpinned by the functioning of natural ecosystems but with contribution of human activities), such as done by e.g. Bulte et al (2008).

PES can be differentiated from other kinds of incentives as they provide a direct (monetary or in-kind) payment, which is conditional to the attainment of a specific environmental objective (Ezzine-De-Blas et al, 2016).

Many definition of PES have been proposed over the last years (see Wunder, 2015). According to Wunder (2015), PES are:

- 1) voluntary transactions
- 2) between service users
- 3) and service providers
- 4) that are conditional on agreed rules of natural resource management
- 5) for generating offsite services.

This definition provides a simple yet comprehensive summary of the key features of PES, i.e. voluntariness and conditionality, which allow differentiating PES from similar instruments based on direct payments like for example obligatory levies on natural resources. This definition will be used in the report with the exception of the last point, as excluding onsite ES would result in excluding PES addressing cultural ES, which are generally enjoyed onsite.

For the purpose of this report we consider three categories of PES programmes:

1. PES financed by public bodies (**public schemes**);
2. PES financed by private companies (**private commercial schemes**);
3. PES established as public-private partnerships, with a significant combination of public and private funding (**hybrid schemes**).

⁵ There is currently a debate among practitioners as to whether to use the term ecosystem or environmental services. In general, the term ecosystem service is used to refer to benefits that are mainly provided by ecosystems, whereas environmental services require key human intervention like, for example, infrastructure or labour.

Box 2.1 : More detailed information on ES and PES definitions

Some authors (e.g. Muradian et al, 2010) consider “ecosystem services” as a subcategory of “environmental services”, as they only refer to the services mainly provided by nature, with little human intervention. On the contrary, Derissen and Latacz-Lohmann, (2013) define “environmental services” as those provided through countryside management and therefore consider them as a subcategory of “ecosystem services”, which are provided by a broader range of ecosystems. Wunder (2015) prefers the use of the term “environmental services” as many PES programmes reward single actions (e.g. planting trees) which are not bundled or systemic as the term “ecosystem” suggest.

The Wunder (2015) definition is an updated version of the most cited definition of PES, the Wunder, 2005’s one, according to which a PES programme is 1) a voluntary transaction where 2) a well-defined ES (or a land-use likely to secure that service) 3) is being “bought” by a (minimum one) ES buyer 4) from a (minimum one) ES provider 5) if and only if the ES provider secures ES provision (conditionality). The main difference is that in this new definition the payment needs to be conditional to some specific management activities, whereas the original definition required conditionality to the ES provision, which is rarely attained (see e.g. Muradian et al, 2010; Muradian and Rival, 2012) because 1) monitoring the provision of ES may be challenging and expensive; 2) in many cases the link between management activities and provision of ES is subjected to high scientific uncertainty.

Launching a PES scheme requires covering different types of costs, including **up-front costs** (e.g. funding needed to set baseline information, organise initial meetings, design the programme), **recurrent costs** (i.e. the transaction costs related to the administrative management of the program, including monitoring and sanctioning) and the actual **payments**.

In general, **intermediaries** tend to play a key role in the design and management of PES schemes in terms of research and management activities, e.g. by collecting and distributing payments, taking care of monitoring and sanctioning activities, carrying out assessments and providing the required research to support the schemes. They can be public bodies, private companies (e.g. private water utility companies) or NGOs. Policy makers can also play a key role as intermediaries, for example by setting rules and providing guarantees to buyers (Liu et al, 2010).

The payment offered by PES programmes can be based on the **inputs** that are necessary to obtain the required ES, including direct and opportunity costs (e.g. PES programmes that compensate farmers for the reduced income or the increased costs linked to the adoption of more sustainable farming practices) or on **outputs** (e.g. carbon credit programmes where the payment depends on the amount of carbon stored). The payment of input-based PES can be established through an estimation of the incurred costs, a negotiation among stakeholders or reverse auctions⁶. The use of reverse auctions is still rare but they may represent an interesting option for the future development of PES programmes. Output-based PES programmes could in principle be established through monetary valuation of ES but this approach is virtually never used (DEFRA, 2014; Laurans et al, 2013; Liu et al, 2010) because it would imply considerable methodological challenges and would be characterised by significant data gaps, high uncertainties, and consequently high transaction costs. All in all, in the vast majority of cases the level of payment is determined through a negotiation process based on opportunity costs.

⁶ A reverse auction is an auction where many sellers compete to offer a good/service to a buyer, as opposite as classical auctions, where many buyers compete for a good/service sold by one seller (see Ferraro, 2008).

According to a recent literature review (Ezzine-De-Blas et al, 2016), there are three main typologies of PES experiences around the world: 1) agri-environment public PES, aiming at improving the environmental sustainability of agricultural practices; 2) PES financed by NGOs to protect biodiversity, and the related ES; and 3) private PES mostly aiming at increasing CO₂ storage in forests and water quality and quantity⁷. However, PES programmes can also address a wide range of ES including, for example, the reduction of flood risk or recreational benefits. Other literature review of PES experiences have been carried out by Schomers, Sattler and Matzdorf, 2015. In addition, a few databases have also been created to collect information on PES experiences across the world⁸.

Overview of the PES experiences in the EU

Most PES schemes in the EU are financed by public bodies, typically via the Common Agricultural Policy (CAP) (Scherr et al., 2007; Schomers and Matzdorf, 2013). Given that the EU's agricultural policy and its funding mechanism is specific to the EU and hardly replicable elsewhere, this review does not cover programmes exclusively financed by CAP-funded agri-environment measures (AEMs)⁹ even though, as discussed below, they can be considered PES (section 2.3.2).

Based on the methodology outlined above this review has identified 29 operational PES schemes in the EU (see Annex for full details). Even excluding the PES programmes exclusively financed by the CAP there are many PES programmes (12 out of 29) financed by public bodies, mostly (but not only) at a regional scale. The review found 13 cases of private schemes and only 4 examples of hybrid schemes, which are still rare in the EU.

Most PES schemes are currently implemented in the UK (see Figure 2.1) due to special recent interest and support from the government. The second largest number of operational PES schemes were identified in Germany (five examples), including those summarised in Box 2.2, Box 2.5, Box 2.6, Box 2.9 and Box 2.11, but there are experiences all over the EU, including two iconic examples in France (Box 2.7).

PES programmes in the EU are mostly implemented at a local or regional scale (12 and 13 of the 29 cases, respectively). The review found only four national schemes, including the Drinking Water Forest initiative summarised in Box 2.11.

The majority of PES included in this review address agricultural areas and in particular water catchment areas. Nevertheless, there is also a variety of programmes targeting forest areas and others targeting peatlands, grasslands and floodplains (Figure 2.2).

As shown in Figure 2.3, the most targeted ES are those related to water quality¹⁰. PES programmes are also largely employed to ensure conservation of specific species and habitats and, to a lesser extent, to support recreational uses of natural areas, improve flood risk management and increase carbon sequestration in peatlands or forest areas. Some PES address multiple ES like, for example, the Pumlumon Project in the UK

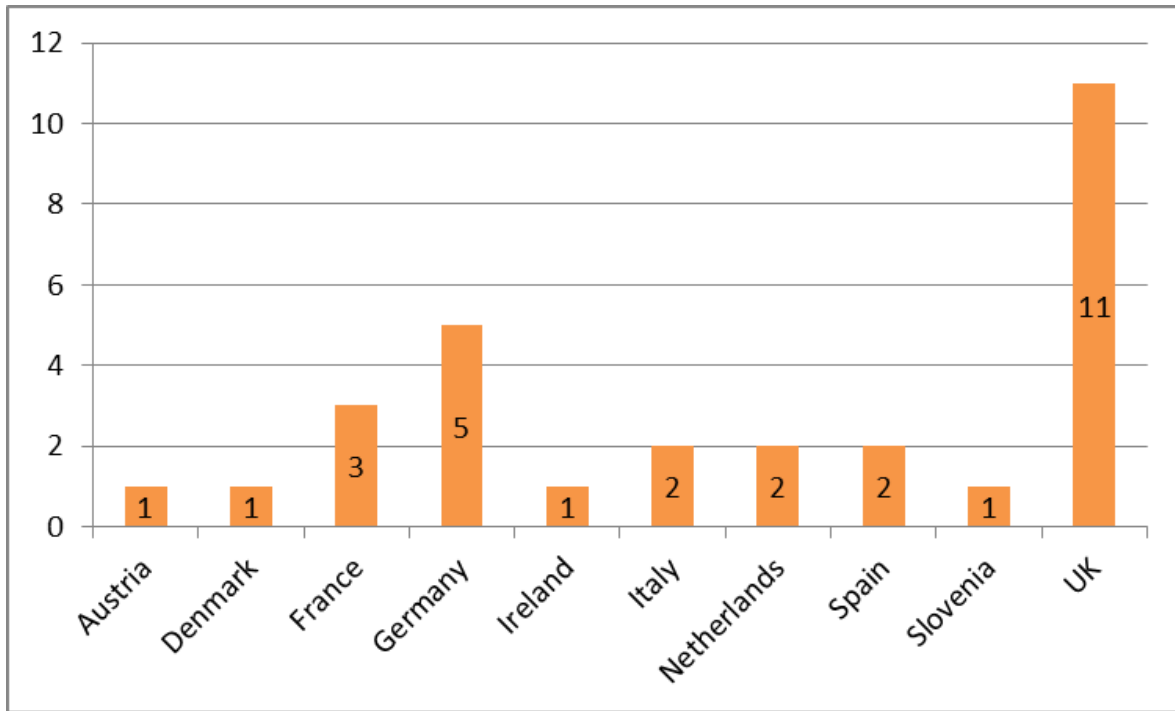
⁷ According to the State of watersheds payments report, transactions over PES programmes at the global level totalled more than \$8 billion in 2011 and with evidence of a substantial step up in new watershed PES programmes in 2012, see www.ecosystemmarketplace.com.

⁸ See for example www.watershedconnect.com, www.ecosystemmarketplace.com and <http://www.oas.org/dsd/PES/Database.htm#>

⁹ An exception to this rule is represented by PES schemes co-financed by AEMs, like for example the Working Wetland Project, where a variety of public and private financing sources (£162,600 between 2008 and 2015) complement the CAP funding (£7.4 million in the same period).

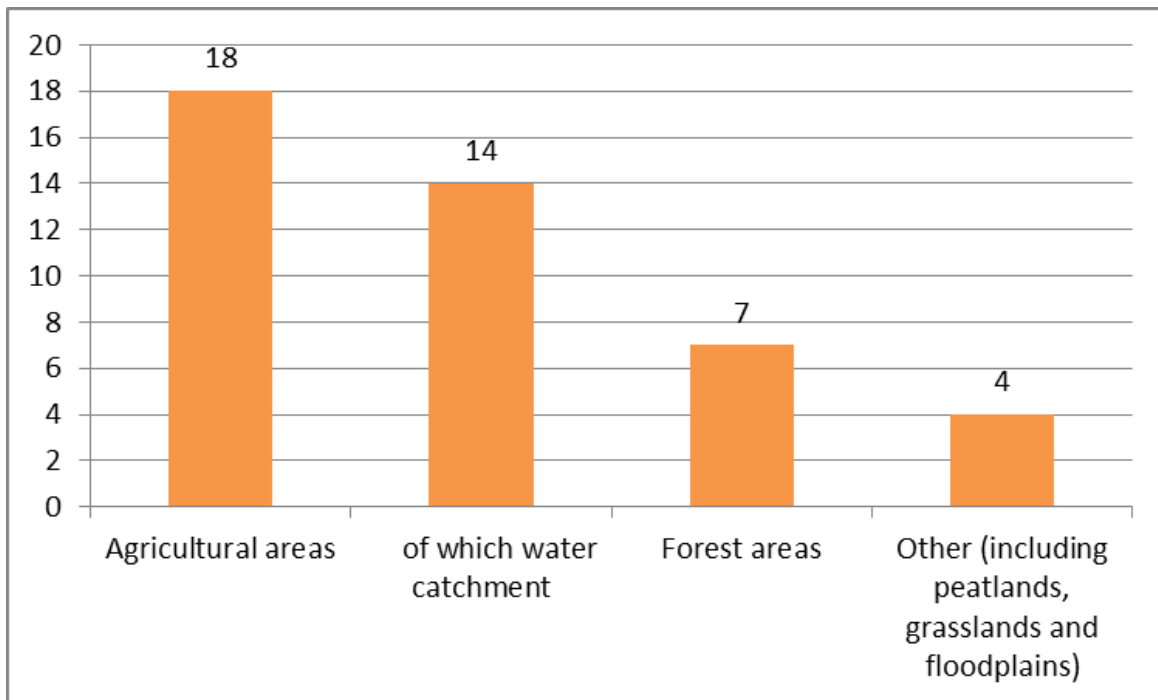
¹⁰ According to the Ecosystem Marketplace database (<http://www.ecosystemmarketplace.co>), there are 44 PES projects in the EU supporting investments in watersheds, with a value of \$60.8 million. These include not only operational PES, but also pilot ones.

(Box 2.13), which targets carbon sequestration, flood risk management, water quality and biodiversity at the same time.



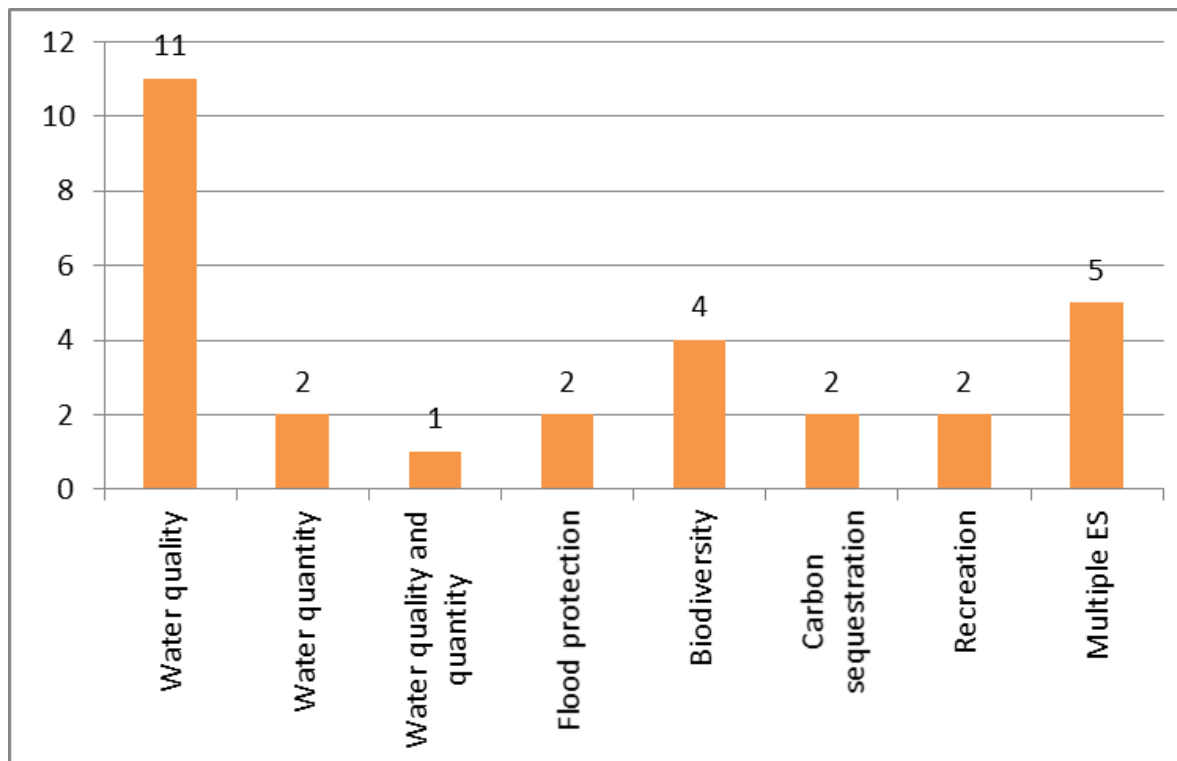
Source: own elaboration

Figure 2.1 : Geographical distribution of operational PES schemes in the EU (n = 29)



Source: own elaboration

Figure 2.2 : Overview of the type of areas targeted by PES programmes in the EU (n = 29)



Source: own elaboration

Figure 2.3 : ES targeted by the operational PES in the EU (n = 29)

As at the global level (see section 2.1), most EU PES remunerate management actions and not directly the provision of ES (the result-based agri-environment measures outlined in section 2.3.2 represent an interesting exception). In other words, the payments are mostly input-based (25 out of the 29 cases reviewed in the context of this study) and calculated on the basis of the costs due to changes in the management activities (including opportunity costs). This is because output-based payments are more difficult to calculate, as they require estimating a baseline scenario if additionality is to be ensured. Furthermore, associating a monetary value to a specific ES is difficult due to methodological challenges and data gaps.

The review identified only four PES with output-based payments. These included two offsetting programmes for the voluntary market where the payment is based on the tonnes of carbon saved (MooreFutures Programme in Box 2.9 and UK Woodland Carbon Code), the Westcountry Angling Passport programme, where anglers remunerate agricultural land owners for the recreational use of fishing sites located in their land (Box 2.10), and the Water Savings Convention, where the energy company compensates farmers for reducing the use of irrigation water in order to obtain increased water availability for hydropower generation.

In addition, the result-based AEMs discussed in section 2.3.2 are output-based, but the payment is calculated in a similar way as in the input-based programmes, i.e. based on the costs related to the required changes in management strategies.

Some of the public PES schemes are directly financed through taxes and levies, for example the Cooperation Model for the Protection of Drinking Water in Lower Saxony, Germany (Box 2.2). However, this does not contradict the requirement of voluntariness of Wunder's (2015) definition. In fact, even though citizens are not free to choose not to pay taxes - and to a certain extent even to pay certain kinds of levies on essential goods (Engel, Pagiola and Wunder, 2008) - these programmes were established through the specific initiative

of a public body, which could have decided to pursue its environmental objectives in other alternative ways like, for example, the establishment of legislative measures. In this case the institutions that take the initiative to establish and fund the PES scheme can be defined as users even where they represent a broad category of users (e.g. public water utilities, which use PES to implement the quality of the water they deliver to citizens), or even society as a whole (as in the case e.g. of the Austrian government supporting reforestation projects).

In most PES schemes intermediaries play a key role in terms of carrying out key research activities, establishing rules, collecting and distributing payments, ensuring a smooth running of the scheme, and a good communication between ES users and providers. Different kinds of institutions can act as intermediaries, including research institutions (e.g. French National Institute for Agronomic Research in the Vittel Programme, Box 2.7), public authorities (e.g. Natural England in the case of Gowey Meadows scheme, Box 2.14), private companies (e.g. United Utilities in the SCaMP programme, Box 2.12), NGOs (e.g. Westcountry Rivers Trust in the Upstream Thinking Programme, Box 2.8), and also volunteers (e.g. result-based agri-environment scheme in Schleswig-Holstein, Box 2.6).

Monitoring activities are in place in most cases. In some cases they are carried out by public bodies, as for example in the case of MoorFutures (Box 2.9), English Woodland Grant Scheme (Box 2.3) and Gowey Meadows Programme (Box 2.14). In other cases they are carried out by NGOs, as in the Mature Forest Reserve Programme in Catalonia (Box 2.4), Pumlumon Project (Box 2.13) and Upstream Thinking Programme (Box 2.8). In some PES programmes private companies are in charge of the monitoring activities, e.g. in the Lower Saxony Drinking Water Programme monitoring is carried out by water companies (Box 2.2).

Many EU PES programmes have been established in recent years and for this reason a comprehensive evaluation of their impact is not yet available. However, the information collected as a part of this review provides some insight in to factors influencing the success of PES programmes, including for instance the methodology to determine the payment level (e.g. the payments for intact bird clutches under the German programme for the protection of meadow birds presented, Box 2.6), types of ES targeted, rules established in the contract, role of intermediaries, and involvement of volunteers. The remaining of this chapter will provide an overview of EU public, private and hybrid PES programmes with examples of interesting cases.

Public PES in the EU

Overview and examples of public PES

Where no reference to a box is indicated, Table 9.1 provides an overview and more details of the public PES outlined below.

Most public PES in the EU are financed through the EU Common Agricultural Policy (CAP). However, 12 interesting PES experiences can be found that are funded by other public bodies. They all address agricultural areas (6 programmes) or forest areas (6 programmes) and mainly (but not only) aim at improving the ES related to water quality and forests.

Most of these schemes are implemented at a regional scale (7 examples) and to a lesser extent at a local scale (3 examples). Only two public PES schemes could be found financed at the national scale, namely two national forest programmes aiming at protecting forests in Austria and Slovenia. The Austrian National Forest Reserve Program compensates forest owners for avoiding timber logging, with an available budget of €850,000 per year. The Slovenian government supports management activities to protect private forests, including reforestation activities, preventative measures for forest protection and maintenance of wildlife habitats.

Four of the public PES schemes included in this review are financed by public water companies in the UK, Germany and Italy aiming at improving water quality by supporting the adoption of more sustainable agricultural practices in their catchment areas. There is also an interesting example of a PES scheme financed by the Guadiana River Basin Authority in Spain to address the overexploitation of groundwater due to irrigation via the promotion of reforestation projects. Five public PES programmes included in this review aim at protecting forests of high biodiversity value or financing reforestation activities. They are financed by public bodies at the provincial, regional or national levels.

The Cooperation Model for the Protection of Drinking Water in Lower Saxony (Germany) is an interesting example of a public PES aiming at improving water quality through changes in farming practices, where water companies act as intermediaries by managing the grants and performing monitoring activities (Box 2.2). It is mainly financed by the German federal state of Lower Saxony through a levy on water extraction, even though CAP financing is used for a related information service to farmers.

Another interesting project, named Slowing the Flow at Pickering (UK), is financed by different public bodies aiming at reducing flood risk in Pickering (a town in North Yorkshire) by supporting land management measures that slow the rain water flowing through the town.

Finally, we found an interesting PES programme in the Overijssel province (the Netherlands). It supports the construction, management and maintenance of landscape elements like canals, wooded banks, hedges, pollard willows, which improve the rural landscape and ensure water storage and retention. It is financed by municipalities and the province of Overijssel (50% each).

The payment of all public PES schemes included in this review is input-based and it is established based on the incurred and opportunity costs due to changes in land management practices.

A wide range of bodies act as intermediaries, including NGOs (e.g. Acciónatura which manages the forest reserves in Catalonia, Spain, Box 2.4), municipalities (e.g. public water utility company Romagna Acque in Italy, Table 9.1), national bodies (e.g. Forestry Commission in the English Woodland Grant Scheme, Box 2.3) and research bodies (e.g. Durham University in the Slowing the Flow at Pickering programme, Table 9.1).

Box 2.2 : Cooperation Model for the Protection of Drinking Water in Lower Saxony (Germany)

The Kooperationsmodell Trinkwasserschutz (Cooperation Model for the Protection of Drinking Water) was created in 1992 in the German federal state of Lower Saxony in order to reduce the level of nitrates, pesticides and sulphate pollutants in groundwater. 85% of drinking water in the region is provided by groundwater and was being increasingly degraded by intensive agricultural practices. The Model was established as part of the Water Act of Lower Saxony (Niedersächsisches Wassergesetz), which introduced a levy for water extraction of between €0.0026 and €0.06 per m³ (the exact amount depends on the water's origin and use), with an annual revenue of approximately €47 million.

The Kooperationsmodell Trinkwasserschutz also includes the so-called Wasserschutzzusatzberatung (Supplementary Water Protection Consultation), an information service for farmers financed by the Lower Saxony state and the European Agricultural Fund for Rural Development (EAFRD).

The Model funds cooperation agreements between water utility companies and farmers. The former sign 5 year grant agreements with the Lower Saxony state, with includes the targets to be achieved in terms of water quality, and establish voluntary agreements with farmers. The agreements detail targets, measures

to be implemented (e.g. reduction of nitrogen fertilization and use of catch crops) and the payment farmers receive, which compensate them for the foregone income (e.g. up to €250/ha if farmers forgo the use of livestock manure). Water companies monitor the groundwater quality in their monitoring stations and wells and carry out annual inspections on the farms. If farms do not respect the terms of the contract, they are asked to repay the amount of money already received.

The Lower Saxony state's Department for Waterways, Coastal and Nature Conservation establishes the technical framework of the Model (even though the specific measures are established at a regional level, in order to adapt to local characteristics). It is also responsible for the administrative side of processing and carries out evaluation activities, including the collection and analysis of financial and environmental data.

The budget available for the voluntary agreements and consultation processes is of €18 million per year (€15 million from the levy for water extraction and €3 million from the European Union), which is allocated according to a location-specific priority scheme.

In 2013 the programme financed 73 collaboration programmes, covering 304 thousand ha of land (almost all agricultural and pasture land in Lower Saxony). It had an important role in lowering the level of nitrates in drinking water abstraction, as well as the total amount of mineral fertiliser bought and the per-holding nitrate surplus level. However, the programme is increasingly challenged by a growing competition of intensive agriculture and biogas, which translates into higher opportunity costs of agricultural practices with low level of fertilisers (similarly to what happens in Baden Wurttemberg (see Box 2.5).

Source: Matzdorf (2014)

Box 2.3 : English Woodland Grant Scheme, UK

The English Woodland Grant Scheme aims to improve the ES provided by existing woodlands and create new ones. The Scheme remunerates owners of woodland leaseholders and tenants (with the owners' consent), and also government departments and other public bodies owning forest land. The scheme consist of the following grants:

- The Woodland Planning Grant for the preparation of plans for sustainable woodland management in accordance with the UK Forestry Standard.
- The Woodland Assessment Grant for information gathering to improve management decisions.
- The Woodland Regeneration Grant for natural regeneration or restocking after felling carried out to deliver environmental improvements such as ancient woodland restoration.
- The Woodland Improvement Grant for works that provide environmental and social benefits (e.g. coppice restoration, deer management, access tracks, public access facilities)
- The Woodland Management Grant for partial coverage of the costs of providing high-quality public benefits from existing woodlands.
- The Woodland Creation Grant offers extra financial incentives where woodland creation delivers key public benefits, including Farm Woodland Payments to compensate for lost agricultural income.

The Forestry Commission (the government department responsible for management) acts as an intermediary and grants are delivered through the UK Rural Development Programme.

The Grant is administered at a local level, as applicants need to apply at the local office of the Forestry Commission, which is responsible for approving the applications. All proposal of felling and woodland creation are included in a public register for 28 days in order to allow for comments and feedback.

Source: Smith et al. (2013)

Box 2.4 : The Mature Forest Reserves (Selvans) in Catalonia, Spain

The Mature Forest Reserves in Catalonia (Spain) represent an interesting example of a PES programme in a Mediterranean country. They aim to support the conservation of mature forests, which are characterised by a high level of biodiversity and a great importance in ecological terms.

In 2005, a pilot scheme to preserve mature forests in the Montseny natural park in Catalonia (Spain) was initiated by Jume Hiddalgo, a then officer of the Girona provincial council. In 2007, the scheme became fully operational in the whole province of Girona.

Originally, the scheme was established as a private and public hybrid scheme, where the provincial government used its tax income to pay municipal forest owners and private donors payed for privately owned forests. Nevertheless, this structure became too complicated to manage as the provincial government had constraints in its competencies to handle private financing. For this reason and because of budgetary cuts in 2012, the programme was split into two different initiatives. The Girona Provincial Council's subventions were restricted to local authorities owning public forests, whereas the raising and management of private funds were assumed by the NGO Acci3natura, which included it in a broader initiative called Compensanatura, an online fundraising tool aimed at collecting online donations from individuals and companies (75% of these donations are invested in stumpage acquisition in Spain and other countries). Acci3natura is now aiming to extend the programme to four provincial councils in Catalonia, including Girona, Barcelona, Lleida and Tarragona and trying to upscale the private funding (EY and Biotope, 2017).

The public programme creates mature forest reserves through preservation agreements between the Girona Provincial Council and forest owners, which ensure that owners do not log trees for 25 years (Russi et al, 2011). In order to qualify for the programme, the forests need to satisfy a number of criteria. For instance, the forests need to include autochthonous and climax vegetation and mature trees of a good genetic quality, which have been intact for the past 80 to 100 years (EY and Biotope, 2017). The applications are ranked according to these criteria and grants are awarded annually to the applicants.

The payment to the forest owners is calculated as a compensation for the forgone income, i.e. the revenue that forest owners would have obtained by logging the timber, and the calculations are done using the forest management plans. The payments are made upfront when the contracts are signed but they are stopped if the conservation practices are abandoned. The compliance is regularly monitored by forest officers hired by the government and in case of non-compliance the full subsidy received so far must be re-paid to the public authority, together with a €5,000 penalty.

By 2014 the public programme allowed to protect 1,187 ha of mature forests. €927,941 of public funds have been invested so far on stumpage acquisition through forestry aids calls. Nevertheless, there are still mature forests which are not yet involved in the scheme and the additionality value of the programme can be questionable, as in some cases forest owners would have not logged trees in their forests even without the subsidy provided by the programme (EY and Biotope, 2017).

Sources: Russi et al. (2011); Prokofieva and Gorriz (2013); EY and Biotope, (2017)

EU Common Agricultural Policy (CAP) and the result-based agri-environment measures

The EU Common Agricultural Policy (CAP) is a key European policy and absorbs almost 40% of the overall European budget (€408.31 billion in the 2014-2020 programming period) thereby representing the largest single budget item. 23% of the CAP budget (€95.58 billion in the 2014-2020 programming period) is used for the European Agricultural Fund for Rural Development (EAFRD), which finances the EU support to the Rural Development Programmes (RDPs).

RDPs are prepared by the EU Member States or regions (in the case of federal countries like Germany, Spain, Italy and the UK) and aim to support the agricultural and forestry sectors while improving their environmental sustainability. They detail the so-called agri-environment measures (AEMs), which aim to encourage farmers to “employ methods of land use compatible with the need to preserve the natural environment and landscape and protect and improve natural resources”¹¹. AEMs are intended a key role in improving the environmental impact of agriculture by encouraging, among other things, improvements in soil quality, more efficient use of water, higher degree of agricultural biodiversity, and reduction in the use of polluting inputs like fertilisers and pesticides. They normally offer farmers five-year contracts with annual payments per hectare. The latter are calculated for each measure on the basis of the additional costs related to environmental management and the income foregone resulting from the difference in agricultural management practices compared to a reference situation. If necessary, an additional 20% can be added to the payment to cover farmers’ transaction costs (however, transaction costs are very rarely taken into account when calculating the premiums of the agri-environment measures).

The EAFRD co-finances the AEMs at an average rate of 55% (rising to 85% in economically lagging areas of the EU¹²) and the national or regional managing authorities cover the remaining costs.

Arguably all CAP-funded AEMs can be defined PES if Wunder (2015)’s definition is adopted (see section 2.1). In fact they are 1) voluntary transactions 2) between service users (the managing authorities, who act on behalf of society in general) 3) and service providers (farmers) 4) that are conditional on agreed rules of natural resource management (those required by the AEMs) 5) for generating offsite services (all those provided by environmentally sustainable agricultural practices). However, a specific kind of AEMs merits more attention in the context of a discussion on public PES programmes, i.e. the result-based schemes (RB-AEMs). In fact, they have been designed to increase the conditionality of CAP-funded AEMs, a key issue when analysing PES programmes (Meyer et al, 2015; Schomers and Matzdorf, 2013).

RB-AEMs link the payment to the provision of the desired environmental outcome, rather than to prescribed management activities, as is the case of the more classical action-based AEMs (AB-AEM). RB-AEMs tend to ensure high conditionality as farmers are paid only if they achieve the required environmental objectives. In addition, the risk of adverse selection¹³ is lower as farmers are encouraged to choose the land they wish to enrol in the scheme with a view to maximise the environmental benefits - and the subsequent payment - created and received (Burton and Schwarz, 2013; Sabatier, Doyen and Tichit, 2012). RB-AEMs allow the farmer greater flexibility in management practices compared to AB-AEMs thereby encouraging innovation (Matzdorf and Lorenz, 2010). Flexibility also improves cost-efficiency as it allows farmers to adapt their

¹¹ EC Regulation 1698/2005 Recital 31

¹² EC Regulation 1698/2005 Article 70 (3)b

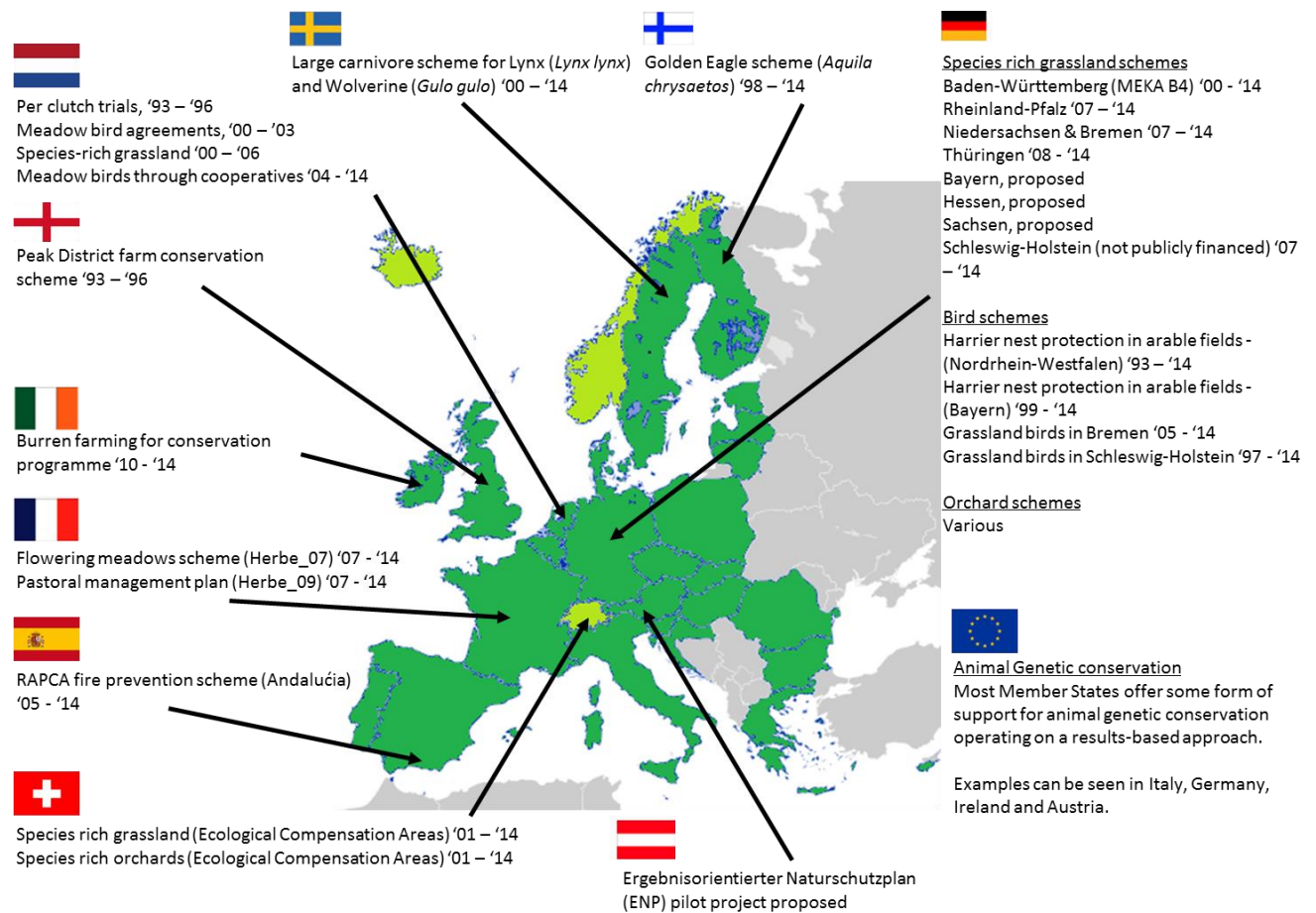
¹³ Adverse selection occurs when farmers select the parcels with lower yields (i.e. lower opportunity costs) or the easiest and cheapest management activities, irrespectively of the ecological characteristics (Quillérou and Fraser, 2010). This phenomenon results in a less favourable relation between invested (public) money and environmental outcomes than if fields and management activities were selected in order to maximise environmental benefits (Quillérou and Fraser, 2010).

management activities to the features of the land, weather conditions and other specific characteristics (Sabatier et al., 2012) and increases intrinsic motivations towards conservation (Muradian, 2013). In addition, RB–AEMs generally contribute to spreading environmental awareness and increasing the motivation of farmers towards environmental protection (Oppermann and Gujer, 2003).

The great majority of AEMs are action-based, i.e. they remunerate farmers for respecting a set of requirements established in the RDP, e.g. limitations in the use of fertilizers or biocides and specific dates for mowing the grassland. However, there are already a few RB–AEMs in Europe (see Allen et al, 2015; Burton and Schwarz, 2013; Schwarz et al, 2008 for literature reviews on this topic).

According to Allen (2015), there are more than 30 RB-AEMs in operation or planned in EU and EFTA countries, mostly in Northern and Western Europe. Most aim to preserve biodiversity in species-rich grassland and link the payment to the auto-declared presence of defined wildflower indicator species, used as proxies for species-richness of the habitat. Such measures are currently in place in Baden-Württemberg (Matzdorf and Lorenz, 2010), lower Saxony, Brandenburg (Matzdorf, Kaiser and Rohner, 2008), Thuringia, Rhineland-Palatinate (MULEWF 2010), France (De Sainte Marie, 2014), Ireland (DAFM, 2014) and Switzerland (Oppermann, 2003). However, there are some RB–AEMs aiming at the conservation of key animal species, for example birds in Schleswig-Holstein (Stapelholmer Naturschutzvereine, 2007), breeding waders in the Netherlands (Verhulst et al., 2007) and carnivores in North Sweden (Zabel and Holm-Müller, 2008). Finally, there are a few RB–AEMs focussing on water quality such as those aiming at reducing nitrogen surplus in three German states (Techen and Osterburg, 2011). RB-AEMs programmes are relatively small in terms of the area they cover and the number of farmers involved, mostly because they have been developed at a local scale to meet specific biodiversity objectives in a defined area. However, the area under agreement for the more established schemes (e.g. the German and France ones) is far higher than the average, which suggests that RB-AEMs have significant potential to expand in the future (Allen et al, 2015). See Figure 2.4 for a summary of existing experiences in the EU.

Box 2.5 summarise the main features of the oldest RB-AEM of the EU, which was introduced in 2000 in Baden-Württemberg, Germany, in order to preserve biodiversity in species-rich grassland. Another interesting example of a CAP-financed result-based agri-environment measure is the German programme for the protection of meadow birds, in place in the German federal state of Schleswig Holstein (Box 2.6). This programme provides a good example of the essential role of the intermediary body for the success of PES programmes, including the employment of volunteers to carry out monitoring activities, based on which farmers receive the payments.



Source: Allen et al (2015)

Figure 2.4 : Result-based agri-environment measures in Europe

Box 2.5 : The result-based agri-environment measure in Baden-Württemberg (Germany)

MEKA B4 was the first result-based agri-environment measure co-funded by the CAP. It was introduced in 2000 in Baden-Württemberg (Germany) and in 2014 it was replaced by an updated version called FAKT-B3.

Farmers entering the voluntary five-year MEKA-B4/FAKT-B3 contracts qualify for the annual payment if their land includes a number of species/taxa from a list of key indicator species/taxa of wildflowers (28 for MEKA-B4 and 30 for FAKT-B3). These species/taxa can be found in south-western Germany and can be used as a proxy for the grassland's species richness. The farmers' annual payment claim is based on self-declaration of the presence of the required number of indicator species.

The Ministry for Rural Area and Consumer Protection is the managing authority of the Baden-Württemberg Rural Development Programme, who finances and approves the AEMs in the region. Institutions who act as intermediary are the Regional Councils, which coordinate and supervise the implementation of the AEMs (and also offer counselling activities to the District Offices) and the District Offices (municipal level),

which are responsible for the controls on the ground of the implementation of the agri-environment measures and for counselling activities addressing farmers.

The payment was €50/ha between 2000 and 2009 and €60/ha between 2000 and 2014 for 4 species (MEKA-B4). FAKT-B3.1 introduced two levels of payment: €230/ha for 4 species (FAKT-B3.1) and €260/ha for 6 species (FAKT-B3.2). The species need to be found in each third of a transect taken diagonally across the grassland parcel.

For MEKA-B4, the payment was based on the calculation of the incurred costs and the income foregone with respect to a reference situation. For MEKA-B4 the reference situation was established as intensive grassland management with three cuts per year, the first two for silage and the third one for hay. Extensification was considered to result in two cuts per year with a later first cut, in order to allow the wildflowers sufficient time to bloom and produce seed. This late first cut results in fodder with lower protein and higher lignin content, which is suitable neither for silage nor for biogas, but only for hay, which can be fed to horses, young cattle and smaller animals, but not to highly productive cattle husbandry. Income foregone related to MEKA-B4 was calculated as reduced yield (due to a reduction from three to two cuts per year) and a 20% reduction in the nutrient content of the fodder due to late mowing (the reduced nutrient content is calculated by multiplying the reduction in the energy content by the market price of the barley used for animal feeding). As regards incurred costs, extensive grassland management requires more field work than intensive management, as farmers need to move the mowed grass for three days to ensure it dries adequately, whereas silage does not require dry grass and can be produced in one day. A reduction in the input costs was also included in the calculations (i.e., a 25% decrease in the use of fertilisers and reduced use of machinery).

As regards monitoring mechanisms and sanctions, fields participating in MEKA-B4/FAKT-B3 are submitted to risk-based control checks: 5% of the participating farmers are controlled each year (1% are chosen randomly and 4% using a risk indicator attributed to each farm, based on the outcome of the previous years and used to identify farms that are prone to not fulfil the requirements). Farmers making false claims have to return to the authorities all payments received since the signature of the five-year contract.

Sources: Matzdorf and Lorenz, 2010; Russi et al, 2016

Box 2.6 : The result-based agri-environment measure to protect meadow birds in Schleswig-Holstein, Germany

In 1997 the Meggerdorf environmental organisation has started a pilot PES scheme in Schleswig-Holstein (the most northern federal state of Germany), in order to protect highly endangered species of meadow birds, including the lapwing, in the wet lowland area. The aim of the initiative was to collaborate with the farmers working in the area to encourage them to use agricultural practices that did not harm the clutches and the young birds. Initially, the farmers were compensated for their activities with donations provided by local companies and banks.

Nevertheless, after two years from the launch of the successful programme the federal state of Schleswig-Holstein decided to develop a CAP-financed agri-environment measure to finance it. Since 2007, a local association (Kuno e.V.) has been acting as an intermediary and has taken up the management responsibilities. Two-thirds of the manager's salary is jointly financed by the federal state and the EU (Matzdorf et al, 2014). Voluntary site supervisors also play a crucial role in the success of this programme, as they are the ones who search for the birds' clutches.

The farmers receive an output-based payment where they get compensated for undertaking land management practices which provide protection for the birds, such as avoiding the clutches during spring cultivation, delaying the mowing of the pastures or putting a fence around the clutches (Matzdorf et al, 2014). The agreements with the farmers are purely verbal and the payments are based on the number of intact clutches that are found on the farmers' land. The farmers get €150 for each individual clutch and €350 for two or more clutches per hectare. If the farmers have to apply mowing restrictions they can also receive €350 for individual clutches (Matzdorf et al, 2014).

The funds are distributed annually, based on the monitoring undertaken by the volunteers. In case a force majeure takes place (for instance if foxes destroy the clutches) the payments are still provided.

According to Matzdorf et al. (2014), in 2013 88 farmers took part in the programme, and they protected 417 clutches in an area of 310 hectares. A key success factor of the programme is recognised to be the personal relationship and communication with the farmers, as well as the involvement of a dedicated group of volunteers.

Sources: Matzdorf et al. (2014)

Private PES

Overview and examples of private PES in the EU

Where no reference to a box is indicated, Table 9.2 provides an overview of the private PES outlined below.

There are at least 13 private PES programmes in the EU, which are exclusively financed by private companies or citizens. Seven of them are carried out at the local level (e.g. the Vittel and Evian natural mineral water programmes, Box 2.7) and four at the regional level (e.g. the Upstream ThinkingBox 2.8). Only two private PES schemes could be found at the national level. They are a water and carbon offsetting programme for the voluntary market, i.e. the Drinking Water Forest in Germany (see Box 2.11) and the Woodland Carbon Code scheme in the UK.

Private PES schemes can be financed by private citizens or companies who want to offset their carbon emissions (e.g. the Moorfutures programme in Germany, Box 2.9, and the Woodland Carbon Code in the UK) or their water use (the Drinking Water Forest). Other PES schemes are established by mineral water companies (Vittel and Evian in France, Norda in Italy) or private water utilities (South West Water and Wessex Water in the UK, Copenhagen Energy Corporation in Denmark), which support agricultural practices aiming at improving water quality in their catchment areas. In addition, two programmes were found that allow private citizens to support traditional cattle raising (the 'Adopt a sheep' programmes in the Netherlands and Ireland) and one financed by an energy company who compensates farmers for their reduced use of water for irrigation, in order to have more water available for hydropower generation (the Water Savings Convention in France). Finally, the Wescountry Angling Passport scheme allows recreational anglers to access private fishing sites in exchange for a fee, which is used by land owners to finance improved land management activities (Box 2.10).

The ES providers in these schemes are owners or managers of agricultural or forest land, with the exception of the 'Adopt a Sheep' programme in the Netherlands where the ES provider is a NGO called Landschap Overijssel.

As regards the addressed ES, six private PES programmes aim to improve water quality while one programme supports improvements in water quantity (Water Savings Convention) and one programme targets both water quantity and quality (Drinking Water Forest). MoorFutures and Woodland Carbon Code finance carbon storage. The Westcountry Angling Passport and the 'Adopt a Sheep' programme in Ireland finance cultural ES and biodiversity protection.

Nine private PES schemes included in this review address agricultural areas and one a heather area (the 'Adopt a Sheep' programme in the Netherlands), whereas the MoorFutures programme in Germany finances the restoration of peatland areas. The Woodland Carbon Code and the Drinking Water Forest programmes finance reforestation activities.

Even though these schemes are purely financed by private actors, the role of public bodies is key to ensure their success. For example, the regulation on mineral water quality in France motivated the mineral water companies Evian and Vittel to set up PES programmes in order to ensure they meet the targets established for mineral water (Box 2.7).

Intermediaries are very important for the success of private schemes and carry out essential activities such as managing, monitoring and research, while also being essential in building trust between service users and providers. The intermediaries can be public-private partnerships (e.g. the Association for the Protection of the Catchment Area of Evian Mineral Water, Box 2.7), NGOs (e.g. the Westcountry Rivers Trust in the Upstream Thinking initiative, Box 2.8), regional governments (e.g. the Ministry for Agriculture, Environment and Consumer Protection of Mecklenburg-Vorpommern in the MoorFutures programme, Box 2.9), research institutions (e.g. the French National Institute for Agronomic Research in the Vittel programme, Box 2.7) or even volunteers (as in the case the Drinking Water Forest initiative, Box 2.11).

The payment of most programme is input-based but four initiatives could be identified where the payment is output-based. These include the two carbon offsetting programmes, where the payment is based on the tonnes of carbons stored in forest areas; the Westcountry Angling Passport, where the payment is linked to the anglers' access to specific fishing areas; and the Water Saving Convention, where the payment to farmers depends on the irrigation water they manage to save.

Offsetting credits for the voluntary market like MoorFutures, Woodland Carbon Code and Drinking Water Forest initiative have been included in the review because they can arguably be considered PES, according to Wunder's (2015) definition (see section 2.1). In fact, they are voluntary for both ES users and providers and are conditional on agreed rules of natural resource management. On the contrary, the offsetting programmes that are created and commercialised to respond to regulatory requirements, such as for example those for new urban developments, are described in Chapter 3. They are not to be considered PES because they are not voluntary on the service users' side.

Box 2.7 : The Vittel and Evian Natural Mineral Water Programmes, France

The Vittel Programme and the Evian Natural Mineral Water Programme are two well-known showcase PES scheme examples in Europe. They were both initiated in late 1980s by private mineral water companies, with the objective of maintaining water quality via the promotion of sustainable agricultural practices.

In the case of Vittel, Nestlé Waters (who bought the Vittel company in the 1990s) realised the increasing risk of nitrate concentration in the mineral water they commercialised, which was a consequence of agricultural intensification in their water catchment area. In order to address this problem, Nestlé Waters decided to create a partnership with the French National Institute for Agronomic Research (INRA) in order

to assess the area's environmental problems and whether a PES scheme could be established. Later, it created the Agrivair institute, in order to act as an intermediary in the PES programme that the company was about to develop. Agrivair approached the farmers working in the area to sign contracts with the duration of 18 to 30 years.

Nestlé Waters grant farmers with an annual payment of on average €200 per hectare per year during five years, as well as free technical assistance to support sustainable production and the abolition of the farmers' land debt. In addition, land owned by Vittel is provided to the farmers with the right of usufruct. In addition, farmers receive €150,000 per farm, which is aimed to cover the costs of modernisation that needs to be undertaken. Finally, Agrivair also provides a payment which ensures that farmers apply compost (Perrot-Maître, 2013). The payments are input-based, i.e. they are not conditional on the changes of nitrate concentration in the aquifers but are based on the costs associated to the agricultural practices needed to reduce the nitrate inputs (Smith et al, 2013). Farmers signing the contract need to apply improved land management practices to reduce nitrate concentrations in the soil. Such practices include among others the replacement of maize animal feed with alfalfa and hay, the reduction of stocking rates to one head per hectare, a reduced use of agrochemicals and improved waste management (Perrot-Maître, 2013). In order to ensure compliance, Nestlé Waters' laboratory monitors the water quality daily and INRA monitors the nitrate levels in soils.

Even though the Evian Company was not necessarily facing any specific risks of water quality degradation, they also decided to develop a PES scheme in their water catchment area to ensure the quality of their bottled water. In 1992, a public-private partnership between the company and local authorities in the area, the Association for the Protection of the Catchment Area of Evian Mineral Water (APIEME, Association pour la Protection l'Impluvium de l'Eau Minérale d'Evian), was established and was tasked with the development of a sustainable agriculture development plan, which would ensure the quality of the mineral water and act as a key intermediary body. Furthermore, the company also partnered up with INRA to undertake research and provide advice, similar to the Vittel case. Nevertheless, in contrast to the Vittel case no direct compensation is provided and there is no land acquisition but collective projects are funded by APIEME, which for instance provide financial support to comply with sustainable agriculture practice standards or provide technical assistance. While the PES scheme is an important element of the agreements, it is only a component of a broader water protection policy applied by APIEME. This broader approach also contributed to the maintenance of traditional landscapes and the preservation of biodiversity in the area (Defrance, 2011).

The two cases show various similarities that seem to be key to ensure the success of PES schemes. The key role of intermediaries was essential in building a strong relationship between the stakeholders and providing effective coordination. In addition, the involvement of research institutions was essential, as they provided a sound-based scientific background to the actions undertaken. The strong link between local development and environmental quality, in this case water quality, is also an important factor in both cases and helps to achieve a win-win case for the private businesses and farmers. Finally, the strict legislation in France for the 'Natural Mineral Water' label is also a strong driving force (Defrance, 2011).

Sources: Defrance (2011); Perrot-Maître (2013); Smith et al. (2013)

Box 2.8 : Upstream Thinking with Westcountry River Trust in South West England

In the South West of England, the private water company South West Water (SWW) partnered up with the NGO Westcountry Rivers Trust (WRT) to develop an action plan for three catchments (Upper Tamar, Fowey

and Wimbleball) which were prone to rapid water level rises and high surface runoffs, and were characterised by low water quality due to agricultural practices linked to dairy, beef and sheep production.

The scheme, which is administered by WRT, started in 2008 as a pilot scheme in the Upper Tamar catchment on around 90,000 hectares of watershed (Matzdorf et al, 2014). Farmers are offered financial assistance to change their land management practices in order to improve water quality. Capital investment in infrastructure is provided by SWW, and is accompanied by a contract detailing a set of restrictions placed on farming operations, such as the maximum number of livestock. Infrastructure improvements include for instance fencing to create buffer strips and keeping the kettle away from the catchment, and the building of a slurry pit or a roof over the manure store (Matzdorf et al, 2014). The contracts between the farmers, the water company and the NGO run for either 10 or 25 years. In order to ensure that improvements continue even if the ownership of the farm changes hand, the longer-term contracts are covenants. Farmers are required to co-finance 50% of the investments. The WRT carries out the monitoring of the scheme in partnership with various academic groups.

WRT played a crucial role in the pilot scheme, as it managed to build a strong relationship with the farmers and gained a good understanding of the area. The trust built between WRT and farmers proved to be essential and greatly helped the operation and establishment of the scheme.

Given the success of the initial pilot scheme, the programme was further extended to the Wimbleball and Fowey catchments and around £4 million are currently available for it (Matzdorf et al, 2014).

The initiative undertaken by WRT is part of the broader Upstream Thinking Initiative, which also includes the Exmoor and Dartmoor MIREs project, the Devon Wildlife Trust's Working Wetland project, the Cornwall Wildlife Trust's Wild Penwith project, the Farming and Wildlife Advisory Group South West and the Westcountry Rivers Trust Otter project (Smith et al, 2013), as well as the DEFRA PES pilot project in the River Fowey described in Box 2.15.

Sources: Matzdorf et al. (2014); Smith et al. (2013)

Box 2.9 : MoorFutures, Mecklenburg-Vorpommern (Germany)

The MoorFutures programme is an interesting example of a carbon credit scheme for the voluntary market, where private citizens and companies can buy carbon offsetting credits that finance the restoration of a peatland area in Germany. Peatland restoration provides great benefits not only in terms of carbon capture and storage, but also of biodiversity conservation.

In 2011, the Ministry for Agriculture, Environment and Consumer Protection of the Mecklenburg-Vorpommern federal state (Germany) established a system of carbon credits for the voluntary market, in order to involve the private sector in the rewetting of a peatland area of great biodiversity importance. The first MoorFutures project (Kieve Polder) was started in July 2012.

The MoorFutures (the carbon credits) cost €35 each in Mecklenburg-Vorpommern and correspond to one tone of saved CO₂ per year. So far 11.5,000 MoorFutures were sold in about four years, financing the restoration of 55 hectares of peatlands.

The Ministry acts as an intermediary body and guarantees that the projects financed through the MoorFutures will be maintained at least for a period of between 30 and 50 years, depending on the project. In addition, when establishing the programme it commissioned to the university of Greifswald a

study on the economic potential of different land use options and a model of the emission reduction potential of peatlands (the Greenhouse Gas Emission Site Type methodology – GEST, see Couwenberg, 2011). Finally, it financed the creation of a webpage and the preparation of flyers and brochures to disseminate the project.

In 2012 the MoorFutures project was extended to Rehwiese (Brandenburg) and in 2014 to Königsmoor (Schleswig-Holstein), with a price of 67€ in Brandenburg and 50€ in Schleswig-Holstein. The project covers about 120 ha in the three federal states.

Sources: Joosten et al, 2015

Box 2.10 : The Westcountry Angling Passport in South West England

There are only few examples of PES schemes which primarily target recreational ES and the Westcountry Angling Passport initiative in the UK is one of them.

In the South West of England, waterways are rich with salmon, trout and other cold-water fish and fishing has been important in this area for long. Nevertheless, many of the rivers are located in privately owned agricultural or forest areas and are not adequately maintained, which in return has a negative impact on angling.

Recognising this problem and also building on its long-term relationship with the local farmers, the Westcountry Rivers Trust, a private NGO which also played an important role in the Upstream Thinking initiative (Box 2.12), has developed a fishing pass for the region, the so-called Westcountry Angling Passport. While there are three different programmes within the initiative, from a PES perspective the most interesting one is the 'Token Scheme Fishing' (Matzdorf et al, 2014). The farmers allow access to rivers, lakes or streams located in their land to recreational anglers for a fee. In return, the farmers and land owners invest in the maintenance of the waters and river banks, including for instance fencing, scrub clearance, making casting sites and access paths and stiles (Smith et al, 2013). While the main ES targeted is the improved recreational value of the landscape, other ES, such as water quality and improved habitats are also maintained and enhanced.

The initiative is also unique because its payment system is based on tokens. The anglers wanting to visit one of the water sites have to purchase tokens either from outlets or from the website that has been specifically created for this purpose (<http://westcountryangling.com/>). They have to drop the tokens, which are sold for a unit price of £2.5, into the boxes provided at the fishing grounds. The number of the tokens required to fish on the sites are determined by the farmers and land owners together (Matzdorf et al, 2014). At the end of each year, the farmers collect the tokens in their boxes and redeem them at the Westcountry River Trust (WRT), using the cash received to maintain the fishing grounds. The WRT passes on 100% of the token values to the farmers and thus covers its costs through brochure advertisement. Financing from the EU were used to establish the scheme in 2003 and then to revise it in 2009.

The WRT monitors the fish returns and the fishing usage every year and this information is used when establishing the number of tokens required for the fishing grounds. The fishing grounds are also rated according to their water quality, type of fish that can be caught and the expected fishing success (Matzdorf et al, 2014).

Given its success, the Westcountry Angling Passport is now also linked with similar token-based angling PES schemes, including the Wye and Usk Angling Passport and the Eden Rivers Passport. In order to maximise the benefits the tokens were made to be interchangeable (Smith et al, 2013).

Sources: Matzdorf et al. (2014); Smith et al. (2013)

Box 2.11 : The “Drinking Water Forest” (Trinkwasserwald® e.V.) initiative in Germany

In 1995 two forest engineers and an industrial engineer decided to found the Trinkwasserwald® e.V. (Drinking Water Forest) non-profit association, with the aim to exploit the contribution of forests to the quality of drinking water through the conservation of high-quality groundwater. They realised that Germany is mainly covered by monoculture coniferous forests, which are prone to damages from storms and pests and also have lower groundwater quality and recharge rates compared to deciduous broadleaf forests. With this in mind, they initiated a project aiming at converting the coniferous forests into mixed deciduous forests by planting deciduous trees.

While the association is supported by up to 2000 volunteers, the forest conversions and plantations are financed primarily by businesses which use large amounts of water and want to offset their water usage (Matzdorf et al, 2014), similar to the idea of offsetting greenhouse gas emissions. One example of a company involved in the programme is the Bionade GmbH, which manufactures non-alcoholic beverages from biologically controlled raw products.

Each of the interested companies assumes the costs of tree planting. Costs primarily depend on the size of the area to be converted but in most cases they are between €17,500 and €20,000 per hectare, which covers the selection of the area, the plantations (and re-plantation if needed) (Matzdorf et al, 2014). The Trinkwasserwald® e.V. association is responsible for the implementation of the initiative, and they provide the payments to the private and public land owners of the forest areas.

Each year the association together with the landowners and a local forester evaluates the status of the forests and decides whether there is a need for re-plantation. In order to assess the impacts of the initiative the association is working together with two universities with the aim to determine the benefits in terms of improvements in the quality of drinking water in the areas.

Sources: Matzdorf et al. (2014)

Hybrid PES in the EU

Overview and examples of hybrid PES in the EU

Where no reference to a box is indicated, Table 9.3 provides an overview of the hybrid PES outlined below.

Hybrid PES schemes are interesting examples of collaboration between the public and private sector. They are not yet very common in Europe with only four examples identified in the EU. In addition to these, a set of sixteen pilot PES programmes financed by the UK government between 2011 and 2015 are summarised in section 2.5.2. These hybrid schemes were not included in the overall literature review because they are not in an operational stage.

The share of private and public financing varies in the different examples. For example, most of the funding of the Working Wetland Project (UK) is provided by a public source (CAP-financed AEMs). In contrast, in the

case of the SCaMP programme (Box 2.12) the majority of the funding is provided by the private water utility company¹⁴.

The hybrid schemes included in this review are all at a regional or local scale and they are all located in the UK. They target a wide range of typologies of land use including grasslands, agricultural land and floodplains. They address a variety of ES, including improvement of water quality and quantity, flood control, carbon sequestration and recreation. The payments are all inputs-based. The intermediary roles are carried out by NGOs (e.g. the Devon Wildlife Trust in the Working Wetland Project), private companies (e.g. United Utilities in the SCaMP programme) and a public body (the Environment Agency in the Goway Meadows programme).

The most known hybrid PES experience in the EU is the SCaMP programme (Box 2.12), the first PES programme established by a water company in the UK. The programme is co-financed by the water company United Utilities and two UK public bodies, Natural England and the Forestry Commission. SCaMP is often mentioned as an example of a successful PES because of the well managed partnership between the various stakeholders. The programme's latest evaluation also showed its success in terms of the land's improved ecological conditions (United Utilities, 2016).

The Pumlumon Project in Wales is also a good example of a public-private PES where the stakeholders have proved to work effectively together and where an NGO acts not only as an intermediary but also partly as a user of the ES provided by landowners of the area. The Goway Meadows Programme, also located in the UK, is an interesting example of a PES where a private oil company and public environmental authorities partnered up to improve the flood protection ES provided by a lowland grazing marsh (Box 2.14).

Box 2.12 : The Sustainable Catchment Management Programme (SCaMP) in North West England, UK

The Sustainable Catchment Management Programme (SCaMP) is a good example of a collaboration between a water company and tenant farmers, aiming at improving primarily water quality but also sequestration, biodiversity and recreational opportunities. The area covered by the programme is habitat for animals and plants of national importance, and has been degraded over the years by industrial air pollution and unsustainable agricultural practices. Farmers in particular drained the moorlands in order to put more livestock on the fells.

In order to restore the hydrological function of the peat soils, in 2005 United Utilities (UU), the UK's largest listed water company, initiated the SCaMP scheme on around 20,000 hectares of their catchment land in the Peak District and the Forest of Bowland, in North West England. The land is primarily an upland moorland and 13,000 hectares are designated as a Site of Special Scientific Interest¹⁵ (SSSI) (Smith et al, 2013). The agreements with the tenant farmers are managed by UU land agents, while the NGO Royal Society for the Protection of Birds (RSPB) provides technical assistance in developing farm plans. The initiative supported activities such as blocking drainage ditches, restoring moorland, establishing woodland, installing waste management facilities and livestock fencing (Smith et al, 2013). These improvements also allow the farmers to access additional income from the CAP-funded agri-environmental measures via two public authorities, Natural England and the Forestry Commission.

¹⁴ During the first phase of SCaMP (2005-2010) the share of private financing was 75% (information on the public – private share is not available yet for the second and third one).

¹⁵ SSSIs are sites in England, which are protected by law in order to conserve their wildlife and geology.

During the first phase of the initiative (SCaMP I: 2005-2010), UU invested £8 million and an additional £2.5 million of public support through agri-environmental measures grants was provided by Natural England and the Forestry Commission (Smith et al, 2013). 75% of UU's capital costs have been paid by their customers via minor increases in the water bills.

Given the success of the first phase, between 2010 and 2015 SCaMP II was implemented, and a further £11.6 million was invested by the water company to improve the management of catchment areas across 30,000 hectares in Cumbria and South Lancashire (United Utilities, 2016).

In order to assess the success of the scheme, the SCaMP Monitoring Programme was established, which primarily focuses on the botanical and hydrological impacts of the improvements. Overall, the SCaMP activities had a significant beneficial impact on water quality in many locations (United Utilities, 2016). Natural England also assessed the 17,500 hectares of the SSSI land that is part of the programme and found that the land in favourable or unfavourable recovering condition increased from 14% to 99.4% (United Utilities, 2016).

At the moment, the programme is in its third phase (2016-2020). SCaMP III has a different focus as it expands to those catchment areas where UU takes the water from but does not own the land. For this reason, it adopts a targeted approach driven by the so-called drinking water safeguard zones, i.e. drinking water catchments where water quality in rivers, reservoirs or groundwater is deteriorating and is becoming harder to treat, due to human activities on the land (United Utilities, 2016). The water company has partnered up with other stakeholders, including Natural England, Rivers Trusts, National Trust, RSPB, Moors for the Future and Catchment Sensitive Farming.

Sources: Smith et al. (2013); United Utilities (2016)

Box 2.13 : The Pumlumon Project in Wales, UK

The Pumlumon Project, located in the Cumbrian Mountain range in Wales, is a PES scheme applying an integrated approach by aiming at improving not only the provision of ES but also related social and economic benefits. One of the objectives of the programme is to reconnect the citizens with the environment and make them realise the importance of nature around them. The project aims at having a beneficial impact on the local communities via the creation of new skills and jobs (Matzdorf et al, 2014).

As a result of intensive agricultural use, in particular sheep farming, the conditions of the uplands across Wales have deteriorated and have negatively affected wildlife and soil quality. The latter has resulted in an increased risk of flash flooding. Furthermore, with the upland drainages the peat soils have started to dry out causing a considerable carbon release into the atmosphere (Matzdorf et al, 2014).

The Pumlumon Project was initiated by the British Wildlife Trusts in 2007 as one of the pilot schemes of the Living Landscapes conservation programme. It is managed by the Montgomeryshire Wildlife Trust (MWT). The MWT acts not only as an intermediary who connects the farmers, the private sector and public authorities but also as the ES user by channeling funds from two major charitable sources (Biffaward and Waterloo). In addition to these financial sources, funding is also provided by local and national government and statutory agencies (Smith et al, 2013) and by the Landfill Tax (Matzdorf et al, 2014). This tax includes a credit scheme where landfill operators can contribute a share of their landfill tax to environmental organisations to undertake various activities in the region.

In order to improve land management practices, contracts are signed with farmers, which include the changes required in land management practices over the entire period of the contract. The contracts are signed for 5 to 30 years. In order to avoid double-funding from agri-environment schemes, the farmers who receive agri-environmental funding or wish to receive them in the future are not paid under this scheme for the activity itself but only for maintaining the infrastructure that was implemented as part of the Pumlumon Project. The farmers receive a payment of £50 per hectare for the provision of each ES (Matzdorf et al, 2014). For instance, if a farmer rewets 10 hectares of peatland and also plants one hectare of trees he will get £500 per year for the rewetting and an additional £50 for the planting. In order to determine this value the Welsh government's valuation methods were used as guidance.

The participating farms are inspected once a year by the MWT project managers. Furthermore, the impacts of their activities on the habitats and hydrology are closely monitored in order to provide a scientifically rigorous evaluation of the project. According to this monitoring, by 2011 the water table had raised by 5 cm as a result of ditch blocking and the red grouse population were the largest ever recorded in Wales (Matzdorf et al, 2014).

While the biggest challenge was to convince both farmers and conservation organisations that ES-based economic models are feasible options, the involvement of local farmers in the early stages of the project was seen as an important success factor.

Sources: Matzdorf et al. (2014); Smith et al. (2013)

Box 2.14 : The Gowy Meadows Programme in Cheshire, UK

In 2002, a PES scheme was launched by a public-private NGO partnership to protect the Gowy Meadows, a lowland grazing marsh in the north west of England. The oil company Shell owned this area, which was over-grazed and drained, and did no longer function as a flood plain. Shell decided to lease the land to the Cheshire Wildlife Trust (CWT) to create a reserve. In addition to the CWT, the Environment Agency and Natural England also took part in the partnership, Natural England acting as both an intermediary and a service user.

The CWT leases the land from the oil company (then Shell, now Essar Energy) and aims to deliver flood alleviation and water management, which are considered as crucial issues by the oil company, since its refineries are considered to be at risk from both fluvial and tidal flooding. The programme mainly targets the restoration of a network of drainage ditches (Smith et al, 2013). In addition, traditional grazing techniques are applied, which also provide biodiversity benefits, by contributing to the conservation of, among others, otters, water voles, harvest mice, barn owls and dragonflies (Askeland, 2004).

Sources: Smith et al. (2013); Askeland (2004)

Pilot PES projects in the UK

This section summarises a set of pilot hybrid PES programmes that have been financed by the UK government between 2011 and 2015 with the aim of exploring the potential for PES across England and Wales, including both developing PES schemes in practice and carrying out research projects on specific related issues. These pilot projects are of particular interest as they are a signal of a strong interest and commitment of a national government to explore the potential of PES.

The pilot projects addressed a wide range of ES, including those related to improved water quality, cultural ES, flood risk management and urban green infrastructure. Most of the financed projects were at an early stage and were carried out in order to evaluate their feasibility. The total cost for the UK government was £274,000 between 2011 and 2013 but an estimated additional 50% funding has been secured through co-funding and partnerships with interested institutions. Five projects have been financed between 2014 and 2015 but they haven't been evaluated yet. At the moment there seem to be no plans to finance other PES projects in the UK.

The service users who co-financed the pilot PES projects included water companies interested in reducing investment needs for sewer capacity and water purification; recreational visitors and local tourism business; local authorities interested in improving the public goods provided by ecosystems in local regeneration projects and reduce flood risk; developers interested in nitrogen mitigation through reduction of agricultural pollution (the Habitats Regulation requires nitrogen neutrality for new developments to be permitted); corporate buyers interested in carbon trading through peatland restoration; and also the central government via agri-environment measures. A wide range of institutions acted as intermediaries, including environmental charities, companies and local authorities.

According to the evaluation of the eleven pilot projects carried out between 2011 and 2013 (DEFRA, 2014) the projects delivered a range of positive impacts and contributed to build up evidence and develop methodologies to set up different kinds of PES programmes. Catchment-based projects, aiming at delivering cost-effective water quality improvements, have shown the most important potential for PES applications. The evaluation exercise also shed light on a range of challenges, the key ones being related to difficulties in attracting private funding and ensuring long term sources of financing (e.g. covering monitoring costs).

One of the most interesting pilot projects is summarised in Box 2.15. It aimed at improving the water quality of River Fowey (Cornwall, UK) by introducing more sustainable agricultural practices. According to South West Water, the water company who co-financed the scheme, such practices provided a benefit-cost ratio of 65 to 1 with respect to employing engineering solutions to treat polluted water downstream. The project represents one of the few experiences of a PES based on a reverse auction in the EU¹⁶.

Box 2.15 : The PES pilot project in the River Fowey (Cornwall, UK)

South West Water (a private water company) co-financed one of the DEFRA's pilot projects in the catchment of the River Fowey in Cornwall. The PES scheme was part of the South West Water's Upstream Thinking Initiative (see Box 2.8).

The activities and payments included in the contracts were based on an auction process, which took place in August and September 2012 (the first example of a reverse auction being used in a PES in the UK). All farmers in the Fowey catchment were provided with a list of capital investments that could be funded under the scheme and asked to enter bids, by indicating the proposed investment and the associated grant they would require from South West Water. After that, an environmental improvement score was associated to each bid, based on the improvement in water quality that the investments would bring, and the bids with the highest cost-effectiveness (i.e. the best ratio between the environmental improvement

¹⁶ Another example of a PES programme based on a reverse auction is the Scottish Challenge Fund, which is part of the Woodland Grant Scheme (WGS) summarised in Box 2.3. The scheme aimed at supporting afforestation projects and the payment to land owners was based on a reverse auction process (Latacz-Lohmann and Schilizzi, 2005; OECD, 2010; Zandersen, Braten and Lindhjem, 2009).

score and the requested grant). The received bids totalled £776,000 of investment, and the programme distributed £360,000 to the best bids.

Westcountry Rivers Trust acted as intermediary, by visiting farms in the catchment in order to identify projects eligible to be included in the scheme, organising the payments and providing support and information to farmers. In addition, the University of East Anglia supported the process by helping design the auction process.

The auction mechanisms allowed to increase the cost efficiency of investments aiming at improving the environmental impact by 20% to 40% with respect to a fixed-price mechanism previously used to distribute Upstream Thinking funds, and had lower transaction costs related to administration. As a drawback, this system may be more complicated for farmers than an approach based on fixed-price subsidies, and may allow less certainty on the environmental outcomes for the funders.

Source: Day and Couldrick (2013)

3 Offsetting

Definitions

Biodiversity offsets are defined as “*measurable conservation outcomes resulting from actions designed to compensate for significant residual adverse biodiversity impacts arising from project development¹⁷ after appropriate prevention and mitigation measures have been taken. The goal of biodiversity offsets is to achieve no net loss (NNL) and preferably a net gain of biodiversity on the ground with respect to species composition, habitat structure, ecosystem function and people’s use and cultural values associated with biodiversity*” (Business and Biodiversity Offsets Programme, 2013). The Business and Biodiversity Offset Programme (BBOP) further establishes a set of principles which create a framework for successfully designing and implementing offsets (Box 3.1).

Biodiversity offsets can be also regarded as a type of ecological compensation measures, which is a broader and more generic term covering a wide range of measures with the aim to provide recompense for some loss or service (Conway et al, 2013).

Box 3.1 : The BBOP Principles on Biodiversity Offsets

Adherence to the mitigation hierarchy: A biodiversity offset is a commitment to compensate for significant residual adverse impacts on biodiversity identified after appropriate avoidance, minimization and on-site rehabilitation measures have been taken according to the mitigation hierarchy.

Limits to what can be offset: There are situations where residual impacts cannot be fully compensated for by a biodiversity offset because of the irreplaceability or vulnerability of the biodiversity affected.

Landscape context: A biodiversity offset should be designed and implemented in a landscape context to achieve the expected measurable conservation outcomes taking into account available information on the full range of biological, social and cultural values of biodiversity and supporting an ecosystem approach.

No net loss (NNL): A biodiversity offset should be designed and implemented to achieve in situ, measurable conservation outcomes that can reasonably be expected to result in no net loss and preferably a net gain of biodiversity.

Additional conservation outcomes: A biodiversity offset should achieve conservation outcomes above and beyond results that would have occurred if the offset had not taken place. Offset design and implementation should avoid displacing activities harmful to biodiversity to other locations.

Stakeholder participation: In areas affected by the project and by the biodiversity offset, the effective participation of stakeholders should be ensured in decision-making about biodiversity offsets, including their evaluation, selection, design, and implementation and monitoring.

¹⁷ While biodiversity offsets are defined here in terms of specific development projects (such as a road or a mine), they could also be used to compensate for the broader effects of programmes and plans.

Equity: A biodiversity offset should be designed and implemented in an equitable manner, which means the sharing among stakeholders of the rights and responsibilities, risks and rewards associated with a project and offset in a fair and balanced way, respecting legal and customary arrangements. Special consideration should be given to respecting both internationally and nationally recognised rights of indigenous peoples and local communities.

Long-term outcomes: The design and implementation of a biodiversity offset should be based on an adaptive management approach, incorporating monitoring and evaluation, with the objective of securing outcomes that last at least as long as the project's impacts and preferably in perpetuity.

Transparency: The design and implementation of a biodiversity offset, and communication of its results to the public, should be undertaken in a transparent and timely manner.

Science and traditional knowledge: The design and implementation of a biodiversity offset should be a documented process informed by sound science, including an appropriate consideration of traditional knowledge.

Source: Business and Biodiversity Offset Programme (2013)

One of the most important building blocks of any biodiversity offsetting schemes is the concept of the mitigation hierarchy¹⁸ (see above the BBOP Principles). Actions to achieve no net loss should be considered in the following order (BBOP, 2012; Tucker et al, 2014):

1. **Avoidance:** measures taken to avoid creating impacts from the outset, such as careful spatial or temporal placement of elements of infrastructure, in order to completely avoid impacts on certain components of biodiversity.
2. **Minimisation:** measures taken to reduce the duration, intensity and / or extent of impacts (including direct, indirect and cumulative impacts, as appropriate) that cannot be completely avoided, as far as is practically feasible.
3. **Rehabilitation/restoration:** measures taken to rehabilitate degraded ecosystems or restore cleared ecosystems following exposure to impacts that cannot be completely avoided and / or minimised.
4. **Offset:** measures taken to compensate for any residual significant, adverse impacts that cannot be avoided, minimised and / or rehabilitated or restored, in order to achieve no net loss or a net gain of biodiversity. Offsets can take the form of positive management interventions such as restoration of degraded habitat, arrested degradation or averted risk, protecting areas where there is imminent or projected loss of biodiversity.

In addition to offsetting compensation for impacts on biodiversity can be also delivered via the use of habitat banking and fee-in-lieu schemes.

Habitat banking is an extension of offsetting, which creates a “market where the credits from actions with beneficial biodiversity outcomes can be purchased to offset the debit from environmental damage. Credits can be produced in advance of, and without ex-ante links to, the debits they compensate for, and stored over time” (EFTEC and IEEP, 2010). In the case of offsets, the debits (due to biodiversity degradation) and credits (compensation measures) need to be matched for each case, even though offset delivery may be undertaken in a single location to satisfy demand for more than one offset requirement. This is not the case in habitat

¹⁸ Within the United States the concept of mitigation hierarchy is referred to as the ‘mitigation sequence’.

banking where offsets are not necessarily designed to match a specific debit at the time of creation and the offsets can be stored until they are selected to compensate for a specific impact.

In contrast, **fee-in-lieu schemes** are offsets that pool payments - equivalent to the cost of replacing lost biodiversity and ecosystem services - for instance through a governmental institution or appointed body or via an independent environmental trust fund and use these to provide biodiversity and ecosystem service benefits. These do not necessarily ensure no net loss from a specific project or development but can be designed and regulated such that they offset losses collectively (e.g. at the regional or sectoral level) (Tucker et al, 2014).

Offsetting in the EU

The EU legislative framework and the concept of 'No net loss'

In 2011 the EU adopted its Biodiversity Strategy which establishes 6 targets and 20 actions to halt the loss of biodiversity and ecosystem services in the EU by 2020 (European Commission, 2011). In particular, Action 7 introduced the goal of 'no net loss of biodiversity and ecosystem services' which paved the way for schemes to compensate for and offset biodiversity losses. While the EU 2020 Biodiversity Strategy does not define no net loss, a preliminary definition¹⁹ was set by the Council of the European Union. Furthermore, in its resolution in 2012 the European Parliament "*urged the Commission to develop an effective regulatory framework based on the 'No Net Loss' Initiative*" (European Parliament, 2012) and also recognised the need to apply the Business and Biodiversity Offset Programme's (BBOP) Principles (Box 3.1).

In order to support the development of the No Net Loss (Initiative the Commission has set up a Working Group on No Net Loss of Ecosystems and Services (NNL WG) and also financed several studies to support the NNL initiative (see Conway et al, 2013; Rayment et al, 2014; Tucker et al, 2014). Tucker et al. (2014) assessed a set of policy options to incorporate the NNL objective into the EU policy framework and also highlighted some key design features of an effective biodiversity offsetting system, including the need for a strong regulatory framework to ensure a strong adherence to the mitigation hierarchy (Box 3.1), the establishment of a clear set of principles and standards and the use of an effective monitoring system. Although the study found that there are a number of actions that can be taken to avoid and minimise impacts on biodiversity, such as through more effective obligatory environmental impact assessments²⁰, it is clear that residual impacts will still occur and therefore some form of offsetting will be required to achieve the NNL objective.

This analysis was then followed by an EU-wide public consultation and an impact assessment is currently under preparation which also takes into account the results of the consultation. The public consultation showed the controversial nature of offsetting and highlighted the polarised opinions of key stakeholders in the EU. While the decision on the next steps for the NNL Initiative is currently in the hands of the European Commission it seems unlikely that any legislative based mandatory requirement for offsetting will be proposed in the near future. Further development of the NNL Initiative will also need to take into account the Commission's conclusions on its assessment of the EU nature legislation (Tucker et al, 2016)²¹. If the

¹⁹ "A preliminary definition of this concept is that conservation/biodiversity losses in one geographically or otherwise defined area are balanced by a gain elsewhere provided that this principle does not entail any impairment of existing biodiversity as protected by EU nature legislation (Council of the European Union, 2011).

²⁰ EU Strategic Environmental Assessment (SEA) and Environmental Impact Assessment (EIA) legislation

²¹ The EU Commission has established a rolling review programme of EU legislation, with the results of the review of EU nature legislation published at the end of 2016: http://ec.europa.eu/environment/nature/legislation/fitness_check/index_en.htm

Commission decides to go ahead with some form of offsetting initiative it will take many years to implement as a significant amount of preparation needs to be undertaken, for instance to develop sufficient capacity amongst competent authorities. Therefore, even if a decision is made within the next year to go ahead with some form of requirement for offsetting, practical offsetting actions will probably not be required before 2020.

While NNL is not an explicitly stated objective in the EU legislative framework it does appear as an implicit objective in the EU's nature conservation legislation, i.e. the Birds and Habitats Directives. In particular, Article 6.4 of the Habitats Directive (Council Directive 92/43/EEC) establishes a requirement for developers to compensate for (i.e. offset) unavoidable impacts on the EU conservation network (i.e. the Natura 2000 network). Although these EU directives have been transposed in all EU Member States implementation of the requirement for compensation for impacts in Natura 2000 sites is not consistent and currently there is a lack of guidance (including on available tools and metrics) to ensure that residual impacts are fully compensated for in the most appropriate way (Conway et al, 2013).

In addition to the EU directives, the EU's legislation on assessing environmental impacts²⁰ of planned actions and strategies include a reference to the mitigation hierarchy. Furthermore, the EU legislation on environmental liability (i.e. Environmental Liability Directive - ELD) requires remedial compensation for instance for accidental biodiversity impacts and thus are relevant for biodiversity offsetting. With the introduction of the new reformed legislation on environmental impact assessments (i.e. the EIA Directive in 2014, Directive 2014/52/EU) rules have been strengthened. The revised legislation includes requirements for ongoing monitoring of "significant adverse environmental impacts", for the mandatory assessment of "reasonable alternatives" to projects and for a description of a baseline scenario. However, biodiversity is now explicitly mentioned in the revised legislation. Furthermore, Member States must ensure that the envisaged mitigation and offsetting measures are implemented by the developers, if required (Tucker et al, 2016).

The design of current offsets in the EU

As indicated above, as a result of the EU legislative framework, Member States are compensating for residual impacts in Natura 2000 sites on habitats and species that are protected under the EU nature conservation legislation. Nevertheless, there is a small group of EU Member States, including France, Germany, Sweden and the UK, where national or regional initiatives are taking the offsetting approach one step forward with the aim to go beyond the EU level requirements. Such initiatives are the focus of this section and below we provide an overview of the main design features of offsetting experiences in these countries.

Table 3.1 : Overview of main offsetting schemes in the EU

Name of scheme	Country	Short description
Impact Mitigation Regulation (IMR)	Germany	The most advanced offsetting scheme within Europe is in Germany where a mandatory offsetting has been in place since 1976 and it is applied to all impacts on biodiversity (not only on protected species and protected areas).
DEFRA's pilot offsetting	England, UK	In 2012, the UK's Department for Environment, Food and Rural Affairs (DEFRA) started a pilot programme in England, which launched voluntary offsetting in six areas across the country. Despite this offsetting remained infrequent.
Law Grenelle II / National guidance on "avoid, reduce and compensate"	France	A mandatory offsetting system is under development in France, which is primarily applied to relatively high biodiversity habitats and aims to achieve net biodiversity gain.
CDC Biodiversité - pilot habitat banking	France	In 2008, the financial organisation Caisse des Dépôts et Consignations (CDC) created a subsidiary (CDC Biodiversité) to pilot a habitat banking scheme.
Environmental Code	Sweden	Under the Swedish Environmental Code offsetting is mandatory for impacts on protected areas, while offsetting for impacts outside these areas are on a voluntary basis.
Fisheries fee	Sweden	The Swedish fisheries fee acts as a fee-in-lieu scheme as it requires developers are required to pay a fee in case any developments are expected to impact fish stocks, which is then used for compensation.

Source: based on Tucker et al (2014)

In later sections, the German and the UK examples are presented in more details. Box 3.2 provides an overview of Germany's biodiversity offsetting policy, which is the most advanced in the EU as environmental impact mitigation and the offsetting of residual impacts has been a mandatory requirement since 1976 and it has been applied not only to protected areas or for protected species but to impacts on other categories of biodiversity too.

Biodiversity offsetting in other EU Member States is less developed compared to the German system. For instance, offsetting is only rarely required in the UK by planning authorities where developments have residual impacts on biodiversity outside protected areas. In response to this a pilot programme was launched in England between 2012 and 2014 to encourage offsetting on a voluntary basis. Although the programme did not result in a significant increase in offsetting it did reveal a number of important lessons, which are presented in Box 3.3.

In most situations, in the EU offsets are carried out by the developers or appointed third parties (e.g. consultants) in relation to specific expected impacts from individual developments. However, in some cases offsetting is achieved through habitat banking or fee-in-lieu schemes, which also aim to achieve NNL.

Mandatory vs. voluntary: Offsetting schemes can be delivered as part of a mandatory or voluntary policy framework. A mandatory system is in place in Germany and is under development in France, while the degree of voluntariness is for instance differentiated in Sweden based on the type of the area that is being covered. While compensation is mandatory for impacts on protected areas under the Swedish nature conservation legislation (Swedish Environmental Code) impacts on biodiversity outside of these areas is only on a voluntary basis (Tucker et al, 2014). At the same time, the voluntary system rarely leads to offsetting in practice. Other experiences both in the EU and internationally have showed that only mandatory requirements can address adequately the residual impacts on biodiversity and ensure that NNL is achieved (Tucker et al, 2014). This was also the conclusion of the pilot offsetting programme that took place in England between 2012 and 2014.

Objective: As for the main objective of the offsetting policies the schemes in place in the EU primarily aim to achieve NNL nevertheless there are some exceptions. For instance, in Sweden while a legal framework for voluntary compensation outside protected areas is provided nevertheless the achievement NNL is not an explicit requirement (Tucker et al, 2014). In contrast, in the case of UK's pilot offsetting programmes achieving a net gain was the ambition of the UK Government.

Mitigation hierarchy: The effective implementation of the mitigation hierarchy is considered to be one of the most crucial building blocks of any offsetting schemes. While offset schemes should only undertake compensation after appropriate avoidance and mitigation measures has been put into effect in practice this principle does not always seem to be followed and in particular guidance is often lacking (Conway et al, 2013). An exception to the lack of guidance is, for instance, France where in 2012 the French Ministry of Ecology, Sustainable Development and Energy adopted a specific guidance on how to avoid, reduce and offset the impacts on the natural environment and an accompanying document further clarifying the mitigation hierarchy was also published later in 2013 (Tucker et al, 2014). A prominent example in the EU where adherence to the mitigation hierarchy is strongly embedded in the regulatory framework for offsetting is in Germany.

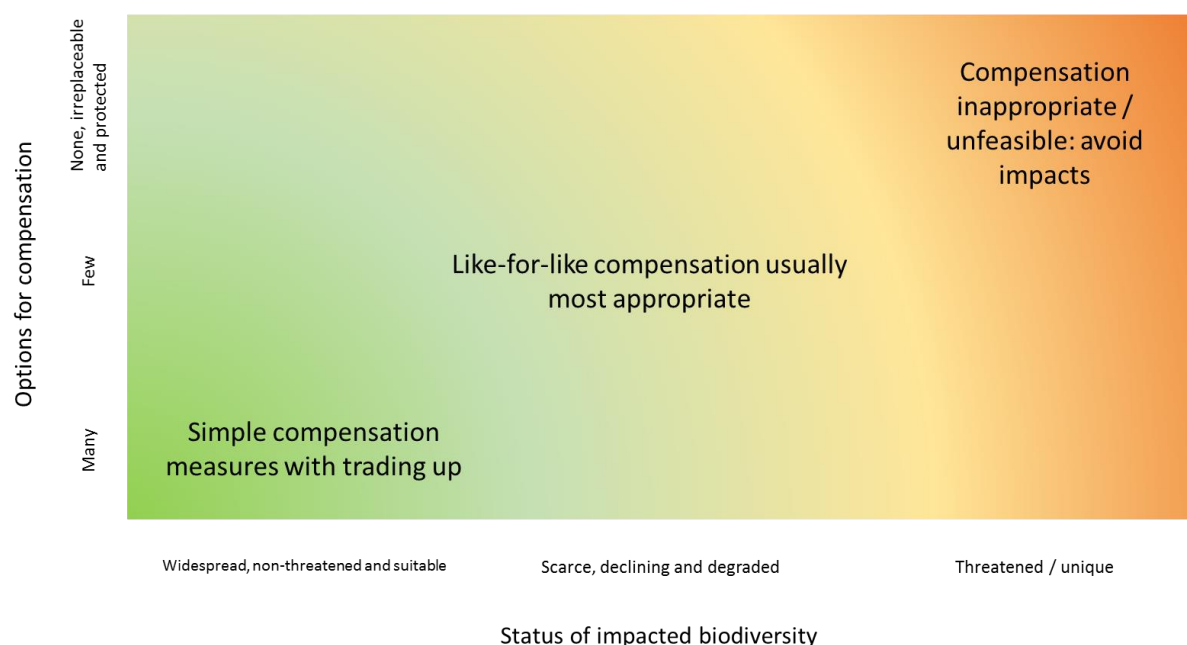
Functional and spatial relationship: A key design feature of offsetting schemes is the functional and spatial relationship between the habitats and species impacted by the development and their location and the habitats and species provided by the offset and its location (Table 3.2). Like-for-like or in-kind offsets provide the same habitats and functions while out-of-kind offsetting provides different biodiversity components, but under normal exchange rules they should be of equal or greater biodiversity value. The latter is often referred to 'trading-up' when biodiversity with higher conservation value is established. A key principle is that the more important, threatened and irreplaceable a biodiversity component is the tighter the like-for-like requirement should be. Thus in the EU compensation for habitat and species protected under the EU nature conservation legislation must be strictly like-for-like. The appropriateness of compensation in view of the status of the impacted biodiversity and the options for compensation is presented in Figure 3.1. In France, offsetting is only applied to relatively high biodiversity habitats and therefore only like-for-like offsetting is allowed. In contrast, offsetting in the UK address impacts on a wider range of habitat types and therefore trading-up is encouraged where low biodiversity value habitats are impacted.

Another important consideration is the location of the offset in relation to the impacted area. In general offsetting frameworks require the offset to be close to the impact, and in some cases on the same site, and this requirement is more strictly applied the higher the value of biodiversity components that are impacted. Thus impacts within the EU Natura 2000 sites should normally be compensated for within or alongside the site if at all feasible. However, it is important to take into consideration other ecological issues that might mean that on-site locations are unsuitable (e.g. as they may be disturbed or isolated from other areas of habitat) and off-site locations may provide other advantages (e.g. increasing functional connectivity amongst habitat / protected area networks).

Table 3.2 : Functional and spatial relation of offsetting schemes

	Strong link	Loose link
Functional relation	Like-for-like / in-kind offsetting	Out-of-kind offsetting
Spatial relation	On-site offsetting	Off-site offsetting

Source: Darbi (2010)



Source: Tucker et al (2014)

Figure 3.1 : Appropriateness of compensation in view of the status of the impacted biodiversity and the options for compensation

Types of offsets: While most EU examples apply a scheme where offsetting is undertaken in a project specific context there are also examples of habitat banking. In 2008, the French financial organisation (Caisse des Dépôts et Consignations (CDC)) created a subsidiary (CDC-Biodiversité) to pilot a biodiversity banking scheme with its first pilot site located in Plaine de Crau in the Provence-Alpes-Cotes d’Azur region (Olsen, 2010). In 2002, when the scope of the Federal Nature Conservation Act of Germany, the cornerstone of the German offsetting scheme, was loosened compensation pools were introduced which can be regarded as a form of habitat banking. In addition to offsetting and habitat banking, one specific example of a fee-in-lieu scheme which serves as a compensation tool also exist in Sweden. In case a development, such as a coastal or hydropower installation, results in impacting fish stocks a fisheries fee needs to be paid by the developer (Tucker et al, 2014).

In most cases, offsets are provided through habitat creation, re-creation and restoration. There has been a wide discussion whether averted risk offsets, where biodiversity or ecosystems which are known to be at risk are protected, should qualify or not. While averted risk offsets may be a good option as biodiversity and ecosystem services that are part of such offsetting are not dependent on habitat restoration and creation there are several major disadvantages. In Europe, many habitats that are prone to future degradation are already protected to some extent and thus the added value of averted risk offsets are questionable. An element of uncertainty also exists as the future rate of habitat-specific loss and degradation cannot be fully

predicted. Finally, such offsets can simply result in the displacement of the activity that is threatening the habitats and ecosystem services in the first place (Tucker et al, 2014). Averted risk offsets are not allowed in Germany but one example where such offsetting is allowed in the EU is the mandatory offsetting required in Sweden.

Sectors: With regards to the sectors covered, the offsetting schemes in place in the EU primarily target infrastructure (including both transport and energy) and urban developments while the impacts of the agriculture, forestry and fisheries is not covered.

Metrics: The quantification of how much compensation is required is a crucial step in any offsetting and thus the use of metrics to calculate the residual impacts (debits) and offset gains (credits) is important. International experience indicates that appropriate metrics for habitats should consider both the intrinsic biodiversity value and the actual condition (Rayment et al, 2014). Nevertheless, experience shows that offset schemes in the EU lack uniform and transparent methodologies for assessing gains and losses (Conway et al, 2013). For instance, in Germany there are no standards at the federal level on the use of metrics and thus a wide mixture of methods are being used. In contrast, for the English pilot offsetting programme a standardised methodology was recommended, establishing so-called 'biodiversity units', on the basis of intrinsic habitat value and condition. However, it was criticised for being overly simplistic and therefore unable to capture the real value of biodiversity and ecosystems. Metrics should also take into account the time that it will take for offsets to deliver their intended outcomes (e.g. reflecting on society's time preferences through discount rates) and the risks of short and long-term offset under-delivering or failure.

According to Rayment et al. (2014) in order to secure long term conservation benefits the following factors should be ensured with regards to the offsetting schemes:

- A legally binding contractual agreement should be made between the developer/provider and the authority in which compliance conditions are set;
- As part of the compliance conditions a long term management plan should be set up;
- Rights to manage the land for conservation purposes should be secured;
- Safeguards against changes in land use and/or obligations to use the land for conservation purposes in the long term should be used;
- In order to fund conservation actions secure access to finance should be ensured; and
- Safeguards against risk of failure should be established for instance via the use of metrics, contingency funds, financial insurance and/or financial insurance.

Monitoring and reporting: Finally, in order to ensure compliance with the offsetting requirements monitoring and reporting is needed. In general, monitoring of offsetting schemes in the EU is not carried out in a consistent way and is not always effective (Tucker et al, 2014). For instance in German requirements on monitoring and reporting has been weak and contributed to low levels of offsetting success (Tucker 2017).

Box 3.2 : Offsetting in Germany

Germany's biodiversity offsetting policy has been in place since 1976 which makes it the oldest offsetting policy in the EU. The legal requirements are laid down in the Federal Nature Conservation Act (FNCA) and the Federal Building Code, which together are widely referred to as the Impact Mitigation Regulation (IMR) in Germany. The IMR poses a mandatory offsetting requirement by requiring avoidance of any significant adverse effects on nature and landscapes and compensation for residual impacts on natural assets (including habitats, soil, water, climate, air quality and the aesthetic quality of the landscape) and their functions (Underwood et al, 2014). The objective of the IMR is to achieve no net loss of biodiversity assets and their functions at least and this applies to all areas not just within protected areas. The adherence to the mitigation hierarchy is strongly built into the IMR.

Initially, the FNCA strictly prioritised on-site and like-for-like offsets to address specific impacts of projects but it was difficult to meet these requirements, which contributed to low level offsetting. Therefore revisions to the legislation in 2002 and 2009 relaxed the rules and since then the location and the form of the offsetting can be chosen to be more specific to the development (Tucker et al, 2014). Furthermore, the revisions resulted in the introduction of eco-accounts which can be seen as a form of habitat banking. Since 2004, German municipalities have been able to set up these eco-accounts to store and use offsets which they can use for their development projects (Tucker et al, 2014).

The IMR addresses impacts from built developments such as transport infrastructure, electricity infrastructure, buildings, housing and mining, but specifically excludes the impacts of agriculture forestry and fishing (provided that such activities follow good practice standards). Offsetting can be provided through habitat creation, re-creation or restoration but risk aversion offsets are not allowed (Tucker et al, 2014).

As there is no federal level standard or guidance on the metrics that need to be used to quantify the expected impacts and the required offsets a wide range of approaches exist in Germany. The four main types of methodologies include the following (Darbi and Tausch, 2010 in; Tucker et al, 2014):

- Compensation area coefficients / ratios for biotope types;
- Biotope valuation procedures based on the ecological value and area of the biotopes;
- Approaches based on the cost of restoring the area where the impact occurred;
- Verbal argumentative methods based on expert judgment.

The same applies to contingency measure as there are no federal level requirements to address possible offset failures, although there are some states where additional actions are needed to be done to ensure long term management. As part of the revision of the FNCA, monitoring and reporting requirements have been strengthened and competent authorities are now obliged to closely monitor the timing and the status of the mitigation measures and offsetting. Furthermore, the authorities have the right to require reporting from the developers. Despite these strengthened requirements, there is some evidence that the situation has not improved considerably, as a 2010 study of compensation measures, under 20 development plans in Baden-Württemberg, found that only 2/3 were implemented and only 1/3 achieved their desired outcomes (Sperle, 2010).

According to Tucker et al. (2014) Germany's mandatory offsetting overall seems to be beneficial and practical without involving high costs and resulting in high administrative burdens. Nevertheless, there is still room for improvement, for instance via the application of more consistent approaches to the use of metrics or via the inclusion of residual impacts from agriculture, forestry or fisheries

Box 3.3 : Offsetting in England, UK

In 2012, as a response to fulfil the NNL policy introduced earlier by the Natural Environment White Paper (HM Government, 2011), the UK Government has established a voluntary biodiversity offsetting pilot programme which consisted of six voluntary pilot areas in England: Coventry, Solihull and Warwickshire, Devon, Doncaster, Essex, Greater Norwich and Nottinghamshire.

In 2013, the Department for Environment, Food and Rural Affairs (DEFRA) also published a Green Paper on biodiversity offsets (DEFRA, 2013), which outlined the government's priorities for any offsetting programmes as follows:

- Improve the delivery of the requirements of the planning system with regards to biodiversity by ensuring that it is "quicker, cheaper and more certain for developers";
- Achieve net gain for biodiversity; and
- Avoid additional costs to businesses.

The biodiversity offsetting system introduced by the pilot programme was primarily based on habitats rather than species with a primary focus on biodiversity per se rather than the services that are delivered by ecosystems. The focus was in particular on priority habitats and the pilot therefore allowed impacts on low biodiversity value habitats to be offset through the restoration of higher value priority habitats, which means that 'trading-up' was allowed (Tucker et al, 2014). With regards to the location of the offsets no particular requirements were established but it is general practice for offsets to take place in close proximity to the development sites. Similar to the German system, impacts from farming, fishing or forestry are not addressed and the pilots focused on developments concerning transport and energy infrastructure, urban expansion or industrial development.

In order to create a transparent and simple system to quantify the impacts and expected outcomes of offsetting DEFRA and Natural England developed a metric that established so-called 'biodiversity units', which are broadly equivalent to the widely used habitat-hectares biodiversity offsetting metric (DEFRA and Natural England, 2012). The value of a particular habitat was calculated in biodiversity units with the aim of achieving NNL, i.e. at least one biodiversity unit is gained for each biodiversity unit lost, based on the distinctiveness of the habitat type (i.e. its intrinsic biodiversity importance), the condition of the habitat and the area measured in hectares. The system is also used to estimate the biodiversity units of the offsets that have to be provided, with multipliers applied to the metric to take into consideration the risk of the habitat restoration or creation failing, the time elapsed between the development taking place and the time the offset site reaches its biodiversity unit target and the location of the offset. While the metric seemed to provide a practical calculation system concerns have been expressed that it is too simplistic and does not therefore reliably indicate the real biodiversity value of the sites (Tucker et al, 2014).

In 2014, DEFRA commissioned an evaluation to assess the experience of the six voluntary offsetting pilots and the evaluation found that there were multiple barriers to voluntary offsetting, including resource constraints, immaturity of the market for offsetting and a lack of perceived support in planning policy (Baker et al, 2014). Since the end of the pilot programme in 2014, biodiversity offsetting does not seem to be high on the government's agenda and no particular information has been published on the potential continuation of the scheme.

The US experience and lessons to be learned for the EU

The principle of offsetting permitted impacts to a protected resource has been an active part of US environmental policy since 1958 but was rarely used until the passage of landmark air, water and species protection laws in the early 1970s. At that time, expensive and mandatory impact-reduction standards came to bear on industries and land-uses of all kinds and it soon became apparent that not all impacts could be eliminated – some would have to be permitted. Offsets were developed – informally, sporadically and regionally at first – as a mechanism to prevent net losses to the environment. Air quality regulators defined the first offsets for air pollution in 1974, which by 1978 were allowed to be banked for future use. Regional water resource regulators began to sporadically require wetland and stream offsets for large impacts by 1975, which enabled the development of third-party entrepreneurial “wetland banks” and “stream banks” selling offsets by the 1990s. Species habitat offsets, purchased for compliance with the US Endangered Species Act, were developed by the Clinton Administration in the early 1990s. These, too, are now privately-produced as “species banks”.

Wetland and stream mitigation banking in the US is the largest offset market in ecosystem-based credits in the world. A wetland or stream bank takes the form of large areas of restored resources developed in advance of the impacts requiring offsets. Banking now provides the majority of the water resource offsets required by the US Clean Water Act (Figure 3.2 and Figure 3.3) and can be delivered via four types of offsets (Box 3.4).

Box 3.4 : The four types of offsetting in the US under the Clean Water Act

Offsets to compensate for impacts regulated by the US Clean Water Act can be provided through one of four mechanisms. Since 2008, all mechanisms have been held to the same administrative performance criteria.

On-site Permittee-Responsible Compensation: the applicant who receives a permit with offsets required may choose to perform ecological restoration or enhancement work on the same property as the impact, as part of the same development project.

Off-site Permittee-Responsible Compensation: the applicant may choose to perform ecological restoration or enhancement work on a different property of which they have secured the use and provided for a fully-funded, long-term steward. The regulator must decide how far away from the impact site the offset may be. Under the Clean Water Act, this varies a great deal for off-site permittee-responsible compensation but is always within the same state or regulatory district.

In-Lieu Fee: the applicant may choose to contribute money to a state-managed or private fund that is used to engage in ecological restoration or enhancement that compensates for the impact. Historically in the US, In-Lieu Fees (ILFs) have been badly abused: insufficient money was contributed, the money was rarely spent and the fund was often used for non-environmental purposes. In the latter case, the projects funded were not clearly shown to be an appropriate location or type of offset for the earlier impacts. In many cases the availability of low-cost, low-quality ILF credits undermined the use of higher-quality alternatives and retarded the expansion of Wetland and Stream Banking. The 2008 regulation allowed ILFs to continue, but under very strict requirements and timelines.

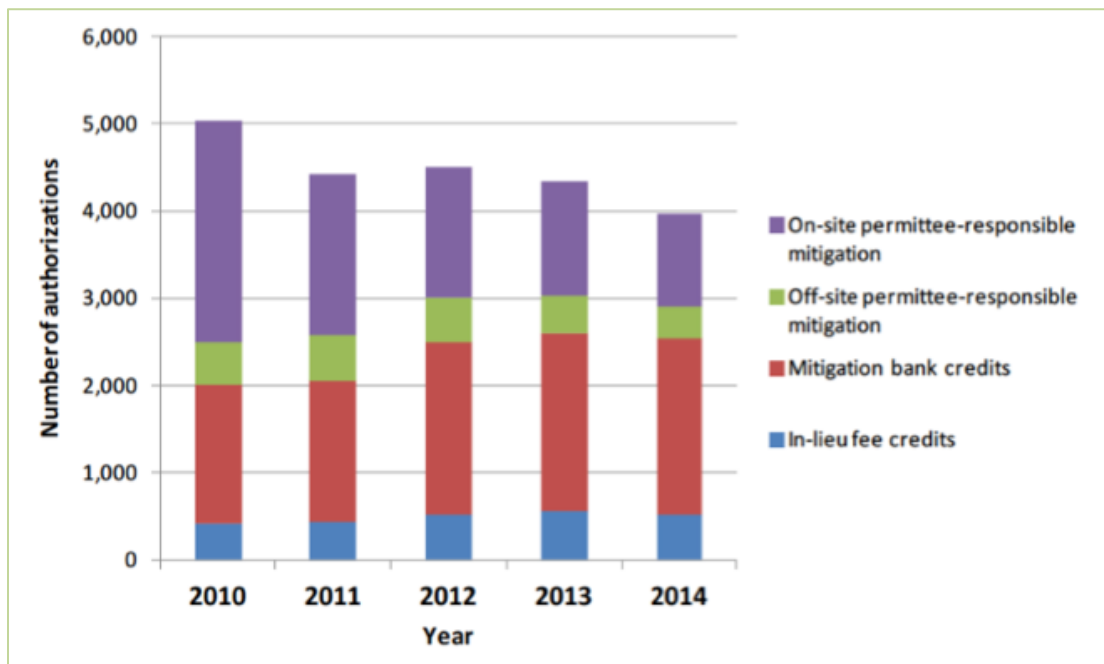
Wetland or Stream Banking: the applicant may choose to purchase a wetland or stream credit from a third-party supplier who has engaged in ecological restoration or enhancement at a property known as the “bank site”. Early banks, from 1984 to the mid-1990s, were mostly state-run but currently the vast

majority of bank credits are supplied entrepreneurially by private-sector firms. These credits must be approved by the regulatory agency prior to sale, but the regulators do not specify the price at which they must be sold. Banks each have a geographic “service area” within which impacts may be compensated for at the bank – typically these are defined at about the size of a minor river catchment. The “bank instrument” is a legal document that defines the liability of the bank owner, the administrative and ecological criteria to which the bank will be held, and a “credit release” schedule. Because wetland and stream banks can be very expensive to develop, and their completion may take years, bankers are typically allowed to sell some credits (say 20-30% of the expected total) at the time they secure and protect the site and sign the bank instrument. Further tranches of credits are released for sale as the bank meets performance benchmarks.

The regulatory agencies in 2008 established what is referred to in the US as “the mitigation hierarchy”²², which states that regulators should consider compensation/offset options in the following order:

1. Wetland mitigation bank credits
2. In-lieu fee credits
3. Any permittee-responsible compensation (on-site or off-site) that is selected through a framework of watershed planning
4. On-site permittee-responsible compensation
5. Off-site permittee-responsible compensation

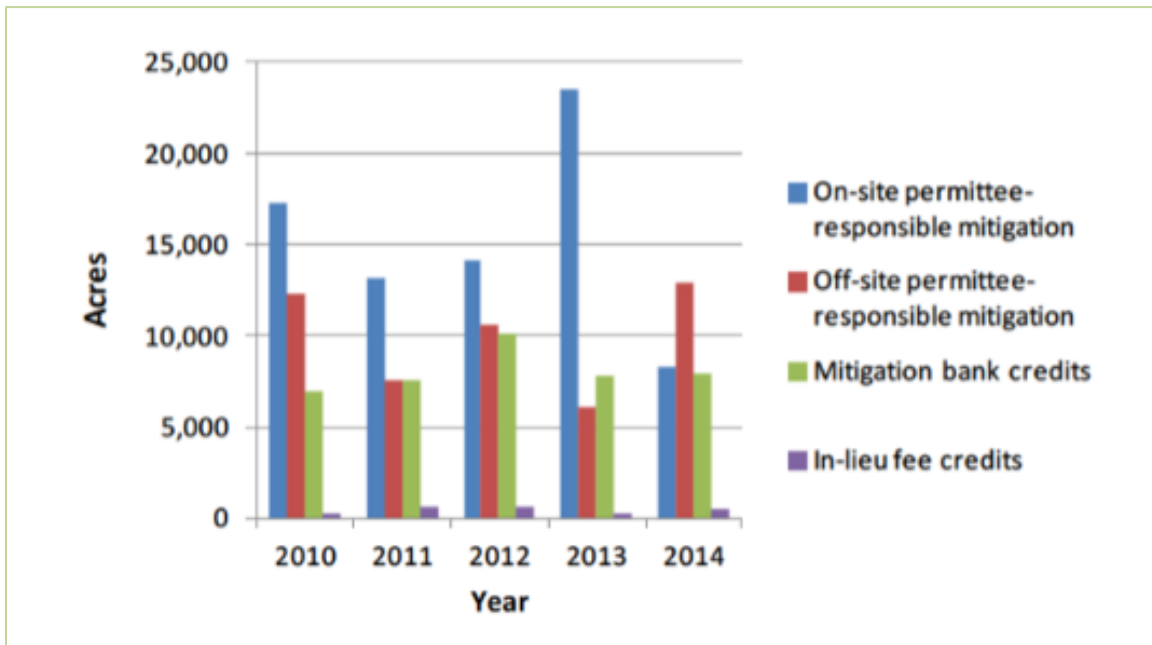
It is the order in which regulators must consider compensation options, but it does not require that wetland bank credits must be purchased if they are available. The selection of the most appropriate compensation mechanism for the circumstance still rests with the regulator.



Source: IWR (2015, p52.)

Figure 3.2 : Number of authorizations per offset type, 2010-2014

²² This differs from the broader mitigation hierarchy principle that is more generally known internationally, as discussed above.



Source: IWR (2015, p53.)

Figure 3.3 : Acres per offset type, 2010-2014

The overall area of wetland offsets required annually is usually between 12,000 and 16,000 hectares. As the achieved compensation ratio is about 2:1 these offsets are acquired to compensate for roughly 6,000 to 8,000 hectares of impact. While there are other mechanisms for offsetting, mitigation banking accounts for between 3,000 and 4,000 hectares of offsets annually. Much of that (perhaps as much as 75%) is provided by entrepreneurial banks, businesses established for the purpose of providing offset credits; the remainder is provided by state-owned projects. Very few offsets come from individual third-party providers (see ELI, 2006; IWR, 2015).

While the US Clean Water Act offset policy has had many successes and there is general consensus in the US about the usefulness of offsets, it is unlikely that the success of wetland banking can be duplicated by assembling its constituent parts in other locales. Wetland banking arose as a response to regulatory problems that were specific to the US social and policy context:

- **Small sites of impact:** Very early in the development of US Clean Water Act offset policy it was found that it was not practicable to acquire or create very small compensatory offsets, and that even if they did so the resulting wetland site would not be of high ecological value. Such sites were often referred to as “postage-stamp mitigations”. Banks provided larger and consolidated sites.
- **Large sites of opportunity:** Agencies found that they could acquire land for offsetting only in relatively large parcel sizes. In the settings where wetland banking arose, wetland restoration usually involved breaking coastal berms or disabling agricultural drainage systems. These techniques tended to restore large areas of wetland – far more than was required for any single project offset. Banking the remainder for future use was a logical response.
- **Monitoring offsets:** A large number of reports on wetland offsetting were issued between 1991 and 2001, all finding conclusively that the government was not ensuring that offsets were high-quality or even being constructed at all (see Erwin, 1991; NRC, 2001). The US Congress found that the agency responsible lacked the staff and resources to ensure that offsetting was happening (GAO, 2005). Wetland banking promised, by consolidating tens or hundreds of small offsets into a single site, to solve the problem of monitoring and staff time.

- **Project planning:** Private developers and public agencies impacting water resources found it difficult to provide offsets in a way that did not interfere with project cost estimates and timelines. Offset provision also burdened them with risk and liability for offset failure that they were eager to avoid. These issues of project planning are solved by the purchase of offsets from a third-party provider.

These were the pre-existing problems, posed by a maturing regulatory environment in which offset requirements were becoming normal, for which banking provided solutions. These problems, not the development of markets or providing income to offset providers, were the impetus for wetland banking in the US.

Banking's relative success at solving these problems, and its general acceptance of offsets in the US, depend on three features of the US policy context:

Mitigation sequence (Box 3.5). Under the US Clean Water Act, offsetting is used only after impacts on biodiversity have been avoided and then minimised as much as possible. The decision to issue the permit must be made before the issue of offsetting is considered²³. This insulates offsets policy from accusations, common elsewhere, that it provides a "license to trash". As a result of this decision, offsets are politically a rather neutral and even boring issue that excites no particular public opinion or passionate debate – instead the energies of environmental advocates tend to be focused on the issuance or denial of environmental impact permits. Since offsetting must not influence that decision, it is seen as a secondary issue. While it is true that the principle of "the sequence" (often called "the hierarchy" outside the US) is articulated in many offset policies worldwide, outside of US Clean Water Act contexts it is often not well-grounded in regulation, not clearly mandatory, and is thought to be frequently disregarded in practice (see Baker et al, 2014).

Regulatory power and regional federalism: The requirement to offset impacts to water resources is national and applies to any project for which a federal permit is required. In practical terms, this means that it applies to all projects impacting water resources. The same is true for endangered species. Since everyone is regulated, there is no risk of economic "flight" from areas with more strict environmental requirements. The expense of acquiring offsets is now considered a normal cost of doing business everywhere in the United States - it may vary with real estate prices and other factors, but the legitimacy of the requirement itself, applying to everyone, is not questioned. Nonetheless, there is substantial regional variation in the implementation of offsets policy by regional offices of the major Federal agencies. The finer points of implementation have been devolved to these offices and it is common to see regionally-specific procedures for requiring, measuring and certifying offsets. The ecological criteria for a successful offset site, for example, are set by each of the 38 different Districts of the US Army Corps of Engineers, providing a level of flexibility and responsiveness to regional stakeholders and ecology that would be impossible in a more centralised system.

Longevity and learning: The pattern of publicly-owned banks providing credits for public-works projects dominated the practice of US wetland banking for its first 10 years, roughly from 1984-1995 (see Short 1988). This allowed a generation of developers and regulators to observe how wetland banking worked, what offsets cost to create in different regions, and how long they took to deliver and approve – all at public expense. It allowed the kind of learning necessary for a set of private offset providers, eventually, to invest

²³ In the 1980s the two agencies charged with administering the Clean Water Act disagreed over the sequential character of the avoidance/minimisation and the offsetting steps. The agency issuing permits (the US Army Corps of Engineers) routinely allowed promises of extravagant and high-quality offsets to influence their decision about the preferred project alternative. The Environmental Protection Agency (EPA) viewed Avoidance and Minimization as steps that had to occur without any consideration of promised compensation. The issue ended up before the US Supreme Court in 1988, and was decided in EPA's favour.

in offset creation as a business venture. The lack of this kind of prior learning is seen to be one of the main causes of failure behind the United Kingdom's recent Biodiversity Offsets Pilot (Baker et al, 2014).

Box 3.5 : The US mitigation sequence

In the US, “mitigation” refers to all efforts to reduce and offset permitted impacts. First defined in 1978, the mitigation requirement applies to all governmental agencies and actions, large or small that had any impact on the environment (including the issuing of government permits for private-sector development). In the 1980s, the agencies administering environmental permits defined “mitigation” as something that occurs in a sequence of three steps. Thus, in the US policy refers to “the mitigation sequence”, whereas in most of the rest of the world this concept is expressed as “the mitigation hierarchy”.

Under the US Clean Water Act, for example, “mitigation” consists of the following three steps, which must be performed in order:

1. **Avoidance:** an analysis of different project alternatives must be performed, and the least environmentally-damaging alternative (that still fulfils the project purpose) must be selected.
2. **Minimization:** an attempt must be made to reduce the severity of unavoidable impacts through measures such as green and low-impact design.
3. **Compensation (or offsetting):** remaining unavoidable impacts can be offset through compensation activities that restore an amount of the resource equal to or greater than the impact.

Furthermore, the third step – compensation or offsetting – may not be considered by regulators when the decision whether to issue the permit is made. The first step is intended to identify the least environmentally damaging alternative that will meet the project's purpose. The impacts associated with that alternative must be judged independent of any promised compensation/offsets. This prevents the possibility that applicants will promise extravagant compensation offsets in order to get approval for more environmentally destructive projects – offsets which may never materialise. The “license to trash” issue has rarely if ever arisen in the US because the decision about issuing a permit must be based solely on avoiding impact, and not consider the issue of offsetting. Any damage associated with the least-damaging alternative may be so great that the permit must be denied; often, however, it is small enough to be offset with compensation. The compensation requirement is then stipulated in the permit as a “permit condition”, a violation of which may be met with enforcement.

This gradual development allowed the eventual professionalization of offsetting to the point where, by 2002 (ELI, 2006), most offset providers were private businesses established for that purpose rather than individual third-party providers (which is now very rare to see) or the state²⁴.

In the US there is a strict separation between the practice of requiring offsets for regulated impacts and the practice of providing agri-environmental payments to meet environmental policy goals. The agencies in charge of the regulatory programs prefer high standards that disqualify many potential offset projects; the

²⁴ A coalition of offset providers formed in 1995, the National Mitigation Banking Association (www.mitigationbanking.org), that lobbies the government on behalf of the industry. They argue for higher ecological standards, in order to keep low-quality providers from undercutting their profits and threatening public and regulatory faith in their industry. They also argue for more lenient permitting and the expanded use of offsetting.

welfare of offset providers is simply not an issue in achieving the regulatory goal. The agricultural agency, on the other hand, views the support of farmers as their primary mission and so resists the stringent monitoring and verification of agri-environmental projects. The 2008 US Farm Bill included nearly US\$ 6 billion in agri-environmental payments, but projects created with that money are not allowed to provide offsets for regulated impacts. To do so would result in the government subsidising the environmental costs associated with economic development.

As a result of the money devoted to agri-environmental programs, there is quite a bit of competition on the ground between PES and offsetting programs. In some US landscapes where agri-environmental programs are very active, such as the Chesapeake Bay watershed and the Tar-Pamlico watershed, PES providers and wetland or stream bankers vigorously compete for farmers and other land-holders to provide land for offsets. PES is generally preferred by farmers because there is more certainty that payment will be received, and farmers tend to dislike being involved in regulatory (as opposed to voluntary) arrangements. The same kind of competition may possibly develop in the EU if offsetting becomes a more widely-used policy instrument. In order to avoid this, the policy mix should be carefully designed and tailored to the specific needs and characteristics of each place.

The US experience can provide important lessons for Europe (and also for Mexico, should offsetting be adopted there in the future), due to its longevity and extended usage. Box 3.6 summarizes the main characteristics of offsetting under the Clean Water Act in the US.

Box 3.6 : Main characteristics of the US offsetting experience under the US Clean Water Act

US water resource offset markets developed in the context of strong regulatory requirements applying nationwide to all private and publicly-generated impacts. These national requirements are nonetheless subject to regionally-variable interpretation, allowing both constancy and flexibility.

Wetland banking in the US was developed to solve problems concerning the mismatch in size between small impacts and large offset opportunity sites, as well as the administrative problems regulators and developers were experiencing with conventional do-it-yourself offsetting. Wetland banking in the US was not developed in order to create markets or provide income to offset providers.

The high ecological standards applied to offsets discourage low-quality providers and have worked to professionalise the business of providing offsets. Entrepreneurial providers lobby for higher standards but also for more lenient impact permitting.

The strength of the “mitigation sequence,” or “hierarchy” as it is called elsewhere, has resulted in robust public trust that compensation is not a “license to trash”. Offsetting is not controversial in the US because environmentalists are generally confident that the decision to allow the impact has been made independent of the consideration of possible offsets.

The longevity of the US experience, and the lack of public controversy over offsetting, has allowed learning to occur and policy to develop over decades largely out of the light of intense public scrutiny.

Regulatory offsets are considered to be different from agri-environmental projects created through PES-like payments to farmers, and held to very different standards. The two programs can find themselves in competition for project sites in targeted landscapes.

US and EU experiences – differences and lessons learnt

This summary of US offsetting under the US Clean Water Act points to several major differences with EU policy. First of all, there is no comprehensive regulatory requirement for offsets in the EU (beyond the requirements relating to the EU Natura 2000 network of protected areas), and any new such requirement would need time and learning to achieve the level of acceptance offsetting enjoys in the US. Seventeen years elapsed between the passage of the US Clean Water Act and the full articulation and enforcement of the “mitigation sequence” and 36 years elapsed before there were federal regulations governing offsets under the Act.

Secondly, in EU Member States (for instance in the UK) offsets policy promotes voluntary offsetting, and is mainly delivered as small-scale offsets by the project proponent or individual third-party providers (e.g. nature conservation bodies). In the US, there is almost no voluntary market for offsets and offset providers tend to be businesses established for that purpose. There exists a range of PES-like payments to individuals, similar to what is provided through CAP measures in Europe, which are often seen to compete with market-based offsetting rather than to complement it in a policy mix. In addition, an argument that has been put forward by some outside the US for developing offsets policy is to develop new sources of funding for conservation. This has never been a factor in US offsetting, and in fact it would be perceived as an illegitimate way to achieve environmental policy goals. US regulatory agencies explicitly caution that they cannot achieve larger policy goals “on the backs of the regulated community”(US CEQ, 2005). Developers engaged in environmental impacts now generally accept the legitimacy of being required to offset their impacts, but strongly resist the idea that they must help solve environmental problems unrelated specifically to their impact.

4 Other financing mechanisms

Introduction and definitions

In addition to PES and offsetting schemes other innovative financing mechanisms for biodiversity conservation can be found in the EU. This chapter provides an overview of these mechanisms and in doing so it presents some key examples within the EU. Building on the categories of innovative financial mechanisms as classified under the Convention on Biological Diversity (CBD)²⁵ these additional mechanisms are divided into two main groups: innovative public sector actions and leveraging funding from the private sector.

Public sector actions on environmental fiscal reform: Environmental fiscal reform (EFR) refers to the action of shifting the tax burden from economic functions to activities that lead to environmental pressure and entail negative externalities (OECD, 2013). Tax shifting as such is rarely used within the context of biodiversity conservation and therefore EFR within this chapter is defined more broadly to include a range of taxation and pricing measures contributing to biodiversity conservation. These include environmental taxes, environmental fees and charges, environmental tax incentives and ecological fiscal transfers (see definitions in Box 4.1).

Fiscal measures can address a broad range of environmental impacts and do not always have direct implications on biodiversity protection. This chapter provides an overview of those measures which have the most direct impacts on biodiversity and which can therefore be considered as options to mobilise more funding for biodiversity. The governments have multiple options to redistribute the funds generated by different fiscal measures, each of which has different implications on biodiversity conservation. Collected revenues can be either 'earmarked', i.e. directly channelled to support biodiversity conservation, or retained and added to the general state budget. The former seem to be the most effective way to ensure the delivery of biodiversity objectives. Nevertheless in many cases such earmarking is not ensured (Illes et al. 2017). However, even non-earmarked measures such as ecological fiscal transfers (EFT) have the potential to be further scaled up and to contribute to biodiversity conservation on a larger scale (see section 4.2.3).

Box 4.1 : Definitions used in this chapter

An environmental tax is “a tax whose tax base is a physical unit (or a proxy of it) of something that has proven negative impact on the environment” (Eurostat, 2016).

Environmental tax reform refers to “changes in the national tax system where the burden of taxes shifts from economic functions, sometimes called 'goods', such as labour (personal income tax), capital (corporate income tax) and consumption (VAT and other indirect taxes), to activities that lead to environmental pressures and natural resource use, sometimes called 'bads'” (EEA, 2005).

Environmental user fees and charges are “compulsory and required payments to general government or to bodies outside general government, such as environmental funds or water management boards” (EEA, 2005).

²⁵ These categories are the following: environmental fiscal reform, payment for ecosystem services, biodiversity offsets, markets for green products, biodiversity in climate change funding, and biodiversity in international development finance (OECD, 2013). The last two are not in the scope of this report and therefore are not studied in details.

Tax relief supporting biodiversity protection are “arrangements and provisions in general tax schemes, with the explicit aim of providing positive financial incentives steering the taxpayers’ behaviour in a more biodiversity-friendly direction” (Oosterhuis, 2011).

Ecological fiscal transfers are mechanisms aiming to redistribute general tax revenues between government levels and are “allocated on the basis of ecological or conservation-based indicators, such as protected areas” (Ring et. al, 2011).

Environmentally harmful subsidies are a result of governmental action, or non-action, “that confers an advantage on consumer or producers, in order to supplement their income or lower their costs, but in doing so, discriminates against sound environmental practices” (Withana et al, 2012).

Potential to leverage private funding via impact investment: Diminishing public funds and the increasing gap in financing needs to deliver biodiversity objectives has increased the need to increase the contribution of the private sector, which controls vast amounts of financial resources, to biodiversity conservation (Bishop et al, 2008; Dickie et al, 2012). The types of instruments that can support the involvement of the private sector, as well as options for blending public and private resources, is presented in Figure 4.1.

Private funding can be leveraged from investors and/or businesses. Involving the private sector commonly hinges on making a business case for biodiversity and establishing projects that not only have a positive impact on biodiversity but also create a financial return. These investments can be also called impact investments, which according to the Global Impact Investing Network (GIIN, 2016) “*are investments made into companies, organizations, and funds with the intention to generate social and environmental impact alongside a financial return*” and have three key characteristics:

- **Intentionality**, which refers to the investors’ intention to create a positive environmental and social impact;
- **Investment with return expectations**, which refers to the core nature of impact investments, i.e. they are expected to generate a financial return on capital, or at least a return of capital; and
- **Range of return expectations and asset classes**, which refers to the fact that impact investments can cover a wide range of asset classes with varying return expectations, such as cash equivalents, fixed income, venture capital, and private equity.

The private sector’s involvement in biodiversity conservation can also be examined from the businesses’ perspective, in particular in view of their involvement in green markets. Such businesses are often referred to as pro-biodiversity businesses, which – building on the UN Convention on Biological Diversity (CBD) objectives - can be defined as “*a commercial enterprise that generates profits via activities which conserve biodiversity, use biological resources sustainably, and share the benefits arising from this use equitably*” (Bishop et al, 2008). From a business perspective there are multiple justifications to invest in biodiversity conservation, which include for instance the business’ dependence on the health of the related biodiversity and ecosystem services or changing consumer preferences.

Bishop et al. 2008) list a wide range of sectors in which pro-biodiversity businesses can take place – within which the agriculture sector seem to have a prominent role. Sustainable agriculture is increasingly considered as a key tool for biodiversity conservation and an important contributor in impact investing.

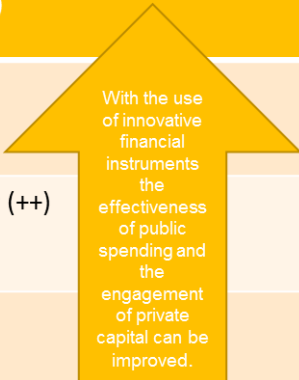
In the context of pro-biodiversity business, marketed products for biodiversity conservation (MPBC) are those products which explicitly “*seek to revenue streams from their sale to biodiversity conservation*” (Verstraeten & Rayment 2017). In general, they can be grouped into three main categories (Treves & Jones 2009):

- **Supportive MPBC:** are those which provide financing to conservation organisations and thus indirectly support biodiversity;
- **Protective MPBC:** where biodiversity is directly targeted by supporting the protection of specific species or habitats which are affected by the production process in question; and
- **Persuasive MPBC:** refer to those products whose producers are being persuaded to adopt more biodiversity-friendly production and/or collection practices.

A key element of the effectiveness of marketed products is whether they are linked to a strong and credible certification process. In that sense, MPBC can be regarded as a form of ecolabels which have a specific focus on biodiversity conservation and can play a key role in expanding green markets, in particular enabling consumers to make better information-based choices. According to the Global Ecolabelling Network (Global Ecolabelling Network 2004) eco-labels are labels which “*identify overall environmental preference of a product (i.e. good or service) within a product category based on a life cycle consideration*” and is “*awarded by an impartial third party to products that meet established environmental leadership criteria*”. In Europe, only a limited number of MPBC exist, some of which are aiming to link products to protected landscapes – see two examples in Box 4.6.

This chapter draws a particular attention to two European example of private financing. From the perspective of investor involvement, the European Investment Bank’s (EIB) Natural Capital Financing Facility (NCF) pilots a blended financial instrument supporting biodiversity conservation with the aim to create a track record of financially viable projects in the EU. The NCF reveals some key lessons on how financial instruments can be used to support biodiversity conservation. From the business perspective, the example of the food and beverages company Mondelez International and its Harmony ecolabel initiative targets the company’s wheat supply chain and aims to deliver biodiversity benefits alongside financial returns.

	Type of capital (amount available)	Financial/Market/Support instruments
Funding source	Private funding (+++)	Business opportunities, voluntary markets and compliance markets
	Blended private and public funding (++)	Risk-sharing tools, leveraging private capital, technical assistance
	Public funding (+)	Project finance – grant funding, technical assistance



With the use of innovative financial instruments the effectiveness of public spending and the engagement of private capital can be improved.

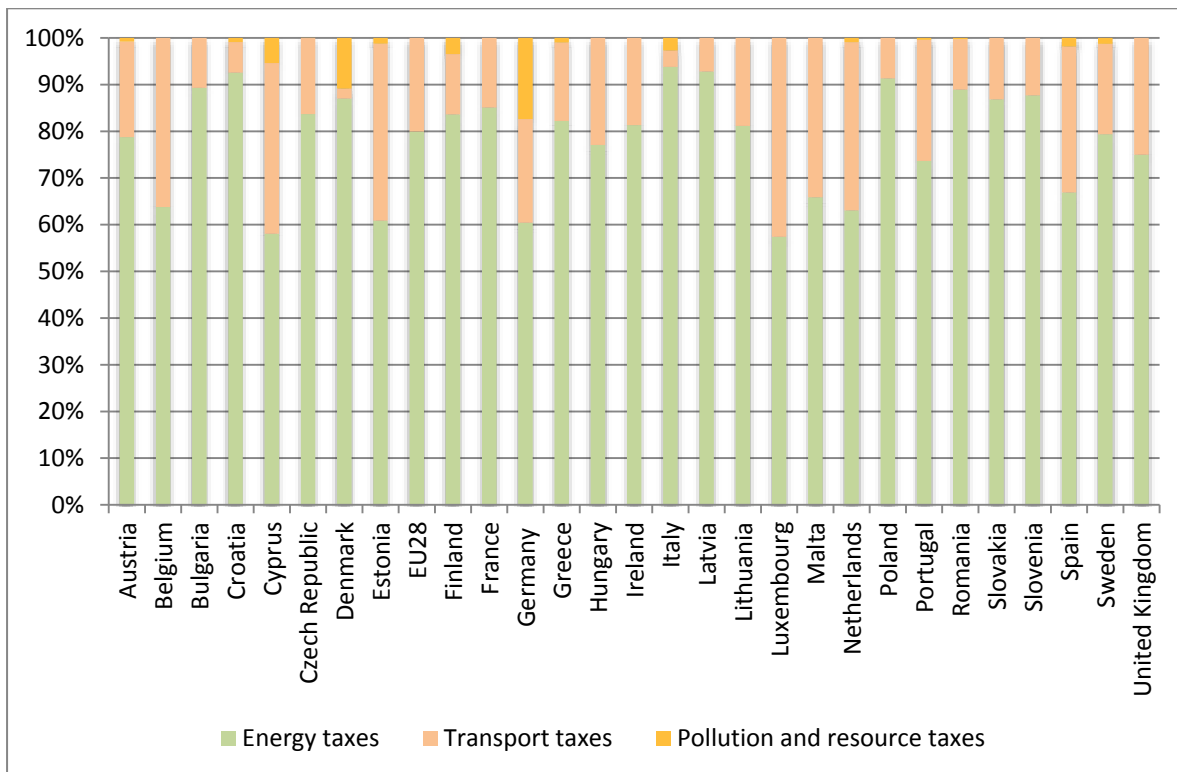
Sources: based on Dickie et al. (2012)

Figure 4.1 : Overview of the role of public and private sectors in biodiversity financing

Public sector actions on environmental fiscal reform

Environmental taxes, user fees and charges

While environmental taxes, user fees and charges have been increasingly used in the last decade in the EU and are successfully supporting the implementation of various environmental policy objectives, there is still scope to widen the scale of their application (Withana et al, 2014). The need to scale up their application is particularly prominent for taxes targeting the use of natural resources, including biodiversity, as the vast majority of environmental taxes target the energy and transport sector, while the share of pollution and resource taxes is still very minor (Figure 4.2).



Source: own compilation based on Eurostat (2016)²⁶

Figure 4.2 : Share of environmental taxes by type of taxes in the 28 EU Member States in 2014

While many environmental taxes, user fees and charges - including for instance water-related taxes, waste-related taxes or product-related taxes - can have an indirect impact on biodiversity by reducing the pressure on natural resources, there is only a limited number of instruments which has the potential to deliver direct benefits for biodiversity conservation. The main types of the latter include the following:

²⁶ Information on the amount of revenues arising from pollution and resource taxes in 2014 was not available for Belgium, Bulgaria, France, Latvia, Luxembourg, Hungary, Malta, Netherlands, Poland, Slovenia, Slovakia and the United Kingdom.

- **Pesticide taxes:** pesticides, if they are overused in the agriculture sector can pose significant risks to biodiversity as they can be toxic and can lead to changes in food chains and habitats. With such fees users, primarily farmers, are incentivised to reduce the use of pesticides.
- **Fertiliser taxes:** fertilisers, similarly to pesticides, if overused in agricultural practices can have negative impacts on biodiversity, as the excessive nutrients can run off into rivers and lakes and pollute groundwater sources. Excessive nutrients in surface water resources can cause algae blooms and can lead to the reduction of biodiversity. With such fees users, primarily farmers, are incentivised to reduce the use of fertilisers.
- **Stumpage / timber fees:** such fees can include for instance tree cutting charges and forest management fees. The aim of these fees is to address the negative impacts on biodiversity caused by unsustainable forestry practices.
- **Hunting and fishing fees:** hunting and fishing activities if unsustainably practiced can have detrimental impacts on fish stock and game populations. Hunting and fishing fees are applied to request hunters and fishers to pay as result of their consumptive use of natural resources. Fishing fees can target both commercial and recreational fishing.
- **Natural park entrance fees:** tourism in natural parks can cause disturbance for species living in the area, as well as negatively impact the habitats. In contrast to fishing and hunting fees, natural park entrance fees are applied on a non-consumptive basis and have the potential to mitigate the negative impacts on biodiversity caused by visitors.

Many of these taxes and fees are commonly used in Europe (Figure 4.3) and while they do have the potential to deliver funding for biodiversity conservation their impact greatly depend on whether revenues are directly used to fund conservation activities (i.e. ear-marked for biodiversity conservation) or are channelled to the general state budget. While some examples exist where earmarking is applied (e.g. Estonian hunting and fishing fees, Box 4.3) this is not often the case and therefore the benefits for biodiversity being delivered by the instruments is limited. While earmarking has important implications on the conservation- and cost-effectiveness of taxes and fees, further aspect also need to be considered when the success of the instruments are assessed, including their social acceptance and how they fit into the institutional context and legal requirements of other policies (Kettunen et al 2017).

	AT	BE	BG	HR	CY	CZ	DK	EE	FI	FR	DE	EL	HU	IE	IT	LV	LT	LU	MT	NL	PL	PT	RO	SK	SI	ES	SE	UK
Pesticides tax									*																			
Fertiliser tax	*	*							*											*							*	
Stumpage / timber fee																												
Hunting / fishing fee																												
Nature park entrance fee																												

Note: * Taxes being abolished and not in place any more.

Source: (Withana et al, 2014)

Figure 4.3 : Member States having introduced environmental taxes and user fees and charges most directly relevant for biodiversity conservation

Pesticide taxes are currently in place in Belgium, Denmark, France, Italy and Sweden, while they have been abolished in Finland (Withana et al, 2014). One of the most successful examples in the EU is the Danish pesticide tax, as pesticides are being taxed on the basis of the environmental and human health impact of the ingredients of the pesticide (Box 4.2). A similar system has been in place in Norway since 1999 and proved to be effective in reducing the environmental impact of pesticides.

Although fertiliser taxes used to be in place in various Member States (including Austria, Belgium, Finland, the Netherlands and Sweden) they have been abolished and currently they are only applied in Denmark (Withana et al, 2014). The reason for the termination of these taxes is linked to the introduction of the EU legislation on nitrate emission (Nitrates Directive (91/676/EEC)), which introduced requirements for farmers

on the use of fertilisers and in some cases made the application of separate fertiliser taxes in the agriculture sector redundant.

Stumpage and timber-related fees are also in place in multiple countries (Austria, Bulgaria, Croatia, Estonia, Hungary, Lithuania and Poland). An interesting example is, for example, the Croatian fee for the use of public benefit functions of forests, which has to be paid by all companies who undertake any economic activities within Croatia's forests. Economic actors who undertake activities in the forests have to pay a minor share of their income. The revenues collected are earmarked and used to fund sustainable forest management practices (Pesut 2011), and therefore have a greater potential to lead to direct conservation benefits.

Hunting and fishing fees have a long standing tradition in the EU - they are in place in at least two-thirds of EU Member States - but in most cases have a very limited scope to deliver fiscal revenues for biodiversity conservation, as they are only rarely earmarked to fund conservation actions. Two of the few existing examples of the use of funds directly earmarked for biodiversity conservation in Europe are in Ireland and Estonia. In Ireland, since 2007 a licensing scheme for commercial and recreational salmon fishing scheme exists, which is also complemented by annual quotas. Half of the revenues collected by the fee are earmarked and contribute to the Salmon Conservation Fund, which is specifically used to fund conservation activities, such as the restoration of habitats, fish passage improvements or the protection of river banks (Kettunen 2017). Another successful example is Estonia's hunting and fishing fees which are, similarly to the Irish salmon fee, earmarked: the revenues are directly used for conservation purposes (Box 4.3).

Box 4.2 : Pesticide tax in Denmark

The Danish pesticide tax has been in place since the early 1980s. Nevertheless it underwent a significant reform in 2013 and since then an innovative approach is applied to calculate the tax rates on pesticides. Before the reform, the tax was calculated first as a share of the wholesale prices of pesticides in the country and later as a share of retail prices. This system was not considered to be effective in reducing the sales of pesticides, which was one of the reasons why a reform took place in 2013.

In 2013, a new approach was introduced, which considered the environmental and human health risks of the individual pesticide products with the aim to incentivise farmers to use the less pollutant and less risky products. The tax rate is now calculated for each individual pesticide product based on human health risks, environmental load (building on the products toxicity to non-target individuals) and the environmental fate of the product (covering bioaccumulation, degradation and leaching to groundwater). While it is still early to comment on the effectiveness of the new system, it is expected that the pesticide load will be reduced by 50% by the end of 2016 – an evaluation is currently being undertaken and results are expected to be published later in 2017.

When the reform was undertaken, it was calculated that the new system would raise DKK 650 million (around EUR 87 million) annually. Nevertheless as a result of a hoarding effect of pesticide products prior to the introduction of the new system, the revenues are only expected to stabilise in 2017. While the funds raised are not earmarked per se, a significant share is reused in the agriculture sector, primarily to mitigate the opposition of farmers. In order to increase the social acceptance of the tax a reduction of land value taxes is applied, which has proved to support the social acceptance of the reformed pesticide tax.

Source: Pedersen, 2017

Box 4.3 : The Estonian hunting and fishing fees

Hunting and fishing fees have been in place in Estonia since the 1990s. While the specific rules of fishing and hunting are laid down in the Estonian Fishing Act and the Hunting Act, respectively, in 2005 an overarching Environmental Charges Act was also created, which provides general rules of all environmental fees in Estonia. This act provides a robust legal framework for environmental fees and ensures that hunting and fishing fees are well-embedded in current policies.

Fishing fees are differentiated based on the purpose of fishing and cover commercial, recreational and special purpose fishing. Commercial fishing fees consider the market price of the fish while recreational fees are based on the period of fishing (there are daily, weekly, monthly and yearly fees). Recreational fishers are also allowed to fish in nature protection areas, but for those areas they need to purchase a special fishing card, which is more expensive and is available only in limited numbers.

One of the uniqueness of the Estonian hunting and fishing fees lies in its revenue collection approach, as funds are earmarked and used for conservation purposes. The fees are earmarked at the proportion of the 2009 tax year-base, which in practice means that above 70% of the collected funds are directly used for conservation. The collected fees are transferred and managed by a special state agency, the Environmental Investment Centre, which collects all environmental fees and distributes them in the form of grants. The agency's website also serves as an important platform to communicate the use of the funds in a transparent way, which is considered to be an important factor in the social acceptance of the fees. The collected revenues arising from the fishing and hunting fees are used for research, conservation actions and awareness raising, including for instance building up an inventory of fish stocks and game populations and habitat restorations. In 2015, the total revenues from the fishing fees were EUR 1.57 million, while hunting fees only raised EUR 130,000.

While no specific evaluations have been undertaken on the conservation effectiveness of the fees, the earmarked funds are a crucial source for conservation activities and are expected to deliver benefits for biodiversity. Given that the collection of funds is done primarily online, the administrative burden for the agency is very low. Furthermore, the user-friendliness of the system has also led to the reduction of illegal fishing and hunting.

Source: Illes, 2017

Tax incentives supporting biodiversity conservation

Within the EU only a limited number of countries apply tax incentives supporting biodiversity conservation at a significant level, and therefore empirical evidence on their effectiveness is very limited. Examples of their use exist in France, the UK, the Netherlands and Finland, with the most developed and best studied system is in France.

The French tax incentive system is applied to the EU protected area network, the Natura 2000 network, and tax exemptions are available from (i) property taxes for un-developed properties on Natura 2000 sites, (ii) inheritance taxes when unbuilt property on a Natura 2000 site is gifted or inherited, and (iii) income taxes for Natura 2000 management costs (Illes and Ratliff, 2017). An overview of the main incentives in the EU is presented in Table 4.1, while the French example is further detailed in Box 4.1. All tax incentives summarised in this section are applied at the national level.

Table 4.1 : Overview of key examples of tax incentives supporting biodiversity conservation in Europe

Name of tax incentive	Country	Key characteristics
Multiple tax incentives and reductions supporting nature conservation in Natura 2000 sites	France	The French system targets Natura 2000 sites and grants tax exemptions from property tax, inheritance tax and income tax when tax payers comply with a set of conservational requirements. This system is the most used currently in the EU and has the potential to support biodiversity conservation. <i>See more details in Box 4.4.</i>
Conditional exemption tax incentive	The United Kingdom	Certain assets, including land of outstanding beauty and of outstanding scientific interest, are exempted from inheritance and capital gains tax when gifted or inherited, in case the new owners enter into an agreement on adequately managing the land and granting public access to it.
Gift Aid Scheme	The United Kingdom and the Netherlands	Donations to charities, including environmental organisations, are exempt from income taxes in the UK and the Netherlands. While these donations can support conservation activities undertaken by charities they do not necessarily fund conservation actions.
Differentiated real estate tax rates	Finland	In Finland, the real estate tax has differentiated rates for unbuilt land in highly populated areas in order to incentivise the re-use of built land and to reduce the pressure on unbuilt areas.
Green Fund Scheme	The Netherlands	The Netherlands' Green Fund Scheme provide a financial incentive for investors to fund green projects, including for instance nature and forestry related projects, which are exempt from income tax. The investments are only exempt from income taxes in case a certificate is granted for the project.

Source: Illes and Ratliff, 2017

Box 4.4 : Tax incentives supporting biodiversity conservation in France

In the mid-2000s, a tax relief system supporting biodiversity conservation in Natura 2000 sites was introduced in France. Currently exemptions are available from (i) property taxes for un-developed property on Natura 2000 sites, (ii) inheritance taxes when unbuilt property on a Natura 2000 site is gifted or inherited, and (iii) income taxes for Natura 2000 management costs. All exemptions are conditional. Land owners are required to enter a contract, either a Natura 2000 Charter or a stricter Natura 2000 Contract, which is agreed between the land owner and local authorities and sets out specific site management requirements. While signatories of the Natura 2000 Contracts are eligible for all three exemptions, those who enter the Natura 2000 Charters cannot be exempted from income taxes for their site management costs. Commitments are for long time periods in order to ensure the ongoing management of the land. In case of the property, tax exemption is for 5 years, while those who receive the inheritance exemption need to enter an 18-year-long contract to sustain the conservation objectives of the land.

While the tax incentives are considered an important tool in overcoming the opposition of land owners, primarily farmers, towards Natura 2000 sites, empirical evidence shows that the system is far from perfect. In general, biodiversity-related indicators are not in place to adequately monitor the conservational effectiveness of the system. While administrative costs seem to be low, there is a concern that the uptake of the incentives is still relatively low. The property tax exemption has also created tension at the local level as local authorities are losing their earnings from property taxes and while financial compensation from the national government is being delivered to them the compensation rates have been increasingly reduced in recent years, creating further problems at the local level.

While the system could provide an interesting example of a tool that has the potential to complement biodiversity financing, it needs to be further studied and in particular better assessed in terms of its role in the broader policy mix for biodiversity conservation.

Source: Illes & Ratliff, 2017

Ecological Fiscal Transfers

Ecological fiscal transfers (EFT) aim to redistribute non-earmarked tax revenue between different government levels (in most cases from national to local level) according to an ecological criterion, most commonly the coverage of protected areas (Santos et al. 2012, Ring et al. 2017). The justification for such intergovernmental fiscal transfers is that while decisions about protected areas are being made at the higher governmental levels, the costs are in many cases born by regional and local authorities. EFT aims to compensate them for the opportunity costs arising from conservation activities, as well as for spill-over benefits arising from these areas. While EFT is not a direct financial incentive for conservation it is likely to increase the acceptance of conservation policies and thus can act as an indirect incentive and deliver benefits for biodiversity.

The instrument originates from Brazil, where a scheme to compensate local authorities (municipalities) for their opportunity costs linked to protected areas for watershed protection and biodiversity conservation was created during the 1990s. The compensation was provided in order to make up the municipalities' foregone revenues from agricultural production due to restrictions for land-use (Ring 2008, Ring et al. 2017). The Brazil EFT scheme is known as the ICMS Ecologico and is currently implemented in 17 out of the 26 states in the country. The ecological criterion that is used for the Brazil EFT is the share of protected areas in the municipal territory in question, the so-called municipal conservation factor. The sum of the municipal conservation

factors is the state conservation factor, which serves as an important benchmark element in the calculations. In case one municipality increases its protected area coverage, the state conservation factor rises and thus the municipal conservation factor of all other municipalities will decrease. This essentially leads to a competition between municipalities. A recent study by Droste et al. (2015) found that the protected area coverage in those municipalities where EFT schemes were in place increased faster than in those states where fiscal transfers are not considering ecological criteria.

EFT has also attracted attention in the EU. Currently, the only large-scale operational EFT is in place in Portugal, while it is implemented at a regional scale in France. Furthermore, discussions on the potential introduction of fiscal transfers using ecological criteria have been taking place in Germany and Poland. Table 4.2 provides an overview of the key characteristics of the EU schemes, while the Portuguese mechanism is further detailed in Box 4.5.

Table 4.2 : Overview of the implementation of ecological fiscal transfers in Europe

Status of implementation	Country (and scope)	Key characteristics
Implemented	Portugal (national)	In 2007, Portugal has introduced a system of intergovernmental fiscal transfers which considered ecological criterion, the proportion of land designated as Natura 2000 site or protected area in municipalities. The scheme has been in place now for almost 10 years. Since it is the only operational national-level EFT in Europe, it provides a useful example on how fiscal transfers can support biodiversity objectives. Further details of Portugal’s EFT are provided in Box 4.5.
Implemented	France (regional)	The only other example of an operational EFT in the EU is in France. Nevertheless the French scheme is only applied at a regional level and it primarily covers only those municipalities which are based in the core areas of national parks or natural marine parks. The scheme provides compensation for municipalities for their opportunity costs of conservation actions and aims to counter-balance the strict regulations on land-use restrictions. It was introduced in 2006. It has limitations with regards to its effectiveness as municipalities do not have the competency to designate national parks in France and therefore the incentive nature of the EFT cannot lead to increased designation of protected areas at the local level.
Under consideration	Germany (regional)	An EFT scheme has been suggested in Germany to be introduced between the federal and state (Länder) level, as well as within the states. The most detailed proposal for the latter has been so far developed in the state of Saxony.
Under consideration / potentially suspended	Poland (national)	In Poland, the Rural Boroughs Association has proposed an EFT scheme, the so-called Ecological Subsidies Act, which would compensate the boroughs that include Natura 2000 sites. The proposed act would compensate for both the opportunity costs, as well as the management costs of the land-use restrictions in Natura 2000 areas. Similar to other EU Member States, the designation of the Natura 2000 sites is done at the

		national level while the management of sites is overseen by local actors. This situation tends to create conflicts among national and local governmental bodies. While the EFT would potentially help mitigating this problem, the current recently elected Government has different priorities and the future of the proposal is in question.
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Source: Ring et al., 2017, Ring et al. 2011

Theoretically, ecological indicators can be integrated into any intergovernmental fiscal transfers as the systems for carrying out such transfers are already in place in most countries in the EU and around the world. This also means that the transaction costs of creating such a system are minor. While the share of protected areas is the most commonly used ecological indicator and serves as a useful tool, one step ahead would be to consider the type of protected areas, as well as their quality. As indicated earlier, the earmarking of funding channelled through different fiscal instruments has a significant impact on their contribution to biodiversity conservation. In their current form, EFT are transferred to municipalities as a lump-sum and not explicitly required to be used for conservation actions.

Finally, the Portuguese example shows that for EFT to contribute to conservation municipalities need to have the competence to designate protected areas. While the integration of ecological criteria into fiscal transfers can mitigate the opposition of local actors against these areas, incentivising municipalities to undertake concrete conservation actions needs these actors to be able to designate new protected areas. Otherwise, EFT schemes have a very limited scope to deliver concrete conservation benefits.

Box 4.5 : Ecological Fiscal Transfers (EFT) in Portugal

The EFT scheme in Portugal has been in place since 2007 and uses the coverage of Natura 2000 sites and other nationally protected areas as an ecological criterion to transfer public tax revenues from the national level to municipalities. The scheme essentially introduced a positive ecological discrimination, as conservation areas have been integrated into the broader system of intergovernmental fiscal transfers in the country. Currently 5 to 10 per cent of one of the key national public funding for municipalities coming from taxes at the national level (the Municipal general Fund) is distributed based on the protected area coverage within each municipality. The transfers only consider the area of the protected sites but not the quality or level of protection of the different categories of the sites. Since fiscal transfers from the state to the local level are an important source of funding for municipalities – around 60% - EFT can increase the social acceptance of protected areas among municipal stakeholders.

Since the introduction of the EFT scheme the role of municipalities in designating and managing protected areas has substantially changed and has seemed to be an important factor in the success of the scheme. In 2008, a year after the introduction of EFT, local authorities were allowed to designate a wider category of protected areas, including for instance private protected areas, which had a significant impact on the development of EFT. In contrast, there seem to be a major setback with regards to the actual payments as they are transferred as lump-sum payments to municipalities, meaning that municipalities have the freedom to decide on how they use the funds (i.e. they do not have to earmark the payments for biodiversity conservation). This limits the ecological effectiveness of EFT as it does not provide any direct funding for biodiversity conservation. Furthermore, there are concerns with regards the transparency of the system as EFT figures are not published separately during the fiscal allocation process and therefore municipalities are not aware of how much money they actually receive as a result of the ecological criteria. This is further aggravated by the fact that currently no monitoring system is in place to assess the

ecological effectiveness of the payments and this also impacts the general perception of EFT at the local level.

While overall there has been a slight increase in the coverage of protected areas in Portugal since the introduction of EFT, it cannot be determined how much of this change was driven by the EFT scheme. Since the introduction of EFT, multiple legislative changes took place in the fiscal transfer system, which has led to cross-over effects between the various criteria used for the distribution of tax revenues to local levels. This has potentially contributed to mask the impact of the introduced ecological criteria. Furthermore, the financial crisis, which was particularly severe in Portugal, has significantly impacted the overall amounts of fiscal transfers and thus had implications on the amount of EFT, as well as on its impact.

At the same time, overall the EFT scheme in Portugal seem to have led to positive changes, in particular in creating a positive mind-set amongst local authorities towards biodiversity conservation. Furthermore, the scheme also proved to be a cost-effective toll since there are no production costs involved and transaction costs are very low.

While EFT can act as an important incentive for local actors to enhance conservation actions, it should be considered as part of the broader policy mix aiming at biodiversity conservation. For instance, Santos et al. (2015), based on the Portuguese example, suggest that EFT should be combined with agri-environmental schemes funded by the EU CAP (see section 2.3.2), which could reinforce the goal of biodiversity conservation between local governments and private landowners.

Source: Ring et al., 2017 Santos et al. 2012, Santos et al. 2015

Leveraging private funding

The involvement of the investment sector

Private capital for projects focusing on biodiversity conservation are scarce, as commercial banks are not aware of this option and existing or potential projects are in many cases are too small to be financed (Bishop et al, 2008). In order to overcome these issues, many experts suggest that the mainstream financing instruments need to be adapted to biodiversity businesses and could be for instance combined with grant funding and/or technical assistance.

A range of financing instruments can be used by the private sector to make funding available for biodiversity, each of them with different characteristics. Table 4.3 provides an overview of these financial instruments (while grant funding is not considered an innovative financing instrument, it is included in the list due to its current importance in biodiversity financing). The financing instruments are assessed against the following criteria (Bishop et al, 2008):

- **Financial risk:** which refers to the probability of losing the investment;
- **Transaction costs:** including staff time and other costs;
- **Ability to exit:** which refers to the ability to regain the investment; and
- **Financial sustainability:** likelihood of generating competitive returns in the long-term.

The gradient of financial risk increases from grant funding to equity investments. The latter in general are less preferred over debt financing as equity investments involve a smaller chance of facilitating exit.

In order to overcome some of the challenges of financing biodiversity businesses, the European Commission and the European Investment Bank has launched the Natural Capital Financing Facility, a financial instrument which blends EU grant funding with debt and equity funds, as well as technical assistance (see Chapter 5).

Table 4.3 : Financial instruments and their key characteristics

Financial instruments	Financial risk	Transaction costs	Ability to exit	Financial sustainability
Grant	L	L	H	L
Recoverable grant	L	L	H	L
Interest rate write-downs	L/ M	M	H	L
Loan guarantees	L /M	M	H	L
Short-term loans	M	M	M	L
Medium / long-term loans	M / H	M	M	H
Mezzanine financing (convertible long-term debt)	M / H	M	M	H
Programme-related investment	M /H	H	M	M
Equity investment	H	H	L	H
Majority / outright ownership	H	H	L	H

Key: H= high, M= medium, L= low

Source: Bishop et al. (2008)

Pro-biodiversity businesses and green markets

While there seem to be multiple pro-biodiversity business opportunities within various sectors (e.g. agriculture forestry, fisheries, ecotourism etc.) there is only a limited number of initiatives and projects which are already in place and are generating financial returns as well as benefits for biodiversity. A successful example in the European agriculture sector is the food and beverages company Mondelēz International's Harmony initiative, which targets the company's wheat supply chain (see Chapter 6).

Bishop et al. (2008) have reviewed the potentials and the current key challenges of financially viable biodiversity businesses and concluded that three main underlying needs have to be fulfilled in order to support the growth of pro-biodiversity businesses:

1. Appropriate enabling policies, such as overcoming regulatory hurdles, has to be developed;
2. Technical assistance, which is tailored to biodiversity businesses, should be provided; and
3. With the assessment of the pros and cons of the various available financial instruments (see above) appropriate access to these financing tools need to be provided.

As indicated above, marketed products for biodiversity conservation can be seen as a specific form of eco-labelling and can play an important role in green markets. Verstraeten & Rayment (2017) has recently reviewed the examples of such marketed products in Europe and have concluded that there is only a very limited number of such products in the European green market and there is a general lack of information on their conservation effectiveness and cost efficiency. Nevertheless, two successful examples of marketed products focusing on biodiversity conservation were identified by Verstraeten and Rayment (2017) and are presented in Box 4.6.

Box 4.6 : Marketed products for biodiversity conservation: two examples in Europe

In two central regions of Spain, Castile-La Mancha and Castile-Leon, a Spanish NGO (Fondacion Global Nature), has recently created an initiative to support farmers operating in Natura 2000 sites and promoting their environmentally-friendly production processes. The NGO is receiving grant support from the EU's LIFE fund and they are using the funds to commercialise legumes, almonds and other crops which are produced in environmental and biodiversity-friendly ways. The main aim of the initiative is to create a differentiating marketing strategy which stands out for the consumers.

The production processes are entirely organic and the farmers are complying with environmental guidelines, which have been established by the NGO and cover biodiversity protection actions, such as the creation of hedges and boundaries for crops in order to provide shelter and food for species, reduced use of fertilisers and crop rotation. Overall, farmers are expressing a growing interest in the initiative. Since 2012 around 400 farmers have been involved, with a total coverage of 20,000 hectares of land.

A contrasting example, where a premium priced product has been created to support nature conservation, can be found in France. In the Aude region, a special vintage wine was developed in 1996, which is closely linked to the protection of the Lesser Grey Shrike bird species. Revenues from the special "Lesser Grey Shrike" wine sales are donated to a special fund which supports the conservation of the bird species and their habitats. Specific agri-environmental measures are being implemented in the area to improve the bird's habitats.

While the economic benefits of the special wine have been quite limited, the "Lesser Grey Shrike" vintage wine has caught extensive media attention, which led to the development of a local identity and put the bird species as the iconic wild bird of the region. Furthermore, the initiative has generated further attention in conservation actions and was an important factor in changing the mind-set of the wine producers to undertake environmentally-friendly production processes.

Source: Verstraeten & Rayment (2017)

Part II – Case studies

5 Natural Capital Financing Facility (NCF) by EIB

Description of the initiative and related processes

Introduction

In 2014, the European Commission together with the European Investment Bank (EIB) launched the Natural Capital Financing Facility (NCF), a financing mechanism which combines funding first loss piece from the EU budget (European Commission's LIFE programme) and the EIB (Box 5.1) to support projects focusing on nature and biodiversity and ecosystem-based adaptation to climate change.

The objective of the NCF is to address market gaps and barriers for revenue generating or cost saving projects that are aimed at preserving natural capital, including climate change adaptation projects, and thereby contribute to the achievement of EU and Member States objectives for biodiversity and climate change adaptation.

Another key objective of the NCF is to prove the market and potential investors that investment into biodiversity (and climate change adaptation) can be financially attractive and that biodiversity conservation activities can be bankable projects that can generate revenues or deliver cost savings. With its approach, the NCF aims to tackle the current lack of experience and track record of profitable business cases for biodiversity conservation actions. Finally, with the use of EU funds, the NCF's objective is to leverage funding from private investors.

Box 5.1 : The EIB and the Commission's LIFE Programme

The European Investment Bank (EIB) is the EU's long-term lending bank, which was set up in the late 1950s. It is currently the largest multilateral development lender in the world. The EIB's shareholders are the 28 EU Member States. The Bank supports both the public and private sector through the provisions of direct investment loans, loans to corporates, to intermediaries, and through equity and debt funds.

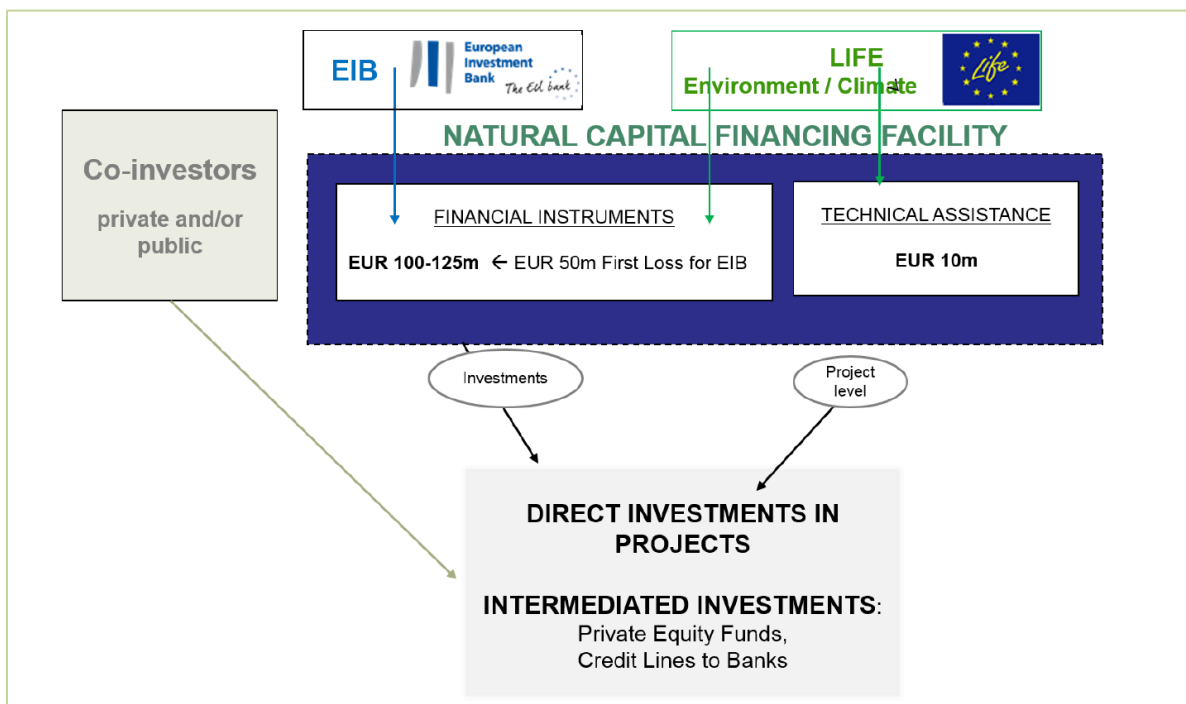
The LIFE programme is the EU's grant funding programme, which targets the environment and climate action. It is the only EU fund that directly supports biodiversity conservation. LIFE co-finances projects with a European added value in the EU Member States. The LIFE programme is managed by two Directorate-Generals (DG) within the European Commission (DG Environment and DG Climate Action) but the implementation of many components of the programme are delegated to other agencies.

In total, EIB will be putting up to EUR 125 million of funds into the facility, which will be guaranteed by EUR 50 million from the European Commission as a first loss piece. The facility provides funding primarily in two ways: direct lending or setting up intermediated structures (e.g. such as funds or credit lines via a financial intermediary). A range of financing options is made available, including both debt and equity financing. In

addition to the EUR 125 million, a further EUR 10 million is provided for technical assistance in the form of a NCF Support Facility, with a limit of EUR 1 million per operation. The European Commission’s contribution to the EIB was EUR 60 million – including the EUR 10 million for Support Facility and another EUR 50 million for guaranteeing investments (EIB 2016). An overview of the NCF’s structure is presented in Figure 5.1.

It was initially foreseen that NCF would support 9-12 operation each with a size of EUR 5-15 million with projects exclusively located within the EU 28 Member States. The terms of the loan tenor were foreseen to be typically up to 10-15 years with a potential grace period of maximum 3 years. For debt financing NCF can finance up to 75% of the total project costs but a single commitment to an operation cannot exceed EUR 15 million. For equity, the maximum support from NCF is 33% of the total operation costs.

The applicants of NCF could be private commercial organisations, private non-commercial organisations, including NGOs, and public bodies and bodies overseen by them (European Union, 2015).



Source: EIB & EC (2015, p. 11)

Figure 5.1 : The structure of the NCF

In order to ensure geographical balance across the EU Member States the following rules are applied (EIB & EC 2015):

- The total support in any Member State can be maximum at 20% of the EU guarantee;
- The support for direct operations and for intermediated operations within each MS are both maximised at 15%; and
- The support for individual project types (see below) are maximised at 35%.

NCFE aims to finance a wide range of natural capital projects and in particular investments will support the following four main types of projects:

- Green Infrastructure, such as investments in green roofs, green walls and ecosystem-based rainwater collection and water re-use systems;
- PES schemes;
- Biodiversity offsets and compensation which are beyond the current legal EU requirements; and
- Pro-biodiversity and adaptation businesses, such as sustainable forestry, agriculture, aquaculture and eco-tourism.

While multiple project applications have been submitted to EIB since the start of NCFE up until now no projects have been officially signed (see section 5.2). Currently two projects have been approved by the EIB Board and are in the final stages of contract negotiations (Box 5.1 and Box 5.2).

History

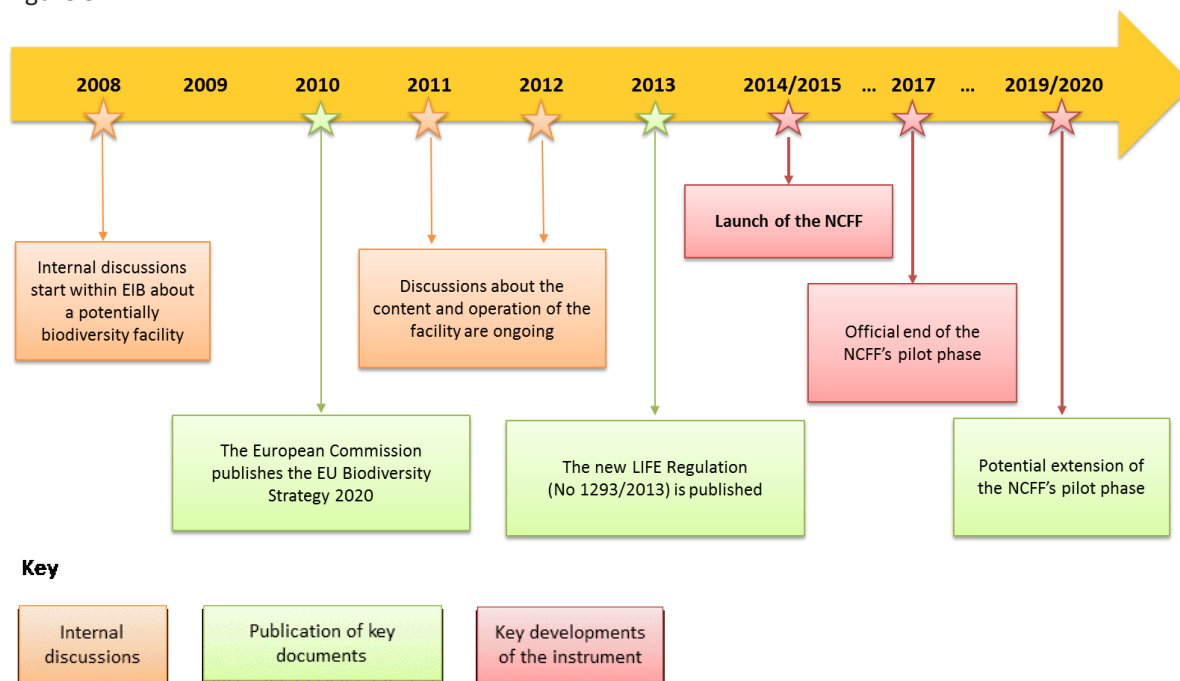
Initial discussions on a potential biodiversity related financial instrument started already in 2008 within the EIB. The negotiations in the Bank also involved the International Union of Conservation Nature (IUCN) and a number of private sector participants, who expressed interest and were keen to develop such a facility (personal communication with EIB, November 2016). Nevertheless, the timing for such an initiative was not considered right within the European Commission, as the Commission was weary of any operations that would entail the purchase and sale of carbon credits and thus a strong political and policy support was lacking.

The publication of the EU's 2020 Biodiversity Strategy was an important step in paving the way towards the adaptation of NCFE. The strategy established a set of headline targets for the EU, including a target for maintaining and enhancing ecosystems and their services by establishing green infrastructure and restoring at least 15 % of degraded ecosystems (EC 2014). In parallel, the European Commission also started to track the biodiversity-related expenditure within the EU's budget, which further highlighted the need to complement EU funding for biodiversity. These developments provided a push to re-visit the discussions about an EIB instrument for biodiversity and after two years of extensive negotiations NCFE was launched in 2014.

In 2013, the legislative basis for the EU LIFE fund for the period of 2014-2020 was also published, establishing the rules on the use of EU financing dedicated to nature. The preamble specifically states that "*financial instruments supported by the LIFE Programme should be used to address specific market needs in a cost-effective way, in line with the objectives of the Programme, and should not crowd out private financing*" (Preamble 35, Regulation (EU) No 1293/2013).

Initially, it was foreseen that the first pilot phase of NCFE would last until 2017. Nevertheless due to unexpected delays (see below) an extension of the facility until 2019 is foreseen as per the Delegation Agreement.

A schematic overview of the key milestones of the development of NCFF is presented in *Source: own presentation based on personal communication with EIB, November 2016*
 Figure 5.2.



Source: own presentation based on personal communication with EIB, November 2016

Figure 5.2 : Key milestones in the development of the NCFF

Relevant actors

The two most important stakeholders involved in the establishment of NCFF are the European Commission and the EIB. Within the Commission, NCFF has been / is a cross-sectoral initiative with multiple Directorate-Generals (DGs) playing a role:

- DG Environment and DG Climate Action, managing the LIFE Programme;
- DG Budget, being responsible for the EU's financial regulations, which have important implications on the rules of NCFF;
- DG Competition, addressing any concerns about EU State Aid rules²⁷;
- DG Research and Innovation, providing support to the EIB in terms of identifying suitable project applications from under the EU's research fund (Horizon 2020 programme) (personal communication with EIB, November 2016).

In addition to the above, the LIFE Committee, which includes representatives from each EU Member State (mainly from the Ministries for the Environment) was closely involved in and consulted on the establishment of NCFF.

²⁷ Under European Union competition law "state aid" refers to any measure that distorts competition or the free market. Such aid is classed by the EU as illegal unless provided under an exemption or notified by the European Commission.

On the other end of the process, project applicants, who can be both private and public legal entities, are the main actors. In case intermediated funds are provided by the EIB, local financial institutions also play a crucial role in the implementation of NCFF.

Role of public policies and public bodies

The role of public policies and public bodies has been already explained in the sections above. The role of EU's biodiversity policy is detailed in section 5.1.2, while the role of the European Commission and its specific DGs is presented in section 5.1.3.

Project selection and monitoring

Once a project application for NCFF is submitted, it first needs to go through an eligibility check by the European Commission, where the following criteria are considered (EIB & EC 2015):

- Projects must promote one or both of the following objectives: (i) *“conservation, restoration, management and enhancement of ecosystems, including through ecosystem-based solutions and/or (ii) application of ecosystem-based approaches that enable businesses and communities to address identified risks associated with current and projected impacts of climate change, including through urban, rural, and coastal green infrastructure projects”*.
- Projects must be able to generate revenues or deliver cost savings.
- Projects must contribute to the LIFE programme's objectives under its nature and biodiversity and/or climate adaptation priority areas.
- Projects must meet the EIB's standard criteria for all investments.
- The recipients of the NCFF support must be a legal entity.

Financial support under NCFF could complement other EU funding, provided a careful attention is paid on avoiding double-funding. Projects should also demonstrate an ability to make a business case for biodiversity, replicability and transferability. Finally, the project's leverage effect, its own financing contribution and its potential for jobs creation is considered (EIB & EC 2015). A separate set of eligibility criteria are also established for the NCFF Support Facility, under which project applicants can receive support for technical assistance.

A template for the NCFF contact form for project applications is available on EIB's website²⁸ and provides guidance to potential applicants.

Once the European Commission gives green light for a project application, the EIB's full appraisal can be initiated. In the EIB project appraisal phase a wide set of issues are checked, including the project's technical scope, its operation plan, its financial and economic justification, its environmental and social impacts, current market and demand in the area, credit risk and the project's profitability. If a positive decision is made, the project is submitted for approval to the EIB Management Committee and Board and, if approved, the negotiation for a contract can start, which once agreed can be officially signed. Once the contract is signed, funds are disbursed according to agreed conditions in the finance contract. During the operation of the financed projects, regular physical and financial supervision and monitoring is undertaken. Finally, the

²⁸ Available at: http://www.eib.org/attachments/documents/ncff_contact_form_en.pdf

cycle ends with the re-payment of the received funds. A schematic overview of the described project cycle is presented in Figure 5.3.



Source: EIB & EC (2015, p 44.)

Figure 5.3 : EIB's project cycle

Measures to ensure long term sustainability

As part of the EIB's due diligence process, the long-term sustainability of the potential projects are checked with a key focus on profitability and sustainable generation of revenues.

As already explained, according to the NCF's rules the duration of the loans are on average 10 years, meaning that projects need to generate sufficient financial returns in order to repay the received financial supports within 10 years.

Analysis of the initiative

Even though the NCF has been in place for over two years, concrete projects remain yet to be officially signed off. Two projects are very close to receiving support, but there is only a very limited amount of information available on them (Box 5.2 and Box 5.3). This section provides a more general overview of the NCF as a whole, and summarises the key lessons that have been learnt so far since the facility's establishment.

Ecological / conservation effectiveness

As indicated above, as part of the project selection process the project applications are cross-checked against the LIFE programme's biodiversity and climate change adaptation objectives. The LIFE legislation in particular establishes the specific objectives for the nature and biodiversity priority area and specifically refers to the

EU's Biodiversity Strategy to 2020 and nature conservation legislation²⁹, including the EU's protected area network, the Natura 2000.

So far most of the submitted project applications have been focusing on re-naturalisation of rivers or restoration of degraded land (personal communication with EIB, November 2016).

There are currently two proposed projects which are very close to the official sign-off of the NCFE funding by EIB: (i) the Irish Sustainable Forestry Fund, focusing on the transformation of forestry in Ireland and (ii) the EU-wide Rewilding Europe initiative, which aims to bring back wildlife to Europe and restore critical habitats via a set of conservation actions. The two projects are presented in more details in Box 5.2 and Box 5.3.

Box 5.2 : The Irish Sustainable Forestry Fund

The Irish Sustainable Forestry Fund is planning to invest in forest assets within Ireland with the aim to transform clear-fell plantations to continuous forestry cover and thus implement more sustainable forestry practices. The fund aims to promote native broadleaf species in monoculture forests, which will be complemented with afforestation on new land when such opportunities will be available. With such actions the fund is expected to deliver significant benefits for biodiversity. Nevertheless, the transformation period of these monoculture plantations can take up to 40 years, which might slow down the performance against many indicators.

The project proponents – a real assets investor (SLM Partners LLP) – are applying for an investment fund under NCFE with a proposed EIB contribution of EUR 13 million. The total costs of the operation are estimated to be EUR 50 million. SLM's main goal is to improve the sustainability of the agriculture and forestry sector using the current momentum behind stronger environmental regulation and better consumer awareness.

Funding from the NCFE Support Facility is also planned to be used for improving conventional forestry inventories and planning systems by integrating important biodiversity related features and indicators into these systems.

Source: EIB (2015b), EIB (2016a), SLM (2015)

Box 5.3 : Rewilding Europe

Rewilding Europe is an EU-wide project initiated by a group of NGOs – WWF Netherlands, ARK Nature, Wild Wonders of Europe and Conservation Capital – with the aim to transform Europe into an area full with wildlife.

As part of the initiative, the NGOs have already started to implement a set of biodiversity conservation activities. In particular they have been funding small pro-biodiversity businesses which operate in rural areas in order to prevent the abandonment of these rural regions. These small pro-biodiversity businesses have a positive impact on restoring landscapes, ecosystems and biodiversity and can therefore contribute to biodiversity conservation.

²⁹ Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds and Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

In order to continue the NGO's financial support for these small businesses, the NCFE project proponents have set up a special purpose vehicle and would like to get a intermediated loan from the NCFE for this special financial intermediary in order to provide loans for the pro-biodiversity businesses. The total costs of this specific operation would be EUR 7 million, with a proposed EIB contribution of EUR 5 million.

Source: EIB (2015a), Rewilding Europe (2015)

Cost effectiveness

The NCFE offers direct investment loans and intermediated funds. Experience so far has shown that direct lending is primarily requested by the public sector and private actors are more interested in intermediate funds, i.e. private sector project proponents prefer the setting up of a facility or a fund, which would then provide the loans to businesses (personal communication with EIB, November 2016).

When the NCFE was launched, the Commission together with the EIB estimated that in order to be attractive from the investor's perspective projects would need to be in a range of EUR 10-15 million with a 10 years loan tenor, as set by the EU Financial Regulation. Nevertheless, the received project applications showed a different picture (personal communication with EIB, November 2016). First of all, the proposed projects turned out to be much smaller than expected, with a range of EUR 3-5 million in general. The credit risk profiles of the submitted project applications were much higher than expected, which also meant that proponents were not able to receive competitive loans and that the EUR 50 million guarantee provided by the European Commission was not sufficient to de-risk the projects. The situation was further complicated by the EU State Aid concerns that do not allow Member States to participate in covering the first loss piece. These concerns are currently under review and might change in the next phase of the NCFE, if the facility is continued.

Overall, the submitted applications show that most of the planned projects cannot yet present a strong enough business case and do not deliver sufficient revenues or cost savings to pass the EIB investment criteria. The relatively short loan tenors also have important implications on the success of the projects: while project proponents are expected to re-pay the financial support in 10 years, many biodiversity conservation projects - in particular those which focus on restoration works - can only be expected to deliver financial returns within a 20-25 year timeframe.

Furthermore, and closely linked to the immaturity of the project applications, while the Support Facility was planned to be used to support project implementation, many of the project proponents actually needed technical assistance already in the application preparation phase.

Social impacts, perceptions and legitimacy

At the start of the negotiations between the European Commission and the EIB on the establishment of the NCFE, the LIFE Committee members were also consulted. Initially, there was lot of scepticism among the Committee members towards the NCFE, including with Member States being concerned about the NCFE competing for LIFE financing with the traditional grant funded projects (personal communication with EIB, November 2016). The added value of the NCFE in delivering a portfolio of bankable conservation projects was not clear to the committee members and further efforts were needed to demonstrate this. Some Member States were also concerned about the NCFE's possible focus on offsetting (see Part I of this report) and clarification was needed to show that only those offsets would be financed by the NCFE which would go beyond the requirements of national and EU legislation.

In order to overcome these barriers a set of actions was required (personal communication with EIB, November 2016):

- In order to convince the LIFE Committee members, further evidence on the limitations of public funding and public policies to deliver biodiversity conservation objectives were needed.
- The potential of NCFE in demonstrating the case for private sector involvement had to be further explained and emphasised.
- The definition of private sector needed to be clarified. Some members were concerned that private sector would be only limited to large private companies – which are in many cases the large polluters. Nevertheless, the scope of the NCFE is much wider and can include pension funds, foundations, private financial actors and any other parties which are not part of the public sector.
- The role of champions – both within the European Commission and amongst the LIFE Committee members - in providing a strong push for the establishment of the NCFE was also proved to be a crucial success factor.

Once the NCFE was launched, a training session was also held for the LIFE Committee members. Although many of the members were coming from the national environmental ministries, in some cases they also included budgetary and/or administrative staff who might not be entirely familiar with the concept and application of natural capital.

Broader institutional context and role of instrument in the policy mix

The NCFE's main aim was to develop a portfolio of bankable biodiversity conservation projects and by doing so prove investors that biodiversity conservation activities can provide an appealing business case to private sector investors.

However, it needs to be recognised that not all biodiversity conservation projects are profitable or can generate revenue. Traditional species conservation projects can only be supported through public sector or grant funding. While the NCFE type of funding can have an important role in the overall biodiversity financing policy mix, it should always be complemented by other sources, including EU and national grant funding.

Main lessons learnt

Building on personal communication with the EIB (November 2016) and the analysis above, the main lessons of the first 2-3 years of the NCFE are summarised below. These lessons can serve as an important background for other banks and public authorities who wish to develop similar facilities to support businesses focusing on biodiversity conservation and can be a useful basis for future learning and improvement.

When setting up the NCFE, the EIB expected that there would be a strong pipeline of projects, as it believed that the main obstacle hindering projects aiming at improving biodiversity conservation was the actual lack of funding. However, this idea proved to be wrong. In fact, while projects concepts still lack a strong business case, sufficient private funding seem to be available. Consequently, the initial 3-year duration of the NCFE will be too short to establish a strong portfolio of projects and therefore an extension of the pilot phase will need to be provided.

The immaturity of the submitted projects also means that their credit risks are still too high and that the guarantee provided will not be enough to de-risk the projects. A limitation with regards to the latter is the current prohibition for Member States to cover the first loss piece.

Projects are also much smaller than expected: between EUR 3-5 million rather than the officially foreseen EUR 10-25 million. Given the small scale of projects and their high risk profiles, they resemble micro-finance projects.

The loan tenors seem to be too short as many biodiversity projects will not be able to deliver financial returns within the 10-years' timeframe but rather require 20-25 years to generate a profit.

Finally, technical assistance has been needed to support the development of project applications rather than project implementation.

6 Example of Pro-biodiversity business: Harmony initiative by Mondelēz International³⁰

Description of the initiative and related processes

Introduction

Mondelēz International, also referred to as Mondelēz, is an American multinational confectionary, food and beverages company with a pro forma revenue in 2015 of more than USD 30 billion. The company is also Europe's largest biscuit baker with brands like *Oreo*, *belVita* and *LU*.

Prompted by the decline of pollinators, in 2008 Mondelēz launched a European initiative called “the Harmony initiative”, addressing the environmental impacts of the company linked to the use of agricultural raw material. Harmony aims to enhance sustainable agriculture and biodiversity protection by targeting the company's own wheat supply chain from farmers to millers. Farmers who decide to be part of the initiative sign up to the so-called Harmony Charter – which currently includes a list of 51 sustainable agriculture practice actions – and in return they receive a premium payment for each ton of the “Harmony wheat”. Farmer cooperatives also receive a payment for the technical assistance they provide to farmers.

The charter focuses on the following four principles (Mondelēz International 2016):

- **Partners:** close partnerships are being made with the farmers and millers;
- **Practices:** farmers are required to apply the 51 sustainable agricultural practices, which include, amongst others, choosing more resistant wheat varieties, soil management, limiting the use of pesticides and fertilisers and sustainable managing water resources;
- **Biodiversity:** 3% of all Harmony field is set aside to grow flowers that attract and support bees and other pollinators;
- **Traceability:** each field where Harmony wheat is grown has an individual Crop Sheet, which provides information on the field's location, the previous crops which was grown on it, the wheat variety that was chosen to grow now and a record of any sort of intervention on the field, including for instance the use of pesticides. Both farmers and millers are also audited: 10% of the farmers are audited randomly by third party auditors for all 51 Harmony practices and 100% of the millers are checked for their compliance with traceability.

With the application of these principles Harmony aims to build on three key pillars:

- Ensuring the quality of the wheat produced;
- Enhancing environmental protection and supporting biodiversity conservation; and
- Addressing societal needs by engaging local communities and expanding the involved stakeholders' skillset.

In order to improve the marketing image of the Harmony initiative a label (Figure 6.1) is put on each of the Harmony products, which has proved to drive growth in some of the Harmony products (see section 6.2.2). In those products which have the Harmony label it is guaranteed that 70% of the wheat used for producing

³⁰ Mondelēz – Harmony is described here just as one example of a private company initiative managing and taking responsibility of upstream supply in the understanding it is representative for a range of large companies – and also SMEs in the EU with similar or equivalent activities.

that specific product is 'Harmony wheat'. While Mondelez is aiming for 100% this cannot be fully guaranteed, due to risks linked to unexpected weather events (LU 2016b).

In technical terms, Harmony is similar to private PES schemes (section 2.4), which work as an incentivising and rewarding initiative. The premium paid to farmers is not transferred to consumer prices but rather the Harmony label functions as a vehicle for creating return on investment, increasing company's sales and profit,



Source: Mondelez International (2016)

Figure 6.1 : The Harmony label used on the respective Mondelez products

History

In 2007, 200 company volunteers within Mondelez in France were asked to develop a project initiative around France's iconic *LU* biscuit brand, which would have a positive and meaningful impact for all stakeholders involved, including employees, actors along the production chain and consumers.

An earlier life-cycle assessment (LCA) of Mondelez's environmental impact (carbon footprint, water footprint and land area used) showed that the most significant impact comes from the raw materials that are being used by the company. The three raw materials which were found to have particularly significant impacts were cocoa, dairy products and wheat (Figure 6.2).³¹ Furthermore, a specific LCA of the environmental impact of Mondelez's biscuit products showed that 70% of their impact also comes from agricultural raw materials (Mondelez's International 2014).

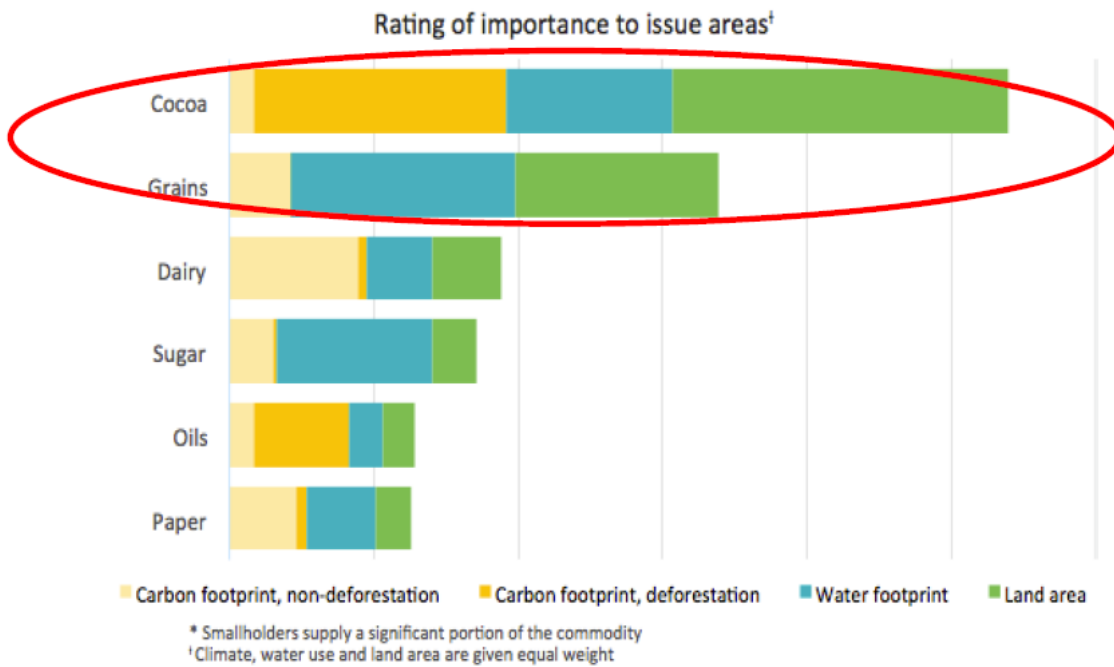
The LCA findings pointed towards targeting grains, in particular wheat. With the understanding that in the EU a total of 156 million metric tonnes of wheat is produced annually - with France growing more than one fifth of that amount - Mondelez decided to focus its actions on the wheat supply chain, starting with France. The Harmony initiative was established on this basis.

When the initiative was established the headline target of the company was to have 75% of biscuits produced in Western Europe with Harmony wheat by 2015. With France as the first targeted country, the initiative has steadily expanded and now also covers Spain, Italy, Belgium, the Czech Republic and Poland (Figure 6.3). By 2013, 44% of Mondelez biscuits in Western Europe were made with Harmony wheat, which later increased to 60% and 75% in 2014 and 2015, respectively, meaning that the headline target was achieved.

³¹ The company also established another signature initiative, Cocoa Life, which focuses on the environmental and social impacts of cocoa productions in non-EU countries (Cote d'Ivoire, Ghana, Indonesia, India, the Dominican Republic and Brazil). For more information see: <http://www.mondelezinternational.com/well-being/sustainable-resources-and-agriculture/agricultural-supply-chain/cocoa>

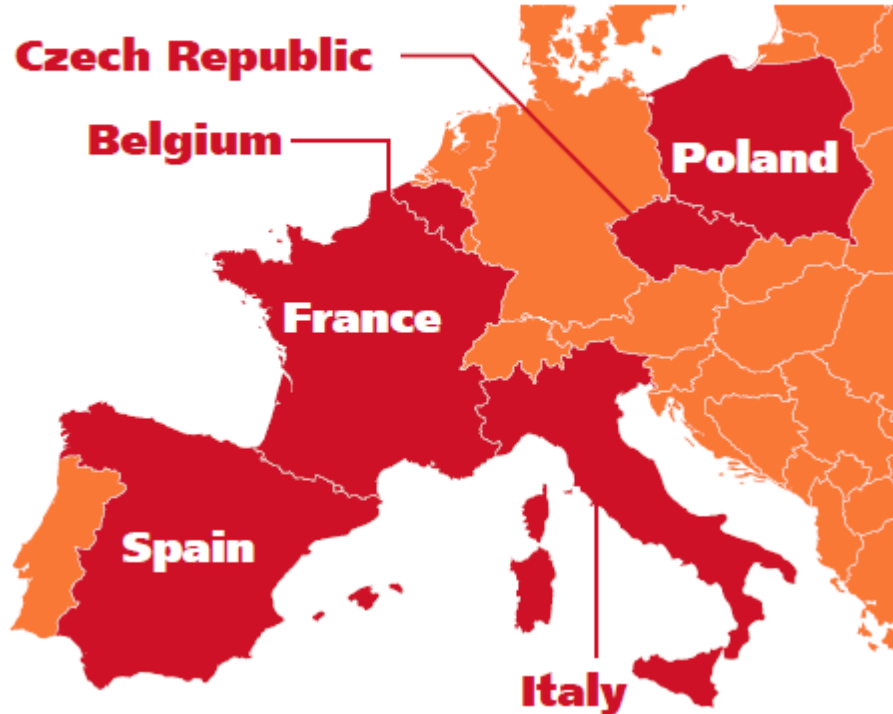
With regards to future plans, according to a personal communication with Mondelēz, no new headline targets have been made with regards to the European wheat production but the company’s main aim is at the moment to evolve the initiative to focus even more on impact at scale. This is important as Harmony is also playing an important role in the company’s 2020 sustainable goals, which were established in 2015 (Box 6.1).

Furthermore, Mondelēz is trying to scale up its wheat initiative in North America. In 2014, a programme was set up in the US with the aim to support collaboration between farmers to share their data, in order to gather a better understanding of the link between wheat production methods and yields (Mondelēz International 2015; Lloyd 2016).



Source: Kraus, F. (2016)

Figure 6.2 : Life-cycle assessment findings of Mondelēz International’s environmental impact



Source: Mondelez International (2015, p.9)

Figure 6.3 : EU Member States currently covered by the Harmony initiative

Box 6.1 : The 2020 Sustainability Goals of Mondelez

- Reducing its carbon footprint by (i) reducing its absolute carbon emissions from manufacturing by 15% and (ii) addressing deforestation, in particular within its agricultural supply chain of cocoa and palm oil.
- Reducing its water footprint by aiming to cut its absolute incoming water use by 10% in priority water sites.
- Reducing waste by eliminating 65,000 tonnes of packaging.
- Reducing total manufacturing waste by 20%.

Relevant actors

Mondelez aims to engage with all actors involved in the wheat production chain (Figure 6.4). Nevertheless the company’s key point of entry are the millers, who can help identify the most suitable cooperatives and farmers for Harmony. The millers are required to use separate storage areas for the Harmony wheat and flour in order to ensure full traceability. They grind the various Harmony wheat blends which are then used in the Mondelez factories.

Cooperatives play a key role in providing training and support for the participating farmers and therefore can be seen as the body monitoring the Harmony Charter on the ground. Furthermore, cooperatives also help to select new farmers to get involved in Harmony.

Finally, farmers are the key players of the initiative as they are required to comply with the Harmony Charter and its 51 sustainable agricultural production methods. To further ongoing engagement, Mondelēz offers annual visits to its factories for the farmers to show them where and how their wheat is used.

At the other end of the chain, consumers are engaged in the initiative with the application of the Harmony Charter label. The targeted communication about Harmony seem to have enabled Mondelēz to drive the growth of some of the Harmony brands, in particular the French LU brand (see section 6.2.2).

Finally, Mondelēz has been working together with NGOs, research institutes and other thirds parties that have provided support to increasing the understanding of the initiative’s impact. For instance, in France the company is working together with the French NGO Noé Conservation, who is leading the monitoring of pollinator populations. The Foundation for Research for Biodiversity (FBR) has received funding from Mondelēz to carry out innovative research projects, for instance on the impacts of agriculture practices on bee populations in France (Mondelēz International, 2014). Information on key ecological indicators (see below) are also being shared with the Museum of Natural History in France.



Source: own representation

Figure 6.4 : Chain of key stakeholders and actors involved in the Harmony initiative

Role of public policies and public bodies

The Harmony Charter builds on the national legal requirements and aims to ensure that farmer are complying with relevant regulations. Mondelēz ensures that it is aware of any changes in national legislation and policies which are then integrated into the Harmony Charter. Nevertheless, public policies do not seem to have had a significant role in initiating or shaping the initiative nor has Mondelēz taken an active role at trying to influence the sustainability of agricultural sector outside its own practises.

With regards to the involvement of public bodies, while Mondelēz has been engaging with multiple stakeholders its engagement has been primarily with NGOs and research institutes rather than public bodies.

Project selection and monitoring

The Harmony initiative is subject to an annual audit by an external body, with 10% of Harmony farmers being randomly selected to be evaluated against the 51 sustainable agricultural practices they have signed up for

(Mondelēz International 2014). Internal audits on farmers are also performed by the cooperatives. Furthermore, all millers are audited each year by the external auditors to check their compliance with the traceability rules of the Harmony wheat.

With regards to sanctioning mechanisms, there are particular requirements within the Harmony sustainable agricultural practices stipulating that in case of non-compliance the wheat cannot be considered as Harmony wheat and thus the premium payments are suspended (personal communication with Mondelēz International, November 2016). These requirements include the following three actions: (1) setting aside 3% of parcels for wild flowers and hedges (melliferous plants) to support pollinators, (2) the use of specific pesticides at plot level, and (3) the ban on treating melliferous flowers with pesticides (personal communication with Mondelēz International, February 2017).

Measures to ensure long term sustainability

The Harmony Charter contracts with the farmers, as well as with the cooperatives providing technical advice to the farmers, are carried out on an annual basis.

While annual contracts do not necessarily ensure long-term commitments, the rate of increase in farmers, cooperatives and millers participating the scheme (section 6.2.3) indicates that stakeholders are keen to be part of the initiative on an ongoing basis. The 70% loyalty rate (personal communication with Mondelēz International, November 2016) also seems to confirm this.

Analysis of the initiative

Ecological / conservation effectiveness

The Harmony Charter includes a list of 51 sustainable agricultural practices. The list is reviewed annually by Mondelēz in collaboration with agriculture experts, and amended if needed. For instance, 2 years ago there were 49 actions included in the Charter. After one of the revisions, 2 additional actions were added.

The main ecological aim of the initiative is to preserve and enhance local biodiversity with a particular focus on pollinators, such as bees and butterflies, given their role in providing food-related ecosystem services and the documented decline in their population numbers across the globe. The two headline actions required from farmers are the (i) dedication of 3% of each wheat field to wild flowers and hedges to attract pollinators and the (ii) responsible use of pesticides. In 2015, for instance 1,151 hectares of melliferous crops were planted as part of the initiative (Lloyd 2015). With regards to pesticide use, while Harmony wheat cannot be labelled organic it can be considered to rank somewhere between organic and conventional products. While pesticide use is not banned per se (with the exception of some specific pesticide products), pesticides should be considered as a last resort.

For each Harmony field farmers are required to develop a Crop Sheet and record information as regards their agricultural practices, including the wheat variety used, interventions taken and the justification for them³². For each farmer it is considered to take two years to yield the 'Harmony wheat' (Nieburg 2015).

³² See an example of a Crop Sheet in France at:

https://www.lulechampdespossibles.fr/Engagement/~/_media/lu/fr2014/Files/PDF/harmony/fichecultureLUharmony.pdf

The current list of Mondelēz sustainable agriculture practices in France is available on the LU brand's website³³. The actions can be grouped into three categories: (i) actions which are required to comply with national legislation (8 out of the 51 actions), (ii) actions which aim to make agriculture production more environmentally friendly (8 actions) and (iii) actions which aim to deliver the Harmony initiative's objectives on biodiversity protection and local traceability (35 actions).

The current list provides requirements on the following (LU 2016a):

- Selection of fields (5 actions), including requirements to consider crops to enhance fertility and reduce pesticide use and apply crop rotations of 3 crops every 4 years;
- Biodiversity protection (6 actions), including requirements to set aside 3% of the parcel for wild flowers and hedges to support pollinators, to provide notification whether the field is located on a Natura 2000 site and the application of intercropping;
- Fertiliser use (5 actions), including requirements to analyse the quality of the soil in the fields every 6 years, to develop a fertiliser plan and to use appropriate devices;
- Health of crops (12 actions), including restrictions and bans on the use of phytosanitary products, requirements to consider weather conditions before any treatments and suggestions for biocontrol of pests;
- Irrigation (2 actions), including requirements to record water usage and to adequately assess climatic conditions, water supplies, soil types and specific plant needs for water;
- Waste management (2 actions), including requirements on waste sorting and collection;
- Quality of the harvest (1 action), including a requirement on the adequate cleaning of harvesting machines in order to reduce the risk of wheat contamination;
- Storage (4 actions), including ventilation and cleaning requirements for storing the Harmony wheat and flour;
- Transportation (2 actions), including requirements to use empty and clean transportation tanks;
- Traceability (7 actions), including requirements for the identification and elimination of the risks of mixing Harmony and non-Harmony wheat, adequate completion and submission of Crop Sheets to Mondelēz and information provision on the Treatment Frequency Index³⁴;
- Environmental impact of storage organisations and millers (1 action), including a requirement on the optimisation of water and energy usage and waste management; and
- Impacts on human (4 actions), including the need to provide adequate technical assistance to farmers and to ensure health and safety.

As the Harmony initiative has been in place in France for the longest period, the first results of Harmony's ecological effectiveness are providing insights on the French experience. The two ecological indicators currently being monitored by the partner NGOs (see above) are the reduction in pesticide use on Harmony fields and the numbers of bee and butterfly populations.

Information about pesticide use is captured by the Treatment Frequency Index by each farmer. This is collected by Mondelēz and is shared with the Museum of Natural History in France, which consolidates similar measurements across the country in order to be able to compare the results. As of 2016, farmers of the Harmony fields used on average 22% less pesticides compared to the national average (personal communication with Mondelēz International, November 2016).

³³ For the full list see:

<https://www.lulechampdespossibles.fr/Engagement/~media/lu/fr2014/Files/PDF/harmony/Synthesedes51pratiques.pdf>

³⁴ French indicator used for tracking pesticide use.

The number of butterfly species and the number of individuals for all types of bees (including honeybees, bumblebees and solitary bees) have been monitored by NGOs in France since 2013 (Table 6.1). The number of bees observed has been steadily increasing reaching 14.5 million individuals in 2016. This translated into 1.56 bees/m² for the 2016 harvest in France (personal communication with Mondelēz International, November 2016). In contrast, the number of butterfly species has been steadily decreasing. The underlying reasons behind this decline are unclear (e.g. the butterfly population may have decreased due to adverse weather conditions).

In addition to the direct biodiversity benefits resulting from the reduced use of pesticides and the plantation of wild flowers and hedges, there are also foreseen further indirect benefits for biodiversity. Mondelēz aims to choose farmers and millers as close to its factories as possible to limit carbon emission. The requirements on sustainable water and energy use and sustainable waste management are also included in the Harmony Charter, with the improved environmental quality indirectly supporting nature conservation.

Table 6.1 : Bee and butterfly populations observed in France as indicators of the ecological effectiveness of the initiative (2013-2016)

	2013	2014	2015	2016
Number of individual bees observed (million)	5.6	7.0	8.6	14.5
Number of butterfly species observed	32	27	26	16

Source: based on personal communication with Mondelēz International, November 2016

Cost effectiveness

A premium (per tonnes of Harmony wheat) is provided both to farmers and cooperatives. The premium rewards farmers for their compliance with the Harmony Charter’s sustainable practices and cooperatives for the technical assistance (and related administrative costs) they provide. The amount of this premium is confidential.

While the premium payment is provided to attract farmers and cooperatives to participate in the initiative, this premium is not transferred into consumer prices. With the use of the Harmony label (Figure 6.1) and further communication campaigns (e.g. LU adverts in France³⁵) Mondelēz’s aim has been to increase its sales through marketing. These efforts have translated into increase in sales of the company’s household brand Petit LU biscuit. In 2010, value sales of the Petit LU biscuit went from -7% to +9% and in 2013 to +8% (personal communication with Mondelēz International, November 2016).

More generally, Mondelēz’s communication had a positive impact on the quality image of the LU brands. A recent survey showed that when consumers were aware of the Harmony initiative there was a +10 points increase in purchase of LU products produced with Harmony wheat with respect to the ones that were not.

Overall, these positive trends translate into a sale increase of LU brand products of between 1% and 2% (personal communication with Mondelēz International, November 2016). While the costs of the Harmony initiative are unknown / confidential, the increase in sales covers them. It is, however, not possible to assess the cost-effectiveness of the initiative without knowing the exact costs and benefits. At the same time, the

³⁵ See at: https://www.lulechampdespossibles.fr/Engagement/Biodiversite?utm_source=Hub-Engagements&utm_medium=Push&utm_campaign=LU-Engagements-Biodiversite

continuous expansion of the initiative suggests that overall the initiative not only helps Mondelēz to gain a better and 'greener' profile amongst its consumers but it is probably also financially beneficial for the company.

While the initiative seems to be cost-effective from the Mondelēz's perspective, it is hard to assess its overall cost-effectiveness in terms of the delivery of biodiversity conservation objectives (i.e. whether different measures would deliver more tangible benefits for biodiversity with similar costs). Furthermore, while the premium paid to farmers has not been translated into consumer prices so far the question remains whether Mondelēz will be able to maintain this business model in the long-term. There might be a tipping point when the increase of consumer prices will become necessary in order to continue to make profit from the sales of premium-wheat biscuits. This could be particularly problematic if other food companies decide to apply similar schemes creating a more saturated market with similar products.

Social impacts, perceptions and legitimacy

Partnering with local communities and extensive stakeholder engagement is a key pillar in the Harmony initiative. A wide range of actors are part of the initiative: Mondelēz's main contacts are millers with cooperatives and farmers are the cornerstones of the actions on the ground. Cooperatives provide technical support to the farmers and thus ensure that farmers require the needed skill sets.

According to Mondelēz, farmers take a pride for participating in the initiative (personal communication, November 2016). This is strengthened by the annual visits of farmers to Mondelēz's factories, when farmers are introduced to the final products which contain their wheat.

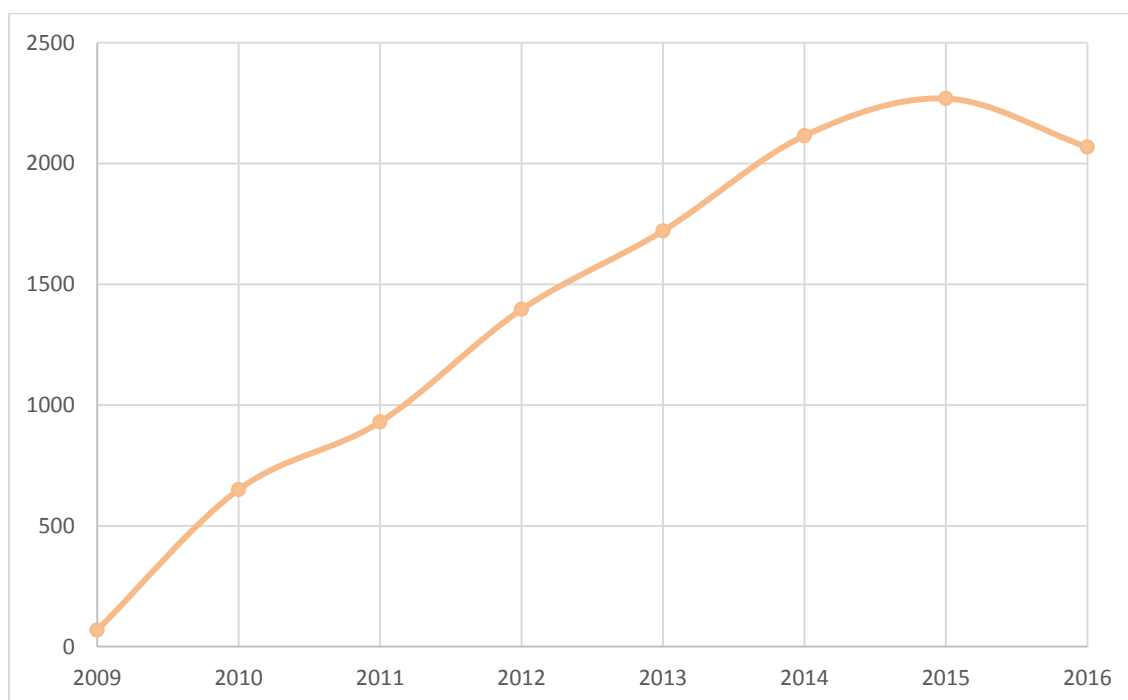
With regards to the scale of stakeholders engaging in the initiative, in the first year of Harmony (2009) 68 farmers, 1 miller and 1 cooperative were involved in France. Since then the initiative has experienced a substantial growth and, according to Mondelēz, getting farmers involved has never been an obstacle for the initiative.

The increase in the numbers of farmers involved over the years is presented in Figure 6.5, while Table 6.2 provides an overview of the share of the different stakeholders (farmers, millers and cooperatives) in each of the participating countries in 2016. Until 2015, there has been a steady increase in farmers' number but in 2016 the involvement has slightly decreased. As earlier indicated, the initiative has started in France and this explains the highest number of participants there compared to other countries.

In 2016, the 2068 farmers producing Harmony wheat covered 40,000 hectares of land (personal communication with Mondelēz International, November 2016). In 2014, in total 19,000 tonnes of Harmony flour were produced (Mondelēz International, 2016).

In addition to the cooperation with stakeholders along the wheat supply chain, Mondelēz has been engaging with external stakeholders in various conferences and meetings to promote its initiative. In 2016, Mondelēz has worked together with the Spanish IE Business School to develop a detailed case study on Harmony, particularly in Spain, with a focus on the drivers behind the initiative and its implications for the company. The case study is expected to be published in 2017 and will be used in the Business School's MBA classes (Kraus 2016).

Finally, internal engagement is also taking place within Mondelēz itself with the aim to ensure that the company's employees are also aware of the initiative and its positive impacts on the environment and biodiversity (personal communication with Mondelēz International, November 2016).



Source: based on Mondelēz International (2015) and personal communication with Mondelēz International, November 2016

Figure 6.5 : Total number of farmers involved in the Harmony initiative (2009-2016)

Table 6.2 : Total number of key stakeholders involved in the Harmony initiative in 2016

	France	Spain	Italy	Belgium	Czech Republic	Poland	Total
Farmers	1691	181	88	49	34	25	2068
Millers	4	2	2	3	1	1	13
Cooperatives	20	15	2	2	0	1	40

Source: based on personal communication with Mondelēz International, November 2016

Broader institutional context and role of instrument in the policy mix

Some of the sustainable agricultural practices listed in the Harmony Charter are in line with the EU's Common Agricultural Policy (CAP). However, the requirements of Harmony pose more demanding rules on farmers. In France, where Harmony has been in place for the longest and thus the scheme is at its most mature stage, the charter with which farmers need to comply include a set of requirements which are also embedded within the national regulations. At the same time, overall national or EU level policies do not seem to have been acting as a driving force behind the initiative.

Harmony can be considered a private PES scheme combined with an informal certification programme. Given the private sector's minor involvement in PES schemes in the EU the initiative provides a pioneering example for private sector engagement and for other food companies in the EU and world-wide. At the same time, a careful assessment is needed to better understand the possible conflicts with other financing instruments (e.g. agri-environmental measures under the CAP).

7 Conclusions

The review of the state-of-play of innovative financing instruments for biodiversity conservation in the EU leads to the following conclusions.

PES: PES are increasingly used to finance nature conservation around the world, including the EU. Most PES schemes in the EU are financed by public bodies with key focus on agricultural water catchments and water quality. A number of PES schemes financed by the private sector can also be found across the EU. Even though these schemes are purely financed by private actors, the role of public bodies can be key to their success. Finally, there are a few examples of hybrid PES schemes, establishing collaboration between public and private sector.

Agri-environmental measures (AEM) under the EU Common Agricultural Policy (CAP) can be formally considered as PES, with result-based AEMs representing the most recent innovation in these payments. Result-based payments are of particular interest because of their potentially higher conditionality, as they link the payment to the provision of a desired environmental outcome rather than to prescribed management activities. Furthermore, such schemes allow the farmer greater flexibility in management practices compared to traditional action-based AEMs, thereby encouraging innovation. Of course, result-based agri-environment schemes are not always the best option to improve the environmental sustainability of agricultural practices, as in some cases they may entail an increased risk for farmers with respect to action-based AEMs (e.g. in cases when the provision of the desired environmental outcome can be substantially influenced by external factors like weather or where the species targeted are animals that can move from field to field). Result-based AEMs are best used when it is easy to find proxy indicators for biodiversity conservation and where there is a clear link between conservation practices and provision of an environmental outcome.

Offsetting: Under the EU legislation, the EU Member States are commonly compensating for residual impacts of land use changes on the EU network of protected areas (Natura 2000 network). In addition, a number of countries including France, Germany, Sweden and the UK have national or regional initiatives in place taking the offsetting approach beyond the EU level requirements. In general, ensuring the delivery of benefits through offsetting continues to be widely debated across the EU. Experiences both in the EU and internationally have showed that only mandatory requirements can address adequately the residual impacts on biodiversity and ensure that no net loss of biodiversity is achieved. The effective implementation of the mitigation hierarchy is considered to be one of the most crucial building blocks of any offsetting schemes.

Innovative use of fiscal instruments: Many biodiversity-relevant taxes and fees are commonly in use in Europe. However their impact greatly depends on whether the revenues are directly used to fund conservation activities (i.e. earmarked for biodiversity conservation). While some examples exist where earmarking is applied, this is not often the case and therefore the biodiversity benefits delivered by fiscal instruments in the EU are limited. Ecological fiscal transfers (EFT), as currently in place in Portugal, provide a pioneering example of how ecological indicators can be integrated into intergovernmental fiscal transfers, with a view to make such transfers a mechanism to recognise the conservation efforts (or burden) at municipal level.

Private sector financing: One of the main difficulties for the private sector to invest in projects which have a positive impact on biodiversity is the lack of experience and track-record on biodiversity conservation actions in the form of a financial investment. To address this, the EU together with the European Investment Bank (EIB) launched the Natural Capital Financing Facility (NCFF), with a view to reduce the risk of private investors

in biodiversity impact investment via direct lending or intermediated investments. While a promising number of projects are in the pipeline, one of the main lessons learnt so far is that biodiversity projects still have a lot to learn in terms of developing a strong enough business case for the investment sector.

As regards business involvement, while there seem to be multiple pro-biodiversity business opportunities within various sectors in the EU (e.g. agriculture forestry, fisheries, ecotourism etc.) there is only a limited number of initiatives and projects in place that seems to be generating financial returns as well as conservation benefits at a larger scale. The Mondelēz's Harmony initiative, covering a range of EU countries and a relatively large area of agricultural land, offers some insights for mainstreaming and scaling up business involvement in the future.

Developing a strategy for financing policy mix: In general, given the current level of application and identified needs for further developments, it is unlikely that the uptake of innovative financing mechanisms on its own would bridge the existing financing gap for biodiversity in the EU or its Member States, at least in a short term. However, continued efforts to mainstream the use of innovative mechanisms hold potential for improving the overall instrument mix for financing biodiversity conservation, both in terms of helping to increase the total funding available, and improving the effectiveness of funding and participation of stakeholders in (certain) conservation actions.

Up until recently the EU and its Member States have focused on promoting the use of innovative mechanisms in a pioneering and ad hoc manner, focusing on exploring the feasibility of different instruments and/or sharing interesting examples. With an increase in the number of innovative instruments, a more systematic approach to the uptake and scaling up of these instruments is required, both at the EU and national level. Such an approach should focus on the joint application of instruments - rather than promoting individual instruments – identifying the different roles funding instruments could play in the mix and key drivers for their uptake. For example, fiscal instruments such as taxes and tax incentives can help to protect the “no net loss” baseline. PES schemes can help to generating concrete funding for conservation measures facilitating private finance notably in cases where private companies aim to address and manage not only impacts but also their dependencies on ecosystem services.

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9 Annex - PES examples

Table 9.1 : Examples of public PES in the EU

Name	Country/ region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Lower Saxony Drinking Water Programme	Germany/ Lower Saxony	Regional	Cooperation agreements between water utility companies and farmers are established to improve groundwater water quality. The programme is mostly financed through a levy on water extraction	Agricultural areas/ water catchment	Water quality	Water utility companies	Farmers	Lower Saxon State Department for Waterways, Coastal and Nature Conservation	Input-based	Perrot-Maître (2013); Smith et al. (2013)
Romagna Acque's sustainable upstream management	Italy/ Central Apennines	Local	Romagna Acque compensates farmers for improved forest management practices which are beneficial for water quality and decrease the high level of sedimentation. The programme was financed through an increase of 1-3% in the water bill (raised to 4% in 2012) and resulted in a 25% reduction in soil erosion, a decrease of the nitrogen concentration and a stabilised pH, reducing the costs of water purification for the company, increasing the dam life and increasing or maintaining annual forest revenues for forest landowners	Forest areas/ water catchment	Water quality	Romagna Acque S.p.A. (a public water utility company)	Forest landowners	Municipalities (they receive the funds from the water company and finance the landowners)	Input-based	Watershed Connect (2016), Leonardi (2015), Muys et al. (2014)

Name	Country/region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Organic farming in the catchment area of Mangfalltal	Germany/Munich	Local	Farmers receive a compensation for 18 years in case they decide to convert to organic farming. Thanks to the programme, the concentration of nitrates decreased from 14mg/L in 1989 to 7.5mg/L in 2009. The available budget is €765,000 per year	Agricultural areas/ water catchment	Water quality	Stadtwerke München (SWM), a water company owned by the municipality of Munich	Farmers	Organic Farming Associations (certification of land use changes, monitoring)	Input-based.	Muñoz Escobar et al. (2013); EY and Biotope (2017)
The Sustainable Land Management Incentive Scheme (SLMIS)	UK/Scotland	Regional	The programme aims at improving water quality within six priority catchments by remunerating farmers to carry out management activities to protect and improve drinking water sources (e.g. stick fencing, ditch modification, peatland restoration)	Agricultural areas/ water catchment	Drinking water quality	Scottish Water, a public water utility (funded by the government via the Water Industry Commission of Scotland)	Agricultural land managers (both land owners and land tenants)	Scottish Water catchment liaison officers, data analysts	Input-based	EY and Biotope (2017); Thomson et al. (2014)

Name	Country/ region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Special Plan for the Upper Guadiana (SPUG) Programme	Spain/ Guadiana river basin	Regional	Reforestation activities are financed to address the overuse of groundwater for agriculture. Reforestation is carried out either by the River Basin Authority (which compensates the land owners) or by the land owners themselves. In the latter case, the RBA covers the costs of the reforestation activities, and in both cases land owners receive a compensation over 20 years	Agricultural areas/ water catchment	Water quantity	The River Basin Authority	Forest land owners		Input based.	EY and Biotope (2017), Greiber et al. (2009)
Slowing the Flow at Pickering	UK/ North Yorkshire	Local	Slowing the Flow at Pickering is a project aiming at reducing the flood risk in Pickering town through land management measures like low level flood storage bunds, large wood y debris dams, drain blockage, woodland creation. These activities slow the rain water falling on the upper catchment flowing through Pickering	Forestry, woodland, heather moorlands, grassland and agricultural areas	Flood protection (also water quality, biodiversity conservation, carbon storage and soil protection)	Mainly DEFRA., with co- financing from other public bodies	Land owners (mainly public land)	Forest Research (coordination, mapping, monitoring, and evaluation work); Durham University (knowledge provider)	Input- based	Smith et al. (2013)

Name	Country/region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Conservation management of grasslands in North-Rhine Westphalia	Germany/ North-Rhine Westphalia	Regional	Farmers are being remunerated to conserve environmentally valuable land with the objective to protect and enhance biodiversity	Agricultural areas	Biodiversity	State of North Rhine-Westphalia	Farmers, shepherds	Biological stations, NRW-Stiftung, the district landscape agencies, the Chamber of Agriculture, LANUV NRW and the Agricultural Faculty (Bonn University)	Input-based	Matzdorf et al. (2014)
National Forest Reserve Program	Austria	National	The program aims to compensate forest owners for avoiding timber logging	Forest areas	Biodiversity and habitats	Austrian government	Forest land owners	The Federal Forest Research Centre	Input-based	EY and Biotope (2017)
English Woodland Grant Scheme – EWGS	UK/ England	Regional	The programme aims to improve the ES provided by existing woodlands and create new ones	Forest areas	Multiple ES (those provided by forests)	Public body: DEFRA	Woodland owners	Forestry Commission (programme management)	Input-based	Smith et al. (2013)

Name	Country/region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Green and Blue Services in Overijssel, the Netherlands (GBD = groenblauwe diensten)	The Netherlands/Overijssel	Regional	The programme aims to improve the delivery of a range of ES linked to rural landscapes and water management activities (water storage and retention). It is financed by municipalities and the Province of Overijssel (50% each). It is based on landscape packages for the construction, management and maintenance of landscape elements (canals, wooded banks, hedges, pollard willows). The contracts cover 20 to 30 years	Agricultural areas	Multiple ES (aesthetic value, recreation, connectivity, water regulation, water purification, habitat conservation)	Landschap Overijssel (provincial body) and municipalities	Land owners and tenants	National Green Fund (money collection and farmer payment), Overijssel Green and Blue Services Foundation (programme management)	Input-based	Arcadis (2010), EY and Biotope (2017)
Mature Forest Reserve Programme	Spain/Catalonia	Regional	Private and public forest owners are compensated to protect the valuable biodiversity of mature forests in Catalonia. The payment is calculated on the basis of the revenue that forest owners would have obtained by logging the timber	Forest areas	Biodiversity in mature forests	Girona provincial government	Private and public forest owners	Acciónnatura, a NGO (implementation); the Forest Ownership Centre, a public agency (monitoring).	Input-based	EY and Biotope (2017), Prokofieva and Gorriz (2013), Russi et al. (2011)

Name	Country/ region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Slovenian financing and co-financing of private forests	Slovenia	National	Public subsidies to private forest owners to support sustainable forest management. They cover 20-40% of the cost of plants and work for artificial regeneration; 30-50% of the costs of plants and work for natural regeneration; 30-50% of the cost of plants and work for forest tending; 30-90% of the extra costs of preventative measures for forest protection; 30-90% of the cost of work and material for other preventative measures; 50-70% of the cost of work and material for maintenance of wildlife habitats.	Forest areas	Those provided by well-managed forests	Slovenian Ministry of Finances	Forest owners	Slovenia Forest Service)	Input-based	Sonnenschein (2017 forthcoming)

Table 9.2 : Examples of private PES in the EU

Name	Country/ region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Vittel Programme	France/ North East	Local	The Vittel company signed long-term contracts with farmers compensating them for using more sustainable agriculture and land management practices, in order to preserve the water quality of their mineral water	Agricultural areas/ water catchment	Water quality	Nestlé Waters (a bottled mineral water company)	Farmers	Agrivair, a subsidiary of Nestlé Waters (negotiation, management); French National Institute for Agronomic Research (INRA) and Nestle Waters laboratory (research); Rhin Meuse Water Agency (monitoring)	Input- based	Perrot- Maître, (2013); Smith et al. (2013); Matzdorf et al. (2014)

Name	Country/ region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Evian Mineral Natural Water Programme	France/ South East	Local	The Evian company developed a PES scheme with local farmers to maintain the water quality in their water catchment area by financing of collective agricultural projects	Agricultural areas/ water catchment	Water quality	Evian (a bottled mineral water company)	Farmers	The Association for the Protection of the Catchment Area of Evian Mineral Water (APIEME), a PPP (sustainable agricultural management plans); INRA (research).	Input-based	EY and Biotope (2017), Defrance (2016)
Norda's watershed management programme	Italy/ South Italy	Local	Norda compensates farmers in its water catchment area to apply sustainable agricultural practices, including organic farming	Agricultural areas/ water catchment	Water quality	Norda (a bottled mineral water company)	Farmers		Input-based	Watershed Connect, www.watershedconnect.com
Upstream Thinking with Westcountry River Trust	UK/ South West England	Regional	South West Water provides capital investments to farmers on their water catchment area to reduce nutrition and pollutant discharge	Agricultural areas/ water catchment	Water quality	South West Water (a private water utility)	Farmers	The Westcountry Rivers Trust. a NGO	Input-based	Matzdorf et al. (2014); EY and Biotope (2017), Smith et al. (2013)

Name	Country/region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Wessex Water's catchment management programme	UK/ South West England	Regional	Wessex Water remunerates farmers for management actions aiming at improving water quality in 15 catchments serving its abstraction points (mostly groundwater, but also some surface water points). Since 2008 the limit on pesticides in drinking water has been exceeded only two times, whereas before this programme there were frequent exceedances of the pesticide limit	Agricultural areas/ water catchment	Water quality	Wessex Water (a private water supply and sewerage utility company)	Farmers	Wessex Water manages the programme itself	Input-based	Smith et al. (2013)
Copenhagen energy PES scheme	Denmark/ Copenhagen	Local	Copenhagen Energy Corporation delivers drinking water to about one million consumers. The scheme aims to improve the quality of groundwater through afforestation projects and restriction on the use of fertilisers and pesticides. It is financed with a fund established by Copenhagen Energy using part of the revenues obtained with the water tariff	Agricultural areas/ water catchment	Water quality	Copenhagen Energy (a private energy and water company)	Private forest owners and farmers		Input-based	Greiber et al. (2009)

Name	Country/ region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
The Water Savings Convention - EDF	France/ South East	Local	EDF remunerates farmers for reducing their water use in order to have more water available for hydropower generation. The payment is calculated on the basis of the reduction in the irrigators' water use	Agricultural areas/ water catchment	Water quantity	EDF (a private energy company)	Farmers		Output-based	EY and Biotope (2017)
MoorFutures	Germany/ Macklenburg - Western Pomerania and Brandenburg	Regional	The programme offers carbon credits available for the voluntary market to finance peatland restoration	Peatland	Carbon sequestration (via peatland restoration)	Private businesses and individuals	Private citizens and foundations	The Ministry for Agriculture, Environment and Consumer Protection of Mecklenburg-Vorpommern (management)	Output-based	IEEP and Milieu (2013); Matzdorf et al. (2014)
Woodland Carbon Code	UK	National	The programme offers carbon credits generated via afforestation to private businesses and individuals.	Unwooded areas	Carbon sequestration (via afforestation)	Private businesses and individuals	Landowners represented by project developers	Accredited certification bodies, the UK Woodland Carbon Registry	Output-based	http://www.forestry.gov.uk/carboncode

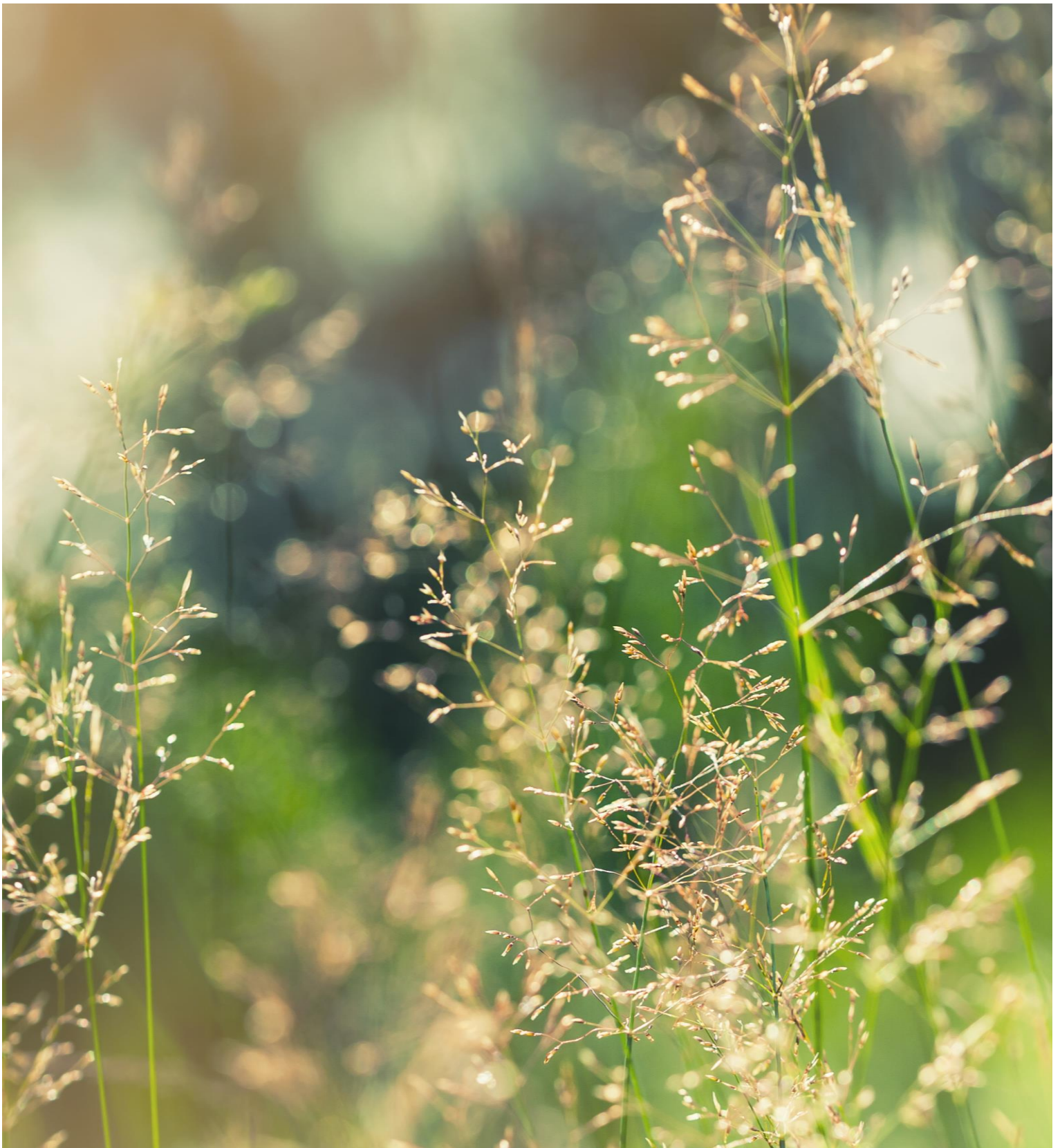
Name	Country/ region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Westcountry Angling Passport	UK/ South West England	Regional	Recreational anglers can access private fishing sites located on farmlands for a fee, which is invested by the farmers in improvements and maintenance of the sites. Anglers need to buy tokens via the Westcountry Rivers Trust to access the fishing areas.	Agricultural areas	Cultural ES (recreation)	Recreational anglers	Farmers, landowners	The Westcountry Rivers Trust, a NGO	Output- based	Matzdorf et al. (2014); EY and Biotope (2017); Smith et al. (2013)
Adopt a Sheep - Ireland	Ireland/ Moll's Gap	Local	Private individuals can "adopt" a sheep and in return they can visit the farms for free. The payment covers the costs of maintaining one mountain sheep for a year. The project aims at preserving natural heritage and traditional farming in the area	Agricultural areas	Cultural ES (recreation) and biodiversity	Private individuals	Kissane Sheep Farm (a private business)		Input- based	EY and Biotope (2017)
Adopt a Sheep - Netherlands	The Netherlands/ North East	Local	Private individuals can "adopt" a sheep and in return they receive news about it. The donations are used to maintain the open-areas and employ shepherds. The amount is calculated to cover the annual costs of rearing the sheep during one year (medical costs, shaving, herding, etc.).	Heather, open areas	Biodiversity (and cultural ES)	Private individuals	Landschap Overijssel, a NGO)		Input- based	EY and Biotope (2017)

Name	Country/ region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Drinking Water Forest (Trinkwasserwald e.V.)	Germany	National	A private non-profit organisation finances forest plantations to offer carbon credits to private businesses who aim to offset their water use. The payment is based on production costs, which depend on the size of the area to be converted.	Forest areas	Water quality and quantity	Private individuals	Landowners	Trinkwasserwald e.V. (a private non-profit association)	Input-based	Matzdorf et al. (2014); EY and Biotope (2017)

Table 9.3 : Examples of hybrid PES in the EU

Name	Country/region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Pumlumon Project	UK/Wales	Local	Farmers are compensated for carrying out improved land management practices	Agricultural area	Multiple ES (biodiversity carbon storage, water storage in landscapes, improved downstream water quality)	Montgomeryshire Wildlife Trust (a NGO, which is funded by the Biffaward and Waterloo charities), national government and statutory agencies	Landowners	The Montgomeryshire Wildlife Trust also acts as intermediary	Input-based	Matzdorf et al. (2014); EY and Biotope (2017), Smith et al. (2013)
The Sustainable Catchment Management Programme (SCaMP)	UK/North West England	Regional	United Utilities, a private water company, took a partnership approach with tenant farmers on their land and undertook collective projects which aimed to primarily improve water quality but also provide wider benefits	Agricultural area / water catchment	Water quality and quantity (also biodiversity, carbon sequestration and recreation)	United Utilities (a private company) and Natural England and the Forestry Commission (public authorities)	Tenant farmers on United Utilities land	United Utilities (management), RSPB, a NGO (technical assistance)	Input-based	Smith et al. (2013); United utilities (2016), EY and Biotope (2017)

Name	Country/region	Scale	Short description	Typology of addressed areas	ES primarily targeted	Service users	Service providers	Intermediary bodies	Typology of payment	Sources
Working Wetlands Project	UK/ Culm National Character Area	Regional	The aim of the programme is to reverse Culm decline by encouraging and supporting landowners to carry out targeted habitat management, creation and restoration projects. The project involves 450 landowners, who own 25,209 ha of farmland	Grassland	Multiple ES (carbon sequestration, flood risk management, water quality and biodiversity)	Agri-environment schemes (£7.4 million between 2008 and 2015) and capital projects (£162,600 in the same period) from Devon Waste Management (private company, £80,000), South West Water, a private company, £15,000), Defra via the Wildlife Trusts (£16,000), the Environment Agency Catchment Restoration Fund (public body, £30,000), BIFFA Flagship Award, a private fund from landfill tax, £21,600)	Farmers	The Devon Wildlife Trust	Input-based	EY and Biotope (2017), http://www.devonwildlifetrust.org/sites/default/files/files/About%20us/Working-Wetlands-the-first-7-years-2008-15.pdf
Gowy Meadows	UK/ Cheshire	Local	An oil refinery located on the Gowy Meadow together with public authorities finances flood plain restorations	Floodplain (freshwaters , lowland grazing marsh)	Flood control (also biodiversity, recreation)	Essar energy (a private company) and Environment Agency and Natural England (a public authority)	Cheshire Wildlife Trust (a NGO)	The Environment Agency	Input-based	Smith et al.(2013); EY and Biotope (2017)



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