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Natura 2000 and Jobs – Scoping Study

Executive summary

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The aim of the *Natura 2000 and Jobs: Scoping Study* is to summarise the state of existing knowledge on the level and type of jobs that are linked to the Natura 2000 network, to explore the methodologies used to assess the employment levels, and to recommend a way forward to improve the evidence base on the links between Natura 2000 and employment. It does not aim to do new primary research or derive new estimates.

Current and future jobs are supported directly and indirectly by the Natura 2000 network.

- The **long-term resilience of ecosystems** is essential for both **direct and indirect jobs**. The **Natura 2000 network** and its link to wider green infrastructure provide an important **enabling environment** for jobs that can support urban, rural and coastal development.
- In addition to **jobs in conservation management**, protected areas play a key role in **sustainable production** – fish, crops, timber – and **jobs in associated sectors**.
- There are also **major integration benefits**, supporting jobs in other sectors such as tourism, cultural heritage & recreation, health, and activities linked to climate adaptation and mitigation.
- Furthermore, there is an, as yet, unknown potential for **scientific breakthroughs** linked to research into the **planet’s genetic heritage, our “living library”**, which can act as a catalyst for **creating skilled jobs**.
- The **EU-Budget** is an important lever for nature related jobs, also helping **leverage private funding** and **complementing national, regional and local expenditure**.
- There is an ongoing **need to invest in knowledge** on the links of nature, sectors of the economy and jobs, to ensure evidence-based policy-making and investments. This will help support **EU policy coherence, implementation, and the added value of the EU budget**.

There are important synergies between biodiversity and employment

- **The aim of the Natura 2000 network**, established under the Birds and Habitats Directive, and covering 18% of terrestrial areas and 5% of marine areas, **is to safeguard biodiversity**, whilst taking into account other economic and social considerations. However, the conservation and restoration measures that take place and their impacts are **an important direct and indirect source of employment** and contribute to smart, sustainable and inclusive growth.
- In addition to **on-site management and restoration jobs for conservation purposes**, there are jobs from **sustainable provisioning of crops, timber and fish**, as well as in a range of **sectors that make use of the natural capital** – **tourism, recreation, health, and education** – as well as support for off-site employment through both **product chains and spending**.
- At the most fundamental level, without a sufficient robust natural system supported by the Natura 2000 network, **there is a risk that losses of ecosystem services protected by the network can undermine not only a range of sectors, but also the basis of the functioning economy itself**. The timing and relative sensitivity of jobs in different sectors to loss of natural capital is, however, difficult to assess, so this employment analysis has focused on direct, indirect and induced jobs, on-site and off-site, including in the supply chain. Consequently, research underestimates the contribution of protected areas to employment.
- **The number of jobs related to Natura 2000 depends on what questions are being asked** and whether the answers sought focus on direct jobs on site or indirect jobs, and in the latter case, whether induced jobs are included, i.e. jobs linked to the knock-on effects from the flow of

money around the economy. It is also important to distinguish between jobs related to the ecosystem within the Natura 2000 sites, jobs affected outside of the sites due to biodiversity, and those linked to activities making use of the natural capital and/or ecosystem services without having conservation objectives in mind. Furthermore, it can be useful to distinguish between incremental jobs from Natura 2000 designation and management activities and wider jobs supported by the protected ecosystems.

The Natura 2000 network supports a wide range of jobs directly and indirectly, through conservation measures, sustainable production and other activities on site. However, the current state of knowledge needs to be improved.

Jobs for nature conservation

- Current expenditure on conservation measures in the **Natura 2000 network support around 52,000 jobs** directly and indirectly. The €5.8 billion needed for the full implementation of the Natura 2000 network has been **estimated to support 104,000 direct jobs** in protected areas management and conservation activities and **174,000 jobs in the EU if indirect and induced jobs are included**.

Jobs in sustainable production

- **Fisheries:** There are 149,000 fishermen and women in the EU, representing 110,000 full time equivalent (FTE) jobs. There is yet no information on how many jobs are directly or indirectly dependent on Natura 2000 network and associated protection measures.
- **Agriculture:** It has been estimated that 1.3 million of the 9.6 million farming jobs in the EU are linked directly or indirectly to Natura 2000. This was, however, a first estimate, which did not distinguish between jobs that are contributing towards Natura 2000 conservation objectives and those that are not, and additional analysis is needed. There is no estimate of the amount of agricultural activity that would be required to maintain and improve conservation status in Natura 2000, but that is being abandoned or already lost, nor of the associated loss of jobs.
- **Forestry:** Of the 3.5 million jobs in the sector, a first estimate suggests that Natura 2000 supports 73,000 jobs. Additional assessment is needed.

Jobs enabled and supported by Natura 2000

- **Tourism:** Tourism employs 12 million people in Europe. Of these, 3.1 million have links to protected areas and 9.8 million to 2 million explicitly with Natura 2000.
- **Health:** There are 8.8 million jobs in the health sector. Now there are only case examples of jobs in Natura sites focusing on preventative health measures and care, but no systematic assessment or aggregate. There is significant additional potential to develop Natura 2000 sites as health hubs.
- **Climate mitigation and adaptation:** Natura 2000 sites offer major benefits in carbon storage, sequestration as well as adaptation to climate change through, for example, urban cooling. There is, however, no measure of the scale of employment linked to this policy objective. Some of the jobs will be found in protected area management and hence conservation jobs can be seen as offering wider public benefits.
- **Research and innovation:** The number of scientific publications on Natura 2000 and ecosystem services has been rising quickly. Furthermore, there are increasing applications of bio-mimicry and bioprospecting supporting innovation and growth. There is yet little data on the number of jobs supported in this area, and to what extent they benefit directly from the biodiversity in the Natura 2000 network. However, this is expected to be a growth area.

Jobs via EU funding: The EU added value via the Multiannual Financial Framework (MFF)

- Investment in the implementation and management of Natura 2000 network can create a range of immediate direct employment opportunities and support indirect long-term employment. The former is a direct consequence of conservation expenditure consisting of jobs related to the on- and off-site management activities. The latter builds on the employment and business opportunities sustained by investment in well-functioning, biodiverse and aesthetically pleasing and/or productive and biodiverse ecosystems (e.g. tourism, sustainable agriculture, fisheries and forestry).
- **LIFE: 2,904 FTE jobs were supported by a sample of 281 LIFE Nature and Biodiversity projects** targeting Natura 2000 sites. This represents about **10 jobs per project** (annual average FTE) during the project duration. Around half of these jobs are maintained for 5 years after the project end, according to the information reported by the project managers.
- **Wider MFF:** Five EU funds under shared management, i.e. ERDF, ESF and the Cohesion Fund, EAFRD and EMFF (previously EFF) – collectively called European Structural and Investment Funds – now integrate biodiversity and Natura 2000 support goals into their funding objectives. In principle, funding to support the implementation and management of Natura 2000 sites can be synergistic with or actively contribute to a range of sectoral EU objectives linked to employment. However, there have been no assessments on the impacts of EU funding on the creation of different types of job (direct, indirect, and induced) linked to the existence and management of Natura 2000 sites.

Lessons from past applications of methods – and how to interpret the results

- **Type of jobs:** Some jobs are for the maintenance of the network and related to **conservation expenditure**; others are **self-sustaining jobs that benefit from the network** rather than being necessary for the network.
- **Confusion can arise when talking about the number of jobs as different sources discuss different aspects.** It is therefore important to be clear whether the focus is on direct and indirect jobs, on on-site and off-site, on off and recurring jobs, jobs and FTEs, jobs fully supported by Natura or simply benefiting, and the timescale of assessment.
- The state of Natura 2000 sites varies significantly across the EU and **one cannot simply scale up using average jobs per area or jobs per site bases as a method.** Expenditure analysis linked to assessment of the share of expenditure related to wages, combined with wage rates is a better means of calculation. This approach can be used for assessing local employment benefits and is less suitable for national or EU-wide assessments.
- **Input-output models** can help with assessing the multiplier effect and hence induced employment values. However, input-output models also have their limits, for example in capturing crowding out effects in other sectors of the economy. In principle, many of the above concerns could be addressed within **general equilibrium models** that capture the feedback loops in an economy. However, data availability and practical challenges, for example in delineating employment supported by Natura 2000 sites, by other protected sites and by natural spaces generally, do not currently allow for the use of general equilibrium models for assessing the employment benefits of the Natura 2000 network overall. There is potential to apply these models in areas such as tourism, however the models would need to be adapted and further data gathering would be necessary.
- **Interpreting results:** There is a need to avoid double counting. For example, jobs associated with the management and restoration of protected areas are often the same as those that could be considered for climate mitigation and adaptation.
- In addition, some jobs are “**change of jobs**” (e.g. due to regulations as part of the management) and others are “**additional jobs**” (due to opportunities provided by the

protection status). There are also likely to be trade-offs in job creation and loss. This can be over time (e.g. short-term job losses to allow stock recovery to support future livelihoods) and across borders (e.g. keeping jobs in the region through production in the region, leading to downward pressure elsewhere). Changes can also occur across sectors (e.g. preventative non medicinal health care, leading to fall in sales of medicine and hence job losses; opportunities lost through constraints to development such as mining in protected areas), and within sectors (e.g. from intensive to extensive agriculture). The whole picture of gains and losses (and across objectives) needs to be assessed to have a suitable evidence base for decision-making.

Way forward for future assessments

Assessment needs and way forward: There is a need for a significant upscaling of analysis of the actual and potential employment benefits from Natura 2000 – this is essential for EU’s **impact assessments**, **REFITS** as well as **major evaluations** such as of programmes and the EU budget.

An improved evidence base can then support **better regulation and integration into policy and funding decisions**, which in turn will support the **EU’s added value** and the **efficiency and effectiveness of EU funding**.

Jobs and nature conservation are both issues of high concern to the European public and formal commitments of the European Institutions and Member States. Yet, historically, there has been only a partial analysis of the different ways in which nature supports jobs. This summary presents a synthesis of the state of knowledge as regards the nature and scale of the jobs supported by the Natura 2000 network directly and indirectly – what is known and where there are gaps that need to be addressed. It also presents key insights on the methods adopted to date and recommendations for analysis to help improve the understanding of the multiple benefits of nature and how these support policy priorities and wider ambitions for policy coherence, mainstreaming and EU added value.

A. What are the links between Natura 2000 and employment?

There are currently almost 213 million people employed in the EU-28, which represents 64% of the active labour force. Around 9.5% (19.716 million¹) are unemployed, with unemployment rates as low as 4% in some countries (Czech Republic: 3.2%; Germany: 3.9%) and as high as 18.2% in Spain and 23.5% in Greece. Tackling unemployment and providing a boost for jobs and skills remains a priority for the European Commission and across Europe.

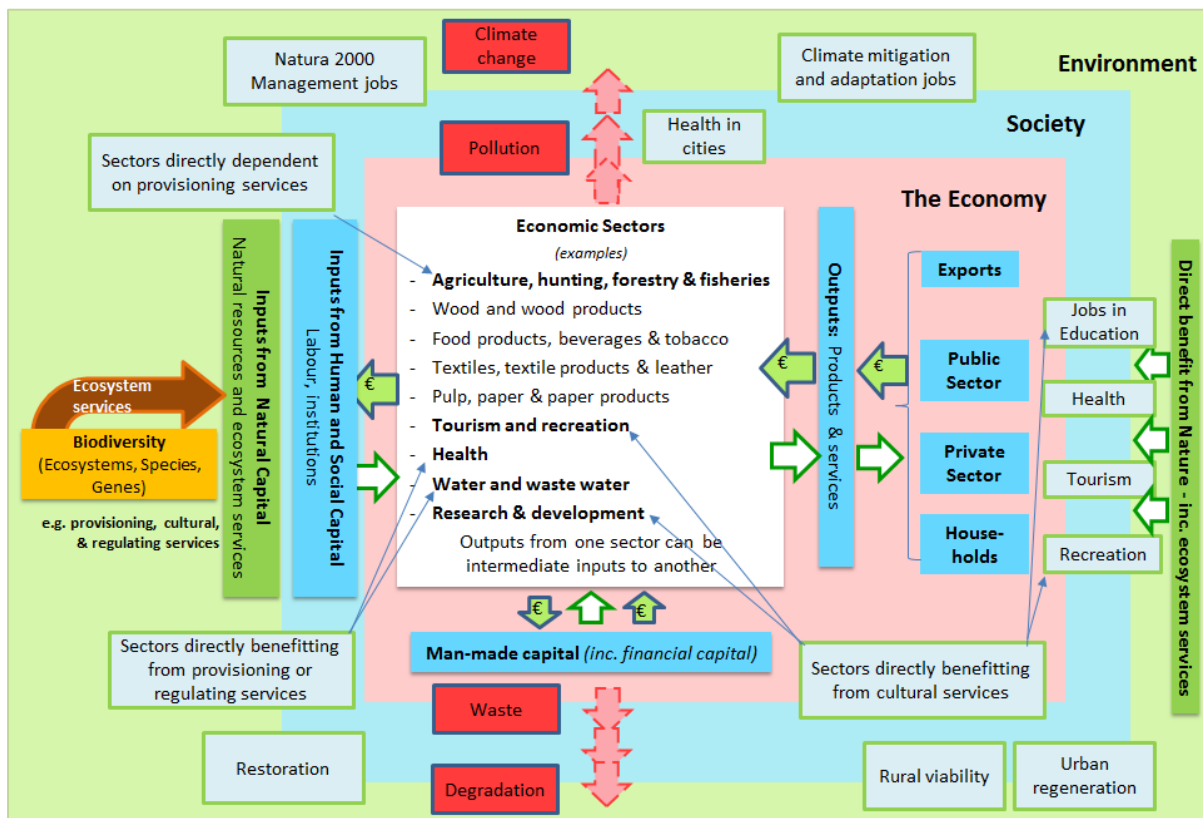
Employment is a stated key priority of the Juncker Commission, the Barroso presidency before that, and for governments and citizens across most Member States. The European Commission's 2016 and 2017 annual work programmes (AWP) and Jean-Claude Juncker's Political Guidelines' priority 1 is *A New Boost for Jobs, Growth and Investment*. The Europe 2020 Strategy's priorities also include employment. This comprises smart (developing an economy based on knowledge and innovation), sustainable (promoting a more resource efficient, greener and more competitive economy) and inclusive growth (fostering a high-employment economy delivering social and territorial cohesion).

While the primary aim of the Natura 2000 network is to safeguard biodiversity while taking into account other economic and social goals, the EU's 28,000 protected areas are an important source of jobs and contribute to smart, sustainable and inclusive growth. They can do this directly – i.e. by jobs on site, whether in the management and restoration, and the continuation of traditional land-uses and their associated jobs, or in sustainable production (e.g. crops, timber or fish), or in sectoral activities (e.g. health walks, recreation, scientific research). Natura 2000 can also lead to jobs "indirectly" – i.e. jobs supported offsite catalysed through Natura 2000 related activities (e.g. spending on hotels, restaurants and transport from tourists visiting the site) and along the product chain (e.g. fish, timber, crop transformation and distribution). There can also be benefits to off-site jobs via pollination, biological control, genetic diversity, as well as via fish nursery functions of marine protected areas. Figure 1 illustrates the multiple ways in which nature supports the economy and society, and Natura 2000 can support jobs.

Furthermore, where funds or investments are attracted to Natura 2000 management, related on-site activities and other local activities, this can lead to increased knock-on spending (as the money stays in the economy) that creates what is termed "induced employment", or the "multiplier effect". This can amplify the employment effect and help in particular with rural viability and urban regeneration, two other priorities of EU policy and funding (see Figure 2).

¹ http://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics

Figure 1: Links between sectors, the economy and the environment: Natura 2000 linked jobs



Source: own representation

Figure 2: Types of jobs supported by Natura 2000 – direct, indirect and induced jobs

	Direct Jobs	Indirect jobs	Induced jobs
Conservation Objectives			
Natura 2000 Mgt	E.g. Protected area managers, wardens	E.g. In construction, capital goods, monitoring and instrumentation	I.e. jobs through induced spending through income as it flows through the economy (multiplier effect). The level depends on: <ul style="list-style-type: none"> The savings rate of different income groups that receive the money and how fast money flows through the economy How open the economy is (the more open, the more money flows out, the lower the multiplier) Methods: Use I-O models and/or multipliers
Restoration	Land management contractors; hydrologists		
Sustainable Production			
Fish	E.g. Fishers	Also jobs along the supply chain: packers, transformers (fish, furniture, food), distributors, retailers, shops	
Timber	Foresters		
Agricultural crops	Farmers on site and in vicinity (pollination)		
Integration into Sectors, Activities and Policies			
Tourism	E.g. Guides	Recreation and tourism infrastructure & services; hotels, transport, restaurants; Health centres and spas; Construction, capital goods Publishing, product innovation	
Recreation & Health	Sports trainers; wardens		
Climate Change	Land and marine area management, contractors		
Research & Innovation	Scientists & teachers		

Source: own representation

B. What is the current state of knowledge?

The full implementation of the Natura 2000 network (estimated to cost €5.8 billion/year) has been **estimated to support 104,000 direct jobs** in protected management and conservation activities and **174,000 jobs in the EU if indirect and induced jobs are also included**. These job estimates by ICF have been presented in the Nature Directive REFIT (Milieu et al., 2016). The state of knowledge is patchier for the wider sector benefits, and where assessments have been made, these can be particularly sensitive to assumptions. Following are key points as regards the state of knowledge, presenting also the number of the total jobs in the sectors to provide a context for the Natura 2000 related jobs.

- **Fisheries:** There are 149,000 fishermen and women in the EU, representing 110,000 full time equivalent (FTE) jobs. There is yet no information on how many jobs are directly or indirectly dependent on Natura 2000 network and associated protection measures.
- **Agriculture:** It has been estimated that 1.3 million of the 9.6 million farming jobs in the EU are linked directly or indirectly to Natura 2000 (Bio Intelligence, 2011). This was, however, a first estimate, which did not distinguish between jobs that are contributing towards Natura 2000 conservation objectives and those that are not, and additional analysis is needed.
- **Forestry:** Of the 3.5 million jobs in the sector, a first estimate suggests that Natura 2000 supports 73,000 jobs (Bio Intelligence, 2011). As this is a first estimate, additional assessment is needed.
- **Tourism:** Tourism employs 12 million people in Europe. Of these, 3.1 million have links to protected areas and 9.8 million to 2 million explicitly with Natura 2000 (Bio Intelligence, 2011).
- **Health:** There are 8.8 million jobs in the health sector. Currently, there are only case examples of jobs in Natura sites focusing on preventative health measures and care, but no systematic assessment or aggregate. There is significant additional potential to develop Natura 2000 sites as health hubs (ten Brink et al., 2016).
- **Climate mitigation and adaptation:** Natura 2000 sites offer major benefits in carbon storage, sequestration as well as adaptation to climate change through, for example, urban cooling. There is, however, no measure of the scale of employment linked to this policy objective. Some of the jobs will be found in protected areas management and hence conservation jobs can be seen as offering wider public benefits.
- **Research and innovation:** The number of scientific publications on Natura 2000 and ecosystem services has been rising quickly. Furthermore, there are increasing applications of bio-mimicry and bioprospecting supporting innovation and growth. There is yet little data on the number of jobs supported in this area, and to what extent they benefit directly from the biodiversity in the Natura 2000 network. However, this is expected to be a growth area.

For some sectors, many of the total jobs in the sector can be seen as directly dependant on Natura 2000 ecosystems and the associated ecosystem services – nursery functions for fisheries, genetic diversity and pollination for agriculture, clean air and amenable climate for health, and attractive landscapes and marine environments for certain types of tourism. An erosion of our natural capital will put pressure on the viability of these jobs. For other sectors, there is arguably less dependence on Natura 2000, despite onsite benefits (e.g. forestry, aquaculture, intensive agriculture). Moreover, in other sectors, Natura 2000 related jobs, while leading to societal benefits, might even undermine other jobs – for example if and where preventative health care displaces treatment-based healthcare. In the latter case, this does not immediately imply a net loss of jobs, as the monies saved on avoided health care costs can be directed towards job creation, if so wished.

There have however been few estimates of the scale of direct and indirect employment benefits for the sectors at an EU-wide level and most evidence has been on the site, case study level, with some country specific extrapolations. The state of knowledge is presented sector by sector below, focusing first on the jobs in Natura 2000 management and restoration, then on the sectors where Natura 2000 allows sustainable production, then the area of sector or policy integration, and finally on the use of the EU budget.

Jobs in Natura 2000 management, restoration and sustainable development

Type of jobs associated with biodiversity conservation and restoration activities in Natura 2000 sites

The management and restoration of Natura 2000 sites requires a wide range of physical and practical interventions, many of which are achieved through the continuation of existing appropriate land use activities, such as low intensity traditional farming or forestry, thus supporting existing jobs in these sectors. However, some practical management measures, and especially restoration activities, require additional specialists and this creates further jobs such as for ecologists, conservation managers, ecological consultants, engineers, hydrologists etc. In turn, jobs amongst suppliers of goods and services to support farming, forestry, engineering and research operations etc. are indirectly created. Therefore, in practice, conservation and restoration activities within Natura 2000 sites create a very wide range of jobs. This is without consideration of other indirectly created jobs in the tourism sector etc., and induced jobs through increased spending, as further described below.

EU-wide estimate

The employment effects of achieving the aims of the Natura 2000 network have been estimated based on jobs created per unit of expenditure on nature conservation combined with an estimate of the annual costs of full implementation of the Natura network in the EU-27 of at least €5.8 billion per year. On this basis, the full implementation of the Natura 2000 network would be expected to support 104,000 direct FTE jobs in the conservation of Natura 2000 sites, and a further 16,000 indirect FTE jobs among suppliers and contractors providing supporting goods and services.

Estimating Direct and indirect jobs from expenditure on Natura 2000

Expenditure required for the Natura 2000 network was estimated at €5.8 billion – based on questionnaires to Member States (Gantioler et al. 2010).

Wage costs account is around 50% of the costs of implementation (Rayment et al. 2009). This implies that €2.9 billion relate to wages.

Natura 2000 wage costs are on average €28,000/year/person (ICF GHK et al. (2012). This leads to the estimate of 104,000 jobs directly involved in nature conservation and restoration activities in Natura 2000 sites.

Indirect and induced effects were estimated to lead to an additional 0.67 jobs per direct job (ICF GHK et al. 2012). This in turn leads to an additional 69,000 jobs, and 174,000 direct, indirect and induced jobs.

Current expenditure on conservation management of the Natura 2000 network has been estimated to support 52,000 jobs (related to €1.72 billion expenditure estimates). For details, see case study 10.

Future potential

As with the current situation, no detailed information appears to be available on the expected trends in jobs resulting from the management and restoration of the Natura 2000 network. However, it is well documented that funding of the Natura 2000 network is inadequate (Kettunen et al, 2011; Kettunen et al, 2016; Milieu et al, 2016) and a significant proportion of the network is in an unfavourable conservation status (EEA, 2015). Therefore, an increase in jobs associated with the management and restoration of Natura 2000 might be expected if increased investment is made to achieve the aims of the Nature Directives. In the longer-term, employment levels may then decline as one-off or intermittent restoration related actions are completed.

Agriculture

Agricultural activity in Natura 2000 can benefit many European protected habitats and species, and in many cases, agriculture is necessary to maintain them in favourable conservation status. Without the Natura 2000 designation and the requirement to maintain management for these habitats and species, agricultural activity in many of the sites would be abandoned, whilst on some sites agricultural activities would be intensified and cease to benefit nature.

A significant proportion of the Natura 2000 terrestrial network is targeted at the protection of habitats and species that depend on agricultural activities for their continued existence, including at least 58 habitat types, 62 birds and 200 other species (European Commission, 2014). In the EU-27 (in 2011), agricultural land accounted for 19.9% of the total area designated as terrestrial SCI and 11.5% of terrestrial SPAs, which form the Natura 2000 network. The Natura 2000 network includes 10.6% of the agricultural land in the EU².

The Natura 2000 network therefore contains a wide range of agricultural systems, ranging from very extensive large-scale seasonal grazing of beef cattle, sheep and/or goats, for example on mountain pastures or coastal grasslands, to wooded meadows, to cereal crops rotated with fallow, to intensive irrigated agriculture that maintains protected species in the irrigation channels. In these systems, agricultural activities that can benefit protected habitats and species include for example grazing fencing, mowing and haymaking, maintenance of ditches, hedges, stonewalls, trees and orchards, and cutting of invasive plants and scrub.

Type of jobs related to Natura 2000

Natura 2000 designation and governance will mostly result in the retention or reinstatement of previously existing agricultural jobs (e.g. farmers and farm workers). These jobs will be retained or reinstated because farmers are given additional public subsidies under EAFRD to implement agricultural practices that benefit biodiversity (although this depends on the implementation choices made by the MS/region and the voluntary commitment by farmers). Being located in a Natura 2000 area may also result in priority access to EAFRD investment measures, which in turn may help farmers to remain economically viable. In view of the downward trends of employment in the sector, job maintenance likely implies the avoidance of job losses, which is considered a benefit in this study. Natura 2000 designation may also create jobs arising from the related obligations e.g. in relation to the restoration/maintenance of landscape features on farms (GHK, 2011). In many cases, the costs of (mostly non-productive) investments can be supported under the EAFRD. In addition, the Natura 2000 designation can provide opportunities for the development of agricultural businesses based on extensive management combined with value added products and other diversified activities. Many of these new jobs are indirectly related to agriculture as they are in food processing and marketing, tourism, recreation, and other related sectors. In turn, flourishing agricultural and food businesses associated with Natura 2000 will stimulate the rural economy more widely.

EU-wide estimate

Only one study to date has attempted to estimate agricultural jobs associated with the Natura 2000 network across the EU. The report for DG ENV (BIO Intelligence Service, 2011) estimated that Natura 2000 directly and indirectly supported some 1.3 million FTE jobs in the agricultural sector each year in the EU-27 during the period 2006–2008. This was 11% of the total 11.8 million FTE jobs the study estimated to be supported by Natura 2000 each year. However, the study did not distinguish between agricultural jobs that are supporting the Natura 2000 conservation objectives and those that are not. There is no estimate of the amount of agricultural activity that would be necessary to maintain and

² Utilised agricultural area (UAA)

improve conservation status in Natura 2000, but that is being abandoned or already lost, nor of the associated loss of jobs. As the number of agricultural jobs in the EU has decreased by half since the beginning of the 1990s, a similar proportion has probably been lost within the Natura 2000 sites that do not yet have a fully functioning management plan and support for agricultural management.

Agricultural jobs in Natura 2000 maintained by partnerships with local authorities in Germany

In Germany, local land care cooperatives, most of which are partnerships between the local authority, farmer groups and nature conservation groups, carry out a large share of land management for nature conservation. Three quarters of the German land care cooperatives are engaged in Natura 2000 site management, and more than a third spend most of their time on Natura 2000. A survey of 119 of the 155 land care cooperatives in 2012 found that they work with around 10,000 farmers and 500 shepherds (Metzner, 2013), which represents around 1% of farmers in Germany³. Data on how much of the agricultural land within Natura 2000 in Germany is covered by these arrangements is not available.

Future potential

There have been no EU-wide studies looking at how agricultural employment in Natura 2000 areas is likely to develop. Any such assessment would need to take into account scenarios of future CAP spending and the reform of the MFF (i.e. an IA of MFF reform is needed), and take into account lessons from past contributions (i.e. an evaluation on jobs support in Natura 2000 from CAP is needed; ensuring that the coherence between policies is taken into account).

The level of employment will also depend on the range of initiatives taken by farmers and local, regional, national authorities, as well as on the associated measures. These include not only payments to support rural viability, but also market measures that increase farm incomes from the generation of a price premium using product labels, including: origin labels, quality labels, either by supplying quality ingredients, and other consumer product labels (see box for some existing labels).

The **Estonian label** Liivimaa Lihaveis promotes meat from cattle grazing on boreal coastal meadows, **Riet Vell in Spain** sells organic rice produced in the Ebro delta and other products from Natura 2000 sites (European Commission, 2014).

PDO Pays d'Auge cider and Calvados from traditional apple orchards or **PDO scheme for moor sheep meat** ('Diepholzer Moorschnucke') in Germany are produced on Natura 2000 sites (European Commission, 2014).

³ The German farmers association estimates that there were around 670,000 farmers in Germany in 2013/14. <http://www.die-deutschen-bauern.de/wissen>

Forestry

Forests harbour a very significant proportion of Europe's biodiversity. Some 375,000 km² of forests are now included in the Natura 2000 Network and overall around 50 per cent of the network is made up of forests. Almost 25 per cent of all EU forest area is included in Natura 2000.

Type of jobs related to Natura 2000

Natura 2000 creates direct and indirect jobs linked to the management of forests, including planning, surveillance, monitoring and warding; scientific personnel and guards; restoration and active forest management; as well as guides, information and communication staff. Other jobs may be created in relation to the production and processing of wood and non-wood products, hunting, and recreation in Natura 2000 forests.

EU-wide estimate

Forest-based industries provide nearly 3.5 million jobs across over 400,000 companies (European Commission (2013) – some of these are linked to Natura 2000. At EU level, a first attempt to estimate employment supported by Natura 2000 in different economic activities provides an estimate of **73,174 FTE jobs/year in Natura 2000 in forestry activities** (Bio Intelligence Service, 2011).

Cork oak forests in Portugal and Spain

Cork oak forests are of crucial importance to the economy and ecology of several Mediterranean countries. Cork oak forests cover almost 1.5 million ha in Europe. Portugal has 34 % of the world's area and Spain is the second country in terms of cork oak forest cover, with 27 % of the total world's area. The number of companies in the Portuguese cork industry increased by around 12 % from 2011 to 2014 and presently the cork sector in Portugal totals nearly 670 companies hiring together 8,295 workers at national level. The main production activities are preparation and manufacturing - production of cork stoppers, agglomeration and granulation. Around 40 million cork stoppers are produced per day in Portugal. Around 1441 jobs are supported on site (in the forests) and an additional 1189 FTE/year through the cork manufacturing offsite. There are also jobs in transformation, distribution and sales (not estimated). For details, see case study 3.

Cork oak forests in Natura 2000	Annual cork production	Workers in the forest	Workers in cork manufacturing	Total direct jobs
360,263 ha	39,628,930 kg	1,441 FTE/year	1,189 FTE/year	2,630 FTE/year

Source: own estimate

Employment related to forestry and Natura 2000 is, however, also an area of trade-offs. For example, in Sweden, a decrease in forest sector employment in and around protected areas in 15 mountain municipalities was detected in the years 1991–2001 (Lundmark et al., 2010). The number of people employed in the forest sector in the protected areas considered in the study decreased from 315 in 1991 to 155 in 2001. The same study however detected an increase in the tourism sector in these areas (from 197 people in 1991 to 237 in 2001). This underlines the need for a transparent analysis of jobs gains and losses and of the measures that can be put in place to manage transitions.

EU financing has been proven to create jobs in forestry linked to Natura 2000 sites. Many LIFE Natura projects (over 55 projects between 2005 and 2014) have specifically addressed the conservation and restoration of forest habitats and species in Natura 2000 as a main target. These projects co-finance the personnel required for the implementation of conservation measures.

Future potential

Finally, forest conservation and restoration is likely to face increasing support for employment in associated measures given the climate change mitigation and adaptation benefits and policies.

Fisheries

EU-wide estimate

European fisheries directly employed just over 149,000 fishermen in 2013 (110,000 full-time equivalents, FTEs), with significant geographical variations. Five EU MS fleets employed 77% of the total EU fishermen, with the Spanish fleet employing 22%, followed by the Italian (18%), Greek (17%), Portuguese (12%), and UK (8%) fleets (STEF, 2015). Although fisheries have relatively limited importance for the EU economy at large, the sector has a local cultural and historic importance that few other sectors can match. Many key fish stocks in the EU are still in very poor state due to, primarily, overfishing, creating medium and long-term risks to fishers' livelihoods.

In many cases, areas within European MPAs that are closed from fishing, whether Natura 2000 or not, have been shown to improve catches around their borders, thanks to an improved state of the targeted stock and spill-over (see, e.g. Goñi et al., 2008; Vandeperre et al., 2011; Garcia-Charton et al., 2013; Di Franco et al., 2014). This can benefit fishery-related jobs. Time-scale is however important. In the long run, there is little doubt that an improved status of stocks thanks to regulated fishing will positively influence our ability to fish in the future compared to a business-as-usual with high fishing pressure. In the shorter term, limiting certain types of fishing or fishing for certain species will naturally have different impacts on different fishery-related jobs.

Empirical analysis of spill-over of lobster from the Columbrete Islands, Spain

The Columbrete Islands are designated as a Specially Protected Area of Marine Importance under the Barcelona Convention since 2001 (World Database on Protected Areas (WDPA), 2016). In 2010, Goñi et al. showed that the harvested spillover of lobster around the Spanish Columbrete Islands no-take area offset the loss of yield of foregone fishing grounds within the site. The mean annual net benefit was 10% of the catch in weight (although not in number of lobsters). The study was based on scientific tag-recapture data gathered between 1997 and 2007. The authors also found that effort concentration along the site boundaries limited the spatial extent of spillover.

Future potential

The level of employment in fisheries depends on the technology and labour intensity of the fishing activity, the quantity and quality of the stock, and demand. An improved state of the marine environment overall will be positive also to commercially harvested species and thereby also to a sustainably operated European fishing sector in the medium to long term. Protected areas such as Natura 2000 sites are one tool that, with the appropriate management and regulations in place, is helping to deliver such improvements.

Tourism and Cultural Heritage

Type of jobs related to Natura 2000

Protected areas are popular tourist destinations and as such are linked to a range of employment opportunities on site (visitor centres and shop, on-site activities) and off-site (e.g. hotels, restaurants, transport).

EU-wide estimate

The tourism sectors employ around 12 million people in Europe and one of five jobs in the services sector is linked to tourism⁴. For the EU-27, GHK (2007, p.34) estimate that around 1.59 million FTE are directly linked to environment related tourism. By considering indirect and induced jobs, this figure amounts to 3.32 million jobs.

Analysis has subsequently focused more explicitly on the question as to Natura 2000's role in the tourism-environment link. A 2011 study (Bio Intelligence 2011) estimated that **Natura 2000 sites supported on average 3.1 million jobs in tourism each year in the period 2006 – 2008**. Visitors who have affinity with Natura 2000 supported from 800,000 to 2 million FTE (Bio Intelligence, 2011)⁵. **This represents about 12% to 23% of tourism related employment.**

Employment in Natura 2000 sites can, if not managed properly, lead to pressures on the site (e.g. land degradation or habitat disturbance). This implies that there are trade-offs to take into account. On the other hand, employment creation through tourism can itself be a balancing item in the trade-offs associated with site designation – e.g. where there are opportunity costs of the site management.

Estimating benefits of Natura 2000 designation in Lille Vildmose, Denmark

This study looking at the Lille Vildmose, an active raised bog in Denmark, considered the impacts that Natura 2000 designation could have on employment on the local area. The study considered that designation would result in the phasing out of some industries including peat mining and farming, but these could be compensated with employment in new sectors. They concluded that designation could create 100 local jobs, particularly in tourism and the promotion of local agricultural products (ten Brink et al, 2002).

Future potential

Eco-tourism has been a growth industry and with additional investment in management, awareness and infrastructure for access and associated measures to manage pressures, it is likely that Natura 2000's role in European tourism will increase in the coming years.

⁴ http://ec.europa.eu/eurostat/statistics-explained/index.php/Tourism_industries_-_employment

⁵ The affinity of a visitor with Natura 2000 refers to both the level of awareness and interest of a visitor in visiting sites with Natura 2000 designation. A visitor has affinity with a Natura 2000 site when he places value in Natura 2000 designation (Bio Intelligence, 2011).

Recreation

Type of jobs related to Natura 2000

Protected areas, such as those within the Natura 2000 network, are ideal locations for many recreational activities. Different attributes of the natural environment, such as topography, elevations, vegetation, climate, wildlife, water bodies etc. can support recreation, which might not be possible, or as desirable, in the built environment. Recreational activities include those both inside and outside one's normal environment, which are often but not always linked with tourism.

EU-wide estimate

One study estimated the economic benefits of walking related trips to the Welsh countryside and coastline in 2009 (Bryan et al, 2011). These accounted for 16% of gross value added in the Welsh tourism sector, and accounted for 11,980 FTEs in Wales, including 110 FTEs in the recreation sector.

As regards marine related recreation, marine and coastal Natura 2000 sites can be used for recreational fishing, an activity carried out by 8 million people in Europe (Hyder et al., 2014). The designation and management of marine Natura 2000 sites can make marine areas more attractive for recreational users by improving the condition of marine ecosystems. In addition, the so-called designation effect (the increase in the appeal and reputation of an area due to its designation as a protected site) can increase the attractiveness of marine areas, thereby creating new job opportunities for sectors providing goods and services to recreational users.

Cabo de Palos, Spain - Increasing diving through MPA designation

García-Charton et al. (2013) show how the number of dives in Cabo de Palos MPA in Spain (designated in 1995) has increased by 225% between 1998 and 2010, which has resulted in a local added value of €870,000 per year and an additional 20 local jobs.

Wild fishing in Wales - EU funding for Natura based recreation

The Wild Fishing in Wales project had a budget of €3 million of which €1.36 million came from the ERDF funding. The aim of the project was to maximise the economic value of wild fishing in Wales and to enhance the ecological function of the sites where this recreational activity can take place. The project developed a range of employment opportunities, including direct employment for 30 angling guides and a dedicated project manager. Indirect employment was not assessed in the project, but opportunities were expected in angling clubs, private fisheries, as well as site maintenance (Brandl, 2011).

Future potential

There have been no assessments on the future recreation related job creation in Natura 2000 network. An ex ante assessment of how EU funds could be used to support this would offer added value.

Health

The health sector represents 10% of EU's GDP, 15% of public expenditure and 8% of employment (around 8,835,000 jobs) (Eurostat, 2015). "Health" is defined by the WHO as "a state of complete **physical, mental and social well-being**..." (WHO, 1946) and the Ottawa Charter for Health Promotion supports the use of nature for health and wellbeing (WHO, 1986).

Type of jobs related to Natura 2000

The links between ecosystem health and human health are many and varied. These include **direct physical and mental health effects** from accessing nature (ten Brink et al. 2016) as well as "**wellness**" benefits, avoiding **disease through the biocontrol** roles of ecosystems (Keune, Martens, Kretsch et al., 2014), via **modern and traditional medicines** that build on the genetic materials in Natura 2000 sites (Newman et al., 2008; Cox, 2009; Chivian and Bernstein, 2008).

EU-wide estimate

There are no EU-wide estimates of the employment benefits from the health-nature interface, but there is a growing number of case examples showing that the EU's 28,000 protected areas can be seen as "health hubs"—e.g. the Kuopio, Moved by Nature Programme in Finland, Pembrokeshire Walkability and Exercise Referral in National Parks in the UK, the Lake Hévíz, Hungary's Unique Thermal and Medicinal Lake, the Slí na Sláinte – Path to Health – in Ireland, and Hajnówka, the Land of the Bison and Primeval Forest Nordic Walking Park in Poland.

Secovlje Salina Nature Park: Wellness and Natura 2000, Slovenia

Secovlje Salina Nature Park in Slovenia has a spa in its grounds, which uses treatments derived from the park including saltpan mud and brine, to boost the immune system and improve overall health. Lepa Vida Thalasso Spa is an outdoor spa and opens only for the summer period due to regulations laid out by the park. In the summer, it employs 25 people, including 20 therapists.

There has also been a growth in 'wellness centre forests' in Europe (e.g. Hotel Forsthofgut's waldSPA in Austria), that offer guided forest bathing and barefoot forest walking paths (Spafinder, 2015). Armathwaite Hall, located in the Lake District, UK, has a forest bathing spa package (Armathwaite Hall, 2016) and the Miramonti Boutique Hotel in Italy also uses "forest therapy" as part of its spa, with a guide leading it (Miramonti Boutique Hotel, 2016). As these are quite novel partnerships between the nature and wellness sectors, employment numbers are not yet available.

Future potential

There are no studies on the potential of health-Natura associated employment at the EU or national level, but the recognition that protected areas can be used as "health-hubs" is increasing (ten Brink et al., 2016). The growth in health related activities, underline that demand is growing and can continue to grow as the evidence of the benefits mounts.

Significant growth in using preventative measures (e.g. exercise in green spaces to reduce obesity and implications such as diabetes) could lead to reduced expenditure on treatment and hence reduced employment in the health care sector. However, this does not necessarily imply a net reduction of jobs in the economy, as the health expenditure savings can be targeted at other issues. The net effect therefore will depend on the labour intensity of the substitution spending.

In terms of funding, most of the major EU funding programmes can be linked to recreational activities to a greater or lesser degree. For example the EARDF and ERDF, could support recreational activities to support regional competitiveness or diversification of a rural economy. Likewise, EMFF could support a shift of fisheries activities to marine recreation.

Natural Risk Management, Climate Change Adaptation and Mitigation

Type of jobs related to Natura 2000

Protected areas, including Natura 2000 sites, play an important role in providing ecosystem services such as flood control or coastal protection, addressing urban heat islands through green spaces, or stabilising land to protect against landslides and other natural risks. Protected areas also contribute to capturing and storing carbon on land (e.g. peatlands, forests) and in the coastal and marine environment (e.g. marshlands, seagrasses). Thus, employment opportunities arise in all activities that protect and improve the ecosystem services generated through Natura 2000 sites.

Mainstreaming activities to address climate change in the different sectors can be based on existing skillsets. The type of jobs are therefore typically similar to the ones mentioned above on managing Natura 2000 sites, in restoration activities (e.g. to restore floodplains) and cover all ranges of skills from manual labour to specialised professions such as engineers and planners. However, some scope exists for further skills and associated jobs that are needed for example for mapping ecosystem services (e.g. in urban environments to address heat stress of urban populations) or for ecosystem-based approaches to address coastal risks such as erosion (e.g. beach nourishment).

EU-wide estimate

Due to the close integration of climate change related actions, especially with regard to adaptation, into existing sectoral approaches, it is methodologically not straightforward to assess the job generation potential quantitatively and currently there exist no EU-wide estimates. As several relevant activities and jobs can target different aims simultaneously (e.g. habitat restoration to improve biodiversity and at the same time to support ecosystem services such as carbon storage), there exists a risk of double counting. Furthermore, previous assessments indicate that the magnitude of job generation is highly site-specific and depends on many local, organisational and other factors.

Future potential

The job generation potential of climate change related activities is potentially large, as climate risks, together with an increasingly urban population in Europe, will call for increased efforts. While adaptation activities are aiming for addressing the risks, they can provide an opportunity to greening jobs, for example through ecosystem-based approaches where Natura 2000 sites can be integrated in risk mitigation strategies, in both urban and rural settings.

Linking climate change adaptation, biodiversity and jobs in priorities of EU Member States

Climate change adaptation strategies in EU Member States increasingly acknowledge the role of nature for addressing extreme weather events and climate risks. In some cases, the strategies go a step further and explicitly draw the link to jobs.

For example, in **Portugal**, the National Climate Change Adaptation Strategy recognises the importance of biodiversity, including Natura 2000 sites, to address climate risks, including their role for reducing the impacts of climate change on the economy and on employment.

In **Spain**, the Third National Plan for Climate Change Adaptation refers to integrating adaptation concerns into a wide range of sectoral policies, including biodiversity policy, to address the impacts on the sector and wider impacts to the economy such as the protection of coastal zones.

A large potential also exists for capturing and storing carbon in terrestrial and marine ecosystems. Related restoration and management activities (e.g. in forests, peatlands and grasslands) are linked to both temporary and permanent jobs for monitoring and maintenance. The job potential arises both from a qualitative improvement of Natura 2000 sites (i.e. enhancing the ecosystem services delivered) and quantitatively from a designation of further sites, especially in the marine environment.

Urban and Regional Development and Regeneration

Type of jobs related to Natura 2000

Protected areas have the potential to provide opportunities in regions that are economically disadvantaged due to for example their remoteness or due to decline resulting from economic restructuring. As in the case of climate change adaptation or mitigation above, the related types of jobs will be of a similar kind to those needed when managing and restoring ecosystems to provide an enabling environment on which other activities can build. Again, all skill levels are of relevance and activities can take place in urban, sub-urban or rural settings.

EU-wide estimate (or key MS or case if no EU-wide estimate)

Investments into Natura 2000 and wider green infrastructure in regions of economic decline can take place at different scales. At neighbourhood and local levels, investments into green spaces can provide direct jobs as well as support social cohesion and integrate communities. Urban Natura 2000 sites can also be a hub for further developing green, biodiversity-rich infrastructure. Related jobs can be found in traditional sectors such as gardening or green space management but also in new solutions for green corridors, and green roofs or walls as integral elements of green infrastructure.

On a larger scale, investments into biodiversity and restoration of ecosystems can be a nucleus for further activities that regenerate regions in decline and provide new opportunities. Recent examples from EU member states such as the establishment of the Hoge Kempen National Park in Belgium in a former coal-mining region (400 full-time jobs equivalents), or the even larger approach to ecosystem restoration in the German Emscher Region, show that investments can bring jobs in different sectors. This applies in both the construction and in the operation and maintenance phase, including knock-on effects in other sectors.

Emscher Landscape Park, Germany

The Emscher Landscape Park (ELP) is one of Europe's largest ecosystem restoration projects. The project is comprised of a river revitalisation programme and over 400 green infrastructure projects. Generating employment in the region was a key objective of the project, particularly in light of the de-industrialisation and decline of the coal and steel sectors, which had previously defined the region. Investments of €4.5 billion led to the creation of 25,847 direct, indirect and induced jobs in the state of Nord Rhine Westphalia in the period 1991-2007. 48,884 direct, indirect and induced jobs were created across Germany for the same period. Input-output models and macro-economic modelling applied in a study of employment benefits linked to the ELP carried out in 2013 provides insights for assessing benefits of ecosystem restoration. Whilst not explicitly a Natura 2000 site, the ELP can help to support argumentation and analysis of future assessments of the value of ecosystem restoration. For details, see case 5.

Natura 2000 sites can be an important element of branding of strategic regions to display the specifics and strengths. Such branding efforts can take a general form, for example incorporating characteristic landscapes or emblematic species, but can also be of a more specific nature, for example when developing regionally denominated products. An entire value chain can be built around the quality of the natural environment. As these activities are typically integrated into certain sectors, including Natura 2000 management, separate numbers on the job creation are not available.

Future potential

There exist many opportunities for using nature-based approaches to stimulate economic activities and generate employment around Natura 2000.

Research, innovation and education

Type of jobs related to Natura 2000

The areas included in the Natura 2000 network can make an invaluable contribution to **research, innovation and education** both on site and off site and support both the creation of new jobs and enrich existing ones. There has been no comprehensive research to date to assess the scale of current and potential future employment benefits; however, a few studies offer some first indications of the benefits of Natura 2000.

The protection of species and ecosystems can provide valuable input to **research, education and scientific knowledge** through monitoring, sampling and analysis activities aimed at developing an understanding of ecosystem functions, habitats and species. For example, there has been a sharp increase in the number of published articles and book chapters that include the words “Natura 2000” from 17 in 2000 to 145 in 2010 and 372 in 2016.

The Natura 2000 network can also provide opportunities for **innovation**. These include both offsite jobs (i.e. laboratory work and product innovation and subsequent markets for products) and onsite field research, for example bioprospecting (the search for and development of new sources of products from nature, including genetic and biochemical resources) and biomimicry (an approach to innovation based on the emulation of nature’s patterns and strategies), see Russi et al. (2016). This results in the creation of new jobs related to on-site research and offsite activities down the innovation chain enabled by Natura 2000 research.

Finally, Natura 2000 areas support **educational** activities both on site (through e.g. “forest schools”, information centres, school visits) and off site (through educational activities related to biodiversity and ecosystems). This can generate jobs (e.g. linked to on-site facilities) and enrich the existing jobs of teachers and educators by providing interesting material and ideas.

EU-wide estimate

Currently, no EU-wide estimates are available for jobs in research, innovation and education related to Natura 2000.

Blue Biotech in Europe

One study that looked at future potential is the estimate by (ECORYS, 2014) of the potential of the blue biotechnology industry in Europe. The authors estimate the annual turnover of the sector at between €302 and 754 million and the employment created at between 11,500 and 40,000 jobs (most of which are high-end jobs). According to the authors, the sector could generate up to 10,000 additional jobs in 5 years if supporting policies are put in place. The potential growth and employment generation related to the blue biotechnology sector are per definition dependent on the availability and state of marine genetic biodiversity.

Future potential

The richness, diversity and uniqueness of biodiversity (ecosystems, species and genes) in Natura 2000 sites, is still a largely untapped source of knowledge with benefits for research, innovation and education. Nature, with over a billion years of “experimentation” via evolution, is a living laboratory and “living library of life”. However, there is very limited research on the future job potential related to Natura 2000 areas and this evidence gap needs to be addressed.

The Role of EU Funding: LIFE+

LIFE is the EU's financial instrument supporting environmental, nature conservation and climate action projects throughout the EU.

What type of jobs related to Natura 2000 does the fund support?

LIFE Nature projects aim to support the development, implementation and management of the Natura 2000 network in particular by applying, developing, testing and demonstrating approaches, best practices and solutions. They are usually focused on concrete conservation measures aimed at maintaining or improving the conservation status of species and habitats for which sites are designated. Projects for improving the management and/or for restoring sites of the Natura 2000 network are therefore the first priority for LIFE Nature funding.

EU-wide estimate

LIFE Nature has co-financed over 1,500 projects from 1992 to 2014, contributing approximately € 1.5 billion to nature conservation in the EU (LIFE Programme website). During the period 2014–2020, around € 2.6 billion are allocated to the sub-programme for environment. At least 81% of the total budget shall be allocated to projects supported by way of action grants or, where appropriate, financial instruments. The first LIFE Multiannual Work Programme covering the period 2014–2017 foresees a budget of € 610,068,900 for the priority area Nature and Biodiversity (European Commission, 2014).

For projects carried out from 2007 to 2014, the Commission has promoted the collection of a number of performance indicators in an ad-hoc database prepared with the collaboration of LIFE projects' managers. The **LIFE Programme Indicators database** includes information about socio-economic indicators as the jobs created by the projects. The project managers are requested to provide information about the number of project-related jobs expressed in full-time equivalents (FTE): 'at the beginning of the project'; 'at the end of the project', i.e. the total project period; and c) 'after the project, i.e. five years after the end of the project.

2,904 FTE jobs were directly supported by a sample of 281 LIFE Nature and Biodiversity projects targeting Natura 2000 sites. This represents about **10 jobs per project** during the projects duration. Around half of these jobs are maintained 5 years after the end of the projects, according to the information reported by the project managers.

Table 1: Analysis of LIFE Nature projects during 2007–2014 period

Number of projects	Total cost	Number of jobs		
		At the beginning	During the project*	5 years beyond
281	833,277,688	647	2,890	1,459

*Annual average FTE

Future potential

LIFE provides over 610 million Euro for the priority area Nature and Biodiversity in the period 2014-2017 (first LIFE Multiannual Work Programme). As LIFE co-finances 60% of the project costs in Nature projects, a total of € 1000 million will be invested in Natura 2000 over this period. It can be estimated that LIFE can support around 3,500 direct jobs (annual FTE) related to Natura 2000 and biodiversity conservation in its first Multiannual Work Programme (2014-2017). This could represent 5,900 FTE jobs considering also indirect jobs (using a multiplier of 1.7).

Key outcome indicators for LIFE projects are reported from 2015, including jobs. This allows a regular assessment of jobs supported by LIFE that can help in mid-term and ex-post evaluations of the societal impacts of the LIFE Programme.

LIFE projects report about personnel costs linked to the actions implemented, which could allow estimating the direct jobs supported under different project activities. External assistance can also provide personnel for the implementation of the project actions and needs to be taken into account when calculating project-related jobs. Indirect jobs are however difficult to assess as this information is not available from LIFE projects reporting and is not included in the Outcome indicators.

Under the new LIFE Programme (2014-2020), LIFE project funding will also be provided through innovative financial instruments. The LIFE Environment sub-programme contributes to one such instrument, the pilot Natural Capital Financing (NCF) financial instrument, which falls under the Nature and Biodiversity project area and will help finance biodiversity projects, amongst other things.

EU Funding: The wider MFF

What type of jobs related to Natura 2000 do the other funds support?

The investment from different sectoral funds can support both direct and indirect employment opportunities. Direct opportunities are created by expenditure on different on- and off-site management activities required to achieve the conservation objectives of the network (e.g. restoration). The employment impacts of this type of investment are often short-term, building on project-related jobs or conservation contracts that help to maintain certain land or resource management activities. Indirect impacts can be created for a longer term, as they are linked to the benefits of investment in well-functioning, biodiverse and aesthetically pleasing ecosystems that generate employment and business opportunities (e.g. tourism, sustainable agriculture, fisheries and forestry).

From a thematic perspective, EAFRD investment is targeted to agriculture and related broader rural development whereas EMFF focus to marine and coastal areas (e.g. sustainable fisheries). Both funds allow investment in initiatives that help to shift rural communities towards more sustainable modes of livelihood, including supporting the creation of green jobs. The ERDF and CF investment can support, for example, activities related to climate change adaptation - including those that concern ecosystem-based approaches - and the enhancement of cultural and natural heritage. ESF investment can be used to support activities that link Natura 2000 sites to broader social and economic cohesion in the region. In particular, investment from the fund can function as an “intermediary” to build capacity and skills to take up green employment opportunities, including business opportunities linked to Natura 2000.

There has been no systematic assessments of MFF contributions to jobs, but there are some case specific evaluation examples that help demonstrate the benefits of EU funding – see Wales Coastal Path case.

Evaluating the benefits of the Wales Coastal Path

The Wales Coast Path (WCP) is over 1400 km long and crosses two national parks (Pembrokeshire Coast National Park and Snowdonia National Park), as well as a number of Natura 2000 sites. Following its official opening in 2012, the Welsh Government commissioned a study into its economic impacts in order to assess if it had met targets specified as part of its ERDF funding. Natural Resources Wales carried out the study, which involved telephone interviews with 1600 tourism related businesses, within a 2 km corridor of the WCP path. The assessment demonstrated that 28.2 FTEs were created as a result of the WCP, and an additional 112.1 FTEs may have been created along the entire route of the path.

Future potential

ERDF, ESF and CF seem to have a considerable further potential for financing activities that link the management of Natura 2000 with employment creation. The scope of these funds is limited in terms of creating direct employment on the sites (i.e. they cannot be used to fund ongoing management or monitoring costs). However, they could be strategically used to target one-off investments that help increase site related employment in a long term, such as development of visitor infrastructure linked to business opportunities for tourism and outdoor recreation. Furthermore, emphasising nature-based solutions to a range of environmental and socio-economic issues can help to direct ERDF, ESF and CF investment to Natura 2000 sites, creating temporary project-related employment. For example, with the knowledge on the public health benefits of nature, increasing ESF could be used to fund a range of different public health and social cohesion related initiatives linked to the existing infrastructure provided by Natura 2000 sites.

EAFRD funding is foreseen to continue to play a crucial role for Natura 2000 management and restoration, but it is very difficult to quantify the impact on employment. Further future employment benefits are likely to result from investments in agricultural businesses and product marketing, which may increase if EAFRD moves more towards funding start-up grants, loans and risk insurance.

Compared to the previous EFF, the EMFF has an expanded scope of funding. This provides more opportunities to fund projects for managing the impacts of fisheries to the wider environment, and support the management of marine protected areas either if it relates to fisheries management (as part of supporting the CFP objectives) or to non-fisheries related management (as part of supporting the IMP objectives). Therefore, it has the potential to play a much greater role in the creation and maintenance of sustainable jobs in marine Natura 2000 areas, both in terms of direct site management activities and by creating marine Natura 2000 related business opportunities via economic diversification of fisheries communities.

Even with concrete projects still in the pipeline, the financing provided by NCFE is foreseen to play an integral role in linking biodiversity - including Natura 2000 sites and other protected areas - to financing approaches explicitly aimed at providing return on investment. Employment creation linked to conservation actions and sustainable management is likely to be one key element in this regard.

In general, PAF could offer a strategic tool to explicitly identify opportunities where the management of Natura 2000 could be linked to the wider national socio-economic objectives, including with a view of employment creation in the longer term.

Given the political commitments to better regulation, EU added value and coherence, it is essential that systematic assessments (ex post evaluation and ex ante assessment) of the employment benefits of the MFF are made, while exploring the role that the Natura 2000 network plays in this context. These results are then to be integrated into the ongoing reflection on the design and priorities of the MFF.

C. What methods have been used to calculate the employment benefits and what further assessments are needed?

What methods have been used?

A range of methods has been used in the past to analyse how protected areas can support jobs. Many of these have looked at **employment factors or ratios** - for example, the number of jobs needed to restore a certain ecosystem type or to harvest and process a certain amount of a product – and extrapolated to national, programme and/or EU level. Furthermore, to capture indirect and induced employment impacts, “rules of thumb” have often been applied (e.g. using a typical “multiplier” to derive indirect jobs from direct jobs). Such approaches often refer to previous estimates and multiply the direct jobs generated by a factor to estimate the knock-on effects.

A more structured approach is available in the form of **expenditure-based analyses and multipliers** that use empirical data on expenditures on different goods and services in and around protected areas, for example on accommodation or transport for touristic activities. These expenditures generate direct income and jobs in the area as well as indirect jobs, based on the demand for goods and services linked to the economic activities in the protected area, including for example investments into the infrastructure. Furthermore, through spending direct and indirect income generated in the region, further knock-effects can be derived in the form of induced income and associated jobs.

Input-output models are a further method that has been used in past analyses. Such models provide a snapshot in time of how different sectors (for example agriculture, manufacturing industries, transport etc.) in an economy are interlinked through purchasing goods and services from other sectors and transforming those into products and services that are offered over the market. Increased activities in one sector, for example in nature-based tourism, have impacts on both the demand and supply side. Due to their relatively detailed structure, input-output models can capture the sector impacts in both the sector of interest and in other sectors, offering more insights than expenditure-based analyses.

Computable **general equilibrium models** provide a more accurate picture of an economy. Essentially building on input-output modelling, they allow for a detailed modelling of economic activities of households, businesses, the government sector and accounting for international linkages. The structure of such models can capture the specifics of different sectors (including different industries) and allows for capturing feedback loops within an economy (for example on labour markets). General equilibrium models are in use for assessments in many policy areas, but have not been applied to assess the employment benefits of Natura 2000 so far. While in principle this approach would be favourable, large data constraints and methodological challenges would need to be overcome.

The above methods have in common that they look at economic activities, goods and services demanded and derive from there the related employment. Another approach is a **supply-oriented approach** that analyses statistical data on employment in sectors (for example from official statistical sources) and further data sources (for example from business associations) to assess the share of employment that is supported by Natura 2000 and other protected areas. This top-down approach requires a set of assumptions on how to separate the employment contribution of Natura 2000 from other protected areas and from wider economic activities across relevant sectors.

How should we interpret the results?

While the idea of using an average or a “typical” number appears intuitive, such approaches do not capture the potentially very wide range of employment benefits from similar economic activities on

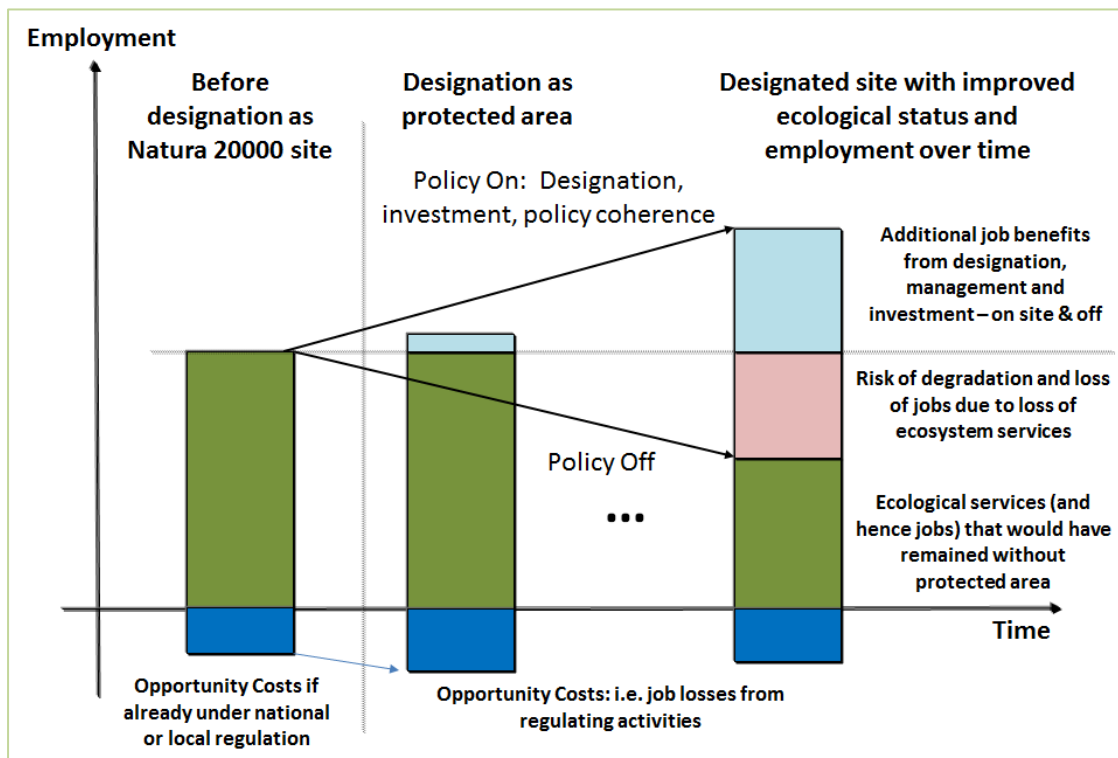
the ground in different Member States. For example, the employment generation potential of restoration activities varies greatly across the localities of the work, also within a country. Taking an average number (e.g. full-time equivalent jobs per ha of a certain landscape restored) and extrapolating on a national or EU-wide level would not produce a reliable number.

Expenditure-based approaches and input-output modelling are more appropriate methods, especially when the focus of the analysis is a local or regional one. When interpreting the findings, however, caution is advisable, for example as regards some implicit assumptions of the approach used, such as the availability of the labour force or inputs in the region in terms of quantity and/or quality. Further important assumptions are that prices for inputs and outputs are fixed and that there exist no capacity constraints. One important caveat of these approaches is that negative feedbacks (e.g. diverting employment from one sector to another through changes of wages) are not accounted for. Thus, especially from an aggregate, national or EU perspective, reliable numbers on employment benefits of activities in and around Natura 2000 sites cannot be derived.

Interpreting results and methods

In employment analysis it is useful to distinguish between **existing jobs that are supported**, **new jobs that are created**, **jobs that are lost** (whether opportunity costs or through structural change), as well as jobs that remain but are changed (i.e. “**change of jobs**” due to regulations as part of the management). Furthermore, it is also important to distinguish between the jobs provided by the ecosystem and those that are incremental, “**additional jobs**” due to opportunities provided by the protection status. On the last point, timescale is important as the protection status safeguards or augments the jobs that the ecosystem provides – see Figure 3.

Figure 3: Natura 2000 related jobs: developments over time



Source: own representation

It is important to assess the **trade-offs** (e.g. reduced forestry related employment and increased tourism – i.e. take into accounts the lower blocks in Figure 3), and not only look at immediate gains and losses. It is also necessary to **integrate longer timescale** and take into account avoided jobs losses from degradation of services and also potential employment benefits from eventual use of savings (e.g. where associated with savings from health care).

There is a need to **avoid double counting**. For example, jobs associated with the management and restoration of protected areas are often the same as those that could be considered for climate mitigation and adaptation.

It is sometimes difficult to **“allocate” jobs to Natura 2000 or to other issues**. For these, it is important to **note explicitly assumptions and provide ranges**.

Methods

The state of Natura 2000 sites varies significantly across the EU and **one cannot simply scale up using jobs per area or jobs per site bases**.

Expenditure analysis linked to assessment of the share of expenditure related to wages, combined with wage rates is a better means of calculation. This approach can be used for assessing local employment benefits and is less suitable for national or EU-wide assessments.

Input-output models can help with assessing the multiplier effect and hence induced employment values. However, input-output models also have their limits, for example in capturing crowding out effects in other sectors of the economy.

In principle, many of the above concern could be addressed within **general equilibrium models** that capture the feedback loops in an economy. However, data availability and practical challenges, for example of delineating employment supported by Natura 2000 sites, by other protected sites and by natural spaces generally, currently do not allow for the use of general equilibrium models for an assessment of the employment benefits of the Natura 2000 network overall. They could be applied to some areas such as tourism, but would need further effort on data gathering and adapting the modelling framework.

In principle, top down approaches looking at the percentage share of jobs in a sector (e.g. health, tourism, recreation, forestry, fisheries) can offer useful comparative estimate approaches giving indicative scales of employment. The total jobs in the sector can be combined with survey results on what share of jobs are linked to protected areas (e.g. as part of wider assessment of nature based tourism surveys). Given the methodological issues that all methods face, it is useful to have several different approaches to help provide a range of estimates to scale the benefits of Natura 2000.

D. How can the synergies be realised? The way forward

A first step forward is to have a better understanding on the range of ways in which Natura 2000 network already does and can in the future support employment directly and indirectly. This implies looking at the jobs linked to biodiversity conservation objectives itself, to sustainable productions and to wider sector activities, integration and policy integration (see Figure 4).

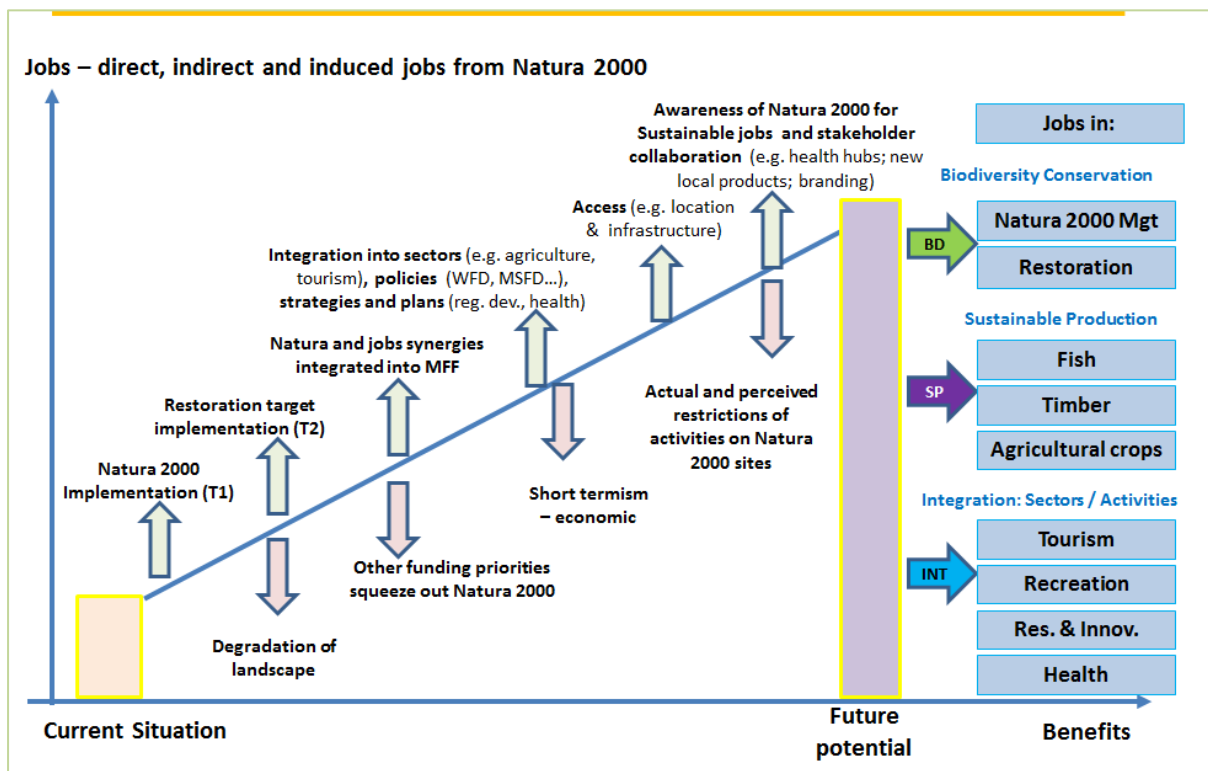
For this, the role of different drivers and barriers to employment need to be better understood and integrated into policy reflections (e.g. ex post valuation, ex ante assessments as well as REFITS) and into EU funding decisions. The MFF has the potential to be an important catalyst for job creation in the EU. Key drivers include:

- **Implementation** of the biodiversity targets and commitments and ensuring due prioritisation and financing.
- **Systematic integration** of nature synergies in other sectors, policies and plans – e.g. by biodiversity proofing and use of other existing tools (SEA, EIA).
- **Improving access and awareness** of the type of activities, benefits and jobs that are possible – e.g. underlining the preventative health care benefits and low cost treatment linked to physical and mental health problems and making use of the nature’s “health hubs”.

It is also important to address the barriers to jobs, including:

- Avoiding the degradation of the landscape
- Avoiding that other funding priorities displace legitimate interests in supporting Natura 2000
- Short termism and
- Debunking some of the myths around regulation of activities on Natura 2000 sites.

Figure 4: Drivers and barriers to future potential



Key: BD: Biodiversity; SP: Sustainable Production; INT: Integration

Source: own representation

While there have been no EU-wide estimates on the number of direct and indirect jobs that could be catalysed or supported by the Natura 2000 network, it is clear from existing trends that:

- A transition to higher **labour intensive, extensive, organic agricultural practices** stand to increase the number of rural jobs supported by agriculture.
- Nature related **tourism and recreation** will be an important future employment sector, most likely growing from its already dynamic base. This would need to respect the “carrying capacity” of ecosystems.
- The viability of future jobs in non-aquaculture **fisheries** will be at risk if there is ecosystem degradation.
- There is major potential for quality jobs related to **scientific research and product innovation** linked to the still to be tapped inherent knowledge in the genes and functions of species in ecosystems.
- With demographic changes, aging and urbanisation, there is potential for many of the 28,000 sites to function as **health hubs**. At one level, this creates jobs – e.g. guides, health workers in nature – and at another it would take jobs – e.g. where expenditure moves from medicinal treatment to preventive non-medical solutions. The trade-off is, however, not quite so simple, as whether this leads to a growth or reduction in jobs depends on the labour intensity of the sectors and activities to which the savings flow.

What are the assessment needs for the future to support the evidence base to inform decision-making?

The EU’s commitment to **Better Regulation** implies understanding the **EU added value**, supporting **policy coherence** and **improving cost effectiveness of implementation**. It also commits to a series of regular **ex post evaluations, REFITS** and **impact assessments** – each requiring the employment aspects to be covered. Therefore, we need:

- **Regular assessment of EU funding contributions** – e.g. EU added value as regards employment, as noted above.
- **Requirements for projects** supported by EU funds to identify jobs on site and off and use EU funding advantage to obtain the evidence base needed for an operational science-policy interface.
- Regular **integration** of the Natura 2000-jobs issues into **policy evaluations** (e.g. ex post assessments, major reviews and impact assessments).
- **Sector assessments** could similarly be useful – i.e. to help understand the real potential for employment in health related activities and what can facilitate this (e.g. infrastructure for the mobility constrained or guides support activities).
- **Investment in data** upon which the above assessments can be built.
- Over time, move **towards natural capital accounting** and **links of jobs satellite accounts** so that a more robust assessment of jobs levels can be made. This will require linked spatial, ecological, social and economic data.

In summary, this scoping assessment underlines that the **Natura 2000 network offers a wide range of direct and indirect jobs** – while a number is linked explicitly to conservation objectives, an even larger number related to on-site and off-site activities enabled by the existence of the Natura 2000 sites.

It will be **important to assess in more detail these links** and ensure that they are **integrated into policymaking, evaluations, project and programme selection and implementation on the ground**.

There remains a need to improve the state of knowledge on the current and potential future jobs from conservation objectives and the various biodiversity targets (notably restoration). The LIFE projects employment analysis offers a useful source of information to build for future assessments.

In the short term, it can be useful to focus particular attention on **assessing jobs linked to EU funds as well as improving the indicators and mechanisms to track job creation.**

While the above focus more on employment from government funding, there is also a need to assess the potential Natura 2000 related employment benefits from sectors and identify where these lead to private sector employment benefits. Here, promising sectors would be **agriculture, tourism, recreation, fisheries and forestry** – care will be needed as regards assumptions for “allocating” jobs to Natura 2000. In addition, it would be important to understand more on the potential job benefits in the **health sector**, i.e. from increasing the use of the Natura 2000 network as health hubs, as this is a key area of potential.

E. Structure of the main report

Part A is a **scoping document** on the state of knowledge that covers the employment benefits in a number of important sectors, also beyond the management of sites, such as agriculture, forestry, and tourism and recreation. Part A follows the below structure.

Report structure: Part A

1. Understanding the Employment Benefits of Natura 2000
2. Jobs in Natura 2000 Management and Restoration
3. Agriculture and Rural Development
4. Forestry
5. Fisheries
6. Tourism and Cultural Heritage
7. Recreation
8. Health Sector
9. Natural Risk Management, Climate Change Adaptation and Mitigation
10. Urban and Regional Development and Regeneration
11. Research, Innovation and Education
12. The Role of LIFE+ Funding
13. The Role of Wider EU Funding
14. Way Forward: Supporting Jobs in the EU via Natura 2000

Part B presents a **methodology summary** on approaches used to assess direct, indirect and induced employment linked to Natura 2000 and methodology recommendations to assess the current and future employment potential and hence help ensure that Natura 2000 and job insights are available for different policy processes in the coming years. Part B follows the below structure.

Report structure: Part B

15. Aims and Objectives
16. Assessments Based on Demand-side Approaches
17. Assessments Based on Supply-side Approaches
18. Lessons Learned from Applying Methods and Recommendations

Part C presents ten case studies that have been developed as part of this scoping study to understand the links between Natura 2000 (and other protected areas) and employment. These cases illustrate how Natura 2000 can support jobs in sectors and show how different methods have been applied to arrive to job estimates, from site-based approaches over expenditure analysis to input-output models. They cover a range of ecosystems and geographies across EU Member States (see Table 2).

Table 2: Case studies included in main report (Part C)

Case	Name	Country	Description
1	Management of Natura 2000 habitats in Serra da Estrela	Portugal	Site-based analysis of job effects of LIFE project on restoring priority habitats
2	Socio-economic benefits of Environmental Stewardship Schemes in England	United Kingdom	Estimating direct, indirect and induced job effects of stewardship programmes based on farm-level surveys
3	Cork oak forests and cork production in Natura 2000	Spain and Portugal	Analysis of direct and indirect jobs generated in production and processing of cork and employment factors based on this analysis
4	Job creation in Southern European Marine Protected Areas	France, Spain, Italy	Job supported through marine protected areas in commercial/recreational fishing and scuba diving
5	Employment Effects of Large-Scale Restoration – Emscher Landscape Park	Germany	Employment analysis of river restoration project based on input-output modelling
6	Secovlje Salina Natura Park and Lepa Vida Spa	Slovenia	Site-based analysis of employment generated through health and wellness activities supported by Natura 2000
7	EU LIFE Programme: Creating Jobs in Natura 2000	EU-wide	Analysis of employment effects of LIFE Nature projects in 2007 – 2014
8	Regional economic contributions of national Parks Through Tourism	Germany	Expenditure-based analysis of tourism-supported jobs in German national parks, with example from Müritz National Park
9	Regional Economic Benefits of Hohe Tauern National Park	Austria	Employment effects of national park management and tourism analysed with an input-output model
10	Expenditure-based EU-wide approaches to calculating jobs linked to Natura 2000	EU-wide	Examining the developments from the Ecotec (2002) study to the GHK (2011) and Jurado et al. (2012) studies

References

- BIO Intelligence Service (2011) Estimating the economic value of the benefits provided by the tourism/recreation and Employment supported by Natura 2000, Final Report prepared for European Commission - DG Environment.
http://ec.europa.eu/environment/nature/natura2000/financing/docs/Estimating_economic_value.pdf.
- Brandl, K (2011) Sustainable Tourism and Nature Conservation – An Investment in our Future. SURF-Nature. Environment Agency Austria. Project funded by Interreg IVC. Available online (accessed 30th September 2016): http://www.surf-nature.eu/uploads/media/Sustainable_Tourism_Thematic_Booklet.pdf
- Cox, P.A. (2009) Biodiversity and the search for new medicine. In *Biodiversity Change and Human Health. From Ecosystem Services to Spread of Disease* (Sala, O.E., Meyerson, L.A., and Parmesan, C., eds.), pp. 269–280. Washington, DC: Island Press.
- EEA (2015) *State of nature in the EU: Results from reporting under the nature directives 2007-2012*. Technical report No 2/2015, European Environment Agency, Copenhagen.
<https://www.eea.europa.eu/publications/state-of-nature-in-the-eu>.
- ECORYS (2014) *Study on Deepening Understanding of Potential Blue Growth in the EU Member States on Europe's Atlantic Arc*. Sea Basin Report FWC MARE/2012/06 – SC C1/2013/02, Rotterdam/Brussels.
- ECOTEC (2002a) EU Eco-Industries: Trade and International Markets, Birmingham. Available online (accessed 28th September 2016): http://ec.europa.eu/environment/enveco/eco_industry/pdf/ecotec_trade.pdf
- Ernst & Young (2006) Eco-industry, its size, employment, perspectives and barriers to growth in an enlarged EU. Report for European Commission, DG Environment. Available online (accessed 28th September 2016): http://ec.europa.eu/environment/enveco/eco_industry/pdf/ecoindustry2006.pdf
- European Commission (2014) *Farming for Natura 2000. Guidance on how to integrate Natura 2000 conservation objectives into farming practices based on Member States good practice experiences*. European Commission, Brussels.
- Gantioler, S., Rayment, M., Bassi, S., Kettunen, M., Conville, A., Landgrebe, R., Gerdes, H., ten Brink, P., 2010. Costs and Socio-Economic Benefits Associated with the Natura 2000 Network – Final Report to the European Commission, DG Environment. Contract ENV.B.2/SER/2008/0038.
http://ec.europa.eu/environment/nature/natura2000/financing/docs/natura2000_costs_benefits.pdf
- García-Charton, J.A., Lorenzi, M. R., Calò, A., Treviño Otón, J., Irigoyen, A., Hernández Andreu, R., Muñoz Gabaldón, I., Marcos, C., Pérez Ruzafa, Á. (2013) Estudios de seguimiento de la reserva marina de Cabo de Palos – Islas Hormigas. Informe producido en el marco del Convenio de Colaboración entre la Consejería de Agricultura y Agua – Comunidad Autónoma de la Región de Murcia y la Universidad de Murcia.
http://www.proyectopescares.com/wp-content/uploads/2014/09/Informe_CPalos_UMU_2013.pdf
- GHK (2011). Evaluating the Potential for Green Jobs in the next Multi-annual Financial Framework.
http://www.birdlife.org/sites/default/files/attachments/2-mff_green_jobs.pdf
- Goñi, R., Adlerstein, S., Alvarez-Berastegui, D. et al. (2008) Spillover from six western Mediterranean marine protected areas: evidence from artisanal fisheries. *Marine Ecology-Progress Series* 366, 159–174.
- Hyder, K., Armstrong, M., Ferter, K., and Strehlow, H. V. (2014) Recreational sea fishing – the high value forgotten catch. *ICES Insight*, 51, 8–15.
- Jurado, E, Rayment, M, Bonneau, M, McConville, A J and Tucker, G M (2012) *The EU biodiversity objectives and the labour market: benefits and identification of skill gaps in the current workforce*. Report prepared for the European Commission, DG Environment, ICF GHK with IEEP, Ecologic, BIO IS and naider.
http://ec.europa.eu/environment/pubs/pdf/biodiversity/Biodiversity%20and%20Jobs_final%20report.pdf
- Kettunen, M, Baldock, D, Gantioler, S, Carter, O, Torkler, P, Arroyo Schnell, A, Baumüller, A, Gerritsen, E, Rayment, M, Daly, E and Pieterse, M (2011) *Assessment of the Natura 2000 co-financing arrangements of the EU financing instrument*. Institute for European Environmental Policy, Brussels, Belgium.
http://www.ieep.eu/assets/791/Assessment_of_Natura_2000_Co-financing.pdf

Kettunen, M, Illes, A, Baldock, D, Rayment, M, Ebrahim, N, Verstraeten, Y, Primmer, E, Rantala, S, Rekola, A and Santos, R S (2016) *Integration approach to financing of biodiversity: evaluation of results and analysis of options for the future*. Final report for the European Commission (DG ENV) (in preparation), Institute for European Environmental Policy, Brussels / London.

Keune, H, Martens, P., Kretsch, C. and Prieur-Richard, A. (2014) Biodiversity and Public Health: An Ecosystem Services Perspective, Ecosystem Service Global Issues, Local Practices, pp.181-189.

LIFE Programme website: <http://ec.europa.eu/environment/life/>

Lundmark, L.J.T., et al. (2010) National Parks and protected areas and the role for employment in Tourism and Forest sectors: a Swedish case. *Ecology and Society* 15 (1):19.

<http://www.ecologyandsociety.org/vol15/iss1/art19/>

Milieu, IEEP and ICF (2016) *Evaluation Study to support the Fitness Check of the Birds and Habitats Directives*. Milieu Ltd, Institute for European Environmental Policy and the ICF International, Brussels.

http://ec.europa.eu/environment/nature/legislation/fitness_check/docs/consultation/Fitness%20Check%20final%20draft%20emerging%20findings%20report.pdf

Newman, D. J. et al. (2008) Medicines from nature. In *Sustaining Life. How Human Health Depends on Biodiversity* (Chivian, E., and Bernstein, A., eds.), pp. 117–161. New York: Oxford University Press.

Nunes, P.A.L.D., Ding, H., Boteler, B., ten Brink, P., Cottee-Jones, E., Davis, M., Ghermandi, A., Kaphengst, T., Lago, M., McConville, A. J., Naumann S., Pieterse, M., Rayment, M., and A. Varma (2011). *The Social Dimension of Biodiversity Policy: Final Report* for the European Commission, DG Environment under contract: ENV.G.1/FRA/2006/0073 – 2nd, pages vii-205, Venice/Brussels, February 2011.

<http://ec.europa.eu/environment/enveco/biodiversity/pdf/Social%20Dimension%20of%20Biodiversity.pdf>

Rayment, M; Pirgmaier, E; De Ceuster, G; Hintberger, F ; Kuik, O ; Gower, H ; Polzin, C ; Varma, A (2009) The economic benefit of environmental policy. A project under the Framework contract for economic analysis, ENV.G.1/FRA/2006/0073 – 2nd. FINAL REPORT, November 2009. Available online (accessed 28th September 2009): http://ec.europa.eu/environment/enveco/economics_policy/pdf/report_economic_benefits.pdf

Russi D., Pantzar M., Kettunen M., Gitti G., Mutafoglu K., Kotulak M. & ten Brink P. (2016) Socio-Economic Benefits of the EU Marine Protected Areas. Report prepared by the Institute for European Environmental Policy (IEEP) for DG Environment. Available Online (accessed 29th September 2016):

<http://ec.europa.eu/environment/nature/natura2000/marine/docs/Socio%20Economic%20Benefits%20of%20EU%20MPAs.pdf>

Scientific, Technical and Economic Committee for Fisheries (STECF) (2015) Annual Economic Report on the EU fishing fleet (STECF-15-07). Luxembourg: Publications Office of the European Union. 434 pp.

ten Brink P., Badura T., Bassi S., Daly, E., Dickie, I., Ding H., Gantioler S., Gerdes, H., Kettunen M., Lago, M., Lang, S., Markandya A., Nunes P.A.L.D., Pieterse, M., Rayment M., Tinch R., (2011) Estimating the Overall Economic Value of the Benefits provided by the Natura 2000 Network. Final Report to the European Commission, DG Environment on Contract ENV.B.2/SER/2008/0038. Institute for European Environmental Policy / GHK / Ecologic, Brussels 2011.

http://ec.europa.eu/environment/nature/natura2000/financing/docs/Economic_Benefits_of_Natura_2000_report.pdf

ten Brink P., Mutafoglu K., Schweitzer J.-P., Kettunen M., Twigger-Ross C., Kuipers Y., Emonts M., Tyrväinen L., Hujala T., Ojala A. (2016) *The Health and Social Benefits of Nature and Biodiversity Protection – Executive summary*. A report for the European Commission (ENV.B.3/ETU/2014/0039), Institute for European Environmental Policy, London / Brussels.

http://www.ieep.eu/assets/2092/Health_and_Social_Benefits_of_Nature_-_Final_Report_Executive_Summary_sent.pdf