EEA Report | No 8/2016

The direct and indirect impacts of EU policies on land

ISSN 1977-8449

European Environment Agency

EEA Report | No 8/2016

The direct and indirect impacts of EU policies on land

European Environment Agency

Cover design: EEA
Cover photos: © www.freeimages.com
Layout: EEA/Rosendahls A/S

Legal notice
The contents of this publication do not necessarily reflect the official opinions of the European Commission or other institutions of the European Union. Neither the European Environment Agency nor any person or company acting on behalf of the Agency is responsible for the use that may be made of the information contained in this report.

Copyright notice
© European Environment Agency, 2016
Reproduction is authorised provided the source is acknowledged.

More information on the European Union is available on the Internet (http://europa.eu).

Luxembourg: Publications Office of the European Union, 2016

ISBN 978-92-9213-731-1
ISSN 1977-8449
doi:10.2800/05464

European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel.: +45 33 36 71 00
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

Contents

Acknowledgements **5**

Abbreviations **6**

Executive summary **8**

Guidance for the reader **15**

1 Introduction **16**

1.1 Developments in land take and land degradation 16
1.2 Drivers and causes of land take and land degradation 18
1.3 The influence of EU policies on land use: an overview 20
1.4 EU policy objectives addressing land take and land degradation 24
1.5 Environmental assessments 26

2 A methodology to assess the impacts of EU policies on land **29**

2.1 An assessment framework 29
2.2 A proposed approach for the analysis and conclusions 32
2.3 Assessing the 'system' of EU policies 36

3 The impact of the EU's main investment policy on land **38**

3.1 Cohesion Policy 38

4 The impact of EU economic sectors on land **47**

4.1 Transport Policy 47
4.2 Energy and Climate Policy 54
4.3 Common Agricultural Policy 60

5 The impact of EU environmental policy on land **69**

5.1 Nature and biodiversity protection 69
5.2 Water management 75

6 Case studies: Spain and Poland **80**

6.1 Spanish case study 80
6.2 Polish case study 89

7 Conclusions 100
7.1 Evidence of impacts 100
7.2 Relevance 100
7.3 Coherence 100
7.4 Effectiveness 101
7.5 EU added value 101
7.6 EU environmental policy 101

References 103

Annex 1 Planning, information gathering and analysis for policy evaluations 113
Structuring 113
Data and information gathering 114
Data and information analysis 114
Synthesis and conclusions 118
References 118

A full description of the two case studies (Andalusia, Spain and Poland) can be found at: http://www.eea.europa.eu/publications/impacts-of-eu-policies-on-land

Acknowledgements

This report has been managed and prepared by the European Environment Agency (EEA) (Gorm Dige) and Milieu Ltd (Tony Zamparutti, Agnieszka Markowska, Guillermo Hernandez and Sandra Planes).

The EEA would like to acknowledge and thank the persons mentioned below for providing comments on and inputs to the draft report. We would also like to thank the 26 participants who took part in the workshop on this project, held on 16 October 2014, for their time and contributions in the form of presentations, commentary, cases and discussions, all of which have made an important contribution to the final version of this report:

- Hedwig van Delden (RIKS, the Netherlands)
- Katrien Debeuckelaere (Legal advisor, Belgium)
- Jacques Delsalle (Directorate-General (DG) Environment)
- Agata Payne (DG Environment)
- Martijn de Bruijn (DG Regional Policy)
- Nicolas Gharbi (DG Regional Policy)
- Carlo de Grandis (DG Mobility and Transport)
- Trees Robijns (BirdLife)
- Piotr Fogel (Institute for Spatial Management and Housing, Poland)
- Jerzy Bański (Institute of Geography and Spatial Organisation, Poland)
- Agnieszka Romanowicz (DG Joint Research Centre (JRC))
- Ewa Woods (Lower Silesia Regional Office, Brussels)
- Maciej Zathey (Lower Silesia Regional Government, Poland)
- Beata Tuszyńska (Ministry of Infrastructure and Development, Poland)
- Katarzyna Chaszczewska (Ministry of Infrastructure and Development, Poland)
- Daniel Baliński (Ministry of Infrastructure and Development, Poland)
- David Evers (PBL Netherlands Environmental Assessment Agency, the Netherlands)
- Clint Marcelo García Alibrand (Environmental Information Network of Andalusia (Rediam), Andalusian Regional Government, Spain)
- Francisco Cáceres Clavero (Rediam, Andalusian Regional Government, Spain)
- Nicola Filippi (Regione Emilia-Romagna, Italy)
- Simone Verzandvoort (Alterra Institute, Wageningen UR, the Netherlands)
- Katharina Peschen (Milieu Ltd)
- Geertrui Louwagie (EEA)
- Johannes Schilling (EEA)
- Stefan Ulrich Speck (EEA)
- Eva Gelabert (EEA)
- Andrus Meiner (EEA)
- Ronan Uhel (EEA).

Abbreviations

7EAP	Seventh Environment Action Programme
AA	Appropriate Assessment
BPS	Basic Payment Scheme
CAP	Common Agricultural Policy
CEF	Connecting Europe Facility
CF	Cohesion Fund
CIS	Common Implementation Strategy
CLLD	Community Led Local Development
CSF	Common Strategic Framework
EAFRD	European Agricultural Fund for Rural Development
EAP	Environmental Action Programme
EAFRD	European Agricultural Rural Development Fund
EAGF	European Agricultural Guarantee Fund
EAGGF	European Agricultural Guidance and Guarantee Fund
EASME	Executive Agency for Small and Medium-sized Enterprises
EC	European Commission
EEA	European Environment Agency
EMFF	European Maritime and Fisheries Fund
ERDF	European Regional Development Fund
EIA	Environmental Impact Assessment
EIB	European Investment Bank
ESF	European Social Fund
ESI fund	European structural and investment fund
ESPON	European Observation Network for Territorial Development and Cohesion
EU	European Union
FAO	Food and Agricultural Organization of the United Nations
FD	Floods Directive
FIFG	Financial Instrument for Fisheries Guidance
FP	Framework Programme
FRMP	Flood risk management plan
GAEC	Good agricultural and environmental condition

GDP	Green direct payment
GHG	Greenhouse gas
GUS	Main Statistical Office of Poland
IA	Impact Assessment
ICT	Information and communication technologies
INEA	Innovation and Networks Executive Agency
ITI	Integrated Territorial Investment
Isocarp	International Society of City and Regional Planners
Jaspers	Joint Assistance to Support Projects in European Regions
JRC	Joint Research Centre
LULUCF	Land use, land-use change and forestry
LUMOCAP	Dynamic land-use change modelling for CAP impact assessment on the rural landscape
LUMP	Land Use Modelling Platform
ND	Nitrates Directive
NGO	Non-governmental organisation
NSRF	National Strategic Reference Frameworks
NVZ	Nitrate vulnerable zone
OP	Operational programme
OSE	Observatorio de la Sostenibilidad en España
PA	Partnership Agreements
PCI	Projects of common interest
PLN	Polish złoty
PoM	Programme of measures
POTA	Spatial Plan of Andalusia
RBMP	River basin management plan
RDP	Rural development programme
Recare	Preventing and remediating degradation of soils in Europe through land care
SAC	Special Area of Conservation
SAPS	Single Area Payment Scheme
SEA	Strategic environmental assessment
SIOSE	Sistema de Información de Ocupación del Suelo en España
SOER	State of the Environment Report
SPA	Special Protection Area
SPS	Single Payment Scheme
TEN-E	Trans-European energy network
TEN-T	Trans-European transport network
WFD	Water Framework Directive

Executive summary

Photo: © Lynn Betts (http://photogallery.nrcs.usda.gov/Index.asp)

The 2011 *Roadmap to a resource efficient Europe* states, in its milestone of actions to address land as a resource, that 'By 2020, EU policies take into account their direct and indirect impact on land use in the EU and globally ...' (EC, 2011d). This report presents a methodology for the assessment of European Union (EU) policies in terms of their land-related implications in Europe and provides an initial testing of the methodology across key EU policies and two in-depth case studies, which focus on Cohesion Policy spending on transport in Poland and Spain.

Trends and drivers

Land take ([1]) for urban, infrastructure and industrial purposes exceeds 1 000 km^2 per year in the EU, with over half of this surface being defined as 'sealed', according to the European Commission's 2011 *Roadmap to a resource efficient Europe* and *The European environment — state and outlook 2015* (State of the environment report (SOER) 2015) thematic fiche on land systems ([2]). Land take is often used as a proxy for soil sealing, which interrupts the contact between the pedosphere and the atmosphere, and thus changes the gas, water and material (including nutrient) fluxes, therefore influencing the natural functioning of soils. Land take is, in turn, also linked to land degradation, in particular via soil sealing, which tends to result in infiltration and soil biodiversity loss. Other land degradation processes include erosion and the loss of organic matter. Land take, soil sealing and land degradation processes affect the delivery of ecosystem services, such as water regulation, food production and carbon retention.

Several underlying causes of land take and land degradation have been identified ([3]). Some of the most important in Europe are outlined below.

([1]) http://www.eea.europa.eu/data-and-maps/indicators/land-take-2.
([2]) http://www.eea.europa.eu/soer-2015/europe/land.
([3]) These draw, in particular, on the report by Mudgal et al., 2014.

- Population: while Europe's population growth is slow overall (and negative in some countries), internal migration, in particular, can lead to an increase in the demand for land use in some parts of Europe, and, at the same time, contribute to the decline of cities and villages elsewhere and the abandonment of farms in rural areas. Migration from outside Europe can also be a pressure for land use, in particular in urban areas. Nonetheless, land take is also seen in EU Member States with overall stable or declining populations, such as Portugal.

- Economic growth and affluence: growth stimulates commercial, industrial and service activities, which, in turn, can fuel demand for construction — and, in turn, land take (JRC, 2013a). Growth, in particular household affluence, influences the demand for food and other land-based products, as well as for larger homes and second homes and, potentially, increases the use of private transport, which, in turn, can influence preferences for housing location.

- Markets and trade: these link EU food production to global demand, and thus can influence agricultural practices and their impacts on land.

- Technological change: this can affect land-related developments in a range of sectors via, for example, changes in the costs of infrastructure and the methods used in agriculture.

- Awareness: along with culture and lifestyle, which influence where people wish to live, the food they buy and more, awareness issues are often addressed as consumption patterns.

- Policy and governance.

This report focuses on the last factor in the above list; in particular, it focuses on EU policies, together with national, regional and local policies, as well as the contexts that influence the implementation of EU policies, and the overall impact of policies and their implementation on land.

Assessing EU policies

EU policies can have a pervasive influence on land in Europe; their impacts need to be considered in terms of Europe's complex, multi-level governance system, from EU to national, regional and local levels. The specific contexts, including the policies and institutions within each Member State, play a key role in shaping the impacts of EU policies.

The methodology presented here uses a conceptual framework that considers the 'chain' of policy documents and actions from EU to Member State level.

Figure ES.1 presents this framework, which incorporates the following elements:

- policy **objectives**, which are the strategic goals and targets that an intervention is seeking to achieve — and which seek to address one or more economic, social or environmental needs;

- policy **inputs**, including instruments such as EU funding, legislative requirements and strategic documents, including their reference (or lack thereof) to land use and assessments;

- policy **outputs** comprising implementation of the policy instruments in the Member States, for example national strategies and programmes and the actual spending;

- sectoral policy **results** in the form of the completed investments; these results are related to a varying degree both to EU sectoral policy objectives and to the objectives on land;

- **impacts**, including intended and unintended impacts, and direct and indirect impacts, of EU policies on land use.

Within this policy framework, and especially at the level of outputs (implementation in the Member States), at least three factors are of crucial importance ([4]):

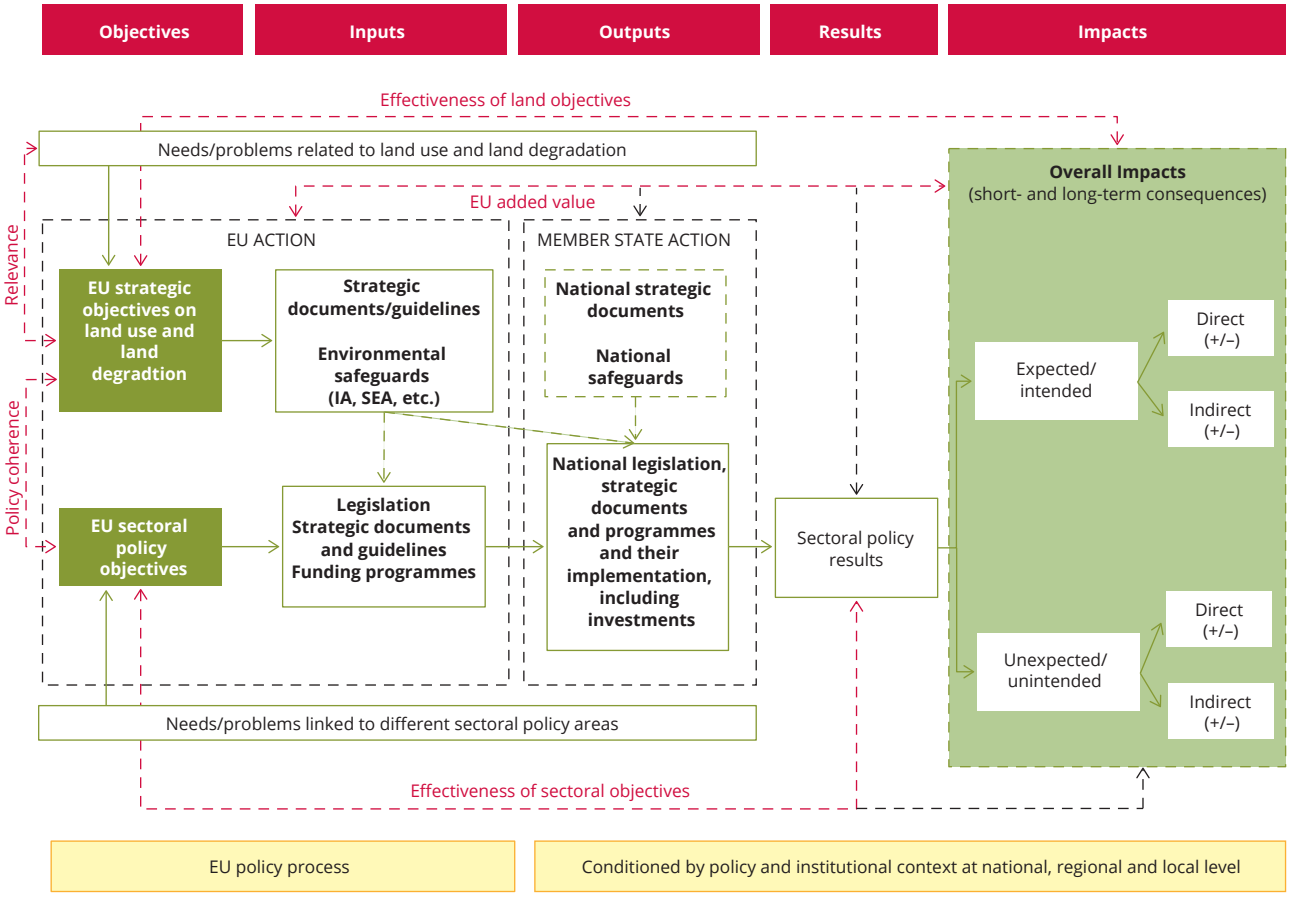
1. the **context** in which these instruments are put in place — which can include a range of national as well as regional and local factors, including the spatial planning framework, key national policies, institutional structure and capacities of government, as well as the role of key stakeholders;

2. **interactions** with other EU policies;

3. the role of **assessment tools**, such as strategic environmental assessment (SEA) and environmental impact assessment (EIA) tools.

([4]) This has been confirmed in both case studies.

Figure ES.1 Conceptual framework for the evaluation of an EU policy's impacts on land



Note: IA: impact assessment; SEA: strategic environmental assessment.

In terms of impacts, these will be direct (e.g. the soil sealing by a new industrial park), as well as indirect (e.g. EU funding support for roads that provide a 'seed' for urban sprawl).

The methodology presented in this study also identifies key steps, data and information sources, as well as methods of analysis for use in the assessment of land-related implications of EU policies. This overall methodology will need to be tailored to the specific objectives (and available resources) that apply to individual assessments.

The EU has established a framework of objectives related to land take and land degradation, through a series of policy documents and, in particular, the Seventh Environment Action Programme. Key elements of this framework include:

- progress towards the target of 'no net land take' by 2050;
- reducing soil erosion;
- increasing soil organic matter;
- remediating contaminated sites;
- integrating land use into all levels of government, including via the adoption of targets on soil and land as a resource.

The conceptual framework presented above can be used to assess the impacts of EU policies on land. It can also be taken further and used to evaluate how EU sectoral policies have contributed to EU land objectives.

Results from testing: an overview of key EU policies and their impact on land

The study tested the methodology on a set of key sectoral policies at EU level: Cohesion Policy, Transport Policy, Energy Policy and the Common Agricultural Policy (CAP). The evaluation results for these four policy areas, which in turn refer to selected policy instruments within each area and should not be considered comprehensive, are presented in Table ES.1.

These results also draw on two in-depth case studies, which analysed how one area of EU policy — Cohesion Policy spending on roads — influenced land take. The case studies were carried out in two of the main recipient countries of Cohesion Policy resources, namely Spain and Poland. The Spanish case study focuses on one region, Andalusia, as governance in this Member State is highly decentralised. The case study of Poland focuses on the national level; it also considers the region of Lower Silesia, which has relatively high economic growth and substantial land degradation problems.

Evidence of impacts

The review has shown that all four policy sectors have important impacts on land take and land degradation in Europe: while many of these are negative, the review also identified potential positive impacts. Overall, quantitative results across the EU as a whole were not found; moreover, such evidence may be difficult to gather for future assessments, as the impacts on land depend greatly on the context in each Member State. Another important issue is that EU policy in each of these areas has evolved over time; assessments will need to address these changes in policy design.

Relevance

All four policy sectors are highly relevant with regard to land take and land degradation, given their roles as drivers of land-related impacts.

Coherence

The review found that coherence of policy and legislative documents with the EU's land objectives varies across the four areas considered. Notably, coherence seems to be strongest, or at least more explicit, for the CAP, perhaps because of the political controversy over its environmental impacts, including the impacts on soil quality and land degradation. In contrast, coherence appears to be relatively poor for Cohesion Policy, the other major area of EU budget spending, with potentially major impacts on land.

Effectiveness

In the study's methodology, effectiveness is considered in terms of actions to limit land take or land degradation. This is apparent in some policy actions, such as Cohesion Policy spending for brownfield redevelopment.

The CAP's cross-compliance requirements, as well as its new 'greening' component, seek to reduce impacts from direct payments; new rules on indirect changes in land use may reduce the impacts of renewables targets related to the promotion of intensive biofuel cultivation. In other areas, including Cohesion Policy, explicit actions to reduce potentially negative impacts were not identified.

EU added value

All four policy sectors can have major impacts on land. For all four sectors, there is a strong interaction between EU and Member State actions. Consequently, all four provide an opportunity to integrate and disseminate EU land objectives much more effectively than via separate Member State action. This opportunity is of particular importance in the case of cross-border impacts on land.

Table ES.1 Overview of the influence of key sectoral EU policies on land

	Cohesion Policy (focusing on transport spending)	Transport Policy (focusing on the TEN-T)	Energy Policy (focusing on the TEN-E and renewables/biofuels)	Common Agricultural Policy
Evidence of impacts	• Project spending funds can have a broad range of impacts on land; some investments, such as those for road transport, can aggravate sprawl and land take trends, as seen in the case studies of Poland and Andalusia • Structured planning and assessment can, at least in some Member States, contribute to mitigating negative impacts on soil and biodiversity	• Transport infrastructure has had direct as well as indirect impacts, including land take, soil sealing and landscape fragmentation, as seen in the two case studies as well as in the literature	• TEN-E investments lead to direct land take and land fragmentation, although the scale of impacts appears lower than for other sectors, such as transport • Renewables targets that promote biofuels are linked to land-use changes, intensive agriculture and pressures on land degradation	• Direct payments have been a driver for the intensification of agriculture and land-related impacts, such as soil degradation • Decoupling has mitigated these direct impacts but appears to be linked to land abandonment, in particular for extensive farming • Cross-compliance has addressed degradation and land management • Spending for rural development can also have positive results
Relevance	• Cohesion Policy's overall objectives include resource efficiency • Spending by ESI funds can have major impacts on land use and land take, both positive and negative; EU land objectives are very relevant	• Because of high spending for transport projects, this sector is very important in terms of achieving EU land objectives	• The EU's biofuel targets have led to land-use changes that could affect degradation; consequently, EU land targets are relevant for this sector	• The CAP has a major influence on agriculture, forestry and rural development in Europe and thus CAP is vital for achieving EU land objectives
Coherence	• EU land objectives are not cited in the legislation governing Cohesion Policy • The impact assessments for the legislation governing ESI funds in the 2014–2020 period did not consider impacts on land or soil	• The Transport White Paper highlights environmental issues and sustainability but mentions land issues only briefly • The TEN-T legislation for 2014–2020 calls for the avoidance of land fragmentation and soil sealing, and thus there is at least a partial coherence with EU land objectives	• TEN-E policy documents refer to the need to reduce land take, although they do not directly cite EU land objectives; there is partial coherence • EU policy documents and legislation have paid increasing attention to the impacts of biofuel targets on land; coherence is growing	• The CAP has increasingly taken on objectives related to land management and addressed land degradation • Nonetheless, further action is needed for coherence
Effectiveness	• Programming requirements have fostered strategic planning • Spending on public transport or brownfield redevelopment, among others, can reduce negative impacts on land • EU land objectives have not been introduced into the 'chain' of implementation	• TEN-T spending to reduce bottlenecks may reduce some pressures on land • The assessment did not identify any other mechanisms used in EU Transport Policy to reduce potential negative impacts on land	• Information was not found on land impacts related to TEN-E investments • For biofuels, information was not found to indicate how effective new provisions have been (or will be) in reducing impacts, such as land degradation	• The CAP has, over time, reduced potential environmental impacts, including those on land; this brief review did not, however, find a definitive assessment of results over time

Table ES.1 Overview of the influence of key sectoral EU policies on land (cont.)

	Cohesion Policy (focusing on transport spending)	Transport Policy (focusing on the TEN-T)	Energy Policy (focusing on the TEN-E and renewables/biofuels)	Common Agricultural Policy
EU added value	• Cohesion Policy covers a broad range of funding areas, and it could be a key mechanism for disseminating and implementing EU land objectives	• EU policy provides an overall framework for transport in Europe, including the TEN-T, and could play an important role in supporting the uptake of EU objectives related to land	• TEN-E builds cross-border connections, and is relevant for addressing EU land objectives • EU policy has been a key driver for the cultivation of energy crops across Europe; consequently, EU action is necessary to address potential land impacts	• As the CAP shapes agriculture across Europe, it is vital in terms of addressing land impacts and maintaining land as a resource, although other drivers, such as markets, play a growing role in shaping agricultural practices

Note: ESI fund: European structural and investment fund; TEN-E: trans-European energy network; TEN-T: trans-European transport network.

EU environmental policy

The review also looked at EU environmental policy and focused on two areas: nature and biodiversity protection, and water management. Both of these areas are closely linked to EU land objectives. The Natura 2000 network protects about 18.4 % of EU territory. The EU Biodiversity Strategy calls, among other actions, for the promotion of green infrastructure (EC, 2013c), which can reduce land fragmentation and support a range of ecosystem services.

The Water Framework Directive and the Floods Directive both create planning mechanisms at river-basin scale. These plans can support actions that improve soil quality and combat land degradation, including measures to put green infrastructure in place.

A key challenge in both fields is integration: notably, linking these land designation and planning requirements with spatial planning.

Final considerations

The evaluation presented here is preliminary. It sought to test the methodology across a range of EU policies and also in two case studies. The work suggests that the methodology provides a valid basis for more in-depth assessments and evaluations.

The results of the evaluation highlight the need to further integrate EU land objectives with sectoral policies. Other work under way at the European Commission involves preparing policy options for a communication on land as a resource. The review carried out here suggests a few elements for consideration in that regard, as follows:

- targets can play a role and have been employed in countries such as Germany, but these should not be stand-alone instruments; rather, a set of actions that provide an enabling framework will be needed to address land take and land degradation;
- EIA and SEA provisions to address land take and land degradation should be reinforced;
- natural capital accounting can put a monetary value on the ecosystem services lost through land take and land degradation; these values need to be considered in policy development, in EIAs and SEAs, and also in policy assessment and evaluation ([5]).

The process of integration can be lengthy and difficult, as seen for CAP; however, while further steps to integrate land issues are needed, this area of EU policy has progressed more than others, including Cohesion Policy, in terms of the coherence of its objectives with EU land objectives.

([5]) The land valuation aspect is touched upon in the EEA Report *Soil resource efficiency in urbanised areas — Analytical framework and implications for governance*.

Finally, the study highlights the importance of the national, regional and local contexts with regard to shaping the patterns of land use that lead to a decrease in land take and land degradation (pressures). The results show the importance not only of spatial planning systems but also of fiscal issues, because, as seen in both case studies (and other parts of the EU), development in land-intensive sectors (e.g. construction) is considered a source of local government revenue. Therefore, the economic and fiscal aspects of land issues, including land prices and taxes, deserve further study.

Guidance for the reader

Chapter 1 notes that the European Commission's *Roadmap to a resource efficient Europe* calls for European Union (EU) policies 'to take into account their direct and indirect impact on land use', and the Seventh Environment Action Programme (7EAP) calls for an improvement in the 'integration of land-use aspects into coordinated decision-making involving all relevant levels of government'. The chapter discusses current trends in land take and land degradation in Europe, as well as drivers for changes in land use, of which policy is one. Among the various drivers, the way in which the specific role of EU policies can be assessed is considered. The chapter presents an overall framework for the influence of EU policies on land use. It focuses on two specific aspects of EU policies: policy objectives for land take and land degradation; and the role of EU-mandated assessments as a tool to identify and address environmental impacts, including those related to changes in land use. The framework outlined is used to develop a methodology to assess the impacts of EU policies on land, presented in Chapter 2.

Chapter 2 presents a methodology for the assessment of EU policies in terms of their influence on land in Europe, a key step that can strengthen integration as per the 7EAP. It presents a framework for the assessment of EU policies on land, including a structure for an assessment of an EU policy on land, and concludes with a brief consideration of how the framework can be used for other types of assessments. The methodology is employed and tested in Chapters 3, 4 and 5, including in the two case studies, and this provides some initial results on the direct and indirect impacts of EU policies on land.

Chapters 3, 4 and **5** provide brief reviews of the direct and indirect impacts of key EU policies on land in Europe. The policies considered here are (1) the EU's main investment policy (Cohesion Policy); (2) economic sector policies (Transport Policy, Energy and Climate Policy, and Common Agricultural Policy); and (3) environmental policies (related to nature and biodiversity protection, and water management). Each chapter starts by describing the general objectives of the policy, in particular the aspects that affect land, and then reviews the policy instruments. It then presents an analysis of the coherence between the sectoral policy objectives and the EU objectives on land. An analysis of specific impacts on land follows, supported by existing empirical evidence. Conclusions are presented at the end of each chapter. It should be noted that the reviews of each policy are brief; the conclusions are not intended to be comprehensive, and they indicate issues that could be considered for more comprehensive assessments in the future.

Chapter 6 presents a summary of the two case studies of Spain and Poland. The full analysis of the two case studies is published as a separate document to this report on the European Environment Agency (EEA) website. The two studies applied the methodology presented in Chapter 2 of this report. The case study of Spain aimed to gain a better understanding of the role played by EU policies in land take- and land degradation-related impacts in the region of Andalusia. In Spain's decentralised system, the regions have a high level of autonomy, and thus the regional level is appropriate for a case study. The case study focuses primarily on urban and territorial development, as well as on transport, as these are by far the main drivers for land-related impacts in the region.

The case study of Poland considered the impacts of EU Cohesion Policy on land, and focused specifically on spending for transport. The choice of Poland for the case study was based on two main criteria: (1) Poland has been the largest recipient of EU Cohesion Funding since 2007; and (2) Poland belongs to the group of (relatively) new Member States that underwent transitions to become market economies in the 1990s. The legacy of the land use and spatial planning patterns that existed under the communist system in Poland might influence current trends; therefore, Poland provides an interesting example that may be representative of other countries of central and eastern Europe.

Chapter 7 summarises the main results and suggests a few elements for consideration and further study.

1 Introduction

Photo: © John von Rosenberg

Land and soil are vital European resources; in recent decades, however, land take for urbanisation and infrastructure has grown at more than twice the rate of the population increase. At the European Union (EU) level, resource efficiency has become a top environmental priority, identified as a Flagship Initiative under the Europe 2020 Strategy, which supports the shift towards a resource-efficient, low-carbon economy for sustainable growth.

1.1 Developments in land take and land degradation

1.1.1 Key terms

This study focuses in particular on **land take**, but also considers **land degradation**. The European Environment Agency (EEA) defines **land take** as the 'change of the amount of agriculture, forest and other semi-natural and natural land taken by urban and other artificial land development. It includes areas sealed by construction and urban infrastructure as well as urban green areas and sport and leisure facilities' ([6]).

Land degradation, in turn, is a complex phenomenon that is linked to the long-term, biological productivity of land. It brings together several elements, including soil degradation and the capacity of land areas to support water resources, biodiversity and primary productivity. Soil degradation, in turn, encompasses erosion, the richness of soil organic matter and also soil sealing. **Soil sealing** is itself closely related to land take, and refers specifically to 'the covering of the soil surface with materials like concrete and stone, as a result of new buildings, roads, parking places but also other public and private space' ([7]).

([6]) EEA (http://www.eea.europa.eu/data-and-maps/indicators/land-take-2), accessed September 2014.
([7]) EEA (http://www.eea.europa.eu/articles/urban-soil-sealing-in-europe), accessed September 2014.

For the potential upcoming Commission communication on land as a resource, land take and land degradation are closely linked with a third phenomenon, namely **land efficiency** (see Figure 1.1).

All of these terms relate to **land cover**, which, according to the Food and Agriculture Organization of the United Nations (FAO), is the observed (bio)physical cover on the earth's surface; and to **land use**, which is characterised by the arrangements, activities and inputs that people undertake in a certain land cover type to produce, change or maintain it (FAO, 2000).

1.1.2 Developments

Land take for urban, infrastructure and industrial purposes exceeds 1 000 km^2 per year in the EU, with over half of this surface being defined as 'sealed', according to the European Commission's 2011 *Roadmap to a resource efficient Europe* (EC, 2011d) and *The European environment — state and outlook 2015* (SOER 2015) thematic fiche on land systems ([8]).

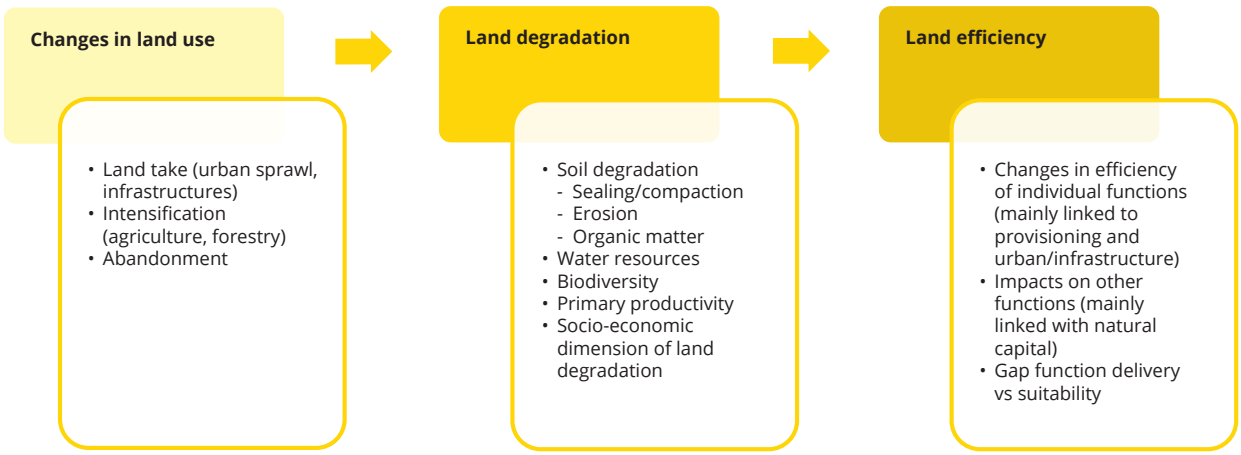
Land degradation also affects a significant proportion of Europe's land area. About 16 % of Europe's land area (including the EU and other European countries, but not Russia) is subject to water erosion and a further 6 % is affected by wind erosion, according to the Joint Research Centre's (JRC's) 2012 report on soil in Europe (JRC IES, 2012), prepared to support the EEA's SOER 2015. In addition, JRC estimates that 45 % of Europe's soils have a low organic content; furthermore, soil contamination is widespread, potentially affecting three million sites (EC and JRC IES, 2012).

The EU's *Environment Action Programme to 2020* (the Seventh Environment Action Programme (7EAP)) highlights that land take and land degradation trends are eroding Europe's natural capital and diminishing ecosystem services; the consequences of this include a threat to biodiversity, increased vulnerability to climate change and natural disasters, and economic, environmental, social and health risks (EC, 2013e).

Land take is linked to land degradation, in particular via soil sealing, which has, in turn, an impact on infiltration, soil biodiversity and erosion in neighbouring locations. Soil sealing means the permanent covering of an area of land and its soil by impermeable artificial material. It causes loss of all environmental soil functions. According to Recare ('Preventing and remediating degradation of soils in Europe through land care') project estimates, sealed land constitutes approximately 50% of land take within the EU. The European Commission's Soil Thematic Strategy identifies sealing as one of the main threats to soil functions in Europe (van Delden et al., 2014).

Agricultural practices in particular can be an important factor in land degradation. The JRC report *The state of soil in Europe* highlights the role of high fertiliser use in the accumulation of nitrogen in soil, which leads to the mineralisation of carbon (JRC IES, 2012). The

Figure 1.1 Links between land take, land degradation and land efficiency



Source: J. Delsalle, Communication on land as a resource, PowerPoint presentation, July 2014.

([8]) http://www.eea.europa.eu/soer-2015/europe/land.

EEA's SOER 2010 identifies soil erosion as among the impacts of intensive agricultural production supported by the Common Agricultural Policy (CAP) (EEA, 2010b). Furthermore, the JRC report states that the knowledge base regarding many of the key functions of soil, which are related to vital environmental services and goods, is still poorly developed. EU research projects, including Recare ([9]), have also addressed this issue. Land take, soil sealing and land degradation affect ecosystem services, such as water regulation, food production and carbon retention. The resulting costs can be significant. Box 1.1 provides the results of a study carried out in the Emilia-Romagna region of Italy.

Moreover, current trends for land take and land degradation are likely to continue in coming years without new policy approaches to address them, as described in Box 1.2.

1.2 Drivers and causes of land take and land degradation

A preparatory study (Mudgal et al., 2014) for the European Commission's planned communication on land as a resource has identified a range of drivers for land use on a global scale. These drivers can be summarised and aggregated as follows:

- demand for settlements, commerce, industry and infrastructure;
- food demand;
- demand for bioenergy, including wood- and crop-derived bioenergy;
- demand for other crop-derived products and other wood products.

The drivers are, in turn, linked to several underlying causes (Mudgal et al., 2014). The important underlying causes in Europe are described below.

- Population: while Europe's population growth is slow overall (and negative in some countries), internal migration, in particular, can lead to an increase in the demand for land use in some parts of Europe, and, at the same time, contribute to the decline in cities and villages elsewhere, and the abandonment of farms in rural areas. Migration from outside of Europe can also be a pressure for land use, in particular in urban areas. Nonetheless, land take is also seen in EU Member States with overall stable or declining populations, such as Portugal.
- Economic growth and affluence: growth stimulates commercial, industrial and service activities, which, in turn, can fuel demand for construction — and, in turn, land take (JRC, 2013a). Growth, in particular household affluence, influences the demand for food and other land-based products, as well as for larger homes and second homes and, potentially, increases the use of private transport, which, in turn, can influence preferences for housing.
- Markets and trade: these link EU food consumption to global producers and also link EU food production to global demand.
- Technology: this can affect a range of sectors, from the costs of infrastructure to the methods used in agriculture.
- Awareness: along with culture and lifestyle this influences where people wish to live, the food they buy and more; they are often addressed as consumption patterns.
- Policy and governance.

Box 1.1 The costs of urban sprawl in Emilia-Romagna, Italy

A recent study calculated the costs of lost soil functions due to urban sprawl in the Emilia-Romagna region of Italy. From 2003 to 2008, urban and industrial areas expanded by about 16 000 ha in the Po Valley plain of the region, an area of productive farmland. The study assessed three types of economic cost related to the soil that became sealed:

- a reduction in agricultural production resulting in a cost of EUR 100 million (estimated based on average wheat yields);
- a loss related to the 'carbon sink' value of this land of EUR 19 million (estimated using a carbon price of EUR 15/tonne);
- the loss of water infiltration for the distribution/collection network amounting to EUR 1 000 million.

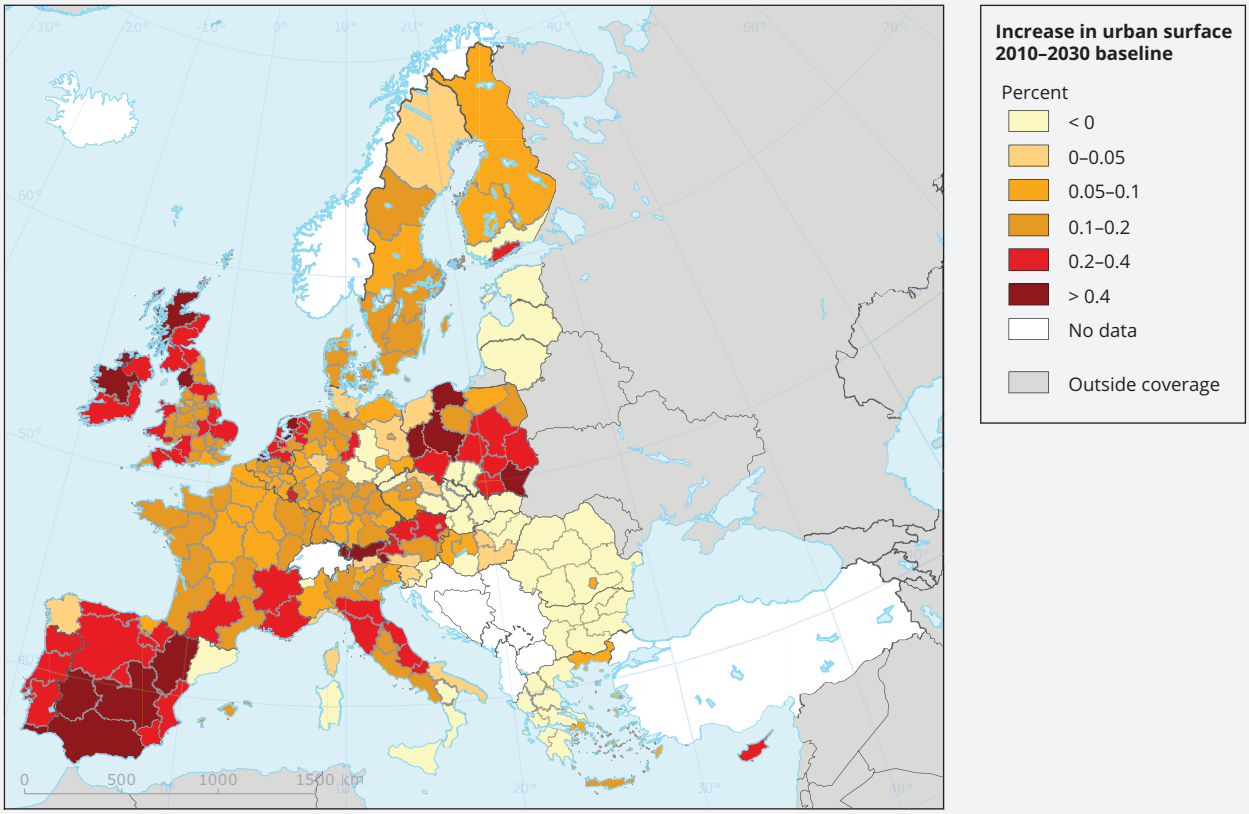
Source: Malucelli et al., 2014.

([9]) www.recare-project.eu.

Box 1.2 Projections of land take in Europe

A recent report for the European Observation Network for Territorial Development and Cohesion (ESPON) presented a forecast of land-use trends in Europe for the coming two decades. The work forecasts that in a 'business-as-usual' scenario, land take in the EU will continue at a fast pace, of 900–1 200 km² per year, until 2030. After 2030, the pace will slow to an average of 150 km² per year, mainly because of Europe's projected decline in population. Urban sprawl will mainly take agricultural land, particularly near existing urban areas. (In a separate trend, marginal agricultural land will continue to be abandoned.)

Map 1.1 Increase in urban surface 2010–2030 baseline



This study also explored alternative scenarios: the 'cities' scenario foresees compact development around large and medium-sized cities; and the 'regions' scenario involves diffuse development focused on existing rural centres, such as small and medium-sized towns, together with the strong protection of natural areas and restrictions on the development of open space. In both of these scenarios, land take would continue but at a slower pace than in the 'business-as-usual' scenario.

Source: van Delden and Vanhout, 2014.

These factors interact in a variety of ways across the different dimensions of land take, land degradation and land efficiency. For example, population density, gross domestic product per capita and the volume of (road) traffic have been identified as key factors that can influence infrastructure in a way that creates the fragmentation of land and habitats (EEA and Swiss Federal Office for the Environment, 2011).

This report focuses on the final factor in the above list, namely policy and governance. In particular, EU policies are considered, together with national, regional and local policies, and the contexts that influence the implementation of EU policies and their impact on land.

While the analysis focuses, in particular, on policies, some consideration of the processes of land change is also important. As several key EU policies support infrastructure development, one important factor is that the construction of roads (and also new railway lines and stations, and rail freight terminals) can provide a seed for sprawl and land take as people use the new infrastructure and move from compact centres to new developments (EEA, 2006). New roads

can also encourage the development of commercial areas outside compact centres. In this process, the construction of a new road will have a relatively small direct impact on land take — but a much larger indirect impact. The indirect impact may, in turn, be strongly influenced by policies and land-use planning at local, regional or national scales; planning can shape outcomes and limit negative impacts.

In addition, EU funding can help municipalities increase their 'attractiveness' to residents, as well as to commercial and industrial enterprises, by funding projects that provide environmental services, cultural and social services, infrastructure for industrial and commercial areas, and research and innovation. These types of investments can attract new residents, both in the short and longer terms, by, for example, boosting local economic growth; these trends can also feed sprawl.

This gives rise to a further issue that is apparent in part from literature on sprawl and in part from the project case studies: competition among local governments can lead to a race for initiatives that use land for new developments (EEA, 2006). From this perspective, local governments and politicians view land as a means to create income for the municipality through taxes (and 'nearly free' raw materials that can be used for local economic development), without consideration of its longer term value as a resource. Box 1.3 describes how the prospect of local revenue has fuelled land take in Italy, including in a region with a policy objective to reduce sprawl. In Poland and in Andalusia, Spain, local governments have promoted development to increase revenue, as seen in the two case studies. This is also the case in many other parts of Europe; for example, in Belgium, municipalities have promoted the growth of industrial zones (K. Debeuckelaere, personal communication, December 2014).

These pressures may be apparent in land prices. This is the case, in particular, around urban areas that are undergoing sprawl that takes agricultural land: prices no longer reflect the agricultural productivity of the land, but rather estimate the future (sub)urban values. While the prices are not drivers per se, they can provide an indication of land take processes. These factors also suggest that local or national taxation methods could be used as policy instruments to address land take (EEA, 2010a).

1.3 The influence of EU policies on land use: an overview

1.3.1 Classifying policy instruments

EU policy and legislation includes a broad range of instruments and mechanisms. A recent review by Evers and Tennekes (2014) provides a classification of the main instruments that influence land use in the Netherlands. The current study and its methodology has used these classifications, with some minor modifications. These classifications are described below.

Legislative requirements

- Area-based designations: EU requirements that designate certain spatial areas for specific purposes, such as Natura 2000 sites.
- Planning obligations: the European structural and investment (ESI) funds under Cohesion Policy require Member States to prepare operational programmes (OPs); for example, under water legislation, Member States prepare river basin management plans (RBMPs) and flood risk management plans (FRMPs).
- EU targets with implications for land: key among these are the EU renewable energy targets, including those for biofuels, which have influenced land use.

Box 1.3 Local revenues and urban sprawl in Italy

In Italy, the central government has removed restrictions on the use of the 'urbanisation charges' that developers pay local governments, allowing revenues that were originally intended to cover infrastructure to be used for other areas of spending. Concurrently, the central government has reduced transfers to local governments. As a result, local governments have strong incentives to promote new development as a source of revenue. At present, the system is in flux, as national, regional and local governments are changing tax systems in the midst of Italy's ongoing economic crisis. However, the dimension of local revenue remains a key policy driver for urban sprawl, even in regions such as Emilia-Romagna, in which, since 2000, regional legislation calls for a reduction in urban pressures on soil sealing and the renewal of existing urban areas.

Sources: Ferri and Adobati, 2011; Emilia-Romagna Region, 2000 (Regional Law No 20/2000 of 24 March 2000 'General requirements for the protection of the use of territory'); and Nazaria Marchi (Geological, Seismics and Soil Service, Emilia-Romagna Region, Italy).

- Requirements for environmental assessments (also called 'environmental safeguards') and ex ante reviews: these include SEAs and EIAs.

Funding

- EU funds that provide project finance: Cohesion Policy in particular, but also other EU mechanisms, including the Connecting Europe Facility (CEF) for energy and transport networks.

- Direct payments to economic actors: in particular, support to farmers under the CAP, which may influence their practices and, thus, land use and degradation.

- Rules linked to financing that directly affect land management: these include rules under the CAP for farmers to maintain good agricultural and environmental conditions (GAECs).

Strategic documents and policy guidelines

- Strategic documents, such as the EU's *Biodiversity strategy to 2020* (EC, 2011c), that define objectives and actions which can influence land use.

- Guidelines and best practices for implementation related to land, such as guidelines on the integration of Natura 2000 to Cohesion Policy 2007–2013 ([10]).

Table 1.1 provides a preliminary overview of eight major EU policies in terms of the key instruments that can influence land use. Many policy areas use several types of mechanisms; an example is the CAP, which provides direct payments to farmers (Pillar I), sets rules that the recipients must follow (GAEC) and provides funding for rural development projects (also called Pillar II). Requirements under EU water legislation include the designation of nitrate vulnerable zones (NVZs) and flood risk areas. Cohesion Policy provides funds for projects across a broad range of EU policy areas. The policy mechanisms used by these EU policies, together with their potential impacts on land, are discussed in detail in Chapter 3.

Safeguards, such as SEAs and EIAs, have a potentially important role to play, as they are required for many types of plans and projects. Consequently, these assessments could shape both the implementation of EU policies at the national level (including regional and local levels), as well as the preparation of national, regional and local initiatives. (Such assessments are discussed further in Section 1.5).

Overall, EU policies can influence a broad range of land-use decisions, including local government choices. One study estimated that over 50 % of decisions in one province in the Netherlands involved EU rules and policies (Fleurke and Willemse, 2014). This does not imply, however, that EU policies have directly shaped all decisions on land use; nonetheless, EU policies influence a broad range of land-use decisions. Figure 1.2 provides an illustration of how EU policies influence land use in a hypothetical piece of territory: it identifies, among others, trans-European networks for energy and transport, water legislation and air pollution legislation, the Seveso Directive for dangerous facilities, and the EU Natura 2000 network. The illustration highlights the need to ensure coherence across different pieces of EU legislation (as well as legislation at national and lower levels) that will influence land use.

1.3.2 Multi-level governance

The pervasive influence of EU policies needs to be considered in terms of Europe's complex, multi-level governance system. Examples from the Netherlands (Evers and Tennekes, forthcoming) show the role of national and local actions in the implementation of EU policy objectives and requirements. Indeed, EU policies can involve a broad range of administrative levels, including:

- EU

- cross-border cooperation

- Member State

- regions/provinces

- local municipalities.

At the national level, Member State governments play an important role in transposing EU legislation and in implementing many policies via national instruments. In many Member States, the national level also carries

([10]) http://ec.europa.eu/environment/integration/pdf/enea/reflection_paper.pdf.

Table 1.1 Key EU policies, grouped by the type of policy instrument that influences land use

	Transport Policy	Cohesion Policy	Energy Policy	CAP	Biodiversity	EIA/SEA	Forestry	Water
Legislative requirements								
Area-based designations					Natura 2000			NVZs, flood risk areas
Planning obligations	TEN-T, corridors	Partnership agreements, OPs	TEN-E, corridors	RDPs (Pillar II)	Natura 2000 site management plans			RBMPs, FRMPs
Targets affecting land use			Renewable energy targets; energy crop criteria	Green area requirement (Pillar I)				
Assessments		Commission review: large projects			Appropriate assessment	EIA, SEA procedures		
Funding								
Project funding	TEN-T funding	ESI funds	TEN-E funding	EARDF (Pillar II)	LIFE+			
Direct payments				EAGF Payments (Pillar I)				
Rules linked to funding	TEN-T networks	Ex ante conditionalities	TEN-E networks	Cross-compliance (Pillar I); EARDF rules (Pillar II)				✓ (?)
Strategic documents and policy guidelines								
Strategic documents	✓		✓		✓		✓	✓
Guidelines		✓	✓			✓		✓

Note: EAGF: European Agricultural Guarantee Fund; RDP: rural development programme; TEN-E: trans-European energy network; TEN-T: trans-European transport network.

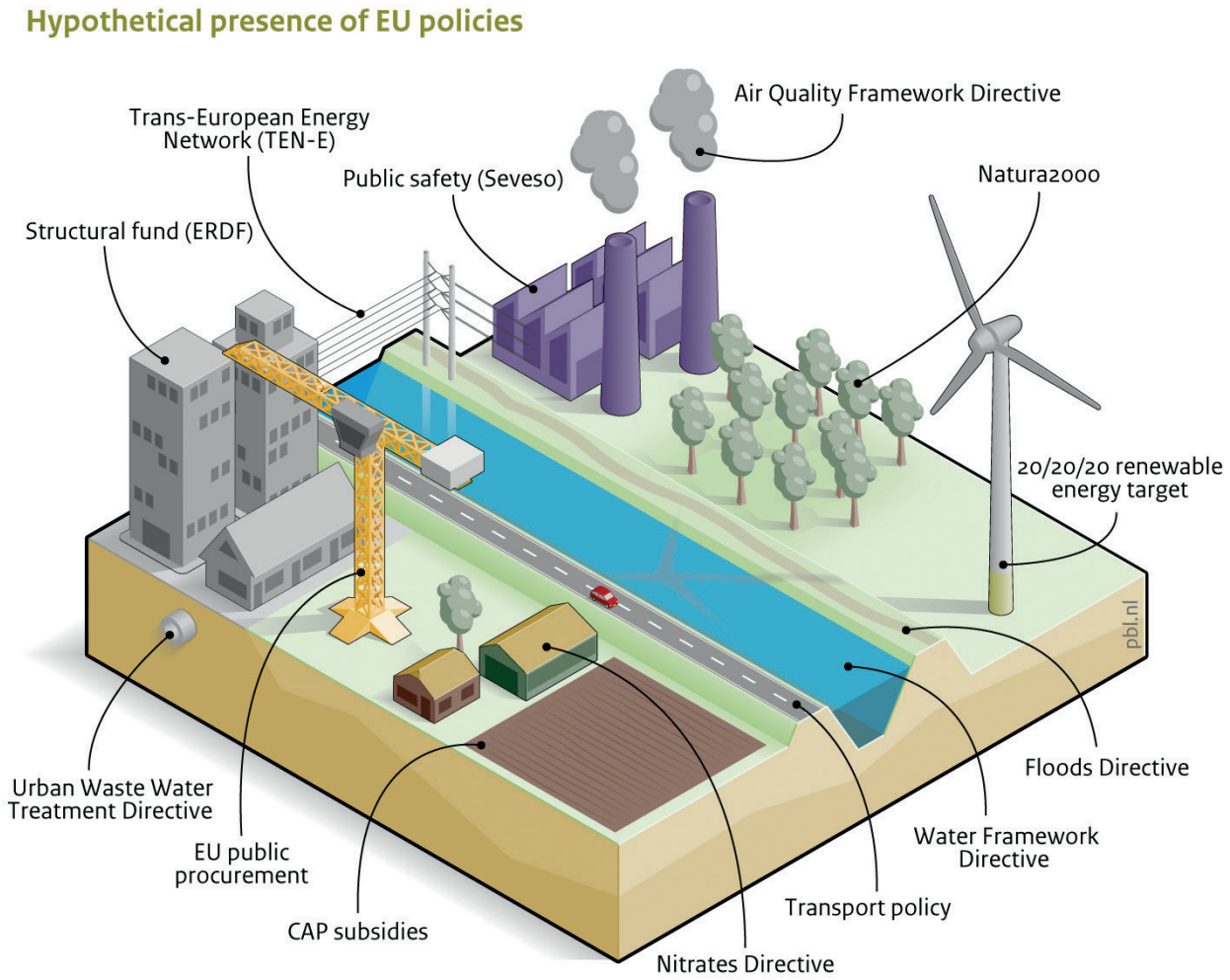
out detailed programming for EU funding instruments, such as those under Cohesion Policy ([11]). In other Member States, this programming is undertaken at regional level, and regions may also have a partial legislative role ([12]). Local governments often play a role by proposing projects for funding and also by implementing a range of key actions.

Cross-border cooperation is seen, for example, in EU water policy: under the Water Framework Directive (WFD), Member States should coordinate planning for shared river basins, which can range from bilateral basins (e.g. for the Tagus River in Spain and Portugal) to the large Danube and Rhine river basins that stretch across several EU Member States as well as other European countries.

These different levels are considered further in Chapter 3, which provides an overview of key EU policy areas, including agriculture, biodiversity and transport.

([11]) This is the case in, for example, Poland; for a more detailed description, see the case study in Chapter 6 of this report.
([12]) This is more typical for countries with strong regional governments such as Germany and Spain. See more description of the example of Spain the case study provided in Chapter 6.

Figure 1.2 EU policies influencing land use: a schematic view



Source: Evers, D. & J. Tennekes, 2016, *The Europeanization of Dutch Spatial Planning*, The Hague: PBL Netherlands Environmental Assessment Agency.

In addition, as Evers and Tennekes (2014) note, Member States play a further role as actors in the EU Council, shaping European policies and legislation. This political aspect of the interplay between the EU and Member States is not considered here — however, it is a key element of the background.

1.3.3 Spatial planning

Member State approaches to spatial and land-use planning are also a key factor in shaping the impact of EU policies on land. Spatial planning considers the way in which countries manage both strategic and land-use planning for a particular territory, which may be national, regional or local. This is carried out in a variety of ways across Europe, depending upon legal and administrative frameworks, as well constitutional law and historical traditions. In 1997, the European Commission identified four major traditions of spatial planning in the EU-15 Member States (EC, 1997); these approaches are detailed below.

- In the 'regional economic planning approach', spatial planning has a very broad meaning that relates to the pursuit of wide social and economic objectives. This refers mainly to the planning system used in France, although it is also used in some new Member States.

- In the 'comprehensive integrated approach', planning is conducted through a systematic and formal hierarchy of plans from national to local level. The federal states of Austria and Germany follow this approach, and regional governments have a key role.

- For 'land-use management', planning is more closely associated with the task of regulating land-use change at the strategic and local levels. The United Kingdom is the main example of a country that employs this approach.

- The 'urbanism tradition' focuses on urban design, townscape and building control, with emphasis on rigid zoning and codes, and is typically seen in Mediterranean countries.

This classification system does not fully consider the EU-13 Member States ([13]). Moreover, it is not the sole way in which spatial and land-use planning systems have been classified. Others include a 2008 review by the International Society of City and Regional Planners (Isocarp, 2008) and the ESPON 2007 project on governance. Nonetheless, a recent review of spatial planning systems in Europe has used and confirmed the 1997 European Commission approach. This review highlights several specific issues that should be considered when analysing planning approaches: the extent to which spatial planning seeks to develop a strategy for the future; the use of 'informal' tools, including stakeholder participation, plus the role of different actors and networks in spatial decisions; the extent to which planning is centralised or decentralised; and, tied to these elements, also the 'policy style' and 'political culture', which can be characterised in several dimensions — one such dimension is the extent to which decisions are based on consensus.

While this study does not provide a further analysis of this topic, the methodology set out in Chapter 2 highlights the important role of the Member State context, including spatial and land-use planning systems, in shaping the impacts of EU policies on land. Moreover, the approach in Chapter 2 highlights the importance of the outcomes related to spatial planning: in particular, whether national, regional or local spatial planning systems encourage compact urban development or sprawl; or whether they focus development on major urban areas or encourage development across large and small centres.

1.4 EU policy objectives addressing land take and land degradation

Several recent EU strategic documents call for action to reduce land take, soil sealing and land degradation. The European Commission's Soil Thematic Strategy (EC, 2006d), released in 2006, cites a range of issues that should be addressed, including soil erosion, soil sealing and loss of soil organic matter. The Strategy highlights the importance of integrating soil protection in national and EU policies, including policies for agriculture, regional development and transport, in order to ensure the sustainable use of soil ([14]). The Strategy called for a Soil Directive — a proposal that has since been abandoned. Nonetheless, more recent policy documents contain key objectives aimed at addressing land take and land degradation in Europe.

The 2011 *Roadmap to a resource efficient Europe* (EC, 2011d) acknowledges the risks associated with soil erosion and contamination, as well as the rapid pace of land take in Europe, and sets out the following milestone:

'By 2020, EU policies take into account their direct and indirect impact on land use in the EU and globally, and the rate of land take is on track with an aim to achieve no net land take by 2050; soil erosion is reduced and the soil organic matter increased, with remedial work on contaminated sites well underway' (EC, 2011d) ([15]).

Since 'decisions on land use are long term commitments which are difficult or costly to reverse' ([16]), the document (EC, 2011d) stresses that the direct and indirect impacts, on land use and land take, of projects, programmes and plans should be analysed. It also states that EU policy in the areas of transport, agriculture, cohesion and energy should provide the right incentives for public authorities and land owners to achieve the objective of 'no net land take by 2050'. Moreover, Member States should 'Better integrate direct and indirect land-use and its environmental impacts in their decision making and limit land take and soil sealing to the extent possible'.

This strategic objective is reinforced in the Roadmap (EC, 2011d) by the formulation of the efficient mobility milestone, according to which by 2020 'the transport sector will deliver greater value with optimal use of resources like raw materials, energy and land .... Transport will ... reduce its negative impact on the

([13]) Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia and Slovenia.
([14]) The guiding principles cited in the Strategy are: (1) to prevent further soil degradation and preserve its functions; and (2) to restore degraded soils.
([15]) *Roadmap to a resource efficient Europe* (EC, 2011d), p. 15.
([16]) *Roadmap to a resource efficient Europe* (EC, 2011d), p. 15.

environment and key natural assets like water, land and ecosystems' ([17]).

Among its actions to implement the Roadmap, the Commission published the *Guidelines on best practice to limit, mitigate or compensate soil sealing* (EC, 2012b). These guidelines state that limitation of soil sealing should be prioritised over mitigation and compensation measures. Moreover, the guidelines call for measures for the regeneration of abandoned industrial or commercial sites ('brownfield sites'), and highlight that integrated regional and local spatial planning could play a crucial role in addressing soil sealing.

A key document for the EU's environmental policy, the *General Union Environment action programme to 2020 'Living well, within the limits of our planet'* (7EAP) (EC, 2013e), was published in 2013 and endorsed by the European Council and Parliament. The 7EAP underlines that the 'degradation, fragmentation and unsustainable use of land is jeopardising the provision of several key ecosystem services, threatening biodiversity and increasing Europe's vulnerability to climate change and natural disasters'. It sets out objectives in this area (see Box 1.4).

The 7EAP underlines the importance of 'greening' measures in the CAP, for example through crop diversification, protection of permanent grassland and the maintenance of ecologically valuable farmland and forest areas.

The 7EAP also refers to the *EU biodiversity strategy to 2020* (EC, 2011c), a policy document that emphasises the negative impact that land fragmentation has on ecosystems and the valuable services they provide. The Biodiversity Strategy, also endorsed by the European Council and Parliament, calls for a better protection of ecosystems and their services, their restoration if degraded, and the incorporation of green infrastructure in spatial planning.

Related to this, the European Commission presented, in 2013, a Communication on 'green infrastructure' (EC, 2013c). The document highlights the role of green infrastructure in 'protecting, conserving and enhancing EU's natural capital' through the integration of land use and ecosystem concerns into spatial planning, as also mentioned in the 7EAP.

Other EU policy documents also highlight the importance of actions that address land take and land degradation. The European Commission's communication on deforestation (EC, 2008a) identifies changes in land use and infrastructure development as the main drivers of forest destruction, and calls for different sectors and policies to contribute to their conservation. In the same vein, the new EU Forestry Strategy (EC, 2013b) highlights the multifunctional role of forests and calls for sustainable forest management in order to counterbalance the increasing pressures on forests ([18]). With regard to urban areas, in 2006 the European Commission adopted a *Thematic strategy on the urban environment* (EC, 2006c), which identifies

Box 1.4 Actions for land and soil in the 7EAP

Under the its first 'priority objective', the 7EAP sets a 2020 target for land:

- '... land is managed sustainably in the Union, soil is adequately protected and the remediation of contaminated sites is well underway.'

The programme reiterates and calls for progress towards the goal of 'no net land take by 2050', set out in the *Roadmap to a resource efficient Europe* (EC, 2011d).

The 7EAP also refers to the outcome of the 2012 Conference on Sustainable Development (Rio+20), which includes the goal of 'land-degradation neutral world'. To achieve this, the 7EAP calls for:

- '...increasing efforts to reduce soil erosion and increase soil organic matter, to remediate contaminated sites and to enhance the integration of land use aspects into coordinated decision-making involving all relevant levels of government, supported by the adoption of targets on soil and on land as a resource, and land planning objective.'

Source: EC, 2013e.

([17]) *Roadmap to a resource efficient Europe* (EC, 2011d), p. 19.
([18]) This strategic paper defines sustainable forest management as 'using forests and forest land in a way, and at a rate, that maintains their biodiversity, productivity, regeneration capacity, vitality and their potential to fulfil, now and in the future, relevant ecological, economic and social functions, at local, national, and global levels, and that does not cause damage to other ecosystems' (EC, 2013a, p. 3).

urban sprawl as one of the main challenges faced by European urban areas, and encourages local and regional authorities to adopt an integrated approach to urban management.

Another EU document that addresses land issues is the 2011 *Territorial agenda of the European Union 2020: Towards a more competitive and sustainable Europe of diverse regions* (EC, 2011n), an informal strategic policy paper agreed by the ministers responsible for spatial planning and territorial development. This agenda indicates strategic priorities for territorial development in Europe. It identifies the overexploitation of natural resources as a major challenge for the EU: 'urbanisation, intensification of agriculture and fisheries, transport and other types of infrastructure development, particularly where they take place in a territorially uncoordinated manner, can cause severe environmental problems. ... Changes in land- and sea use, urbanisation and mass tourism threaten cultural assets and landscapes and may lead to fragmentation of natural habitats and ecological corridors' ([19]). It calls for the protection of high quality soils, ecological systems and landscapes.

In summary, a range of EU policy documents call for approaches and measures that address land take and land degradation. An overview of the issues they address is provided in Table 1.2.

It should be noted that these documents have varying status: for example, the Biodiversity Strategy (EC, 2011c) was endorsed by the European Parliament and the Council, while the Territorial Agenda (EC, 2011n) is an informal ministerial document. The differences in status can influence the approach to implementation. For example, EU funds may support the implementation of some of these documents: the Cohesion Policy funds now identify biodiversity, brownfield redevelopment and green infrastructure among their spending areas (IEEP and Milieu, 2013), and the CAP introduces measures and instruments to promote green infrastructure ([20]). These policy links are discussed further in Chapter 3.

Overall, current policy documents create a framework of EU policy objectives for land soil. These are strategic documents, not legislation, and, moreover, their status varies. The 7EAP, notably, is a decision of the European Parliament and the Council. Work currently underway for a Commission communication on land as a resource is expected to further extend this framework.

1.5 Environmental assessments

The EU requirements for the SEA of programmes and plans, and the EIA of projects, can influence the implementation of other EU policies: for example, an SEA is required for operational programmes under Cohesion Policy and then an EIA may be required for a project to be financed. Both EIA and SEA legislation call for an assessment of 'reasonable alternatives' which might reduce environmental impacts; this could identify alternatives with lower environmental impacts, potentially, for example, with lower impacts on land resources. The outcome of these assessments 'shall be taken into account' in decision-making ([21]).

Strategic environmental assessments (EC, 2001a) aim to ensure that environmental considerations are taken into account in the preparation of plans and programmes likely to have a significant impact on the environment, with a view to promoting sustainable development. The SEA Directive stipulates that an assessment is made of the impact of certain plans and programmes across a broad range of elements: biodiversity, population, human health, flora, fauna, soil, water, air, climate, landscape, material assets, cultural heritage and their interaction. The procedure is mandatory for plans and programmes across a broad range of policy areas: agriculture, forestry, fisheries, energy, industry, transport, waste management, water management, telecommunications, tourism, town and country planning, and land use. An SEA is also required for plans or programmes that 'set the framework for future development consent of projects' which are subject to the EIA Directive ([22]). For other plans and programmes not included in the previous list, Member States should carry out a screening procedure to determine whether an SEA is needed. The SEA Directive also provides for public and stakeholder input on environmental issues during planning.

Environmental impact assessments (EC, 2014d) involve the assessment of the impacts of individual projects on populations and human health, biodiversity, land, soil, water, air, climate, material

([19]) EC, 2011m, p. 7.
([20]) 'The Common Agricultural Policy (CAP) and rural development provide instruments and measures to encourage GI [green infrastructure] and to enhance areas with a high nature value in the countryside .... If properly implemented, these measures can contribute to GI' (EC, 2013c, p. 6).
([21]) As set out, for example, in Article 8 of the SEA Directive (EC, 2001a).
([22]) EC, 2001a, Article 3(2).

Table 1.2 Overview of key EU policy documents addressing land, 2006–2013

	Thematic strategy on the urban environment (EC, 2006c)	Soil Thematic Strategy (EC, 2006d)	Roadmap to a resource efficient Europe (EC, 2011d)	EU biodiversity strategy to 2020 (EC, 2011g)	7EAP (EC, 2013e)	Communication on green infrastructure (EC, 2013c)	EU Forestry Strategy (EC, 2013b)
Specific impacts addressed							
Land take			✓		✓	✓	
Land fragmentation				✓	✓	✓	✓
Land degradation		✓	✓	✓	✓		✓
Soil sealing	✓	✓	✓				
Soil erosion		✓	✓		✓	✓	
Soil organic matter		✓	✓		✓		
Soil contamination		✓	✓		✓		
Contaminated sites			✓		✓		
Drivers addressed							
Urban sprawl	✓	✓					
Specific responses to be taken							
Green infrastructure				✓		✓	
Sustainable land management		✓			✓		✓
Land-use planning	✓				✓	✓	
Regeneration of brownfield sites/land rehabilitation	✓	✓			✓		

Source: EEA/Milieu elaboration.

assets, cultural heritage, landscape and their interaction. EIAs are mandatory for all types of projects likely to have significant effects on the environment (listed in Annex I of the Directive (EC, 2014d)), and thus include infrastructure projects and many others that are likely to result in land-use changes, land take or land degradation. For other projects listed in Annex II of the EIA Directive, national authorities must carry out a screening procedure to determine whether an EIA is necessary: the screening should take into account, among other issues, 'any likely significant effects … of the project on the environment resulting from … the use of natural resources, in particular soil, land, water and biodiversity' (EC, 2014c). Projects must go through an EIA before development consent is granted. The revised EIA Directive (2014/52/EU) strengthens provisions regarding the protection of land and soil.

Appropriate Assessment, under the Habitats Directive (EC, 1992b), requires an assessment of plans, programmes and projects that may affect a Natura 2000 site in view of the site's conservation objectives (EC, 2009e).

The European Commission has developed a series of guidance documents for the SEA and EIA Directives. Their provisions specify questions and issues related to land use. For example, the guidance on the scoping phase for EIA (EC, 2001c) proposes a series of questions, including the questions focused on land listed below.

- Is the project located in a previously undeveloped area where there will be loss of greenfield land?
- Are there existing land uses on or around the project location which could be affected?
- Are there any areas on or around the location which contain important, high quality or scarce resources which could be affected by the project (e.g. forestry, agriculture, groundwater resources or minerals)?

For the review of an environmental impact statement (EC, 2001b), the question below is also included.

- Are direct, primary effects on land uses, people and property described and, where appropriate, quantified?

The guidance on integrating climate change and biodiversity into EIAs indicates that the issues to be addressed include loss of habitats, fragmentation (including the extent or quality of the habitat, protected areas, including Natura 2000 sites, habitat fragmentation or isolation, as impact on processes important for the creation and/or maintenance of ecosystems), and degradation of ecosystem functions and the loss of ecosystem services (EC, 2013f). These issues are also identified in the SEA guidance on climate change and biodiversity.

In summary, the Commission's guidance documents refer to many of the elements set out in the current EU policy objectives on land use and land take. They do not, however, refer to possible indirect impacts, nor do they highlight emerging issues related to land as a resource, such as the ecosystem services of water regulation and carbon retention (see Box 2.1).

A further issue is the quality of the EIA and SEA procedures carried out at Member State level, including the extent to which Commission guidance is used. In its 2009 report (EC, 2009g) on the application of the EIA Directive, the European Commission highlighted several issues, including problems in the quality of information used for EIAs (these issues were considered in the 2014 revision of the Directive (EC, 2014d).

In this regard, there is a concern that recent actions to 'streamline' environmental assessments may affect their role. The European Commission, in a guidance document on streamlining environmental assessments for projects in the trans-European energy network (TEN-E), underlined that streamlining means 'reducing unnecessary administrative burdens, creating synergies and hence speeding up the environmental assessment process'; it 'does not imply any weakening of environmental protection requirements foreseen under EU law' (EC, 2013s). Member States have taken actions to streamline assessments across sectors, including transport. Chapter 6, the case study of Poland, describes the *specustawas* procedure introduced there in 2003.

EIAs and SEAs are carried out by Member States. At EU level, legislative and policy proposals need to undergo an impact assessment, a form of ex ante assessment that considers their potential environmental, social and economic impacts ([23]). Several EU Member States have similar requirements, often called regulatory impact assessments.

This brief overview shows the potential value of environmental assessments (as well as impact assessments) in terms of identifying and mitigating potential impacts of EU policies on land take and land degradation. Given the potential importance of EIAs, SEAs and IAs, assessments of EU policies should, if possible, consider the role of these documents.

([23]) See http://ec.europa.eu/smart-regulation/impact/index_en.htm.

2 A methodology to assess the impacts of EU policies on land

Source: © World Forum on Enterprise & the Environment, Oxford.

The methodology described here is not intended to be a fixed approach; rather, it presents a series of tools and methods that can be adapted to the needs of individual assessments and evaluations, and the resources available. The methodology refers to the 'assessment' of the impacts of EU policies on land. It can also be used for the 'evaluation' of policies; however, in the EU context, a policy evaluation refers to a specific element of the policy process (see Box 2.1).

EU evaluations can take place at various stages of the policy process: an ex ante evaluation can be used to support the decision-making process with regard to the approval of new legislation or policies (at EU level, impact assessments are the main form of ex ante evaluation, although less detailed ex ante evaluations are also undertaken for certain programmes); a mid-term evaluation may be made while the policy is being implemented; and an *ex post* evaluation will be carried out after the intervention is complete.

2.1 An assessment framework

The previous chapter showed that EU policies use a range of different types of instruments, which are implemented via an often complex 'cascade' of multi-level governance. Thus, assessments may need to consider the links between EU policies, their overall objectives and specific instruments, and their implementation at national, regional and local levels.

The assessment framework should thus consider several key elements, and distinguish clearly among them. These elements — drawing on previous work on policy analysis for EEA ([24]) as well as the European Commission's guidelines and toolbox (see Box 2.1) — include those listed below.

- The policy **objectives**: these are the strategic goals and targets that an intervention is seeking to achieve, and which seek to address one or more economic, social or environmental needs.

([24]) See, for example, Figure 6 in EEA, 2001, and Nilsson, et al., 2012. The descriptions also take into account the definitions on pp. 7–8 of EC, 2013h.

Box 2.1 Evaluation as a tool in the EU policy process

Evaluation is a key tool within the European Commission's *Smart regulation in the European Union* (EC, 2010d), providing a 'critical, evidence-based judgement' of whether a new policy or legislative proposal can be expected to meet the needs that have been identified and achieve the objectives set out for it. The Smart regulation agenda commits to an 'evaluate first' principle (EC, 2013d): in other words, before any new policy proposal is considered, an assessment should be made of how existing policy approaches address the issue in question.

In May 2015, the European Commission released its *Better regulation guidelines* (EC, 2015c), which are for use by Commission services when they prepare impact assessments of new policy proposals and when they conduct evaluations of the performance and continued need for existing EU actions (including both financial programmes, and legislative and policy initiatives). These new guidelines, as well as a practical *Better regulation 'toolbox'* (EC, 2015b), for impact assessment and evaluation update previous guidance. The European Parliament also undertakes evaluations as well as impact assessments. The methodology and assessment framework presented in this chapter use the approach presented in the Commission's 2015 guidelines (EC, 2015c) and use the 'toolbox' (EC, 2015b) as a starting point.

- The policy **instruments**: these include EU funding, legislative requirements and strategic documents. Section 1.3 above proposes a typology of EU policy instruments that can influence land use. For the purposes of an evaluation of EU policy impacts on land, the EU instruments can be considered as policy **inputs** ([25]). The **outputs** ([26]) are the effects directly produced or supplied via the EU intervention. In this context, these outputs are, in particular, Member State actions, including policy and legislative actions. Moreover, these can include investment programmes and completed investments.

- The **results and impacts** of these outputs: many of the impacts of EU policies on land use, land take and land degradation will be indirect; for example, EU funding to support roads may provide a 'seed' for urban sprawl. Indeed, these impacts may be unintended consequences of policy implementation. Moreover, the indirect impacts will be influenced, in particular, by the national, regional and local context, as well as interactions with other EU policies. These indirect impacts may vary in terms of space (because of spatial planning and geographical conditions), as well as over time (e.g. urban sprawl may develop slowly but steadily after EU-supported transport investments).

In the evaluation, it is important to consider various factors that will affect the implementation of the EU policy and, thus, its outputs, results and impacts. Four key factors are:

- the **context** in which these instruments are put in place, which can include a range of national as well as regional and local factors, including the spatial planning framework, key national policies, institutional structure and capacities of government as well as the role of key stakeholders;

- the EU policy **process**;

- **interactions** with other EU policies;

- the role of **assessment tools**, such as SEA and EIA.

Figure 2.1 presents a conceptual framework for assessing the impacts of an EU policy on land. EU policies typically involve a series of legislative texts and strategic documents, and then detailed implementing programmes and plans. Policy implementation typically involves both the EU level as well as one or more levels of government within Member States.

Moreover, the conceptual framework sets out possible links between EU objectives on land (i.e. those described in Section 1.4) and sectoral policy objectives. EU legislation and strategic documents go through impact assessments, while, at Member State level, similar ex ante assessments, as well as SEA and EIA procedures, review key policies and projects (as described in Section 1.5). These assessments can play an important role in influencing land impacts and are included in the framework.

([25]) The European Commission also refers to EU intervention and EU action as umbrella terms that include EU legislation, expenditure programmes and more; these can also be identified as activities (EC, 2015a).

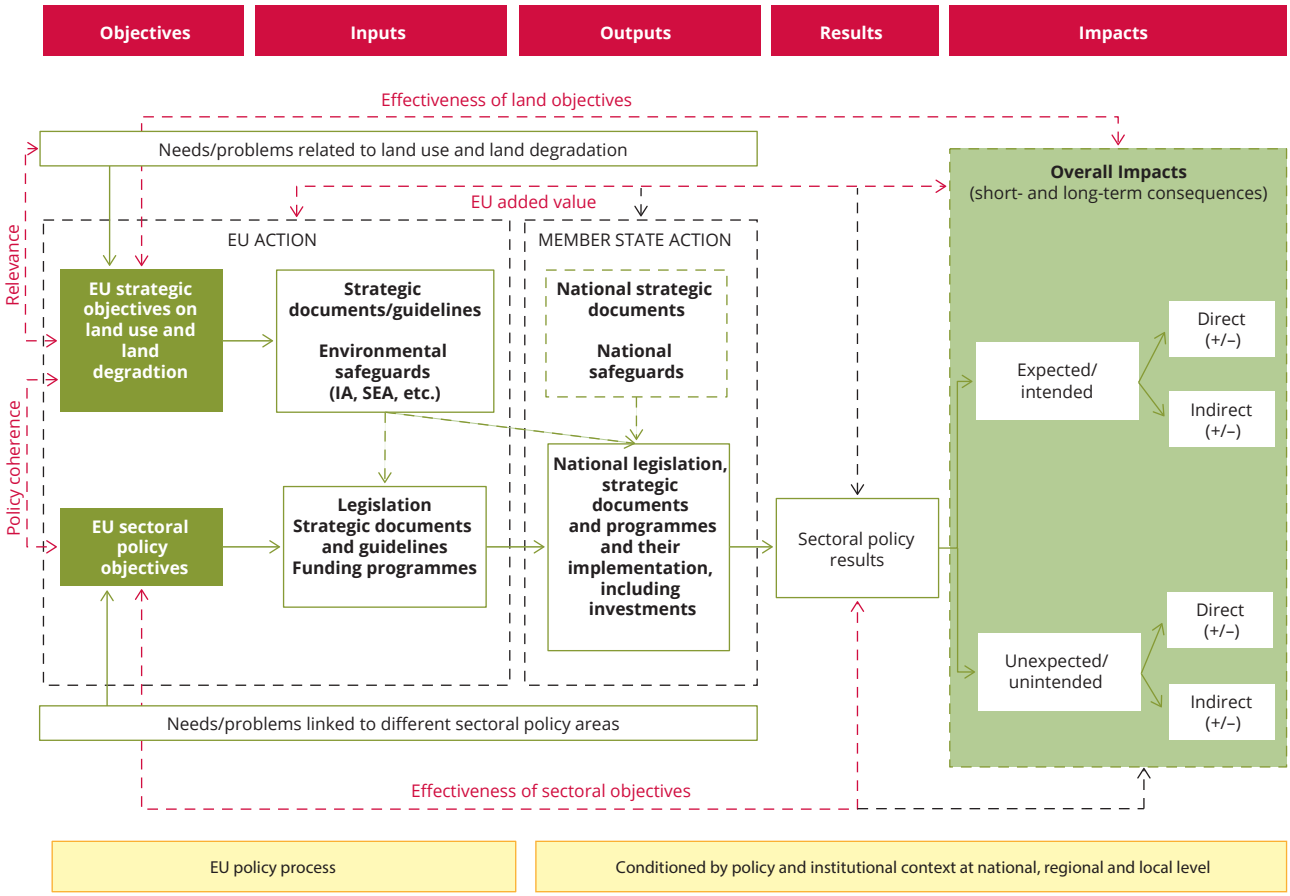
([26]) EU policy documents can use different terms for the types of the effects of EU policies: outputs, outcomes, results and impacts are among the main terms. Here, 'outputs' refer to 'what is directly produced or supplied through the EU intervention', as per the Commission's 2013 draft guidance; impacts are used to cover the broad range of further effects.

A range of contextual factors will influence policy results and impacts, including those for land ([27]). Interactions with other EU policies can influence both the objectives and implementation of the policy in question. For example, Cohesion Policy provides financial support for a series of EU objectives, including those set out in Transport Policy and in environmental legislation (see Chapter 3). For most EU policies, implementation occurs at Member State level; consequently, the policy, institutional and social contexts, including the stakeholders involved, can have a crucial influence on policy outputs and impacts. The spatial planning framework can also play a key role in shaping impacts on land.

All of these factors form a system that will influence policy results, such as the projects financed or the natural areas that are designated for protection, depending on the policy in question, and, in turn, will yield a set of impacts — expected and unexpected, and direct and indirect — including impacts on land use. Thus, the context and the influence of other EU policies are key factors that affect a policy's results and impacts.

The European Commission's approach calls for evaluations to address five criteria: **coherence**, **effectiveness**, **efficiency**, **relevance** and **EU added value** (these are described further in Section 2.2 and Annex 1). These terms, as set out in a recent European Commission consultation document (EC, 2015c), focus on the 'internal' evaluation of a single policy. Therefore, they need to be adapted for the evaluation of EU policies in terms of an external objective that is embedded in other relevant EU policies and strategies.

Figure 2.1 Conceptual framework for the evaluation of an EU policy's impacts on land



Note: IA: impact assessment; SEA: strategic environmental assessment.

([27]) The importance of the context factors in particular is described in the results of the Apraise project (Oikonomou et al., 2014).

Table 2.1 Criteria for the evaluation of the impact of EU policies on land

The European Commission's definitions of the evaluation criteria (EC, 2015c)	Proposed definition of criteria for the evaluation of the impact of EU policies on land
Relevance 'looks at the relationship between the needs and problems in society and the objectives of the intervention'. Key questions include: 'To what extent is the intervention still relevant?'	**Relevance:** To what extent do the EU objectives on land correspond to the needs within the EU in terms of protecting and appropriately managing land as a resource? To what extent are these objectives relevant for this sectoral policy and for this context?
Coherence: Key questions include: 'To what extent is the intervention coherent with other interventions which have similar objectives?'; 'To what extent is the intervention coherent internally?'; and 'To what extent is the intervention coherent with wider EU policy (and with international obligations)?'	**Coherence:** To what extent do sectoral policy objectives and instruments take into account EU objectives for land use, land take and land degradation? Have safeguards such as SEA taken these land objectives into account?
Effectiveness 'considers how successful EU action has been in achieving or progressing towards its objectives'. Key questions include: 'To what extent have the objectives been achieved?'	**Effectiveness:** To what extent did the sectoral policy affect (limit) land take and land degradation? To what extent can changes/effects observed be credited to the intervention?
Efficiency 'considers the relationship between the resources used by an intervention and the changes generated by the intervention'	**Efficiency:** Not identified
EU added value 'looks for changes which it can reasonably be argued are due to EU intervention rather than any other factors'. Key questions include: 'What is the additional value from EU intervention, compared with what could be achieved by Member States at national/regional levels?	**EU added value:** What is the additional value from the EU objectives on land, compared with what could be achieved by Member States at national/regional levels without EU objectives?

A first step in doing so is to set out the EU objectives to be used in the evaluation. Key elements of this framework, as set out in the 7EAP (see Section 1.4), include:

- progress towards the target of 'no net land take' by 2050;
- reducing soil erosion;
- increasing soil organic matter;
- remediating contaminated sites;
- integrating land use in all levels of governments, including via the adoption of targets on soil and land as a resource.

Table 2.1 proposes criteria that should be used for the evaluation of the impact of EU policies on land (these criteria are also indicated in Figure 2.1). The following section includes questions related to these criteria and the approach for assessment.

The framework (see Figure 2.1) shows how four of these criteria — coherence, effectiveness, relevance and EU added value — will be addressed in an evaluation of an EU policy's impact on land.

The framework follows a linear approach to the analysis of policy impacts. This framework could be extended by a 'more systems' approach that looks at key feedback and changes over time. For example, prior assessments can modify policy objectives and instruments at different levels, and so can changes in the context and other EU policies.

One practical drawback to the framework, and also to a systems approach that goes further by including feedback and changes over time, is that it calls for the analysis of a broad range of factors. Moreover, proving causal relationships in the complex context of EU policy can be difficult (EC, 2015b). The work of any assessment will need to identify the most important elements for information gathering and analysis (see Annex 1). The following section provides some indications for this work; Section 2.2 presents a structure of key evaluation questions based on this framework.

2.2 A proposed approach for the analysis and conclusions

The previous sections have presented an overall framework for assessing the impact of EU policies on land and the steps for an assessment. The results of the work need to be presented in a clear, well-structured

fashion. This section proposes an approach for the presentation, linked to the framework above and the steps indicated in Annex 1. It thus provides both an outline for the assessment and an approach for the analysis. The following chapters test this approach.

Table 2.2 presents the overall approach. Each section in the table is linked to one or more elements in the conceptual framework presented in Section 2.1. In each section, a set of key assessment questions are provided; these are not, however, intended to be exhaustive. When used, the approach and questions will need to be tailored to the specific needs of an actual assessment or evaluation, as well as to time and resource constraints.

The approach and questions presented in the table focus on an *ex post* assessment of an EU policy. The approach will be the same for ex ante assessments, although there will be differences in terms of the evidence available on drivers and impacts (adapting the approach to ex ante assessments is discussed briefly at the end of this section).

The conclusions and recommendations, in particular, will depend on the goals of the assessment or evaluation. For this reason, this section is presented in three parts: first, overall assessment issues are presented, then evaluation criteria results (if relevant) are described and, finally, any recommendations, if relevant, are described. The discussion of evaluation criteria focuses on four of those commonly used in EU evaluations. The following further criteria could be considered for specific evaluations:

- **acceptability** to stakeholders;
- **distribution** of impacts in terms of geographical areas (e.g. in or surrounding urban areas or in rural areas), as well as in terms of sectors of the population affected;
- **synergies and conflicts** between EU policy objectives and policy instruments, and those at national, regional or local levels.

Table 2.2 Proposed overall approach for the assessment of the impacts of an EU policy on land: key stages of analysis and questions

Framework elements	Key questions to be addressed
Context	
Needs/problems related to land use, take, degradation; needs/problems linked to the specific sectoral policy	Key policy needs addressed by the EU policy
	Main areas of land use, land take and land degradation that can be implicated by the policy; current trends
Policy objectives	
EU sectoral policy objectives; EU land-use policy objectives	Overview of the policy
	What are the overall objectives of the policy?
	How do the objectives interact with those for other EU policies?
Policy instruments	
EU policy instruments, including legislation, strategic documents, guidelines and funding programmes	What policy instruments are used?
	How is the policy implemented?
	How is implementation linked to other EU policies?
Assessing coherence with land objectives	
Policy coherence	How do the overall strategic documents and legislation take on board EU objectives that address land take and land degradation?
	How does the legislation, guidance or other documents for specific policy instruments take on board EU objectives that address land take and land degradation?
	How have the specific SEAs, EIAs or other assessments for this policy addressed potential impacts on land?

Table 2.2 Proposed overall approach for the assessment of the impacts of an EU policy on land: key stages of analysis and questions (cont.)

Framework elements	Key questions to be addressed
Assessing the impacts of policy implementation	
Policy impacts	What are the main aspects of implementation that could influence land use, land take and land degradation?
	What have been the direct and indirect impacts on land, to the extent that evidence is available?
	How do these impacts interact with those related to other EU policies?
	How do contextual factors (such as system(s) of spatial planning in the Member State) affect the impacts from the EU policy?
	What are the uncertainties in the assessment of impacts?
Conclusions: overall assessment issues	
Overview of the extent and type of impacts	How important is the EU policy as a driver of land take or land degradation? How does it interact with other drivers?
	Does the EU policy address and reduce pressures on land?
	What are the most important factors at national, regional and local levels which have supported or hindered the uptake and implementation of EU goals addressing land?
	What are the roles of stakeholders in terms of influencing impacts on land?
Conclusions: evaluation criteria (if relevant)	
Relevance	To what extent do the EU objectives on land correspond to the needs within the EU (or case study area) in terms of protecting and appropriately managing land as a resource? To what extent are these objectives relevant for this sectoral policy and for this context?
Coherence	To what extent do sectoral policy objectives and instruments take into account EU objectives for land use, land take and land degradation? Have safeguards such as SEA taken these land objectives into account?
Effectiveness	To what extent did the sectoral policy limit potential land take and land degradation? To what extent can changes/effects observed be credited to the intervention?
EU added value	What is the additional value from the EU objectives on land, compared with what could be achieved by the Member State(s) at national/regional levels without EU objectives?
Recommendations (if relevant)	
Framework overall	Recommendations for: • policy action, based on the assessment and evaluation; • monitoring of land impacts from the EU policy; • approaches for follow-up assessments

3.2.1 Assessments and case studies at national, regional or local level

As the national, regional and local context can play a crucial role in the implementation of EU policies and thus their influence on land (see Chapter 1), case studies can be a valuable tool for the assessment of an EU policy. In addition, a stand-alone assessment could consider the influence of an EU policy on land in a single Member State, or a single region or local area. Table 2.3 proposes a structure for analysis in a specific geographical area.

Table 2.3 Proposed approach for a national, regional or local assessment or case study

Framework elements	Key questions to be addressed
1. Context	
Needs/problems related to land use, take and degradation; needs/problems related to the specific EU policy area; other elements of the economic, social, policy or institutional context, including spatial planning; stakeholders	What are current general trends in the case study area with regard to land take and land degradation? How do these trends compare with the rest of Europe or the country? What are the main drivers for land trends? What are the main stakeholders affecting land trends? What is the role and approach of spatial planning?
2. Policy objectives	
Strategic policy documents; coherence of sectoral policies with respect to land-use objectives; ex ante and environmental assessment	Describing how the EU policy or policies under assessment are implemented in the case study area, and the stage in the policy cycle Reviewing key national, regional and local policies: • Are there objectives that address land take and land degradation? • What are the most relevant strategies influencing the policy under assessment? Do they include objectives related to land take and land degradation? To what extent are they coherent with EU land objectives and with any national, regional or local land objectives? • To what extent do national or regional SEA or EIA requirements or guidance call for analysis of the potential impacts on land use, land take and land degradation? • How have the SEAs and ex ante assessments relevant for the policy addressed potential impacts on land?
3. Policy implementation process	
Policy outputs; the influence of the context, other policies (EU, national, regional and local), spatial planning and stakeholders	Identifying the main policy outputs Are there specific issues or obstacles for implementation (e.g. institutional capacity or the economic and environmental context) that influence policy outputs How does spatial planning influence the implementation of the EU policy? Have there been interactions with other EU policies? If EIAs were undertaken, how have they addressed land use? What was the role of the main stakeholders and how did they influence implementation of the EU policy? Of spatial planning? Of related EU policies? How are changes in land use and land degradation monitored and reported? How do these results feed into policy development or policy monitoring?
4. Evidence of impacts on land	
Impacts: direct and indirect, expected and intended, and unexpected and unintended	What are the direct impacts of the EU policy on land use, land take and land degradation? What have been (or are expected to be) the longer-term and indirect impacts on land use, land take and land degradation? How do EU policies fit into and interact with the overall set of drivers for land? How do the impacts of different EU policies interact at Member State level? What are the uncertainties in the assessment of impacts?

2.2.2 Ex ante assessments

The methodology presented in the previous sections focuses on the *ex post* assessment of the impacts of an EU policy on land. Ex ante assessments are also valuable and indeed necessary if EU policies are 'to take into account their direct and indirect impact on land use', as set out in the *Roadmap to a resource efficient Europe* (EC, 2011d). Stronger ex ante assessments, including those in the framework of SEAs, could help to identify and address potential impacts at national and regional scales, for example those arising from OPs for EU Cohesion Policy spending.

The framework presented above can also be used for ex ante assessments; however, there are differences, particularly in terms of the data and information base, the methods used for the analysis and also with regard to conclusions. The evidence for potential impacts on land could use methods such as:

- interviews with officials and experts who could indicator key drivers, discuss their potential interaction with the proposed policy and the possible future impacts;
- quantitative modelling, which will need to use data, based on current policies and assumptions, on the influence of the new policy and include future plausible external conditions under which these policies could be implemented;
- comparisons with the impacts of similar, existing policies, if appropriate data are available;
- assessing the robustness and flexibility/adaptability of the policy under various scenarios.

Most importantly, ex ante assessments are intended to support policy makers in taking a decision on the proposed policy or legislative instrument. This will likely involve the assessment of alternatives, a step required for EU impact assessments and also in the EU legislation for SEAs. Ex ante assessment can, thus, in principle provide the opportunity to identify and explore alternatives that reduce undesired impacts, such as land take and land degradation.

2.3 Assessing the 'system' of EU policies

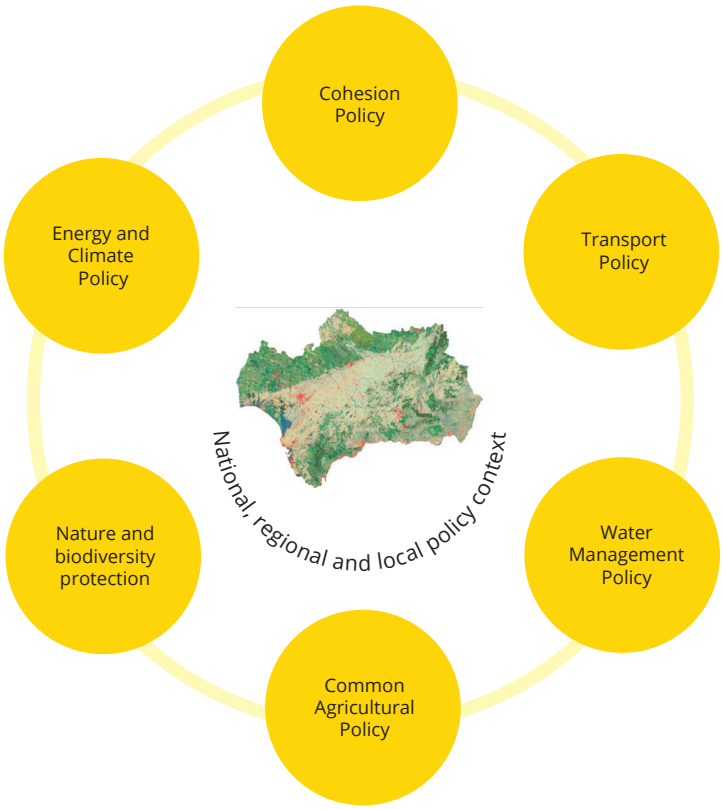
The previous section focused on an evaluation of a single EU policy, taking into account its interaction with the 'system' of other EU policy areas, as well as institutions, stakeholders, spatial planning methods and other elements that influence impacts within a specific territory.

A different type of assessment could be useful at the national, region or local level. The results from Evers and Tennekes (2014) show that a broad range of EU policies influence land use within Member States. This 'system' of policies is illustrated in Figure 2.2; the national, regional and local context is of course a key factor in terms of how EU policies influence land use in a territory. This type of assessment could address, in particular, questions about interactions among policies, and how actions for their implementation can reduce land take and land degradation, as well as strengthen synergies.

Overall, the approach set out in this section should provide a useful starting point for such an assessment. A key task for this assessment will be to consider the synergies and conflicts among EU policies. The following questions could be considered in the assessment:

- What are the main synergies observed in terms of land use, land take and land degradation?
- What are the main conflicts observed in terms of land use, land take and land degradation?
- How does spatial planning influence the implementation of the EU policies? How does it address synergies and conflicts among policies?
- How do EU policies fit into and interact with the overall set of drivers for land?

Figure 2.2 A 'system' of EU policies affects land use in a territory



Note: The figure presents selected EU policy areas, and is not intended to be comprehensive.

Source: EEA/Milieu elaboration.

The overall goal of this type of assessment could be to strengthen synergies and reduce conflicts, in particular with an eye to cross-cutting policy objectives that could include:

- protection of land as a resource;
- protection of biodiversity and ecosystem services;
- actions to adapt to climate change;
- economic costs and benefits.

With regard to the methods for analysis, Evers and Tennekes (2014) mapped EU policies and their influence on land. This allows an assessment of the locations in which conflicts (and coherence) among EU policies could be occurring, and also facilitates an analysis of the links between EU policy requirements and spatial planning in the Netherlands.

Modelling and scenario-building could be valuable tools for considering the potential future developments and policy solutions; these approaches will provide a long-term perspective that could be used, for example, when considering adaptation to climate change. Qualitative scenarios can also help to integrate the influences of different policies and drivers, and explore potential solutions.

3 The impact of the EU's main investment policy on land

Photo: © Gary Denham

3.1 Cohesion Policy

Cohesion Policy has financed investments across a broad range of sectors, including environment, energy, transport and urban development. While the largest amounts are spent in lower income regions, the ESI funds under Cohesion Policy operate in all parts of the EU. Spending across the many sectors and regions could have a broad range of impacts on Europe's land. This section provides an overview and considers, in particular, spending on transport, a sector that is considered in further depth in the two case studies, namely of Andalusia (in Spain) and Poland.

3.1.1 Overall objectives

The main objective of EU Cohesion Policy is to reduce significant economic, social and territorial disparities between European regions through investment funding for key sectors. Nonetheless, Cohesion Policy has evolved over the past several decades from mainly a redistribution mechanism aimed at supporting less-developed regions ([28]) to the EU's primary budgetary tool that supports its strategic goals.

With the launch of the revised Lisbon Strategy in 2005 (EC, 2005b), which focuses on growth and jobs,

([28]) The Single European Act (1985) established the legal basis of the Community´s Regional Policy. Title V on economic and social cohesion sets out that 'in order to promote its overall harmonious development, the Community shall develop and pursue its actions leading to the strengthening of its economic and social cohesion', particularly by 'reducing disparities between the various regions and the backwardness of the least-favoured regions' (Article 130a). It also states that 'the European Regional Development Fund is intended to redress the main regional imbalances in the Community through participation in the development and structural adjustment of regions whose development is lagging behind and in the conversion of declining industrial regions' (Article 130c).

Cohesion Policy was explicitly conceived for the first time as a mechanism to achieve EU strategic socio-economic objectives. The European Commission's Community Strategic Guidelines for 2007–2013 subsequently sought to 'align cohesion and rural development policy closely with the Lisbon agenda' (EC, 2005a). With the adoption of the Europe 2020 strategy in 2010, Cohesion Policy and its structural funds became the 'key delivery mechanisms to achieve the priorities of smart, sustainable and inclusive growth in Member States and regions' (EC, 2010b). Currently, the main goals of Cohesion Policy are to foster economic growth and job creation, tackle climate change and energy dependence, and reduce poverty and social exclusion.

3.1.2 Policy instruments

Cohesion Policy is implemented via an articulated set of legal and programming documents from EU to national and regional levels.

The policy follows 7-year cycles, and it uses ESI funds: the European Regional Development Fund (ERDF), the European Social Fund (ESF), the Cohesion Fund (CF), the European Agricultural Fund for Rural Development (EAFRD) ([29]), and the European Maritime and Fisheries Fund (EMFF). The funds and their spending are governed by EU regulations. For the 2014–2020 cycle, the EU adopted an overarching regulation that sets out common rules across the five funds (EC, 2013m), along with further, specific legislation for each. The 2014–2020 legislation sets out 11 thematic objectives for spending (modifying the previous structure) and introduces an 'ex ante conditionality' for each.

For the 2014–2020 programming period, the European Commission also presented an overarching policy document, the Common Strategic Framework, setting out its approach and objectives for Cohesion Policy. In addition, the Commission has prepared a range of guidance for Member States on spending.

Another component is an overarching programming document for each Member State. This was introduced in the 2007–2013 cycle with the National Strategic Reference Frameworks. For the 2014–2020 cycle, this role is taken by partnership agreements which describe how each Member State will use its funds in a way that is consistent with the EU 2020 Strategy for smart, sustainable and inclusive growth (EC, 2010b). The partnership agreements will be adopted by the European Commission by means of an implementing act, and thus have a legally binding nature (unlike the previous frameworks).

The OPs, developed at national or regional level, are the key planning tools for Cohesion Policy spending. They contain, at minimum, a development strategy for the funding covered by the programme, funding priorities and specific objectives and measures, financial appropriations, indicators to monitor the effectiveness of the implementation, and a review of horizontal principles. The OPs are subjected to an *ex ante* assessment within Member States, for overall consistency and accuracy, and also a SEA. They are submitted to the Commission for review and approval, based on consistency with the EU 2020 objectives and Cohesion Policy regulations.

Spending itself is carried out via projects, to be chosen via appraisal criteria. Project proposals may also be subject to specific eligibility criteria in order to be considered in the appraisal. Finally, projects and OPs are subject to monitoring, auditing and *ex post* evaluation requirements.

Figure 3.1 provides an overview of the Cohesion Policy framework.

The various funds under Cohesion Policy are a major component of EU spending. In total, over EUR 345 billion were allocated under the 2007–2013 cycle through several EU funds, 36 % of the total EU budget for that period. During the 2014–2020 programming period, over EUR 453 billion will be allocated.

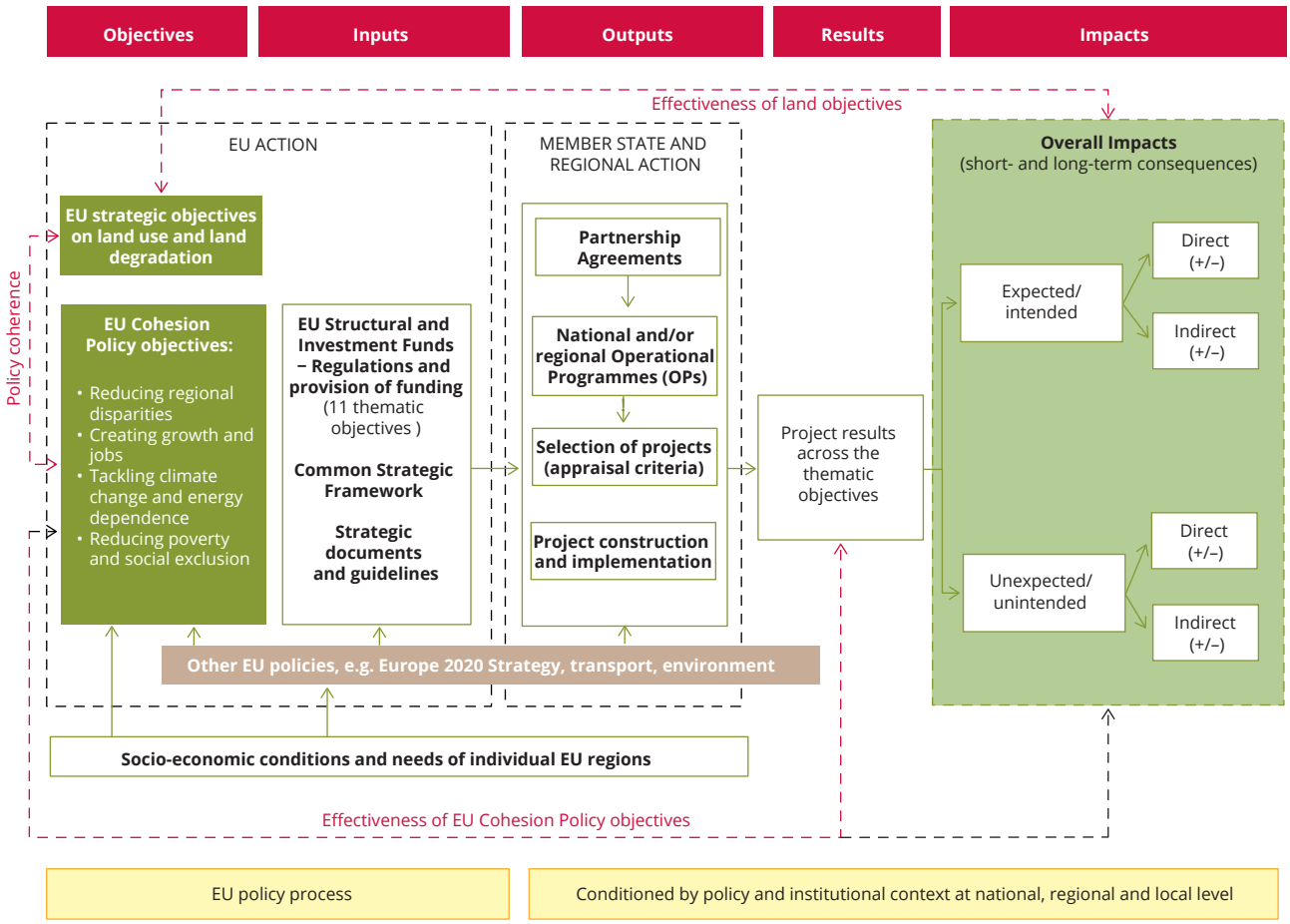
3.1.3 Assessing coherence with EU land objectives

The coherence of Cohesion Policy objectives with EU objectives on land can be assessed at each of the major steps in this 'cascade' of policy documents:

- EU legislation (as well as policy and guidance documents) and their impact assessments;
- national programming documents (national strategic reference frameworks and partnership agreements);
- operational programmes, along with their SEAs and ex ante assessments;
- eligibility and appraisal criteria for project funding;
- monitoring data and evaluation reports.

([29]) The EAFRD is also part of the CAP.

Figure 3.1 Conceptual framework for the evaluation of Cohesion Policy impacts on land take and land degradation



Assessment can also consider specific areas of programming; for example, in the 2014–2020 cycle, Member States are encouraged to prepare integrated programmes that cut across the various funds (e.g. ERDF, ESF and CF), which will provide greater flexibility in programming, and engage regional and local actors as well as local communities in the implementation of programmes, such as Community Led Local Development (CLLD) initiatives and Integrated Territorial Investment (ITI). For example, ITI seeks to implement a common investment strategy for a territory, and thus may address land-use issues, including land take.

In addition, EU-led initiatives have assisted Member States with the implementation of Cohesion Policy; a key example of this is provided by Jaspers (Joint Assistance to Support Projects in European Regions), a joint initiative of the Commission and the European Investment Bank which provides expertise for the preparation of large infrastructure projects. These projects may play an important role in terms of impacts on land, and, consequently, it could be valuable to assess how Jaspers incorporates EU land objectives in its work.

EU legislative and policy documents

A review of the main Cohesion Policy legislative and policy documents for both the 2007–2013 and the 2014–2020 cycles found few references to EU land objectives.

For the 2007–2013 cycle, the regulation governing ERDF identifies possible spending areas with potential effects on land, including the rehabilitation of contaminated sites, brownfield redevelopment and investments in Natura 2000 sites (EC, 2006e). No other references were found, and land objectives were not cited among the overarching objectives or approaches for Cohesion Policy in this or other legislation. It should be noted that

Table 3.1 Common indicators related to land

Indicator	Name	Definition
Land rehabilitation	Total surface area of rehabilitated land	Surface of remediated or regenerated contaminated or derelict land made available for economic (except non-eligible, e.g. agriculture, forestry) or community activities
Nature and biodiversity	Surface area of habitats supported in order to attain a better conservation status	Surface of restored or created areas aimed at improving the conservation status of threatened species. The operations can be carried out both in or outside of Natura 2000 areas

at the start of this cycle, the main EU policy documents referring to land were the *Thematic strategy on the sustainable use of natural resources* (2005), which refers to land aspects (e.g. land use, soil) and the *Thematic strategy for soil protection* (EC, 2006d).

For the 2014–2020 programming period, the Common Strategic Framework identifies sustainable development as one of the horizontal principles for spending, and states that 'actions taken may include the following:

- directing investments towards the most resource-efficient and sustainable options;
- avoiding investments that may have a significant negative environmental or climate impact, and supporting actions to mitigate any remaining impacts;
- taking a long-term perspective when 'life-cycle' costs of alternative options for investment are compared;
- increasing the use of green public procurement' (EC, 2013n).

These elements do not refer to land, which again is cited mainly in terms of a possible area of spending. Both the specific regulation for the ERDF (EC, 2013l) and that for the CF (EC, 2013k) indicate that resources can be used for 'protecting and restoring biodiversity and soil and promoting ecosystem services, including through Natura 2000, and green infrastructure' and both also refer to decontamination of brownfield sites in urban areas. In addition, the ERDF Regulation also provides funds for the promotion of innovative technologies aimed at improving the protection and resource efficiency of soil.

The EU guidance document on monitoring and evaluation for the programming period 2014–2020 ([30]) includes, in the list of common indicators for all Member States, two indicators related to these types of land projects (see Table 3.1).

Therefore, the documents for the 2014–2020 cycle do not explicitly take on board the EU's policy goals related to land, as set out in the 2011 *Roadmap to a resource efficient Europe* (EC, 2011d) and the 2013 7EAP (EC, 2013e). It is apparent that the EU policy process is often lengthy: the 2013 regulations governing Cohesion Policy for 2014–2020 were presented by the European Commission in 2011, the same year as the Roadmap and two years before the 7EAP. The lack of reference of land objectives may, thus, be an example of the time lag needed for policy coherence, a lag that can occur in terms of both 'horizontal' coherence (across policy areas) and 'vertical' coherence (across administrative levels) (Nilsson et al., 2012). However, European Commission inter-service consultation is supposed to avoid this type of situation.

EU impact assessments

The impacts of Cohesion Policy on land or soil are not considered in the impact assessment of the Common Provisions Regulation (EC, 2011l) or in the impact assessment of the ERDF- and CF-specific regulations (EC, 2011h) for the 2014–2020 programming period. They were also not mentioned in the impact assessment of the Structural and Cohesion Funds Regulation for the 2007–2013 cycle (EC, 2004a).

Member State programming documents

Coherence can also be assessed in Member State documents, in particular the partnership agreements for the 2014–2020 cycle and the OPs. Box 3.1 provides an overview of two states (*Länder*) in Germany, and highlights the potential role of national policies, namely, in this case, Germany's federal target to

([30]) http://ec.europa.eu/regional_policy/sources/docoffic/2014/working/wd_2014_en.pdf.

reduce land take. The case studies (see Chapter 6) discuss examples in Andalusia (Spain) and in Poland. It should also be noted that European Commission services review the OPs and pay attention to various environmental aspects, including land use and land degradation. However, the main focus of these reviews is on compliance with EU legislation, including EIAs, SEAs, the Habitats and Birds Directives, and the WFD. This is also the case for the review of major projects ([31]) implemented in the Member States.

3.1.4 Assessing impacts from policy implementation

Section 1.3 sets out a classification of the EU policy instruments that can influence land. This section focuses on one key type of instrument under EU Cohesion Policy: funding for projects. The previous section (Section 3.1.3) considered another important type of instrument, namely planning obligations, specifically Partnership Agreements and OPs. It also noted the use of rules linked to funding: ex ante conditionalities. Cohesion Policy uses other instruments as well, including assessments, such as SEA and EIA, as well as a Commission review of proposals for large investment projects (worth EUR 75 million or more).

A broad range of project spending under Cohesion Policy could influence land. Prominent among these is spending on transport, which was the largest single area of spending in the 2007–2013 programming period, receiving just over one-fifth (EUR 75.5 billion) of all funding for this period (see Table 3.2). Transport spending has direct impacts on land take, soil sealing and land fragmentation; however, it might also have, in some cases, more indirect impacts, as increased attractiveness of suburban and rural areas as a result of improved accessibility can indirectly prompt urban sprawl (EEA, 2006). Spending on urban transport may, in contrast, reduce pressures for sprawl and land take. These impacts will be analysed more in depth in the case studies presented in Chapter 6.

Box 3.1 Addressing land issues in regional Operational Programmes (OPs) in Germany

In its National Sustainable Development Strategy (2002), Germany established a target to reduce land take to 30 ha per day by 2020, compared with levels of about 130 ha per day at the time. The Federal Environment Agency established intermediate targets for 2010 (of 80 ha per day) and 2015 (of 55 ha per day). Although Germany met the first of these targets, it is not on track to meet the 2015 target; land take in 2012 was about 70 ha per day.

The 2020 target is cited in Germany's Partnership Agreement for 2014–2020. Germany will receive approximately EUR 19.3 billion under EU Cohesion Policy in this spending cycle, and the Partnership Agreement calls for the reuse of unused urban areas and the recovery of previous industrial sites, along with 'inwards' development of residential areas. Transport infrastructure is not among the main areas of spending. In contrast, the National Strategic Reference Framework for the 2007–2013 period, while calling for 'careful land use' and noting that the country had a surplus of commercial areas, did not cite the national target. Moreover, in that spending cycle, Germany had a federal OP for transport infrastructure.

The attention paid to the federal target varies across regional (i.e. *Länder*) OPs. North Rhine-Westphalia is one of five regions that translated the federal target into a regional one. The 2014–2020 OP for North Rhine-Westphalia cites a regional target of 5 ha per day in 2020 and 0 ha per day in the longer term. This OP provides financing for urban revitalisation, reuse of brownfield sites and former industrial sites, as well as currently unused commercial areas. It does not contain a spending line for transport infrastructure (which received about EUR 1.3 billion in the 2007–2013 spending cycle). The 2014–2020 draft regional OP for Mecklenburg-Western Pomerania, in contrast, does not refer to the federal target, although it does mention that the reduction in land take is a challenge that needs to be addressed. Neither of these regions' OPs contain a major spending capacity for transport; nonetheless, some transport infrastructure may still be funded under other priority areas, such as the competitiveness of small and medium-sized enterprises.

These differences in the OPs reflect important differences in the context among German regions. For example, regional attention to the federal target has varied. Moreover, some regional governments (including that of North Rhine-Westphalia) exercise stronger control over local spatial planning (T. Wiertz, Leibniz Centre for Agricultural Landscape Research, personal communication, October 2014). Moreover, the two regions cited above are quite different: in North Rhine-Westphalia, which borders the Netherlands and Belgium, built-up areas covered over 15.9 % of the territory in 2006 (EEA Corine data), and the region has an extensive transport network; in Mecklenburg-Western Pomerania, in eastern Germany, artificial areas covered only 4.4 % of the territory, the transport network is much less developed and income per capita is lower. Quite likely, these contextual factors influence the attention paid to land take.

([31]) 'Major' being defined as those worth EUR 50 million or more.

Environmental and sustainable development interventions accounted for EUR 104 billion of Cohesion Policy spending (ERDF and CF) in the 2007–2013 cycle, which represents approximately 30% of all funding for this period (EC, 2010a). Of these funds, around EUR 44 billion were direct environment-related investments (e.g. investments in wastewater treatment infrastructure and improvements in air quality), whereas a further EUR 60 billion were indirect (e.g. investments in sustainable transport and 'clean' energy) (EC, 2010a). Over time, the share of funds allocated to environmental and sustainable development interventions have increased: in the 2000–2006 programming period, the abovementioned investments only received around EUR 37 billion (Fichter, 2010) of Cohesion Policy spending (although for half of this period, spending only covered the EU-15 Member States).

These different investments comprise a range of potential influences on land. Spending on environmental infrastructure, such as water and waste management, could increase the attractiveness of areas, encouraging development and sprawl. On the other hand, spending on urban transport and brownfield redevelopment could support more compact urban development, whereas interventions in the area of biodiversity protection might have positive impacts on the quality of soil. Energy expenditure supports the construction of new infrastructure, which commonly results in land take and other effects; however, some types of renewable energy investments, such as wind farms, may be compatible with continued agricultural land use and thus would result in limited impacts on land. Spending on urban and rural regeneration, and culture and tourism should increase the attractiveness of territories, but, in a wider context, could have a range of potential influences on land. Spending on greenfield commercial and industrial zones could lead to direct and indirect land take.

Project spending by area is not yet available for the new cycle that started in 2014. For this cycle, the breakdowns in spending have changed slightly, and there are 11 thematic objectives. A key element has been the introduction of ex ante conditionality, which may influence the types of projects on which funds are spent and their impacts, by inducing the progressive integration of environmental concerns in other sectoral policy areas, such as transport and energy. An overview of the ex ante conditionalities related to transport, energy and the environment is provided in Table 3.3.

Based on the above, Figure 3.2 shows the direction of the impacts on land of different interventions receiving ESI funds (i.e. positive or negative) and the potential intensity of impacts (i.e. direct or indirect).

It should be noted, however, that the impacts on land of the implementation of Cohesion Policy are, to a large extent, site specific, as the final effects on land will depend on the mix of interventions carried out in a particular territory. Moreover, the legal, institutional and policy context at national, regional and local levels also play an important role in determining the final impacts of these interventions.

The case studies of Andalusia (Spain) and Poland (see Chapter 6) show that Cohesion Policy spending on roads has fuelled urban sprawl and land take. In both cases, the impacts of Cohesion Policy are closely influenced by the context at national, regional and

Table 3.2 Cohesion Policy spending, 2007–2013: key themes that can influence land use

Theme	Project areas	Amount, 2007–2013 (billion EUR)
Transport	Railways, motorways, multimodal transport, airports, ports and inland waterways (including TEN-T projects)	75.5
Environmental protection and risk prevention	Environmental infrastructure, urban transport, brownfield redevelopment and contaminated site clean-up, biodiversity protection and Natura 2000 site investments	50.0
Energy	Electricity, natural gas and petroleum networks, and renewable energy	11.2
Urban and rural regeneration	Urban development, strengthening polycentric development and rural–urban links	11.0
Culture	Protection of cultural heritage, sustainable tourism and regional attractiveness	6.1
Tourism	Tourism services and protection of natural heritage	6.1

Note: The amounts represent the available funds per theme for the EU as a whole at the beginning of the period, resulting from the combined figures for the ERDF, the CF and the ESF. They do not reflect the actual spending. TEN-T: trans-European transport network.

Source: European Commission, DG Regional Policy.

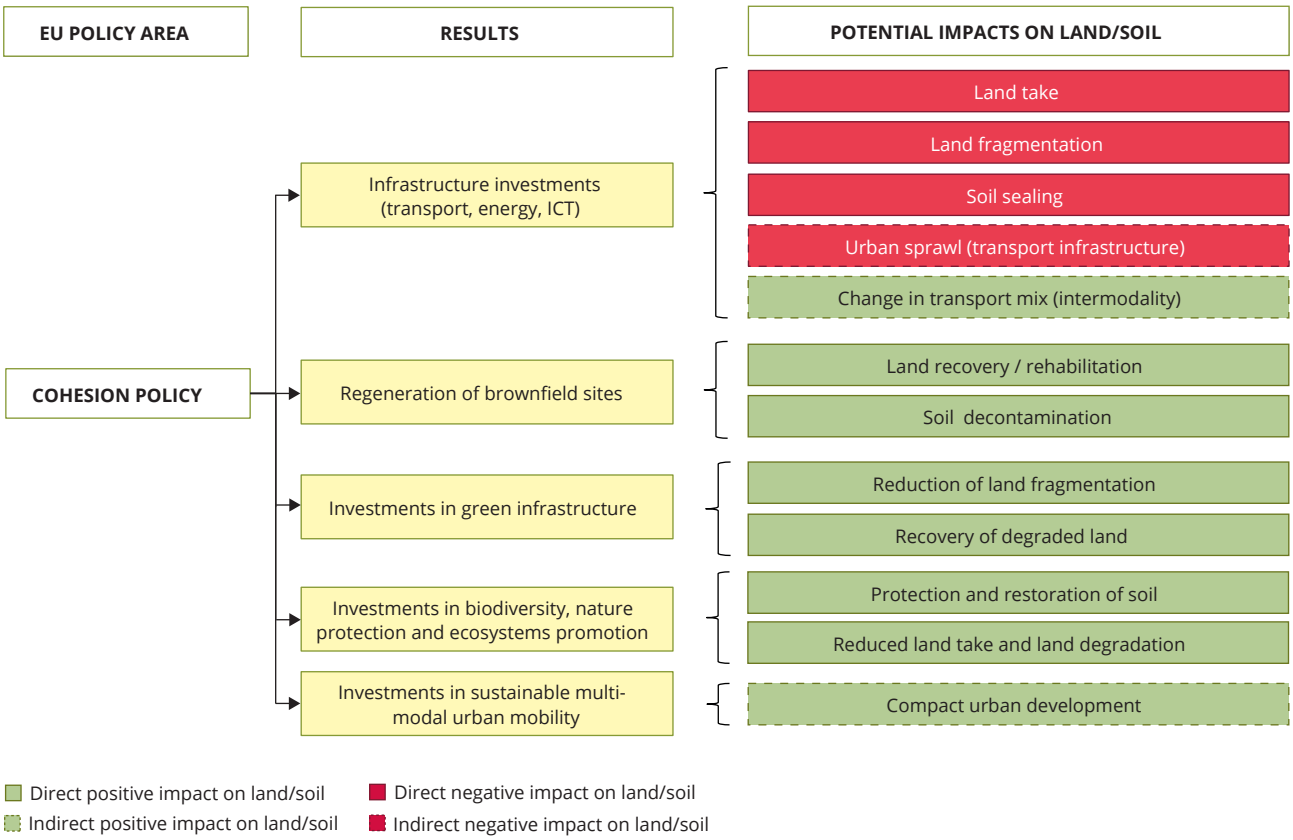
Table 3.3 Cohesion Policy 2014–2020: key spending areas that can influence land use and their ex ante conditionality requirements

Thematic objective	Spending areas	Ex ante conditionality
Low carbon economy	Sustainable multimodal urban mobility, energy infrastructure and renewable energy, and smart grid investments	Actions to promote energy efficiency
Climate change adaptation and risk management	Investments for adaptation to climate change including ecosystem-based approaches; investments to address specific risks, ensuring disaster resilience and developing disaster management systems	National or regional risk assessments for disaster management, taking into account adaptation
Environment and resource efficiency	Environmental infrastructure, investments in biodiversity and nature protection, and green infrastructure; promotion of ecosystem services	Water pricing policy; waste management plans
Sustainable transport and network infrastructures	Investments in transport infrastructure, including TEN-T infrastructure covering rail, road, inland waterways and sea transport, as well as multimodal and interoperable modes and other projects to upgrade the network of railways and roads, aimed at removing transport bottlenecks and congestion; smart energy distribution, storage and transmission systems	Comprehensive plan(s) or framework(s) for transport investment; plans for smart energy infrastructure

Note: TEN-T: trans-European transport network.

Source: European Commission, DG Regional Policy.

Figure 3.2 Potential impacts of Cohesion Policy interventions on land and soil



Source: EEA/Milieu elaboration.

local levels. In Andalusia, for example, the growth model in recent decades has been closely linked to sprawl and large-scale infrastructure development, abandoning the region's traditional model of compact Mediterranean cities. In this context, Cohesion Policy spending has helped to fuel this new sprawl. In Poland, factors influencing sprawl include the low added value of agriculture, which makes land conversion more attractive.

Both case studies highlight national and regional documents that call for a reduction in land take and promote more compact development. Despite the coherence between their objectives and the EU land objectives, it appears that, in both case studies, there is a disconnection between the objectives and local actions: many local governments in both Andalusia and Poland see sprawling development as a goal to be pursued for revenue and other purposes.

The case studies also highlight that Cohesion Policy has introduced a more structured approach to investment planning, as well as environmental assessment. For Poland's Via Baltica route, public controversy and EU scrutiny prompted a further environmental assessment; this led to changes in the planned highway route and led to lower landscape fragmentation and biodiversity impacts than would have occurred if the original proposal had gone ahead.

These results extend those of previous EEA studies, which highlighted the impacts that Cohesion Policy spending, in particular on transport infrastructure, can have on land take and urban sprawl (EEA, 2006). Modelling work by the European Commission JRC has led to similar conclusions: an ex ante assessment of the potential impacts of 2014–2020 Cohesion Policy spending, on aspects related to land use, ecosystem services and urbanisation patterns, using the Land Use Modelling Platform (LUMP) considered several impacts, including the effect of spending on local attractiveness, together with its potential to increase local economic growth; both of these factors are considered to lead to greater land take and soil sealing. The study developed a 'reference' scenario, without Cohesion Policy spending, and a 'business as usual' scenario, with this spending. The modelling results indicated that expenditure would slightly increase urbanisation and, thus, land take across the EU. The study looked at one further option, a 'policy compact' scenario, in which Member States promote compact urban development in already built-up areas. In this last scenario, urbanisation and land take expand more slowly than in the other two (JRC, 2013a).

The tentative results of the study point out that there are 'trade-offs between physical capital investment, development, land use changes and their environmental impacts' ([32]). In this sense, it is noted that Cohesion Policy can induce additional land take both directly, as a result of investments in infrastructure, and indirectly, as economic growth might prompt higher demand for land. These results underline the importance of a policy framework that promotes compact and efficient land use, and, thus, the need to ensure strong coherence between land objectives and Cohesion Policy through the chain of legal and policy documents to implementation. Moreover, the study shows how modelling can be used to test the potential impacts of spending programmes and suggests that more fine-grained modelling tools could help regional and national policy makers in ex ante assessments.

3.1.5 Drawing initial conclusions

Evaluation results

This section provides a brief assessment of the impacts of EU Cohesion Policy on land. Among the key results of this analysis are the following:

- project spending by ESI funds can have a broad range of impacts on land, with some investments — such as those for road transport — aggravating sprawl and land take trends and others decreasing them;
- the impacts will depend greatly on the national, regional and local contexts, as seen in the case studies of Poland and Andalusia;
- spending for road transport in particular has contributed to land take, through both direct and indirect impacts, for instance by fuelling sprawl; this is seen in the two case studies and also from the literature;
- some areas of spending, such as brownfield regeneration, could reduce land take and land degradation;
- the introduction of a structured and rigorous process of planning, monitoring and assessment can, at least in some Member States, contribute to preventing some negative impacts on soil and biodiversity.

([32]) JRC, 2013a, p. 57.

Table 3.4 Summary of the assessment per evaluation criteria

Evaluation criteria	Summary of the assessment
Relevance	The overall objectives of Cohesion Policy include resource efficiency, and thus the effective management of land as a resource is relevant. Spending by ESI funds can have major impacts on land use and land take, both positive and negative; consequently, EU land objectives are very relevant for Cohesion Policy.
Coherence	EU land objectives are not cited in the legislation governing Cohesion Policy. While some spending areas — such as brownfield redevelopment — support EU land objectives, these goals are not explicitly integrated in the current policy framework. The impact assessments for the legislation governing the ESI funds in the 2014–2020 period did not consider either direct or indirect impacts on land or soil.
Effectiveness	Cohesion Policy introduces a set of programming requirements as well as assessments: these have fostered strategic planning, as seen in the Andalusia case study. This provides the opportunity to identify and mitigate possible impacts. It is not clear to what extent these have reduced impacts on land, as this depend on Member State approaches. The review indicates that there has been no systematic effort to introduce EU land objectives into the 'chain' of implementation (e.g. via Partnership Agreements), and, consequently, little effectiveness at EU level of addressing these objectives.
EU added value	Cohesion Policy covers a broad range of funding areas. As shown in the case studies, it has served to introduce systematic, multi-year programming in many Member States (including through ex ante conditionality rules) and to mainstream ex ante (and ex post) assessments into regional development policies. Consequently, Cohesion Policy could be a key mechanism to disseminate and implement EU objectives related to land.

Table 3.4 provides information for an initial evaluation of Cohesion Policy in terms of the EU's land objectives.

Links with other EU policy areas

Funding under Cohesion Policy supports a broad range of EU policy areas, including transport, energy and environment. The Poland case study highlights the link between Cohesion Policy and trans-European transport network (TEN-T) policies. These links indicate the need for an interdisciplinary approach to assessment and evaluation across policy areas.

Issues for future assessments

This chapter has presented a preliminary investigation of the impacts of EU Cohesion Policy on land. The two case studies (Chapter 6) provide detail regarding the impact of Cohesion Policy spending on transport in Andalusia (Spain) and in Poland. Future assessments of the impacts of Cohesion Policy on land might consider the following issues:

- As Cohesion Policy covers a broad range of policy areas, it has many interactions with other EU and national policies. The case studies here focus on interactions with Transport Policy. Future assessments could also look at these interactions in terms of the broad 'system' of EU policies that influence land in Member States. On the one hand, this can be a part of coherence assessment; on the other, the impacts could be mapped, as in the Dutch approach illustrated in Annex 1.

- In terms of **coherence**, the role of assessments, including SEAs and EIAs, could be considered further. It will also be valuable to investigate the extent to which the *Guidelines on best practice to limit, mitigate or compensate soil sealing* (EC, 2012b) have been followed during the preparation of OPs.

- It would be valuable to have a stronger information base for future assessments; for example, indicators related to land take and land degradation could be proposed for the list of common indicators for Cohesion Policy. This would support the assessment of **impacts**.

- Some of the analytical work cited in the Poland case study suggest a link between Cohesion Policy support for infrastructure and local government decisions that promote sprawl. This potential **impact** deserves further assessment.

4 The impact of EU economic sectors on land

4.1 Transport Policy

EU Transport Policy covers a range of issues and instruments. This chapter focuses on two key aspects of EU Transport Policy: overall objectives, as set out in the 2011 Transport White Paper (EC, 2011o), and financing for the TEN-T, which supports projects across the Member States.

4.1.1 Overall objectives

The objective of the EU Transport Policy is to enhance a 'mobility that is efficient, safe, secure and environmentally friendly and to create the conditions for a competitive industry generating growth and jobs' ([33]). In line with this, the 2011 Transport White Paper (EC, 2011o) establishes a vision for a competitive and sustainable transport system; whereas the former implies the promotion of the smooth functioning of the interior market by eliminating existing barriers between modes and national systems, the latter involves the enhancement of a resource-efficient, environmentally-friendly model.

Over the years, the policy focus has shifted from the objective of establishing a 'single European market for transport' (as in the 1992 White Paper (EC, 1992a)), to include the decoupling between economic growth and transport growth, and the promotion of a more balanced use of all transport modes (2001 White Paper (EC, 2001d) and, more recently, to a genuinely integrated vision of transport (2011 White Paper (EC, 2011o)). This vision integrates efficient mobility and accessibility objectives with resource-efficiency and sustainability goals ([34]).

The EU transport infrastructure policy (or TEN-T policy) has also been subject to changes over the years. It was originally conceived as a funding instrument for major transport projects — the so-called 'priority projects' ([35]). With the new TEN-T guidelines (EC, 2013q), policy focus has shifted away from a geographically scattered set of projects to an integrated network approach ([36]). Funds are now devoted to funding the TEN-T core network, which focuses on bridging the missing links between national transport networks, removing bottlenecks, ensuring interoperability and promoting investments in transport nodes in order to enhance intermodality.

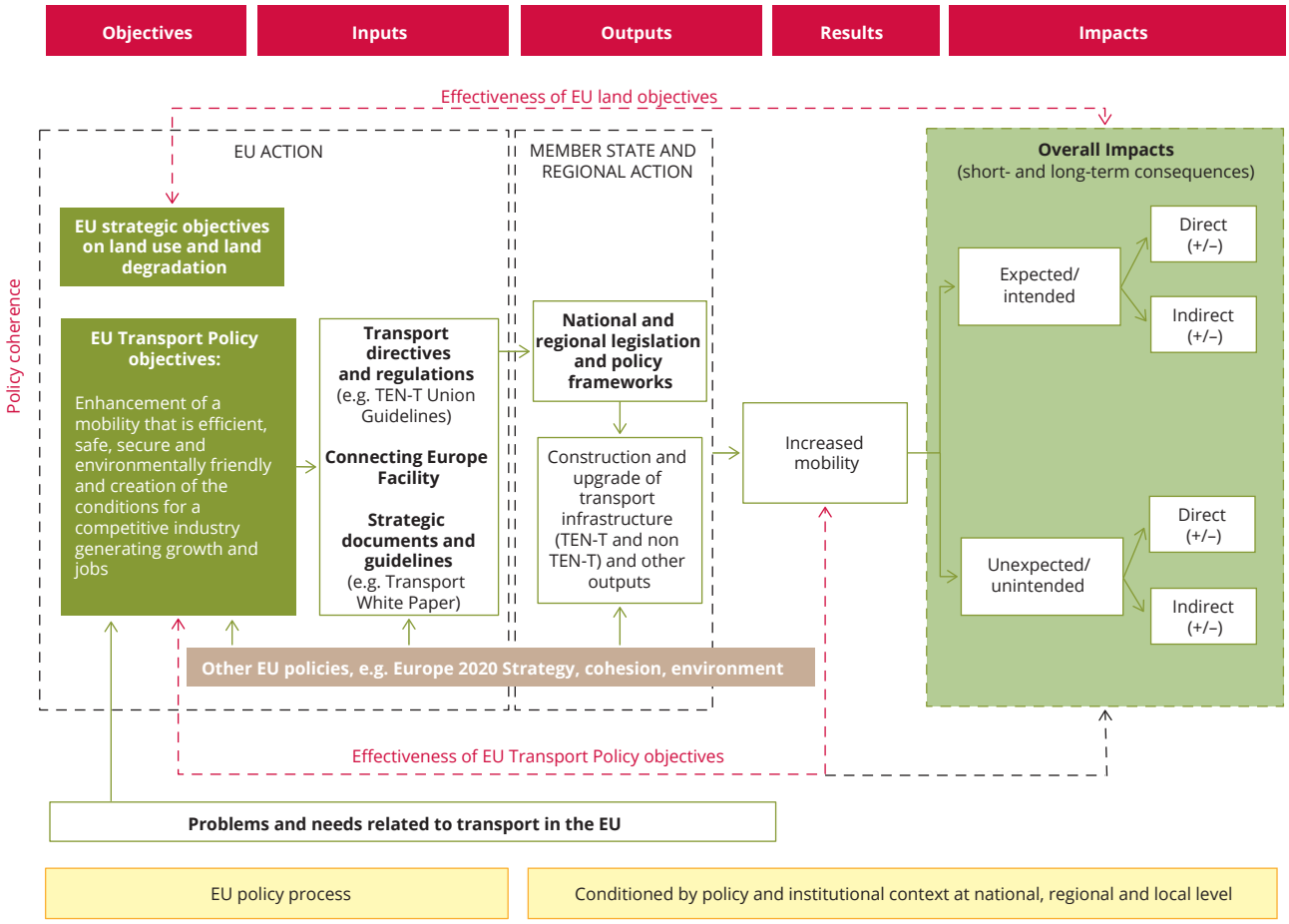
The TEN-T policy has direct and indirect impacts on land. Nonetheless, national and regional contextual factors, such as the transport planning approach in place in each region, play a key role in determining the magnitude and direction of such impacts. These factors and the potential impacts of Transport Policy on land will be extensively analysed in this section.

4.1.2 Policy instruments

Transport Policy is a shared competence between the EU and the individual Member States. With regard to transport infrastructure in particular, the EU sets out the legal framework regulating the processes of planning and implementation of the TEN-T (through the so-called TEN-T Union Guidelines (EC, 2013q)), and provides funds to finance part of these investments through the CEF. Member States remain the main actors in charge of building and maintaining transport infrastructure. They are also responsible for the correct application of rules governing the network in their territory.

([33]) http://ec.europa.eu/transport/about-us/index_en.htm.
([34]) Other previous transport-related documents include 'Keep Europe moving — sustainable mobility for our continent' (2006), 'Logistics — Keeping freight moving' (2007), 'Greening Transport' (2008), 'Maritime Transport' (2009) and 'The Future of Transport' (2009).
([35]) Fourteen priority projects were included in the first Community Guidelines for the development of the Trans-European Transport Network (TEN-T) adopted in 1996, and 16 additional ones were added in 2004 during the first revision of the guidelines.
([36]) http://ec.europa.eu/transport/themes/infrastructure/ten-t-guidelines/transport-policy/index_en.htm.

Figure 4.1 Conceptual framework for the evaluation of EU Transport Policy impacts on land take and land degradation



This analysis focuses on the EU's revised TEN-T approach, introduced in January 2014; this is shown in Figure 4.1. The new legislation (called the TEN-T Guidelines) defines a multimodal TEN-T that builds on existing and planned national infrastructure, identified through an objective methodology ([37]) and which has to comply with a set of common standards set out in the Regulation. Consultation with Member States and other stakeholders has been an integral part of the process of delineation of the core network. Moreover, the Union Guidelines (EC, 2013q) set the investment priorities for the development of the comprehensive network, with the aim of completing the TEN-T network within the agreed timescale.

As noted above, before 2014, the TEN-T programme was conceived as a funding instrument for major transport projects — the so-called 'priority projects' — organised in corridors linking Europe. These were identified at EU level ([38]) based on the proposals from the Member States, and were selected according to both EU-added-value criteria and their contribution to the sustainable development of transport, which implied the prioritisation of environmentally friendly transport modes (e.g. railways and inland waterway transport) ([39]). Today, these priority projects form integral parts of the core network corridors (see Box 4.1).

([37]) For details on the methodology, see SWD(2013)542 final: *The planning methodology for the trans-European transport Network (TEN-T).*
([38]) Fourteen priority projects were included in the Community Guidelines for the development of the Trans-European Transport Network (TEN-T). Adopted in 1996, and 16 additional ones were added in 2004 during the first revision of the guidelines.
([39]) http://ec.europa.eu/transport/themes/infrastructure/ten-t-policy/priority-projects/european-coordinators_en.htm.

Box 4.1 The trans-European transport network (TEN-T)

The TEN-T is a network which comprises roads, railway lines, inland waterways, inland and maritime ports, airports and railway terminals throughout the 28 Member States. It consists of two planning layers:

- the 'comprehensive network', which is a multi-modal network of relatively high density which provides all European regions with an accessibility that supports their further economic, social and territorial development, as well as the mobility of their citizens;
- the 'core network', which is a part of the comprehensive network, distinguished by its strategic importance for major European and global transport flows; nine 'core network corridors' were introduced to facilitate the coordinated implementation of the core network.

The Innovation and Networks Executive Agency (INEA) ([40]) manages the technical and financial implementation of the TEN-T programme.

Source: European Commission, DG Mobility and Transport.

The CEF-Transport funding instrument, which has been in operation since 2014, aims to help complete the TEN-T core network and its corridors by 2030 ([41]) (Figure 4.2 provides an overview of the core network corridors). To that end, CEF will provide EUR 26.2 billion for the 2014–2020 programming period (including EUR 11.3 billion for Member States eligible for the CF). This amount more than triples the amount allocated in the previous cycle (i.e. EUR 8 billion) (EC, 2007c). Despite this, these funds are insufficient for the investment needs identified for the core network, amounting to around EUR 250 billion' ([42]). For this reason, the CEF Regulation (EC, 2013r) establishes that funds should be spent on projects of high EU added value, in particular projects aimed at removing bottlenecks from the main EU traffic routes, building or upgrading cross-border sections, bridging missing links and enhancing rail interoperability (in line with the Union Guideline provisions). These strategic investments can spur wider economic benefits across the network. In addition to CEF funding, the CF and the ERDF also make financial support available for projects that implement the TEN-T. In fact, as presented in Section 3.1.4 above, transport was the largest single area of Cohesion Policy spending in the 2007–2013 programming period, accounting for over one-fifth (EUR 75.5 billion) of all funding for this period.

As set out in the Union Guidelines, Member States and other promoters have to carry out environmental assessments of plans and projects before their implementation in order to comply with EU environmental legislation ([43]).

4.1.3 Assessing coherence with EU land objectives

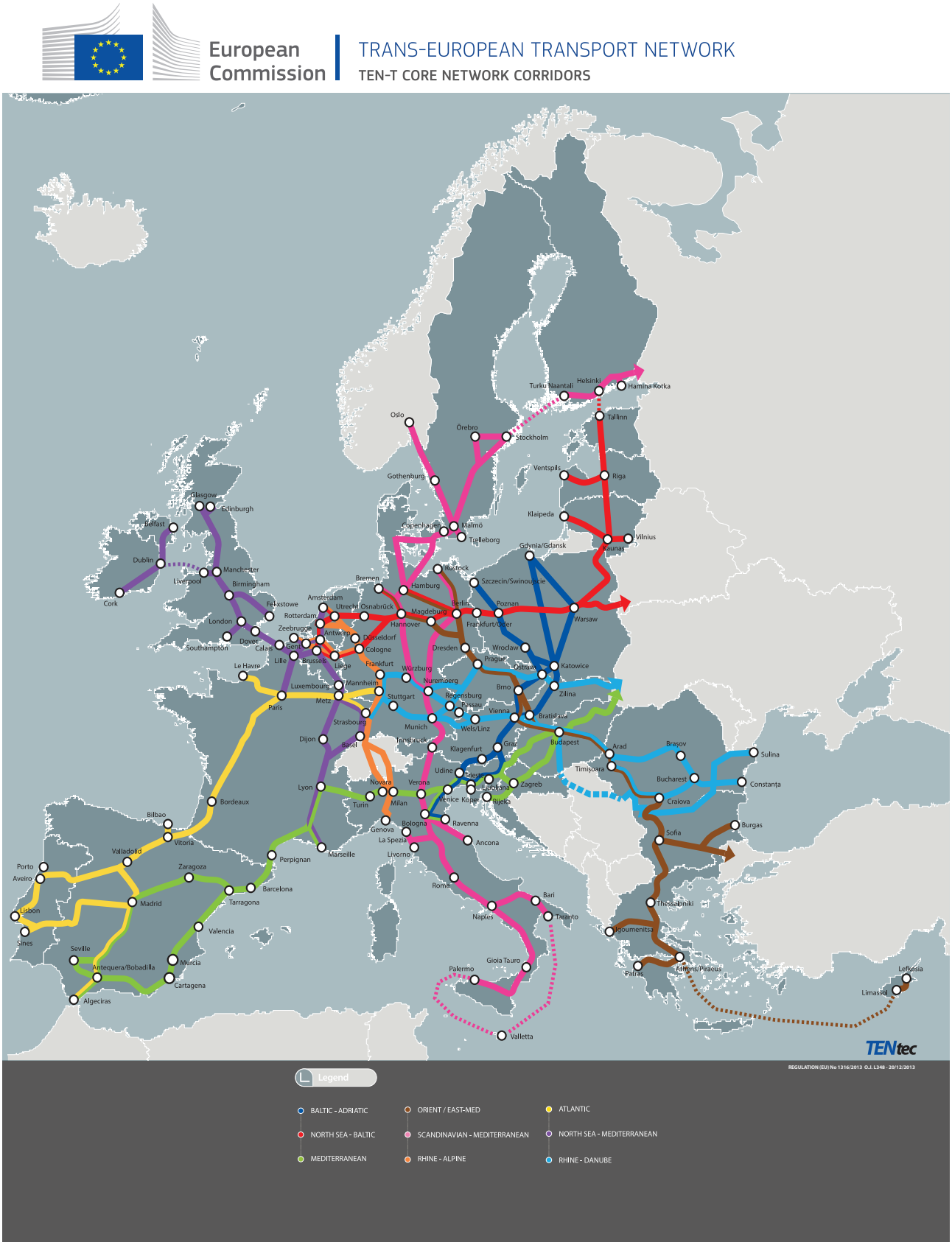
The review of the main Transport Policy legislative and policy documents found several references to sustainability of transport, but few directly addressing land.

The 2011 Transport White Paper (EC, 2011c), the main EU strategic paper on transport, highlights that 'transport has to use less and cleaner energy, better exploit a modern infrastructure and reduce its negative impact on the environment and key natural assets like water, land and ecosystems'. While the White Paper has a strong focus on climate and air pollution goals, environmental impacts related to land are discussed with little detail.

With regard to the transport infrastructure policy in particular, the main legislative document details the TEN-T Union Guidelines (EC, 2013q), according to which

([40]) INEA officially started its activities in 2014 as the successor of the Trans-European Transport Network Executive Agency (TEN-T EA).
([41]) Before the establishment of the CEF in 2014, there was no specific financing facility for trans-European network funds. Funds were allocated to TEN-T and TEN-E programmes.
([42]) EC, 2013a, p. 6.
([43]) In particular, Council Directive 92/43/EEC (EC, 1992b), Directive 2000/60/EC, Directive 2001/42/EC (EC, 2001a), Directive 2009/147/EC (EC, 2009e) and Directive 2011/92/EU.

Figure 4.2 Core network corridors



Source: European Commission, DG Mobility and Transport.

the TEN-T serves a multiplicity of objectives. These are presented in Table 4.1.

The EU Guidelines also highlight that the TEN-T should be planned, developed and operated in a resource-efficient way (Article 5 of EC, 2013q). In particular, this should be achieved through the upgrading and maintenance of current infrastructure to promote synergies with other networks (e.g. energy, and information and communication technologies (ICT)) and enhance infrastructure integration and interconnection.

It is apparent that some of the sustainability objectives, as well as the requirements for planning, are in line with EU land objectives, mainly those referring to the upgrading of current infrastructure and the promotion of synergies with other networks. Nonetheless, reference to the impacts on land have been found in only the Guidelines' preamble, in which it is mentioned that environmental assessments in compliance with various regulations are necessary to 'avoid or, where avoidance is not possible, to mitigate or compensate for negative impacts on the environment, such as landscape fragmentation, soil sealing and air and water pollution as well as noise, and to protect biodiversity effectively' (EC, 2013q). Therefore, specific impacts on land would, in principle, be addressed mainly in national planning and in the process of project selection, and treated in only a general way at EU level.

When all objectives are analysed as a whole, the coherence between Transport Policy objectives and land objectives is somewhat diminished. Indeed, the impact assessment of the 2011 White Paper (EC, 2011f) refers to the trade-off between environmental objectives and socio-economic development goals linked to transport infrastructure, as increasing accessibility and lowering congestion in some areas frequently implies building new infrastructure and therefore additional land use. The assessment also stresses that infrastructure building exerts pressure on biodiversity and ecosystems: 'if ecosystems become too small or isolated, they might not deliver their services to people anymore, such as water and air purification and flood water retention, climate change adaptation and mitigation, nutrient cycling, tourist values, etc. Fragmentation and land consumption by transport infrastructure also leads to the loss of significant areas of fertile soil and useful agricultural land due to soil sealing' (EC, 2011o). The impact assessment also mentions that one of the drivers of transport unsustainability is the lack of coordination between land-use planning and transport planning as a whole, and the lack of coordination between public authorities at different administrative levels.

The impact assessment accompanying the current TEN-T Union Guidelines (EC, 2011i) describes, in line with the impact assessment of the White Paper

Table 4.1 Objectives of the TEN-T

Objectives	Actions
Social, economic and territorial cohesion	Accessibility and connectivity of all regions
	Reduction of infrastructure quality gaps between Member States
	Interconnection between long-distance and regional and local transport infrastructure
Efficient single European transport area	Removal of bottlenecks and the bridging of missing links
	Interconnection and interoperability of national transport networks
	Optimal integration and interconnection of all transport modes
	Promotion of economically efficient, high-quality transport
	Efficient use of new and existing infrastructure
Sustainable single European transport area	Development of all transport modes to ensure that transport is sustainable and economically efficient
	Contribution to the objectives of low greenhouse gas (GHG) emissions, low-carbon and clean transport, fuel security, reduction of external costs and environmental protection
Increase benefits for the users	Meet mobility and transport needs
	Ensuring safe, secure and high-quality standards
	Establishment of infrastructure requirements
	Accessibility for elderly people, persons with reduced mobility and disabled passengers

Source: TEN-T Guidelines, Article 4.

(EC, 2011f), the negative effects of infrastructure on the functioning of land (and the services that can be derived from land), and highlights that TEN-T projects can pose significant threats to biodiversity and Natura 2000 areas, resulting from the 'physical reduction of natural habitats, landscape fragmentation, migration barriers, collision of vehicles with animals, emissions of noise and air pollutants, changes to the water regime and others'. A similar assessment is presented in the impact assessment on the regulation that establishes the CEF (EC, 2011e).

In summary, the nature of transport infrastructure policy impedes the full coherence of Transport Policy objectives with EU land objectives. Nevertheless, some steps have been taken in order to prevent and mitigate, as far as possible, the negative impacts that transport infrastructure causes through the effects of land take with related soil sealing and land fragmentation.

4.1.4 Assessing impacts from policy implementation

This section focuses on impacts related to one main type of policy instrument (as per the classification in Section 1.3), namely project funding, as this is the most prominent mechanism by which EU Transport Policy directly affects land use. Transport Policy also includes planning obligations related to TEN-T, as well as rules linked to financing these projects. Other instruments will also be important in terms of the influence on land, including the use of SEA and EIA procedures for transport plans and projects. (In addition, EU Transport Policy includes several strategic documents (see Section 4.1.1) that influence both EU and Member State policy instruments.)

The implementation of TEN-T policy has expanded the transport networks in the EU. Table 4.2 shows what the total length of the TEN-T core and comprehensive networks will be when complete. With regard to transport modes, current investments are mainly focused on railway lines and inland waterways, whereas roads are, in general, not a funding priority — with the exception of the new Member States, in which some basic infrastructures are missing ([44]). As explained above, investments are also mainly directed at missing bridge links, and ensure multimodality and interoperability.

In line with the findings of the different impact assessments described above, the construction of TEN-T infrastructure, as regulated by the TEN-T Union Guidelines (EC, 2013q) and funded by the CEF, has been found to have negative direct effects on land: it enhances land take, soil sealing and land fragmentation. Indirectly, it might also foster urban sprawl in some cases, if improved accessibility increases the attractiveness of suburban and rural areas. Despite this, an increasing focus on completing the missing links of the core network and the upgrade of current infrastructure is preventing additional land take that would take place as a result of a more uncoordinated approach based on priority projects, in line with the model in place prior to the recent reforms. There is also a potentially positive indirect effect: investments in multimodal integration may lead to more sustainable transport patterns for passengers and freight.

Figure 4.3 provides an overview of potential impacts of the TEN-T network on land and soil. No empirical information or studies were found on the land impacts of EU Transport Policy at European level. Nevertheless, as noted in the section on Cohesion Policy (see Section 3.1), EU spending on transport infrastructure (on roads in particular) includes direct impacts and can trigger indirect land take, soil sealing and land fragmentation; this is also reflected in the impact assessments cited in this section. Despite this, the final impacts of these interventions depend significantly on national and regional policy, and institutional contexts. For example, factors such as the specific spatial planning approach in place in a region, the power of

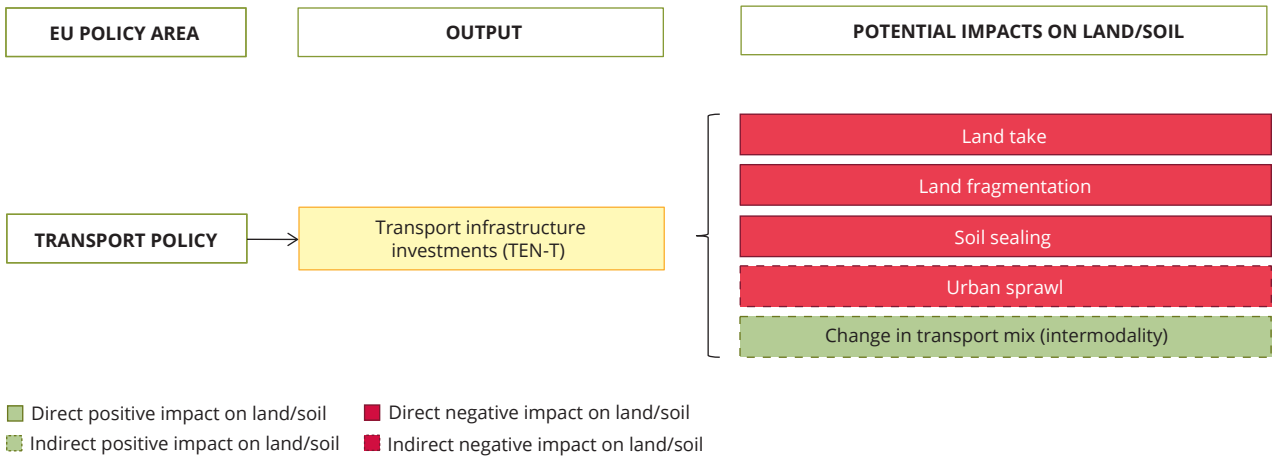
Table 4.2 Total length of the TEN-T core network and comprehensive network when complete

	Core network	Comprehensive network
Railway lines	68 915 km	138 072 km
Roads	59 630 km	136 706 km

Source: European Commission, DG Mobility and Transport.

([44]) Personal communication with G. Schulze and J. Siwinski, European Commission (DG Mobility and Transport), October 2014.

Figure 4.3 Potential impacts of EU Transport Policy interventions on land and soil



Source: EEA/Milieu elaboration.

influence of different social and economic actors, as well as the structure of political incentives, are likely to have an important influence on the magnitude and direction of such impacts.

The case studies of Poland and Andalusia, Spain, illustrate these results. In both case studies, the TEN-T network is a key element of new transport infrastructure. In Poland, the Transport Development Strategy 2020 (CDM Sp. z o.o., 2011) addresses a number of impacts, including land take and land fragmentation. These objectives have received strategic attention as a result of controversy over the EU-funded Via Baltica highway, a section of which had been planned to pass through a Natura 2000 site. In addition, the SEA of the Transport Development Strategy indicates that land take and sprawl is likely to be seen along the routes of new highways, as well as around major urban centres.

4.1.5 Drawing initial conclusions

Evaluation results

This brief review indicates that construction of transport infrastructure has had direct as well as indirect impacts on land:

- these impacts include, in particular, land take, soil sealing and landscape fragmentation, and have been acknowledged in EU documents, such as the impact assessment for the 2011 Transport White Paper (EC, 2011f);
- the Poland case study cites a national analysis, showing that construction of new and improved TEN-T highways is projected to fuel sprawl and land take;
- the case studies indicate that impacts are expected to be influenced greatly by the national, regional and local context, including national and regional transport planning, as well as spatial planning and other factors.

The review focused on specific elements of Transport Policy. Moreover, it did not assess how the sustainability objectives of the 2011 Transport White Paper (EC, 2011o), a key policy document, might have been implemented. The assessment, nonetheless, provides the basis for an initial evaluation of the Transport Policy in terms of the EU's land objectives (see Table 4.3).

Links with other EU policy areas

As shown in Section 3.1, Cohesion Policy spending plays a key role in supporting TEN-T projects, as well as urban transport and other areas of Transport Policy. Moreover, Transport Policy is intended to serve both environmental objectives and the goals of supporting growth and jobs in Europe.

Issues for future assessments

This section has presented only a preliminary investigation of the impacts of EU Transport Policy, and, moreover, has focused on only two aspects. The case

Table 4.3 Summary of the assessment per evaluation criteria

Evaluation criteria	Summary of the assessment
Relevance	Transport Policy can have both direct and indirect impacts on land use, land take and land fragmentation. Consequently, this sector is very important in terms of achieving EU land objectives
Coherence	The White Paper highlights environmental issues and sustainability but mentions land issues only briefly
	The TEN-T legislation for 2014–2020 calls for the avoidance of land fragmentation and soil sealing, and thus there is at least partial coherence with EU land objectives
Effectiveness	TEN-T spending to reduce bottlenecks may reduce some pressures on land
	Overall, however, the assessment did not identify any specific mechanisms at EU level to reduce potentially negative impacts on land from TEN-T spending
EU added value	EU policy provides an overall framework for transport in Europe, including the TEN-T network, as well as key funding for this network. Consequently, EU Transport Policy could play an important role in supporting the uptake of EU objectives related to land

studies (Chapter 6) provide details regarding the impact of Cohesion Policy spending on transport in Andalusia, Spain, and in Poland.

Future assessments of the impacts of EU Transport Policy on land might consider the issues detailed below.

- In terms of **coherence**, the role of assessments, such as SEAs and EIAs, could be considered further. It will also be valuable to investigate whether or not the *Guidelines on best practice to limit, mitigate or compensate soil sealing* (EC, 2012b) have been referred to in the decision-making process.
- Modelling could be used to identify the direct and indirect **impacts** of transport investments on land, in particular for ex ante assessments; an example of this is seen in the Polish case study (Chapter 6).
- In terms of the **effectiveness** of land objectives, future assessments could consider if the quicker 'streamlined' SEA and EIA approaches, such as those in Poland, consider EU land objectives.
- Land cover/land use data, including Corine Land Cover data, could be used to estimate **impacts** in terms of indirect land take related to EU-financed transport infrastructure. Such assessments would, however, need to be interpreted in light of national, regional and local contexts, including spatial planning approaches.
- Some transport investments, including those for urban public transport, can have positive **impacts** on land. Assessments could identify and analyse EU-funded transport investments that have reduced or mitigated urban sprawl and land take in order to identify good practice examples for the future.

4.2 Energy and Climate Policy

EU Energy Policy includes a broad range of policy instruments to achieve its objectives, and these can influence land in multiple ways. This section focuses on two areas of Energy Policy that potentially have substantial implications for land: energy infrastructure policy, in particular to put in place the TEN-E, which seeks to link Member State electricity, gas and other energy networks; and renewable energy policy, in particular for biofuels. The following sections will review each in turn.

4.2.1 Overall objectives

The overall EU Energy Policy objective is to achieve a competitive, sustainable and secure energy system, as set out in the Energy 2020 Strategy (EC, 2010c). The relative importance of these three main objectives, however, has been changing over time (McGowan, 2008). In the 1950s ([45]), Energy Policy at European level was driven by energy security concerns

([45]) The European Coal and Steel Community (ECSC) was established in 1952, and the European Atomic Energy Community (Euratom) was established in 1958.

(i.e. ensuring the diversification of fossil fuel supplies and the development of domestic resources to lower external dependence), which were reinforced after the oil shocks of the 1970s. In the 1980s, policy focus progressively shifted towards the establishment of a single energy market ([46]); liberalisation and competition were expected to enhance innovation, attract new market players and ultimately yield benefits for consumers. In addition, a single market was also perceived to be a mechanism that would ensure market supply and foster territorial cohesion.

New objectives arose in the 1990s: climate change concerns led to the introduction of strategies and targets in Energy Policy for reductions in GHG emissions. Policy focus has since then included the objective of achieving the transition to an efficient and low-carbon energy system, together with the objectives of market integration and energy security ([47]). Consequently, EU energy and climate change policies are now closely intertwined: the 2030 climate and energy policy framework for the EU (European Council, 2014), agreed in October 2014, sets out the targets to be met collectively by the EU Member States, among which is to achieve, at least, a 40 % domestic reduction in GHG emissions by 2030, compared with 1990, and to increase the share of renewable energy and increase energy savings by at least 27 % by 2030 ([48]).

4.2.2 Policy instruments

TEN-E

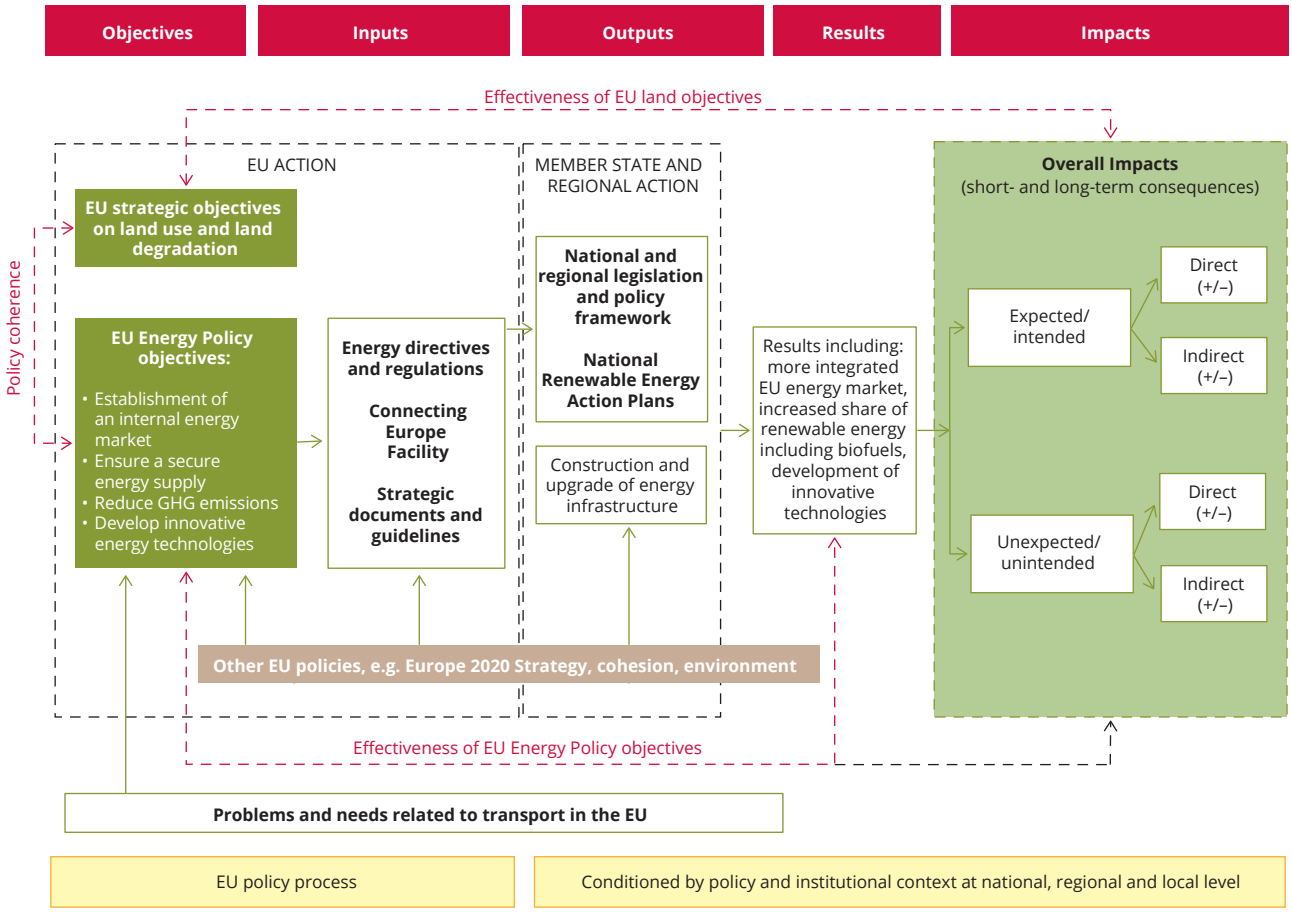
Energy policy is a shared competence between the EU and the Member States. With regard to energy infrastructure in particular, the EU sets out the legal framework that regulates TEN-E planning and implementation, and provides funds to finance part of these investments through the CEF. Member States remain the main actors in charge of building and maintaining energy infrastructure. They are also responsible for the correct application of rules governing the network in their territory (Figure 4.4 provides a conceptual framework for Energy Policy, focusing on TEN-E and renewables).

The TEN-E policy was established in 1996, when the first measures to create a more favourable context for the development of trans-European networks in the energy sector were established (EC, 1996). TEN-E policy has been developed through successive TEN-E guidelines ([49]). Nevertheless, in 2010, the European Commission concluded that the TEN-E framework was lacking 'vision, focus, and flexibility to fill identified infrastructure gaps' (EC, 2013i). The current TEN-E Regulation (EC, 2013i), approved in 2013, sets out a new legal and policy framework to optimise network development at European level by 2020 and beyond. It identifies 12 trans-European energy infrastructure priority corridors and areas, and sets out the criteria to identify the 'projects of common interest' (PCIs), aimed at contributing to the development of the 12 priority corridors. The list of PCIs is revised every 2 years. These projects are considered crucial for helping Member States to integrate their energy markets, foster innovative solutions and ensure security of supply in cases in which private investment is not commercially viable. The analysis presented in this section focuses mainly on the new 2013 legislation.

Since 2014, the CEF-Energy (EC, 2013r) has been the funding instrument aimed at helping to build and upgrade TEN-E. To that end, the CEF will provide EUR 5.8 billion for the 2014–2020 programming period. This amount is considerably higher than the amount allocated in the 2007–2013 cycle: EUR 155 million ([50]). CEF funds are providing financial support to the PCIs ([51]), and are targeted to all parts of the investment cycle (i.e. feasibility studies, EIAs, land and construction permits and construction of projects). In addition to CEF, the CF and the ERDF also make financial support available for projects implementing the TEN-E. As presented in Section 3.1.4. above, spending on energy-related interventions (including both TEN-E and renewable energy projects) amounted to EUR 11.2 billion in the 2007–2013 programming period, which was approximately 3 % of total Cohesion Policy spending in this period.

([46]) See Council Resolution of 16 September 1986 concerning new Community Energy Policy objectives for 1995 and convergence of the policies of the Member States.
([47]) For a detailed analysis of the evolution of EU Energy Policy, see van der Linde, 2007.
([48]) This agreement is based on the Commission Communication from January 2014 (EC, 2014a).
([49]) New TEN-E guidelines were adopted in 2003 and 2006.
([50]) Before the establishment of the CEF in 2014, there was no specific financing facility for trans-European network funds. Funds were allocated to TEN-T and TEN-E programmes.
([51]) In general, the amount of EU support cannot exceed 50 % of the eligible costs. Under certain special circumstances specified in the CEF Regulation, the EU support for construction works can amount to 75 % of the costs.

Figure 4.4 Conceptual framework for the evaluation of EU Energy policy impacts on land take and land degradation



Renewable energy: biofuels

Renewable energy sources include wind, solar, hydroelectric power, tidal power, geothermal energy and biomass ([52]). The 2030 climate and energy policy framework for the EU (European Council, 2014), agreed in October 2014, sets out the targets to be met collectively by the EU Member States, among which is to increase the share of renewable energy and increase energy savings by at least 27 % by 2030 ([53]). The EU has also set obligatory renewable energy targets to be achieved at Member State level by 2020: the Renewable Energy Directive (2009) (EC, 2009c) establishes that 20 % of energy consumption should be met by renewable sources by 2020 and that renewable energy should account for 10 % of energy consumption in the transport sector by 2020. In parallel, the Fuel Quality Directive (2009) (EC, 2009d)) established a target of a 6 % reduction in the GHG intensity of fuels used in vehicles by 2020. Prior to these directives, Directive 2003/30/EC (EC, 2003) established the goal of reaching a renewable energy share of 5.75 % in the transport sector by 2010. These future targets might be met by an increase in the use of biofuels.

The current Renewable Energy Directive required Member States to submit, by June 2010, National Renewable Energy Action Plans to the European Commission. In these action plans, Member States 'set out the sectoral targets, the technology mix they expect to use, the trajectory they will follow and the measures and reforms they will undertake to overcome the

([52]) Biomass refers to the 'the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste' (Renewable Energy Directive (EC, 2009c)).
([53]) This agreement is based on the Commission Communication from January 2014 (EC, 2014a).

barriers to developing renewable energy' ([54]). Member States are in charge of implementing these action plans at national level.

4.2.3 Assessing coherence with EU land objectives

TEN-E

The 2013 guidelines for trans-European energy infrastructure (EC, 2013i) include a reference to land in the preamble, calling for the integration, whenever possible, of energy, transport and communication networks in order to reduce the impact on land, as well as the reuse of existing routes ([55]). The need to foster synergies with other EU network activities was also highlighted in the 2008 Green Paper *Towards a secure, sustainable and competitive European energy network* (EC, 2008b).

The impact assessment of the guidelines does not refer to the impacts of the TEN-E on land, although it does note the potential impacts on local flora and fauna, including the impacts resulting from habitat fragmentation ([56]). It also stresses that the impacts will be highly dependent on the project, which make EIAs of projects crucial.

Renewable energy: biofuels

A key concern for the promotion of biofuels has been their impact on land and agriculture, including the intensive cultivation of energy crops and related environmental impacts, as well as the potential impact that land-use changes have in terms of GHG emissions.

To address these issues, the Renewable Energy and Fuel Quality Directives include 'sustainability criteria' provisions aimed at limiting the potential side-effects of this policy target: 'biofuels and bioliquids ... shall not be made from raw material obtained from land with high biodiversity value, ..., with high carbon stock, or land that was peatland in January 2008' (EC, 2009a). The Renewable Energy Directive also calls on the Commission to review 'the impact of indirect land-use change on greenhouse gas emissions and addressing ways to minimise that impact' (EC, 2009b). Therefore, these provisions focus mainly on climate issues related to biofuels.

In 2012, the European Commission put forward a proposal to limit land conversion for biofuel production. The text highlights that 'emissions from indirect land-use change can vary substantially between feedstocks and can negate some or all of the GHG savings of individual biofuels relative to the fossil fuels they replace' (EC, 2012a). Therefore, it proposes that the share of 'energy from biofuels produced from cereal and other starch rich crops, sugars and oil crops' be limited to 5 % of the total energy consumption of transport by 2020.

The 2011 communication *A roadmap for moving to a competitive low carbon economy in 2050* (EC, 2011b) states that it is necessary to 'advance in 2nd and 3rd generation biofuels and to proceed with the ongoing work on indirect land-use change and sustainability'.

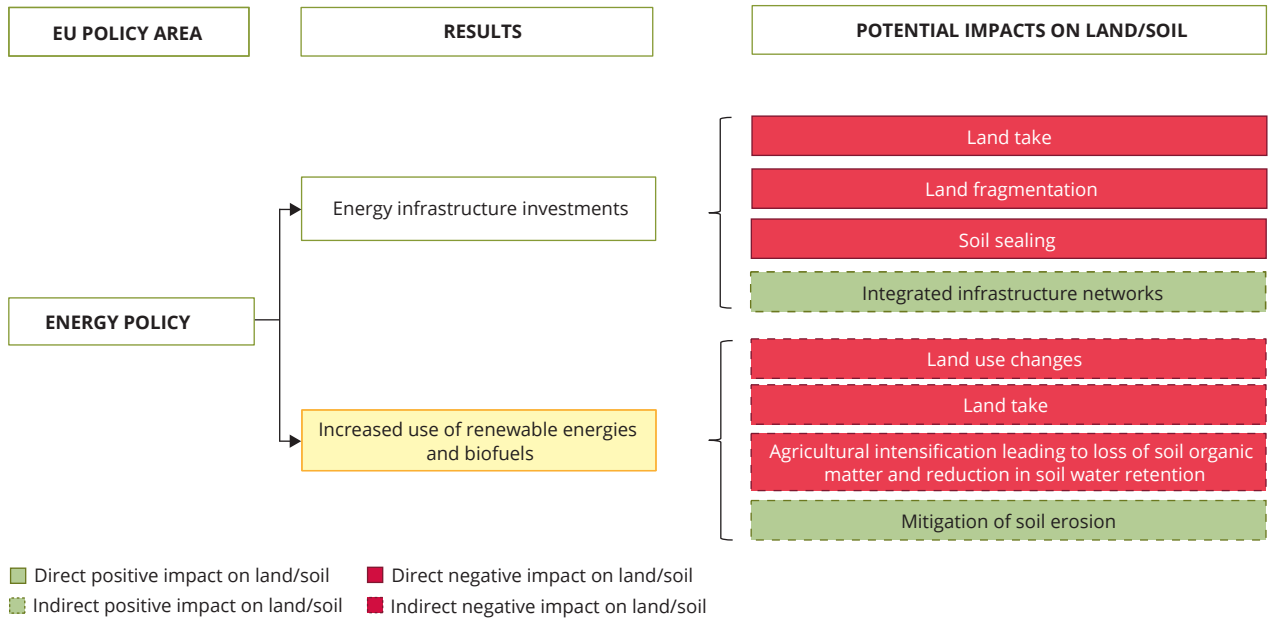
4.2.4 Assessing impacts from policy implementation

This section focuses on impacts linked to two main types of policy instruments: first, project funding, specifically for TEN-E; and second, targets affecting land use, namely those related to renewable energy. Other instruments will also be important, including the use of SEAs and EIAs for energy plans and projects.

The EU Energy and Climate Policies described above can have a range of impacts on land use, land take and land degradation (see Figure 4.5). TEN-E investments will directly take land and may also contribute to land fragmentation. Moreover, the location of TEN-E networks is decided at EU level (in agreement with Member States), and this may limit potential reviews of their environmental impacts via SEAs at Member State level. Investments in renewable energy systems, including wind- and solar-based energy systems, can also consume land, although both of these types of renewable energy systems can be integrated with other uses (e.g. wind power systems can be integrated with agricultural land; and solar cells can be installed on buildings).

([54]) http://ec.europa.eu/energy/renewables/action_plan_en.htm.
([55]) 'When the various European networks are being planned, preference could be given to integrating transport, communication and energy networks in order to ensure that as little land as possible is taken up, whilst ensuring, where possible, that existing or disused routes are reused, in order to reduce to a minimum any negative social, economic, environmental and financial impact' (Regulation (EU) No 347/2013 (EC, 2013i)).
([56]) EC, 2011j, p. 37.

Figure 4.5 Potential impacts of EU Energy Policy interventions on land and soil



Source: EEA/Milieu elaboration.

TEN-E

Existing studies of the land impact of energy infrastructure have not been found. Energy infrastructure investments will have direct impacts on land, including land take, land fragmentation and soil sealing. In most cases, these are likely to be less significant than the direct impacts of transport infrastructure; moreover, indirect impacts are likely to be relatively small, although they could include new industrial installations. Some of these negative impacts might be significantly reduced by the promotion of synergies with other EU networks (e.g. transport or ICT).

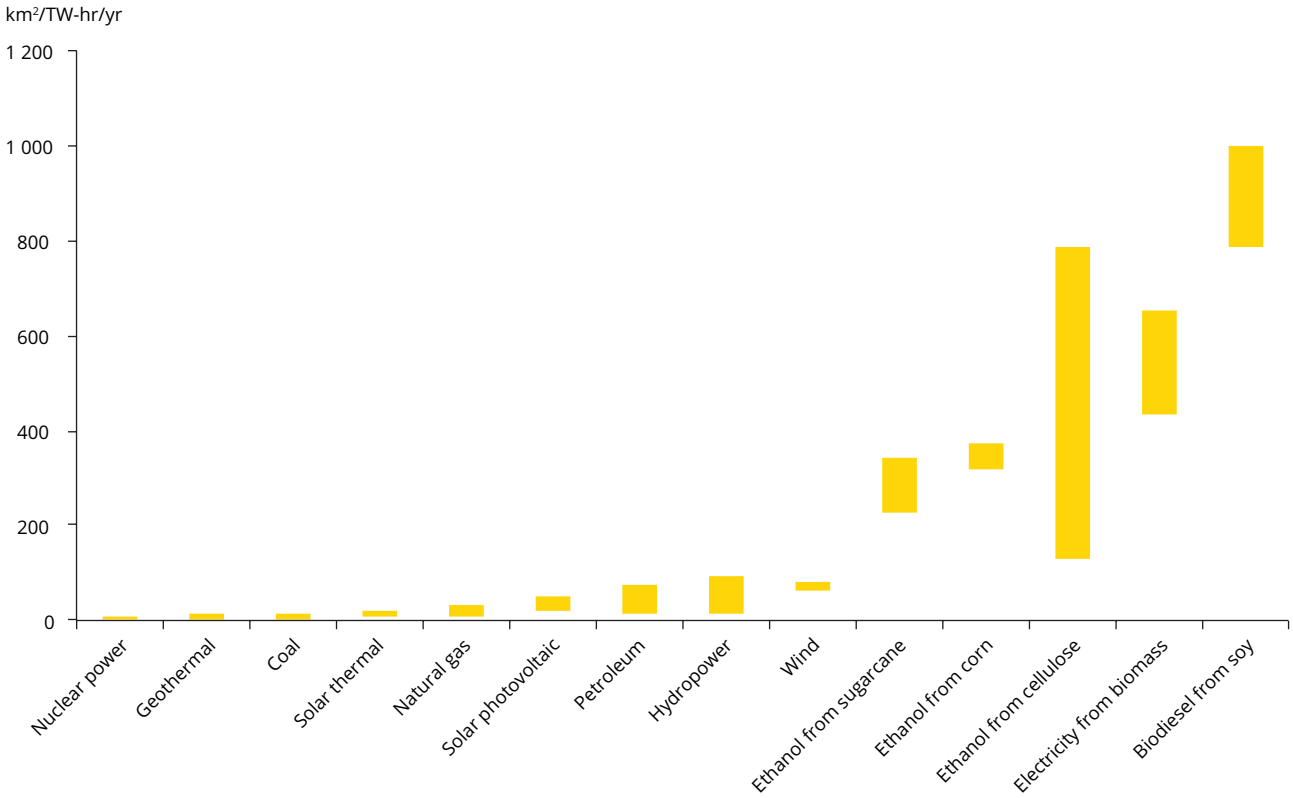
Guidelines presented by the European Commission in 2013 suggest that PCIs could benefit from faster and more efficient permitting procedures, which may also include SEAs and EIAs. While the guidelines refer to 'maintaining the highest possible standard of environmental assessment and protection', it is not clear if this 'streamlining' could result in high environmental impacts, including impacts on land (EC, 2013s).

Renewables: biofuels

The analysis here focuses on the impacts of biofuels and biomass production on land, as this has been a major issue of concern and analysis; while the main focus has been on whether or not they will lead to indirect land-use changes with implications for GHG emissions, their impact on soil quality has also been considered. It is also notable that other forms of renewable energy will have land impacts. Wind turbines take up land, although there are opportunities for farming and wind parks to coexist. Photovoltaic cells and other solar panels can be placed on rooftops, as well as over other areas of land take, such as car parks; however, many large solar facilities are sited on former farmland and there are fewer opportunities for agricultural activities to coexist with solar facilities than with wind turbines (Union of Concerned Scientists, 2013).

The potential impacts of biofuels have been considered mainly in terms of indirect GHG emissions. The 2010 *Report from the Commission on indirect land-use change related to biofuels and bioliquids* (EC, 2010f), in response to the provision in the Renewable Energy Directive, acknowledges that the indirect land-use changes associated with biofuels 'can have an impact on greenhouse gas emissions savings associated with biofuels'. A JRC study highlights that 'higher crop prices may encourage more intensive production methods, leading to more nitrate and phosphate leaching, nitrous oxide emissions, pesticide contamination, soil degradation, loss of biodiversity and landscape deterioration' (JRC, 2010). In addition, the burning of biofuels and energy crop biomass

Figure 4.6 Land-use intensity for energy production/conservation techniques



Note: The values shown are for 2010, as measured in km² of impact area in 2030 per terawatt-hour produced/conserved in that year (km²/TW-hr/yr). Error bars show the most compact and least compact estimates of plausible current and future levels of land-use intensity. The numbers provided are the midpoint between the high and low estimates for different techniques.

Error bars are a graphical representation of the variability of data and are used on graphs to indicate the error, or uncertainty in a reported measurement

Source: McDonald et al., 2009.

are the most land use-intensive (in terms of the area used) energy production techniques in use (JRC, 2010) (see Figure 4.6). Other studies, however, also note that the environmental impacts of such land conversions can be positive in particular cases: 'cultivation of land previously degraded by human activities could produce environmental benefits such as the mitigation of soil erosion' (Stanford University, 2006).

The 2013 Decision of the European Parliament and of the Council on accounting rules on GHG emissions and removals resulting from activities relating to land use, land-use change and forestry (LULUCF) is intended to include these activities in EU emissions estimates. The data could also be used to assess impacts on land degradation related to biofuels, and may, indeed, also provide a base of information for agriculture more generally.

4.2.5 Drawing initial conclusions

Evaluation results

This brief review of two areas of EU Energy Policy, TEN-E and renewables (biofuels and biomass), has indicated the following impacts on land:

- TEN-E investments lead to direct land take and land fragmentation, although the scale of these impacts appears lower than for other sectors, such as transport;
- the targets that promote biofuels are linked to land-use changes, intensive agriculture and pressures on land.

Based on this review, the preliminary conclusions outlined in Table 4.4 can be drawn in terms of the evaluation criteria.

Links with other EU policy areas

As shown in Section 3.1, Cohesion Policy spending supports TEN-E projects as well as renewable energy projects.

Issues for future assessments

Future assessments might consider the elements outlined below.

- This brief review has considered only two aspects of EU Energy Policy. A broader, more systemic assessment of the influence of EU Energy Policy on land could consider other aspects, as well as the **interactions** within Energy Policy and also with other policy areas, such as Cohesion Policy funding.
- In terms of the **effectiveness** of land objectives, future assessments could consider if 'streamlined' SEA and EIA approaches fully address EU land objectives.
- Future assessments could gather data on **impacts** related to TEN-E projects, such as land take and land fragmentation, and also on the effectiveness of approaches to mitigate impacts.
- With regard to **impacts**, the data from the new accounting rules related to LULUCF could be valuable for assessing the impacts of energy crops on land degradation.
- The 'second generation' of biofuels has been assessed to reduce the **impacts** on land of the current, first generation (JRC, 2013b). The promise of the second generation and issues for its development could be a topic of future assessment.

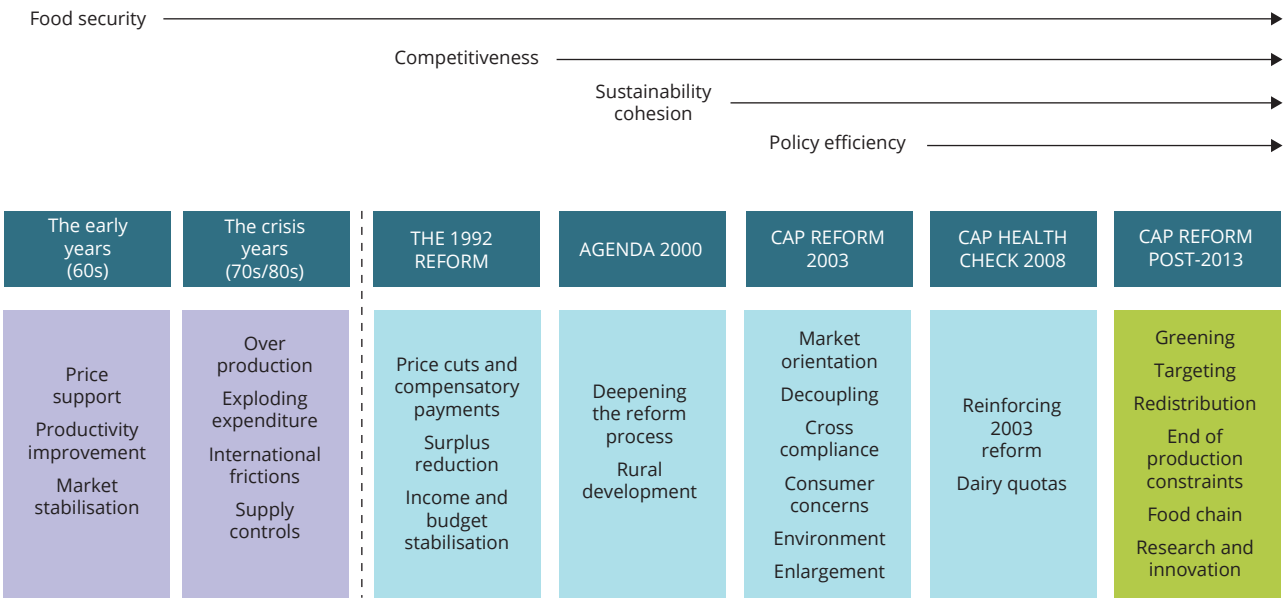
4.3 Common Agricultural Policy

Agricultural land covers approximately half of Europe's territory. The CAP can thus have wide-ranging impacts on land use and land degradation. It has, indeed, often been put forward as a major driver of land-use change in the EU (Rounsevell et al., 2002). It must be noted, however, that, as the CAP has become increasingly market oriented, the influence of market forces — including consumer preferences, global demand for agricultural commodities and price competition on global markets — as drivers of land-related impacts in agricultural and rural areas has also grown. Scientific and technological progress has also substantially affected production processes in the sector via agricultural chemicals, plant and animal breeding, and improvements in machinery, as has labour force and land availability. Finally, climate change can have significant effects on land-use changes; for example, land abandonment as a result of desertification and an increase in

Table 4.4 Summary of the assessment per evaluation criteria

Evaluation criteria	Summary of the assessment
Relevance	The scale of potential impacts from TEN-E investments on land appears lower than for other sectors; nonetheless, EU land objectives are relevant. The EU's biofuel targets have led to land-use changes that could affect degradation (and also its indirect GHG emissions): consequently, EU land targets are relevant for this sector.
Coherence	TEN-E policy documents refer to the need to reduce land take, although they do not directly cite EU land objectives; thus, there is partial coherence. EU policy documents and legislation have paid increasing attention to the impacts of biofuel targets on land; consequently, coherence is growing.
Effectiveness	Information was not found on the land impacts related to TEN-E investments. For biofuels, information was not found to indicate how effective new provisions have been (or will be) at reducing impacts such as land degradation.
EU added value	The TEN-E programme provides cross-border connections, and thus is relevant for addressing EU land objectives. Moreover, EU initiatives could identify synergies among infrastructure plans, such as those for TEN-T, potentially reducing impacts such as land take and land fragmentation. EU policy has been a key driver for the cultivation of energy crops across Europe; consequently, EU action is necessary to address potential land impacts (as well as others, notably those for GHG emissions).

Figure 4.7 Historical development of the CAP



Source: European Commission, DG Agriculture and Rural Development.

cultivable areas in northern latitudes as a result of milder temperatures. Disentangling the influence of, on the one hand, CAP interventions, and, on the other, broader environmental and socio-economic drivers is, therefore, not straightforward, and examining the latter in detail is beyond the scope of this study. Bearing this in mind, the present section provides a brief overview of the CAP and its implications for land use and land degradation, based on recent literature.

4.3.1 Overall objectives

As stated by the European Commission (EC, 2011a), agricultural land and forests cover approximately 47 % and 37 %, respectively, of EU territory, and, therefore, the EU's CAP plays a key role in delivering environmental public goods and addressing climate change, mainly through sustainable land management. As shown in Figure 4.7, although initially geared almost exclusively towards production support and market stabilisation, the CAP has, over time, become more market oriented, thus shifting away from production support towards producer support (income support and safety net mechanisms). It has progressively incorporated environment-related considerations, including support for sustainable land management practices and rural development (EC, 2013g). In 1992, market management (mainly export refunds and intervention purchases) accounted for about 90 % of total CAP expenditure; by the end of 2013, this amount was only 5%. Direct payments, which are currently the main source of support for farmers, are largely decoupled from production (i.e. paid regardless of whether the farmer produces commodities or not, as long as their land is kept in accordance with GAEC requirements ([57]); see next section for further details) ([58]).

4.3.2 Policy instruments

This section presents the main policy instruments of the current CAP, which covers the 2014–2020 period. First, how these instruments are managed is discussed, including the conditions that apply to CAP funding eligibility. Then, the key data related to the volume and distribution of CAP expenditure over time are presented.

The CAP consists of two 'pillars'. The first one refers to direct payments to farmers and market-support measures. The second pillar focuses on rural development. The CAP uses two funds, the European

([57]) http://www.agrifood.se/Files/AgriFood_WP20103.pdf.
([58]) http://www.agrifood.se/Files/AgriFood_WP20103.pdf, p. 4.

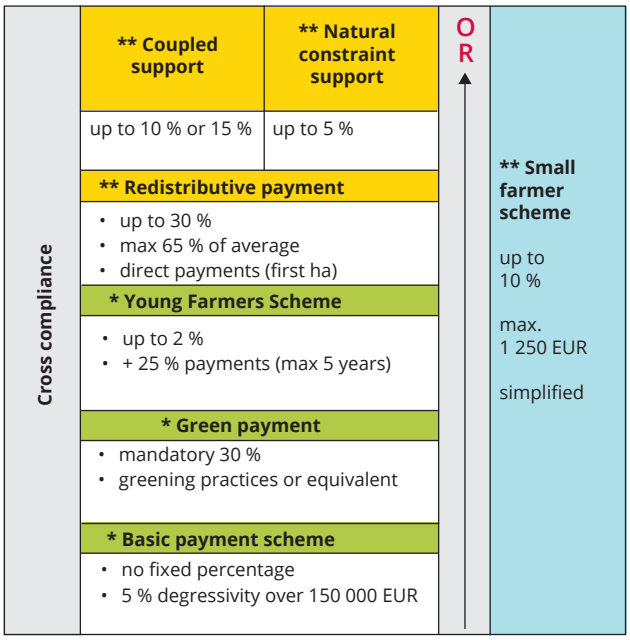
Agricultural Guarantee Fund (EAGF) and the EAFRD, which are part of the general budget of the European Communities. CAP funds are channelled in a context of shared management between the Member States and the Community.

Direct payments are financed via the EAGF. Total payable amounts are set for each Member State. The allocation to individual beneficiaries is then calculated after subsequent EU- and Member State-level modulations and once all claims have been verified. Direct payments are implemented in accordance with two different models: the Single Area Payment Scheme (SAPS) in the EU-12 (apart from Slovenia, Malta and Croatia) and the Single Payment Scheme (SPS) in the EU-15. The SAPS could still be applied until 2020, whereas the SPS is foreseen to be replaced by a Basic Payment Scheme (BPS) as of 2015. In both cases, Member States have flexibility to allocate and administer funds. This can be done according to a variety of models: on the basis of historical individual reference amounts (the 'historical model', which is the most widely applied), on the basis of averages of historical reference amounts of a region concerned (the 'regional model'), or of a mix of both approaches (the 'hybrid model').

SPS and SAPS payments are usually referred to as decoupled subsidies. However, it must be noted that the SPS and SAPS payments are decoupled from the choice of what to produce, but not from land use (i.e. they are linked to the surface of land utilised) (European Parliament, 2013). In addition, in the latest CAP reform, Member States can allocate up to 15 % of their total direct payments to 'coupled support' for specific groups, such as young farmers or small-scale farmers. Figure 4.8 presents the different direct payment schemes and indicates their maximum shares of the national direct payment envelope, as well as whether they are compulsory or voluntary in nature.

Direct payments are linked to environmental requirements via cross compliance, which encompass two main elements ([59]): first, statutory management requirements, which refer to relevant EU legislation and apply to all farmers regardless of whether or not they receive CAP support; and second, GAEC rules. In the legislation for the 2014–2020 cycle of the CAP, soil and carbon stock are included under GAEC requirements, with three specific requirements: minimum soil cover, land management to limit erosion and maintenance of soil organic matter (EC, 2013p).

Figure 4.8 Design of direct payments and their share of the direct payments envelope



* Compulsory ** Voluntary

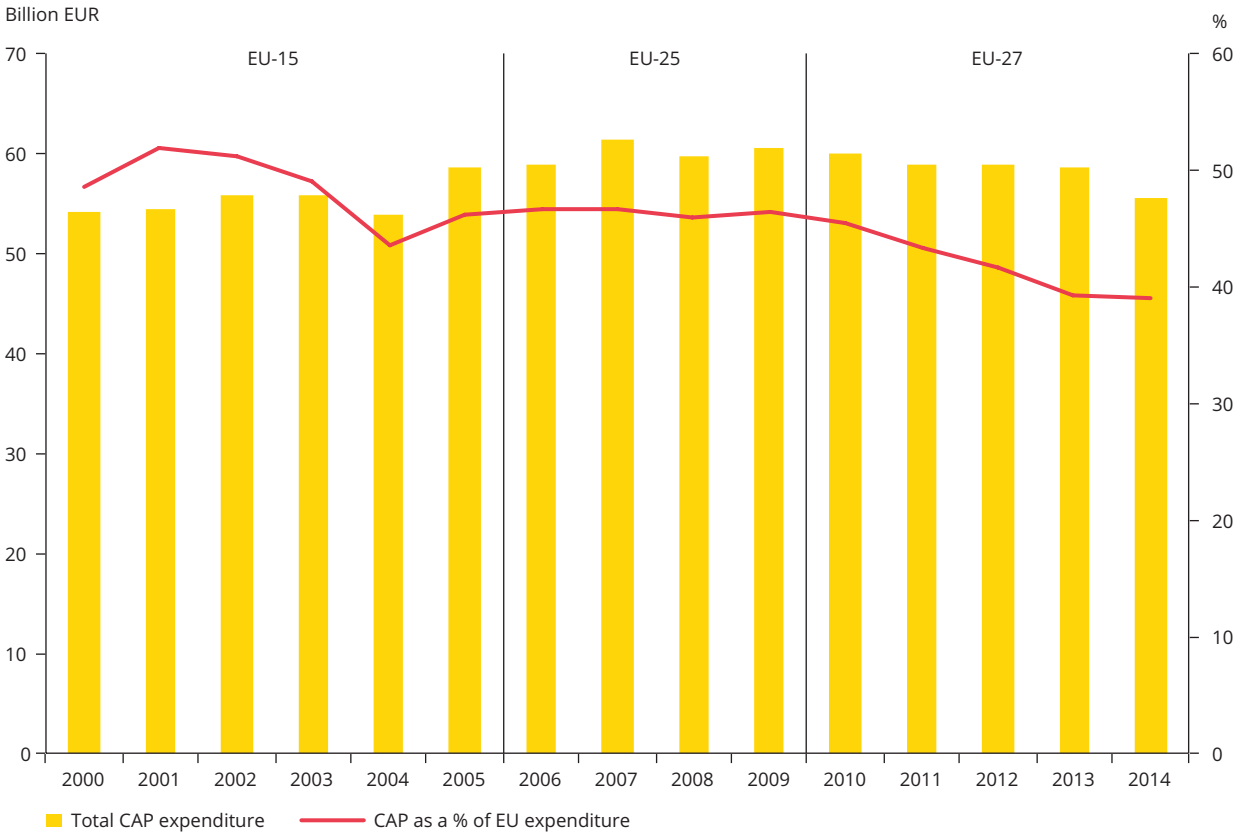
Source: EC, 2013g, p. 9.

The second pillar is funded via the EARDF, which is also part of Cohesion Policy (see Section 3.1). In the 2014–2020 cycle, the main EU legislation governing the EARDF (EC, 2013o) calls for at least 30 % of the resources allocated to each rural development programme (RDP) to go to measures aimed at improving sustainability, such as organic farming, agri-environment-climate measures, payments fostering the coherence of Natura 2000 areas and forestry measures. Most rural development payments under Axis 2 (eight measures, including agri-environmental payments and payments in less-favoured areas) are, like direct payments, subject to cross compliance requirements.

The proportion of the EU budget allocated to the CAP has shrunk since 1985. In 1985, CAP spending accounted for about 70 % of total spending; however, it was just over 40 % of the EU budget in 2012 and, under the current multiannual financial framework, budget ceilings for the 2014–2020 CAP will amount to about 38 % of the total. While the relative proportion of the EU budget allocated to the CAP has fallen, total funding has remained roughly stable since 1993, at between

([59]) http://ec.europa.eu/agriculture/direct-support/cross-compliance/index_en.htm.

Figure 4.9 CAP expenditure in terms of total EU expenditure (2011 constant prices)



Source: European Commission, DG Agriculture and Rural Development.

EUR 50 billion and EUR 60 billion (in 2011 prices). The EU itself has changed over this period with the enlargements in 2004, 2008 and 2013, which increased the number of Member States from 15 to 28. Figure 4.9 displays the annual evolution of CAP expenditure, both in absolute terms and as share of total EU budget expenditure.

For the 2014–2020 budget period, spending on the first pillar is planned to total EUR 312.7 billion in 2014 prices, representing about three-quarters of all CAP spending. The second pillar, rural development, will receive EUR 95.6 billion.

Under the new CAP, Member States will have the possibility to transfer up to 15 % of their total CAP allocations between pillars (see Figure 4.10). Spending on the EARDF, also designated as an ESI fund, should follow the Partnership Agreements under Cohesion Policy (EC, 2013g).

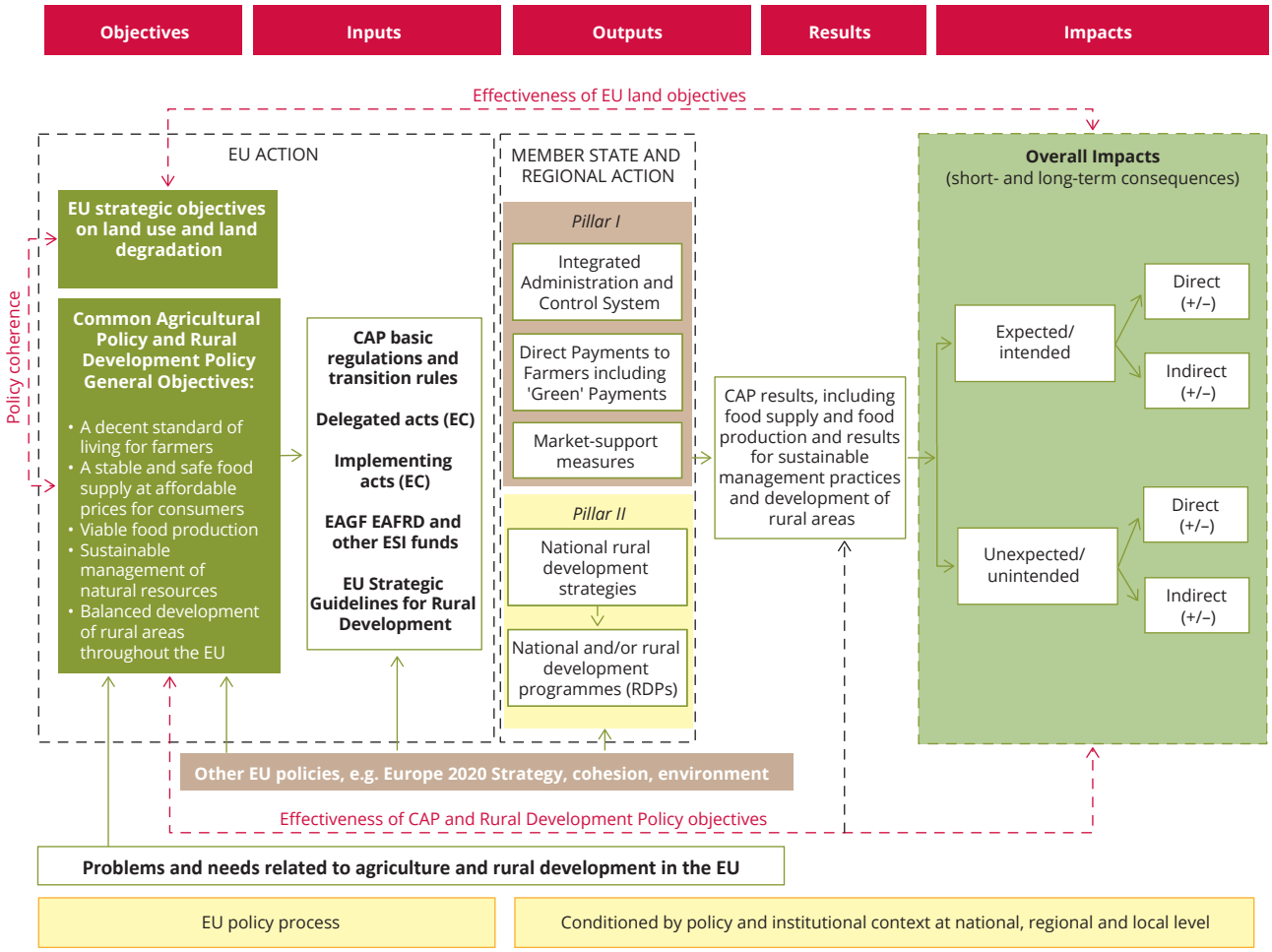
4.3.3 Assessing coherence with EU land objectives

The current EU legislation governing the CAP acknowledges environment-related impacts associated with agriculture; for instance, the CAP regulation on market payments explicitly identifies the enhancement of environmental performance through a mandatory 'greening' component of direct payments as one of the objectives of the new CAP.

Several environmental issues were highlighted in the impact assessment for the new CAP legislation, including the need to mitigate agriculture-driven soil, water and air pollution, as well as threats to ecosystems and biodiversity ([60]). The need to preserve and enhance the environmental benefits of land services and integrate environmental land-use needs into EU policy has also been recognised. In turn, the Commission's Communication on green infrastructure states that the CAP can, 'if properly implemented',

([60]) See, for instance, EC, 2011m.

Figure 4.10 Conceptual framework for the evaluation of CAP impacts on land take and land degradation



contribute to enhancing green infrastructure in the EU. There are also links between the CAP and the EU's Biodiversity Strategy, which, among other objectives, aims to maximise the areas related to agriculture, such as grasslands, arable land and permanent crops that are covered by biodiversity-related measures under the CAP. This is to ensure the conservation of biodiversity and to bring about a measurable improvement in the conservation status of species and habitats that depend on or are affected by agriculture, and to bring about the provision of ecosystem services consistent with the EU 2010 Biodiversity Baseline, thus enhancing sustainable management ([61]).

According to the European Commission, the integration of these and other environmental concerns into the CAP requires 'ensuring a sustainable way of farming by avoiding environmentally harmful agricultural activity' and 'providing incentives for environmentally beneficial public goods and services'. Two overarching principles, which are shared with other EU policies, apply: first, the 'Polluter-Pays-Principle' (obligation to respect common rules and standards for preserving the environment and the landscape); and second, the 'Provider-Gets-Principle', whereby farmers are remunerated for voluntarily engaging in environment-related activities ([62]).

4.3.4 Assessing impacts from policy implementation

This section focuses on two main types of policy instruments that can affect land (following the classification described in Section 1.3): (1) direct payments to farmers and (2) project funding under

([61]) http://ec.europa.eu/agriculture/policy-perspectives/impact-assessment/cap-towards-2020/report/annex2_en.pdf.
([62]) http://ec.europa.eu/agriculture/envir/cap/index_en.htm.

the EARDF. It also notes the role of a third type of instrument, namely rules linked to funding, particularly the CAP's cross-compliance requirements. The second pillar of the CAP also requires Member States to carry out planning and programming, specifically the preparation of RDPs; however, the role of this step is not considered here.

One key factor in any assessment of the impacts of the CAP is the policy's steady evolution. As stated in Rounsevell et al. (2002), subsequent CAP reforms have sought to adjust the ways in which the agricultural sector uses land; this is apparent in the steady reduction of market mechanisms, such as price supports with their strong influence on profitability and thus farmers' decisions with regard to land use, production controls, such as set aside, and, more recently, agri-environmental measures. Many of the changes have been aimed at achieving more sustainable land management. The same authors point out, however, that large-scale land-use conversions of European agricultural land occurred prior to the introduction of the CAP.

In its past forms, the CAP provided suitable conditions for the intensification and specialisation of agricultural production (Rounsevell et al. (undated), op. cit.). A number of studies have assessed the land-related impacts of agriculture in the EU, and, although straightforward attribution is challenging, some of them make the link between such impacts and the CAP itself. Unsustainable agricultural practices have notably been associated with land conversion (e.g. from permanent pasture to arable land), soil erosion and a number of ecosystem dysfunctions associated with nutrient loading. These pressures have resulted in loss of natural capital ([63]). JRC's report on *The state of soil in Europe* highlights, for example, the role of high fertiliser use in building up excess nitrogen in soil (JRC IES, 2012).

Since the introduction of the SPS/SAPS, whereby the bulk of direct payments to farmers was decoupled from production, the CAP has been associated with soil sealing and abandonment of traditional land management practices. CAP-induced land-use impacts, according to existing studies, tend to concentrate on marginal agricultural regions with low productivity, for which decoupling has had negative impacts on biodiversity and landscape because of the homogenisation of land use that results from land being taken out of production. However, cross compliance as well as agri-environmental schemes and national support seem to have helped mitigate potential negative impacts of decoupling on landscape values in these regions (Brady, 2010). Indeed, a JRC study (Lefebvre et al., 2012) concludes that direct payments, as well as the 'less favoured area' scheme ([64]), have enabled the continuation of farming, particularly the preservation of extensive grazing systems, in marginal areas, therefore contributing to the conservation of traditional rural landscapes.

The case study on Poland notes that much of the country's agriculture is based on small farms and has low value added production; as a result, the value of agricultural land itself is relatively low and the conversion of farmland to artificial cover is more attractive. A core focus of CAP support is to increase agricultural returns, which should increase the value of agricultural land; it is not clear, however, the extent to which the CAP, as implemented in Poland, is increasing the value of agricultural land and thus counteracting the pressures for its conversion.

Figure 4.11 presents an overview of the potential impacts associated with current CAP-funded interventions.

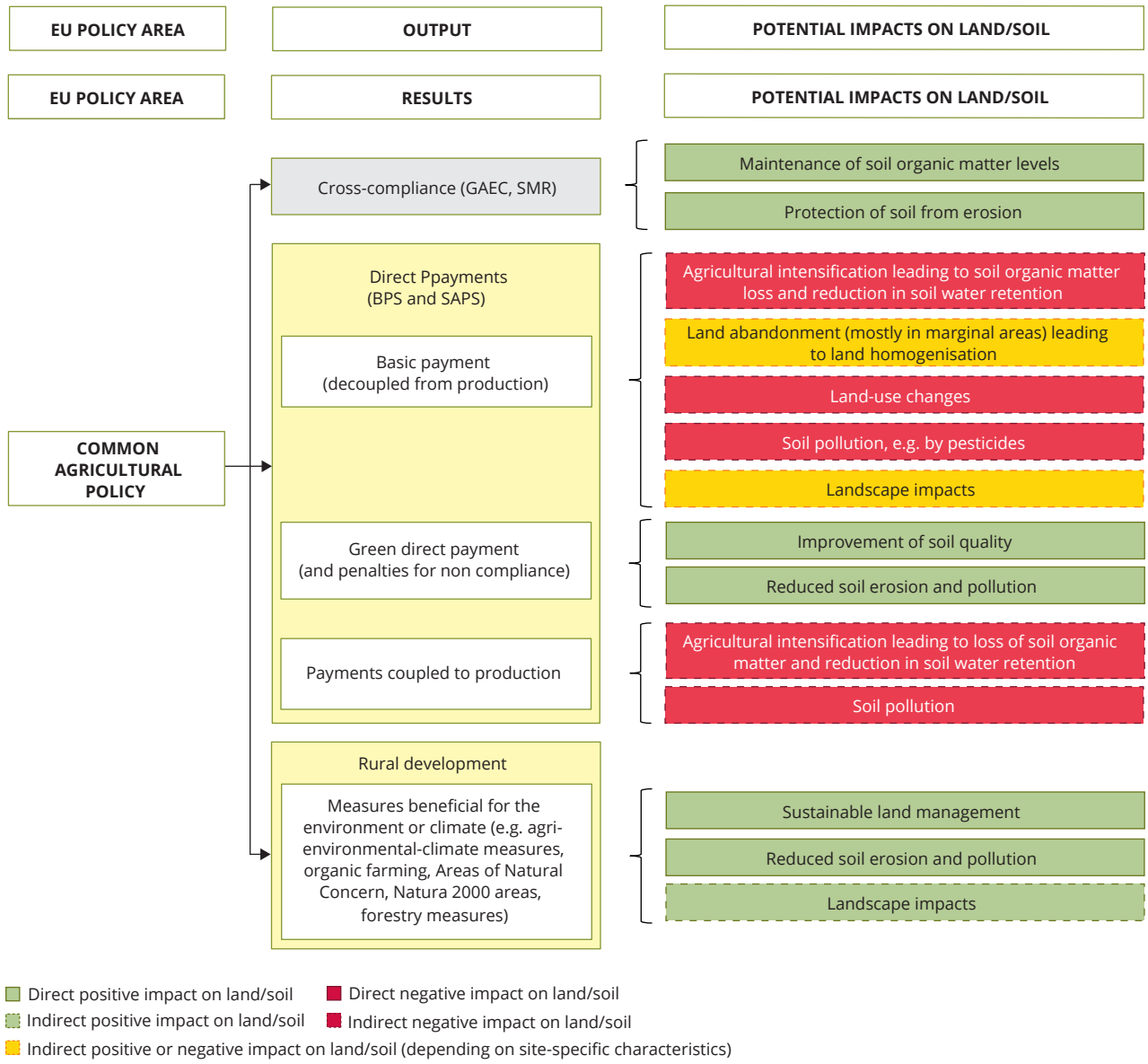
To counterbalance some of the negative impacts with which the CAP has been associated, the aims of the last CAP reform include the enhancement of the sustainability of agriculture and rural development in the EU, with a stronger focus on the provision of public goods. To this end, a policy instrument, the green direct payment (GDP), has been added to the first pillar. GDPs seek to encourage practices that are beneficial for the environment and climate on most of the utilised agricultural area, must account for 30 % of the national direct payment envelope and reward farmers for respecting three obligatory agricultural practices, namely the maintenance of permanent grassland and ecological focus areas, and crop diversification (EC, 2013g). In this regard, the impact assessment accompanying the legislative proposals for the 2014–2020 CAP (EC, 2011l) indicates that the introduction of GDPs is expected to bring about several environmental benefits, in particular with regard to soil; for example:

- green cover should reduce erosion and improve soil quality;
- crop rotation should improve soil organic matter and structure, and reduce soil erosion;

([63]) http://www.eea.europa.eu/themes/agriculture/greening-agricultural-policy/food-security-and-environmental-impacts (accessed on 29 November 2014).

([64]) Under this scheme, farmers in areas in which farming is compromised by geography, topography or climate are eligible for compensation for the extra costs incurred or income foregone. See http://ec.europa.eu/agriculture/glossary/index_en.htm#l (accessed on 29 November 2014).

Figure 4.11 Potential impacts of Common Agricultural Policy on land and soil



Source: EEA/Milieu elaboration.

- ecological focus areas should provide benefits related to biodiversity and soil quality.

The impact assessment referred to the Commission's proposal for the new CAP. The provisions were modified in negotiation with the European Council and Parliament; however, environmental observers have warned that the final compromise significantly reduces the potential of GDPs and other provisions ([65]).

As regards sustainability-oriented measures under the second pillar of the CAP, Member States design and co-finance RDPs. In accordance with EU rules (EC, 2013o), these programmes can cover a broad range of spending areas, including:

- afforestation, agroforestry systems, prevention and restoration of damage to forests, and investments in forestry technologies;

([65]) See, for example, IEEP, 2013.

- agri-environment investments;
- organic farming;
- Natura 2000 and WFD payments;
- payments to areas facing natural or other specific constraints.

At least 30 % of the budget of each RDP must be reserved for voluntary measures that are beneficial for the environment and/or climate change action. During the 2007–2013 period, an average of EUR 825 was allocated per farm to agri-environmental measures in the EU-27; EUR 940 was allocated per farm in the EU-15 and EUR 746 was allocated per farm in the EU-12 ([66]). Figure 4.12 presents a breakdown of the agri-environmental measures, by types of action, implemented in the EU-27, EU-15 and EU-12 in 2009. As can be seen from this figure, the management of landscapes, pastures and high natural value farming accounts for the largest share, followed by crop rotation, set aside and organic farming support.

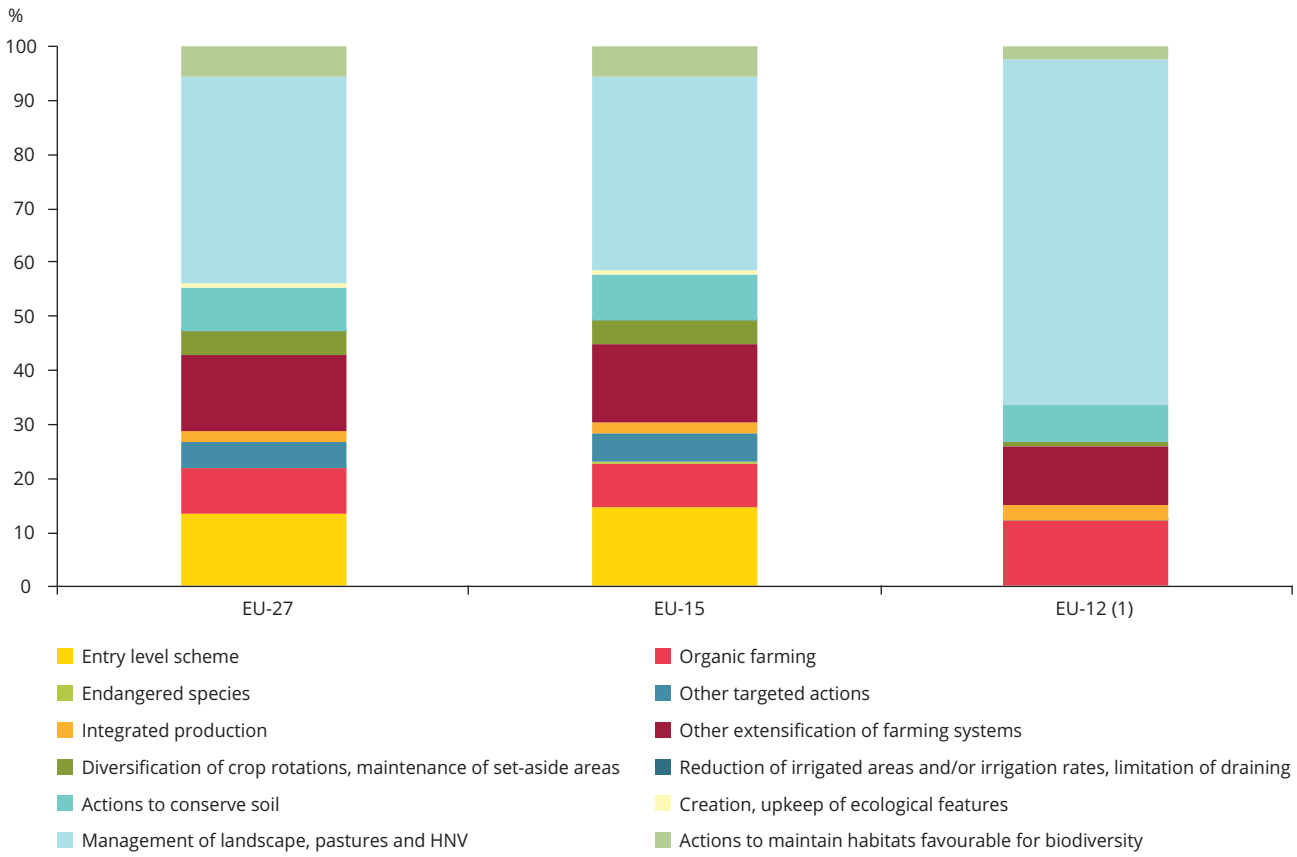
4.3.5 Drawing initial conclusions

Evaluation results

This review has highlighted several key impacts that the CAP has had on land, as detailed below.

- Direct payments have been (and remain) a driver related to the intensification of agriculture and thus to land-related impacts such as soil degradation.
- Over time, the decoupling of direct payments from production has nonetheless mitigated these direct impacts of the CAP.

Figure 4.12 Breakdown of the agri-environmental measures, by types of action, implemented in the EU in 2009 (%)



Note: Data on the different types of commitments include only contracts signed in 2007, 2008 and 2009. HNV: high natural value.

Source: DG Agriculture and Rural Development.

([66]) EC, 2011l, Annex 4.

Table 4.4 Summary of the assessment per evaluation criteria

Evaluation criteria	Summary of the assessment
Relevance	The CAP has a major influence on agriculture, forestry and rural development in Europe, the areas for which cover a very large proportion of the land. Consequently, the CAP is vital in terms of achieving EU land objectives and protecting land as a resource.
Coherence	The CAP has increasingly taken on objectives related to land management and addressed land degradation; indeed, the CAP has gone further than other policies reviewed here, such as Cohesion Policy, Transport Policy and Energy Policy. Nonetheless, there seems to be room to go further; for example, there is scope to address potential impacts in policy assessment, design and implementation.
Effectiveness	The CAP has over time taken on a series of approaches to reduce its environmental impacts, including those on land. This brief review did not, however, find a definitive assessment of results, which are otherwise highly location specific.
EU added value	As the CAP shapes agriculture across Europe, it is vital in terms of addressing land impacts and maintaining land as a resource. At the same time, the reduction in the CAP's market interventions means that other drivers, such as markets and technological development, play a growing role in shaping agricultural practices. This may call for further reviews and evolution of CAP instruments.

- At the same time, decoupling appears to be linked to land abandonment, in particular for extensive farming; this, in turn, can have negative impacts on land, including erosion.
- Cross-compliance, as well as spending for rural development, has addressed land use, management and degradation.
- The CAP reforms for the 2014–2020 cycle stipulate that a share of direct payments should be linked to greening measures. These measures could have positive results in terms of reducing land degradation; however, their implementation by Member States (which will have a significant amount of leeway as far as funding allocation is concerned) will play a key role in shaping the results.
- Spending for rural development can also have positive impacts, particularly via agri-environmental measures; in this regard, the programmes developed by Member States have and will have a key role in shaping these impacts.

Overall, the role of Member States in shaping their CAP spending seems to have grown over time. Also, it appears that the changes in the CAP — in particular the decoupling of direct payments as well as reforms to market-related expenditure — have given market forces a greater role in terms of shaping European agriculture and thus its impacts on land.

Links with other EU policy areas

The CAP will influence the cultivation of energy crops under Energy Policy (see Section 4.3), and will influence land use and impacts. The CAP's second pillar plays an important role in terms of supporting EU forestry policy.

Issues for future assessments

Future assessments might consider the elements outlined below.

- With regard to **coherence**, as well as impacts, a key issue for the new CAP provisions, such as those related to 'greening', will depend on Member State approaches to their implementation; this could be a key area for assessment.
- The analysis has highlighted, in terms of **impacts**, the importance of interactions with market forces; future assessments could address this further through economic analysis of agricultural markets.
- Further research and better monitoring could identify how different CAP approaches affect **impacts**, including land use and land degradation. Modelling could support forward-looking assessments that consider different market scenarios.
- For **impacts**, the loss of ecosystem functions, resulting from land degradation, needs to be further quantified and monetised to inform decision making.
- The Polish case study indicates that low value added agriculture is a driver for urban sprawl and land take. Future assessments could address the **interactions** between agricultural systems and urban sprawl.

5 The impact of EU environmental policy on land

5.1 Nature and biodiversity protection

EU environmental policy covers a broad range of themes, with legislation from biodiversity to air and water quality to cross-cutting assessments, such as EIAs and SEAs, which are reviewed in Section 1.5 above. A range of strategic documents supplement this legislation; notably, the 7EAP for 2014–2020 sets out nine priority objectives and a list of measures, actions and targets to achieve them.

This section focuses on three environmental instruments for nature and biodiversity protection: the Natura 2000 network (created under the Birds and Habitats Directives (EC, 1992b, 2009e)); the EU Biodiversity Strategy (EC, 2011c); and the LIFE programme. Section 5.2 will review another area of EU environmental policy, namely water management.

5.1.1 Overall objectives

Natura 2000 sites comprise an EU-wide network of protected areas designated under the Habitats Directive (EC, 1992b) ('Special Areas of Conservation' (SACs)) and the Birds Directive (EC, 2009e) ('Special Protection Areas' (SPAs)), created with the aim of ensuring the conservation of Europe's most valuable and threatened habitats and species. It was established under the Habitats Directive, which has the overall objective of promoting the protection of biodiversity, in particular the range of rare, threatened or endemic species ([67]). The Directive sets out environmental safeguards against potentially damaging developments on Natura 2000 sites. The Birds Directive's main goal is to protect Europe's wild birds, particularly those that are most threatened.

The EU's **Biodiversity Strategy to 2020** (EC, 2011c), released in 2011, incorporates the global commitments agreed at the Convention on Biological Diversity held in Nagoya (Japan) in October 2010, and represents a step towards the European Commission's first EU Biodiversity Communication (EC, 2006b) (and detailed Action Plan (EC, 2006a)) adopted in 2006. Its headline target is to halt 'the loss of biodiversity and the degradation of ecosystem services in the EU by 2020, and restoring them in so far as feasible, while stepping up the EU contribution to averting global biodiversity loss'. The EU Biodiversity Strategy (EC, 2011c) calls for, among other actions, the addressing of land fragmentation, the development of green infrastructures that link natural areas, and the integration of biodiversity protection into land and water strategies.

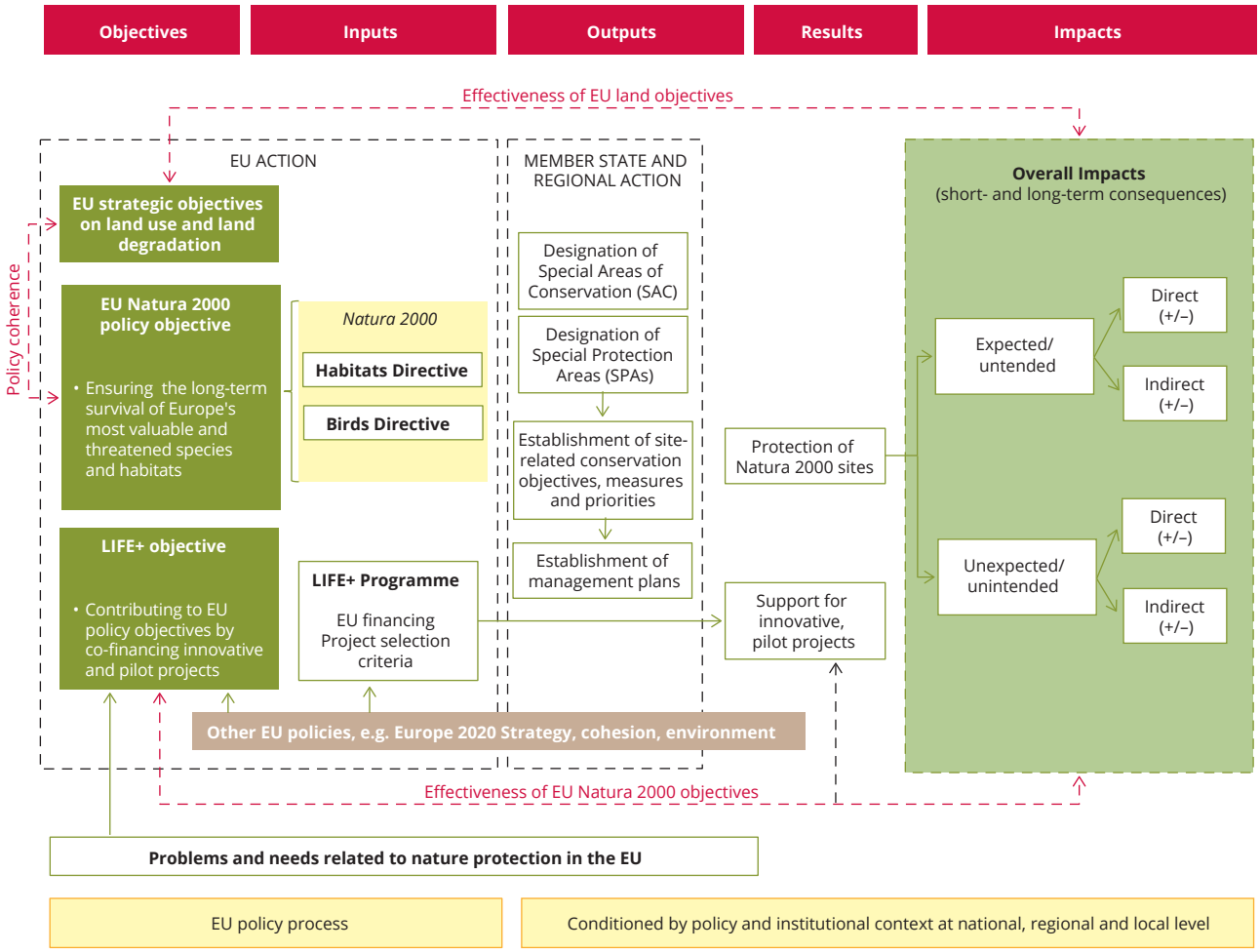
The third instrument that will be analysed here is the LIFE+ Programme, the EU's main financial instrument for projects aimed at the protection of the environment and climate. Its main objective is to 'contribute to the implementation, updating and development of EU environmental and climate policy and legislation by co-financing projects with European added value' ([68]). In the 2007–2013 programming period, the LIFE+ programme co-financed innovative and pilot projects aimed at implementing a range of EU environmental policy objectives, campaigns to raise awareness and training on environment-related issues, as well as projects to develop innovative ideas, technologies and instruments. For the 2014–2020 period, legislation for the LIFE+ Programme sets out a range of financing areas, including finance for biodiversity and the Natura 2000 network, climate actions and support for implementation of the 7EAP (EC, 2013j).

5.1.2 Policy instruments

The review focuses on two policy instruments for biodiversity: Natura 2000 and the LIFE+ programme (see Figure 5.1). A third instrument, the EU Biodiversity Strategy, sets out overall goals and calls for a range of actions at both EU and Member State levels, including via Natura 2000 and the LIFE+ programme. For simplicity, the EU Biodiversity Strategy is not mapped in this section.

([67]) For more information, see http://ec.europa.eu/environment/nature/natura2000/index_en.htm.
([68]) http://ec.europa.eu/environment/life/about/#life2014.

Figure 5.1 Conceptual framework for the evaluation of Natura 2000 and LIFE impacts on land take and land degradation



Natura 2000 sites are selected by the European Commission and Member States in accordance with the criteria established in the Birds and Habitats Directives. The SPAs are designated by each Member State, whereas the SACs require the elaboration of a list by each Member State, specifying the areas containing the species and habitats listed in the Habitats Directive; the list is then submitted to the European Commission for the evaluation and selection process of the areas that will become Natura 2000 sites. After the designation of these sites, Member States have to define site-related conservation objectives, measures and priorities, and develop site-specific management plans. The European Commission has elaborated a wide range of general and sector-specific guidance documents to support the implementation of the Natura 2000 network ([69]).

As noted above, LIFE is the EU's main specific financial instrument for projects aimed at the protection of the environment and climate. This fund is managed by the European Commission, with the assistance of the Executive Agency for Small and Medium-sized Enterprises (EASME), which is responsible for the implementation of many components of the programme ([70]). The programme follows 7-year cycles, and one call for LIFE project proposals is launched every year. These calls are open to public and private entities, and proposals can be submitted either by a single applicant or by a partnership of actors.

LIFE is not the only funding source for environmental investments; indeed, other sources have much greater funds. The CAP, with its greening measures (Pillar I)

([69]) All guidance documents can be found here: http://ec.europa.eu/environment/nature/natura2000/management/guidance_en.htm.
([70]) http://ec.europa.eu/environment/life/about/index.htm.

and rural development funding (Pillar II), supports both biodiversity and water investments (see Section 4.3). Cohesion Policy also devotes a considerable share of its budget to environmental and sustainable development projects (see Section 3.1). Overall, environmental objectives leverage between EUR 10 billion and EUR 12 billion of overall EU spending per year (EU, 2013s).

5.1.3 Assessing coherence with EU land objectives

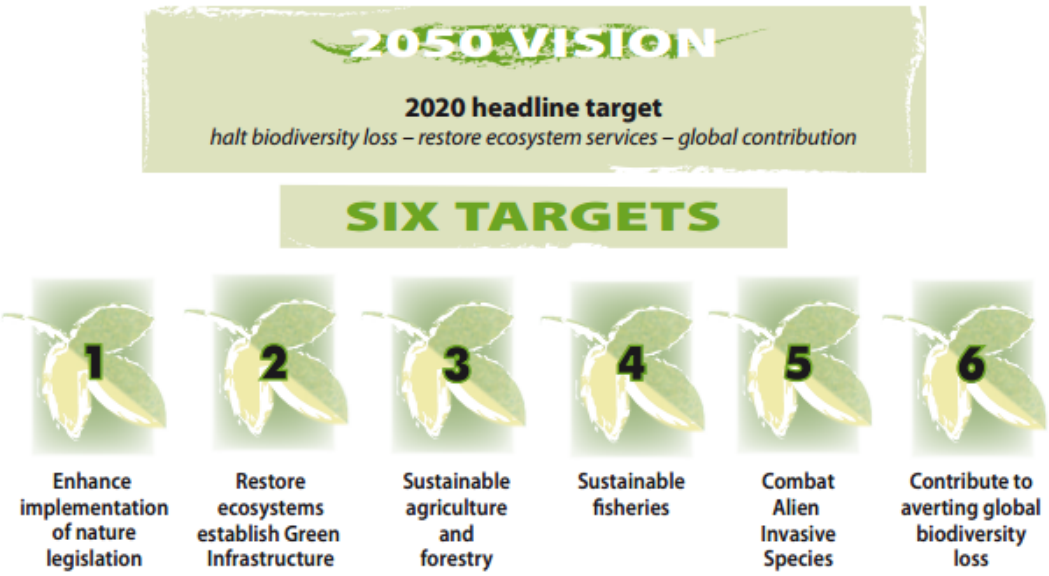
EU nature protection objectives are closely integrated with land objectives. The Birds and Habitats Directives restrict land-use changes in Natura 2000 areas and limit the range of activities that can take place in these areas, therefore enhancing land protection. In particular, Article 6 of the Habitats Directive requires 'Appropriate Assessment' of plans, programmes and projects that may impact a Natura 2000 site in view of the site's conservation objectives, including SPAs under the Birds Directive. The establishment of certain activities in a Natura 2000 area could, therefore, be regulated or even prohibited by the managing authorities, if such activities would negatively affect the site. The Habitats Directive also contemplates the implementation of compensating measures in case of a negative assessment of implications, only in cases in which the projects or plans have to be carried out for 'imperative reasons of overriding public interest' (EC, 1992b).

Most of the targets set out in the EU 2020 Biodiversity Strategy (EC, 2011c) (and in particular Targets 1, 2 and 3) contribute — either directly or indirectly — to soil protection, and reduction of land fragmentation and erosion, in line with EU land objectives (see Figure 5.2).

All of these targets are put in place through several actions, some of which mention land-related issues. Under Target 1, 'Member States and the Commission will further integrate species and habitat protection and management requirements into key land and water use policies, both within and beyond Natura 2000 areas' (EC, 2011c). Land fragmentation is seen as a major factor that harms ecosystems and their services, and Target 2 focuses on the incorporation of green infrastructure into spatial planning to ensure 'better functional connectivity between ecosystems' (EC, 2011c). These targets are aimed at tackling one of the main threats to Europe's biodiversity, which, according to the impact assessment of the Biodiversity Strategy, is 'habitat loss due to land use change and fragmentation' (EC, 2011g).

With regard to the LIFE programme (EC, 2013j), many of the funds for the 2014–2020 period are allocated to projects that deal with land-use development, territorial planning and landscape protection, as well as forest management and forest fire prevention. Some projects are aimed at finding ways of facilitating the implementation and enforcement of soil protection policies, as well as the implementation of green infrastructure projects (see Table 5.1). According to the impact assessment of the LIFE Regulation for 2014–2020, the LIFE+ programme for 2007–2013 led to the 'improved conservation and restoration of some

Figure 5.2 Structure of the EU 2020 Biodiversity Strategy



Source: The EU Biodiversity Strategy to 2020 (EC, 2011c).

Table 5.1 LIFE multiannual work programme 2014–2017: thematic priorities and projects related to soil

Thematic priority	Projects
Thematic priorities for resource efficiency — soil	Projects that limit, mitigate or propose innovative methods to compensate for soil sealing at regional, provincial or municipal level, in line with the Soil Sealing Guidelines.
	Projects designed to achieve better soil management (decreasing erosion, maintaining soil organic matter, avoiding compaction and contamination, conserving/restoring carbon rich soil, etc.) at the local, regional or national level.
	Projects that develop and implement cost-effective support tools and schemes for the identification of contaminated sites at regional or national level.
	Projects for forest monitoring and information systems, and to prevent forest fires.
Thematic priorities for biodiversity	Projects to establish green as well as blue infrastructure and to restore degraded ecosystems.
	Pilot or demonstration projects that test and then implement green infrastructure actions.

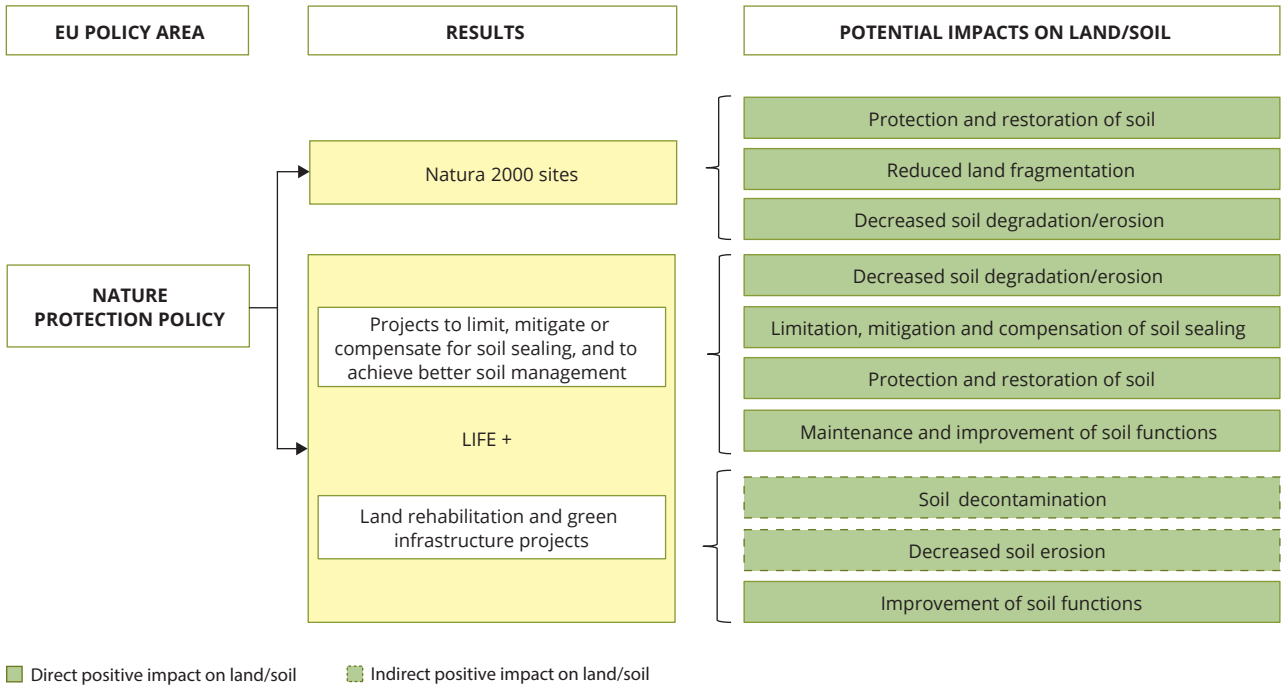
Source: LIFE multiannual work programme 2014–2017 (EC, 2014b).

4.7 million hectares of land, representing some 6% of the total area of the designated Natura 2000 terrestrial sites' (EC, 2011k). Indeed, one of the main 'principal objectives' of the 2007–2013 strategic programme was to finance actions to 'protect and to ensure the sustainable use of soil by preserving soil functions, preventing threats to soil, mitigating their effects and restoring degraded soils' (EC, 2007b).

5.1.4 Assessing impacts from policy implementation

This section assesses two main types of policy instruments for biodiversity and nature protection: area-based designations for the Natura 2000 network and project funding under the LIFE Programme (see Figure 5.3). The Habitats Directive also sets an environmental assessment requirement, namely

Figure 5.3 Potential impacts of Nature Protection Policy on land and soil



Source: EEA/Milieu elaboration.

appropriate assessment, and the Biodiversity Strategy, which is a strategic document, sets out a series of targets and actions; these two latter instruments are not considered here.

Natura 2000

The designation of Natura 2000 status should ensure high levels of protection of a site's soil, and foster the restoration of land if needed. Most importantly, it prevents such areas from being part of economic or urban development processes that could lead to increased soil sealing or land degradation (e.g. as a result of agriculture). This is seen in the case study of Andalusia, where artificial surfaces cover only a small proportion of protected natural areas; moreover, about one-quarter of both agricultural and artificial surfaces in these areas have reverted to natural land. In addition, an integral part of habitat protection measures is the prevention of land fragmentation and the restoration habitat connectivity if this has been disrupted.

The Natura 2000 network consists of over 26 000 sites, covers approximately 18.4 % of the EU territory ([71]) and is the largest protected area system in the world (see Map 5.1). The Birds and Habitats Directives (EC, 1992b; 2009e) aim to protect wild fauna, flora and habitats, and maintain ecosystem services, including those owing to the natural processes that occur in the soil; therefore, these directives are highly restrictive with regard to land-use changes and they place certain limits on the range of activities that can take place in these areas ([72]).

Natura 2000 sites overlap with many nationally protected areas. However, close to half of them do not have a national designation, and thus the network provides an important expansion of protected areas. In total, about 25% of land in the EU-27 is protected either by Natura 2000 sites or by nationally designated areas ([73]). (This analysis looks only at Natura 2000 sites on land; the network also includes marine protected areas, as seen in Map 5.1.)

LIFE programme

Similarly, projects funded by the LIFE programme are also expected to have highly positive impacts on soil, by means of limiting its degradation, and maintaining and improving its functions. This is particularly the case for those projects focused on land-use development, territorial planning and landscape protection, as well as forest management and forest fire prevention. Some projects are aimed at finding ways of facilitating the implementation and enforcement of soil protection policies, and the implementation of green infrastructure actions. In addition, LIFE programme funding supports projects aimed at soil decontamination and projects that create green infrastructure in urban and rural areas.

Since 1992, the LIFE programme has contributed approximately EUR 3.4 billion to the co-financing of more than 4 000 projects ([74]). Over the years, it has reinforced its focus on environmental protection and nature conservation (EC, 2013t), and the most recent working programme (2014–2017) incorporates thematic priorities specifically focused on soil and biodiversity protection. In the 2007–2013 programming period, soil was a 'principal objective' (EC, 2007b) and, according to the mid-term evaluation of the LIFE+ Regulation (Arcadis and VITO, 2010), between 2007 and 2008 approximately EUR 5 million of LIFE programme funding was devoted to five projects in this area. The same document shows that around EUR 49 million were allocated to 92 projects in this area in the 2000–2006 period. The LIFE programme has supported over 20 projects focused on soil sealing, and at least as many on land contamination. LIFE projects have developed web-based spatial systems to support land-use decisions, have tested methods for brownfield regeneration and have promoted green infrastructure (EC, 2014e).

5.1.5 Drawing initial conclusions

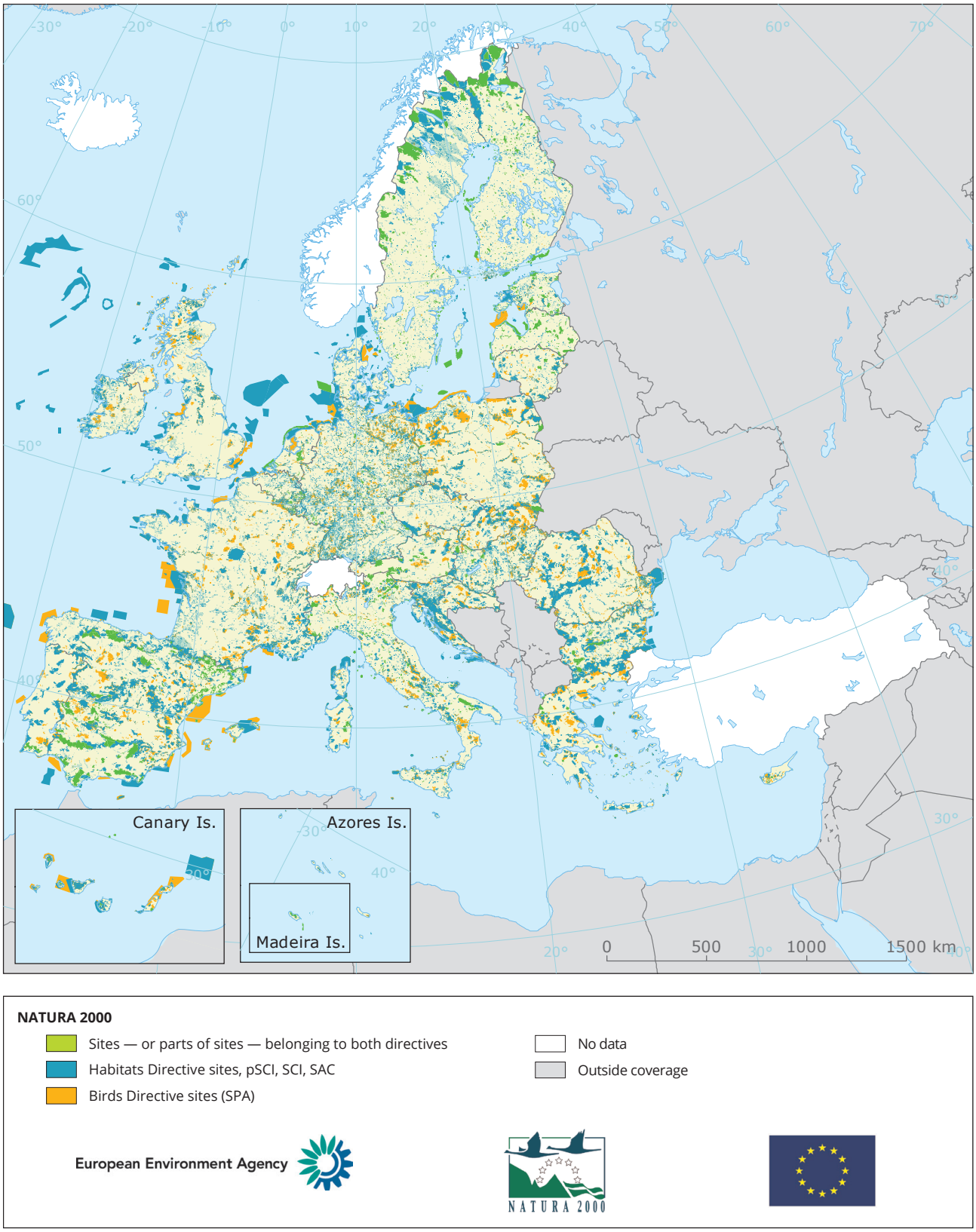
Initial evaluation results

This brief review has identified that EU biodiversity policy has had the following impacts on land (see also Table 5.2 for summary assessment per evaluation criteria).

- The Natura 2000 network, developed under the Birds and Habitats Directives (EC, 1992b, 2009e), has established protection for almost 20 % of EU territory; moreover, almost half of the network was not previously protected under national legislation. In these areas, it is thought that land take has been greatly reduced and that land degradation has halted or, potentially, reversed.

([71]) Natura 2000 Barometer, December 2013.
([72]) Collectively, ecosystem services are estimated to be worth EUR 200 billion to EUR 300 billion per year; significantly, this is more than the annual cost, of approximately EUR 6 billion, of managing the network (http://europa.eu/pol/env/flipbook/en/files/environment.pdf).
([73]) http://www.oee.hu/upload/html/2014-02/YPEF_Educational_material_2014.pdf.
([74]) http://ec.europa.eu/environment/life.

Map 5.1 Land covered by Natura 2000 sites, 2013



Note: The map presents both land and marine Natura 2000 sites. The analysis, however, focuses only on land sites.

Source: EEA, 2013.

- The EU Biodiversity Strategy to 2020 (EC, 2011c) highlights the need to reduce land fragmentation and the role of green infrastructure. Information was not found, however, on the results of implementing this strategy, which will depend on the implementation of EU funding, such as LIFE, CAP and ESI funds, as well as Member State actions.

- Information was not found on the impacts of LIFE spending with regard to land take or land degradation.

Links with other EU policy areas

Natura 2000 sites can include and promote activities that are compatible with their protection status, including high-nature value agriculture. Another link between Natura 2000 sites and other policy areas is that these sites can receive funding from both Cohesion Policy and the CAP. LIFE+ funding supports innovative, pilot projects that can promote environmentally friendly solutions for, for example, agriculture, but also for green infrastructure.

Issues for future assessments

Future assessments might consider the following elements:

- the **interaction** of EU biodiversity with other policy areas could be assessed in terms of overall results, as well as results specifically related to EU land objectives;

- the **impacts** of the LIFE programme in terms of land and soil could be assessed via reviews of selected projects; such reviews could identify direct impacts and also seek to identify their indirect impacts by tracing the dissemination of their results and the uptake of their methods;

- with regard to **impacts**, the role of Natura 2000 sites in protecting and promoting high-nature value farmland could be considered.

5.2 Water management

This section reviews a second area of EU environmental policy, namely water management; it focuses on three key directives that may influence land use: the Nitrates Directive (ND) (1991), the WFD (2000) and the Floods Directive (FD) (2007). In addition, this section considers a recent strategic document for EU water policy, the 2012 *Blueprint to safeguard Europe's water resources*.

5.2.1 Overall objectives

The Water Framework Directive (2000/60/EC) establishes a legal framework for the protection and restoration of clean water across Europe to ensure its long-term, sustainable use. It calls on Member States to attain a 'good status' for all of the surface water and groundwater bodies in Europe. The directive covers all freshwater bodies, as well as 'transitional' waters, such as estuaries and coastal waters up to one nautical mile from the shoreline. A 'good status' is defined in terms of both chemical status and ecological status, and thus the directive protects aquatic ecosystems as well as the wetlands and terrestrial ecosystems that are linked to them.

As indicated in its title, this directive is intended to provide a framework for other EU water legislation. Among these is the earlier Nitrates Directive (91/676/EEC), which seeks to reduce the water pollution caused by nitrates from agriculture sources, such as

Table 5.2 Summary of the assessment per evaluation criteria

Evaluation criteria	Summary of the assessment
Relevance	EU biodiversity instruments, such as the Natura 2000 network, can directly support land objectives, and thus are vital for achieving them.
Coherence	Although policy and legal documents do not cite EU land objectives, the Natura 2000 network, the Biodiversity Strategy and the LIFE Programme directly support land-use and management objectives.
Effectiveness	The Natura 2000 network has protected a significant area of EU territory. Information on results and impacts resulting from the EU Biodiversity Strategy and the LIFE Programme were not found. A key factor in the effectiveness will be the extent of integration with other EU policies, such as CAP and Cohesion Policy spending.
EU added value	Natura 2000 and the EU Biodiversity Strategy cross borders, making an EU-wide policy necessary. This policy could play a vital role in supporting EU land objectives.

mineral fertilisers, which are used on fields, as well as livestock manure.

The Floods Directive (2007/60EC) provides a 'framework for the assessment and management of flood risks' in order to reduce their consequences for 'human health, the environment, cultural heritage and economic activities' (Article 1). It stipulates that EU Member States must take a series of actions to assess, map and plan responses to flood risks. The Directive cites land-use changes among the actions that can be taken to reduce flood risks.

The Blueprint to safeguard Europe's water resources seeks to strengthen the implementation of EU water policy and legislation by tackling 'obstacles which hamper action'; it also sets out a long-term aim 'to ensure the sustainability of all activities that impact on water'. The Blueprint is a non-binding policy document, which calls for 'better implementation and increased integration of water policy objectives into other policy areas', including agriculture, Cohesion Policy, renewable energy, transport and disaster management. The Blueprint highlights the roles that land-use decisions can play in attaining water management objectives.

5.2.2 Policy instruments

The central implementation mechanism for the WFD is the preparation of RBMPs for all of Europe's river basin districts. The deadline for the first plans was 2009, and they are updated every 6 years. These plans should detail the characteristics and conditions of all water bodies in the district, and the pressures, such as pollution, on these water bodies that are related to human activities. Each plan will contain a programme of measures (PoM), which defines the actions required to reach good status, for those water bodies that do not already meet this status, or to maintain their status if they are already deemed to have good status. The plans should include measures under other EU water directives, such as the ND, as well as additional ones needed to meet WFD requirements.

As many of Europe's river basin districts cross borders, the WFD calls on Member States to cooperate on its implementation, including cooperation on the preparation of RBMPs. The most prominent example is seen in Europe's largest river basin district, the Danube, which extends across 11 Member States and nine non-member countries; a joint, international commission prepares an RBMP for the whole district, setting out common actions. Sub-basins of the Danube, such as the Sava River basin (which crosses Croatia, Slovenia, Bosnia and Herzegovina, and Serbia) prepare their own RBMPs, linked to the overall Danube plans; more detailed national plans are also linked in this system.

The actual implementation of RBMPs and PoMs is likely to vary considerably across the Member States. One factor is the legal status of such plans. An analysis (Zamparutti et al., 2012) for the European Commission found that the first RBMPs were approved by national governments in 16 out of 27 Member States and by the national parliament in one Member State. In such cases, in which RBMP approval was obtained at a relatively high, national administrative level by, for example, those in charge of policy areas that can lead to pressures on water bodies, such as agriculture and industry, their provisions should be binding. In other Member States, plans have been approved at lower administrative levels and, therefore, their legal status is likely to be weaker. In general, however, legal status depends on national legal frameworks. Another factor likely to influence the implementation of RBMPs is the extent to which financial commitments have been made with regard to implementing measures. RBMPs provided clear information on the costs of associated measures and the financial resources available to cover these costs in only eight Member States.

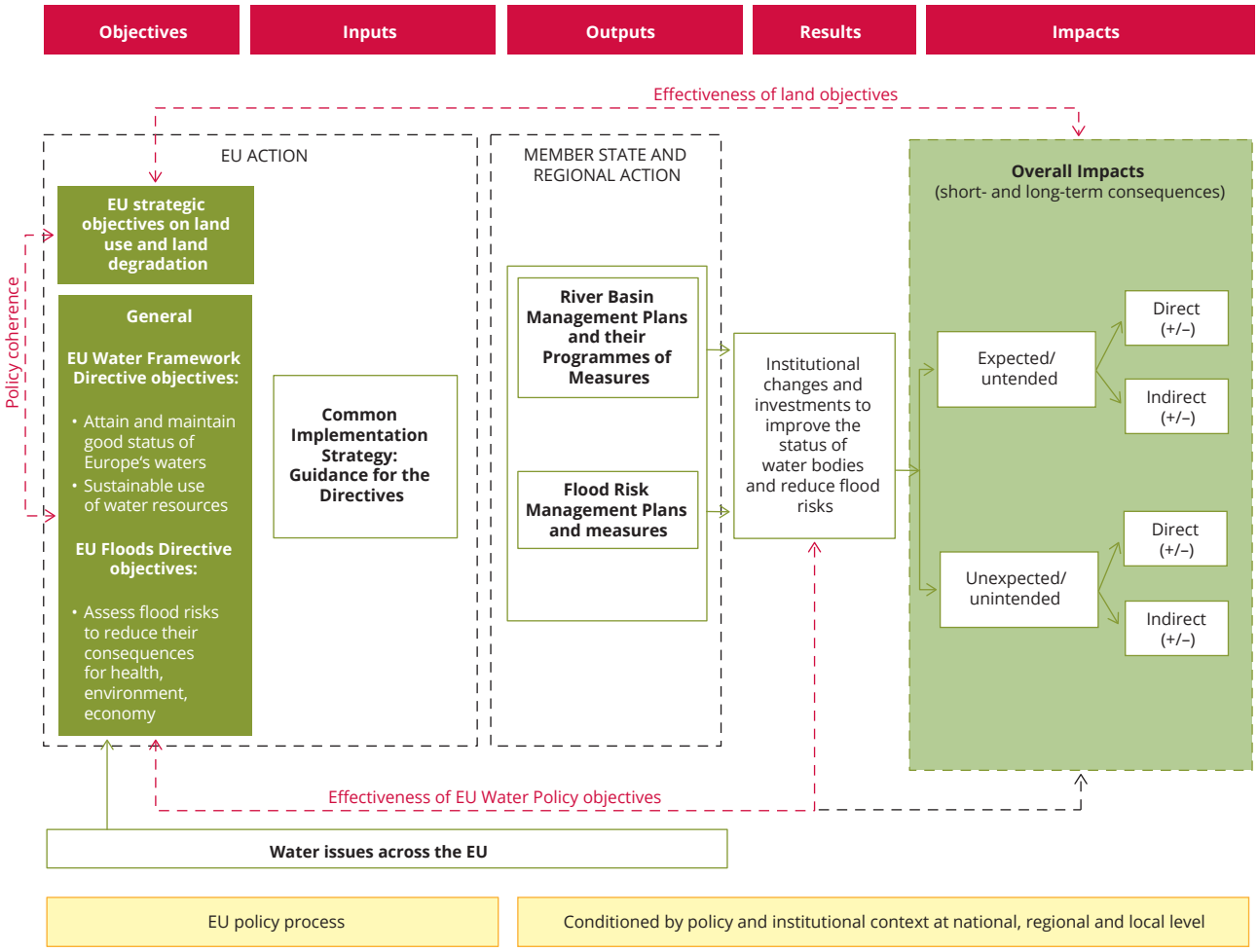
The ND calls on Member States to identify surface waters and groundwater at risk of agriculture-related nitrate pollution; Member States should designate NVZs that drain into these waters. To reduce nitrate pollution, Member States should develop voluntary codes of good agricultural practice for farmers, and, if necessary, binding requirements.

The FD calls on Member States to develop FRMPs, in a process similar to that for the RBMPs. Indeed, starting in 2015, FRMPs should be prepared every 6 years on a cycle parallel to that for the RBMPs.

For the implementation of both the WFD and the FD, the European Commission and the Member States have set up the Common Implementation Strategy, an initiative that has prepared a series of guidance documents that cover a range of technical issues related to the implementation of the Directives, such as monitoring and assessment under the WFD. These are noted in the conceptual framework (Figure 5.4); however, they are not discussed in detail in the rest of this section, as they appear to have only a minor effect in terms of land.

The conceptual framework does not include the Blueprint, which is a non-binding strategy document. The Blueprint focuses on particular implementation via other existing policy instruments. These include the Common Implementation Strategy (CIS) mechanism for guidance documents, as well as EU Cohesion Policy and the CAP.

Figure 5.4 Conceptual framework for the evaluation of WFD and FD impacts on land take and land degradation



5.2.3 Assessing coherence with EU land objectives

The WFD and the ND were prepared before EU land objectives were first put in place in the 2006 Soil Thematic Strategy (EC, 2006d), and thus it is not surprising that they do not contain direct references to objectives related to land use, land take or land degradation. The ND, nonetheless, does contain many provisions that are important for soil quality and thus for land degradation.

The FD of 2007 also lacks direct references to EU land objectives, although it does refer to land-use practices as a mechanism for flood risk management.

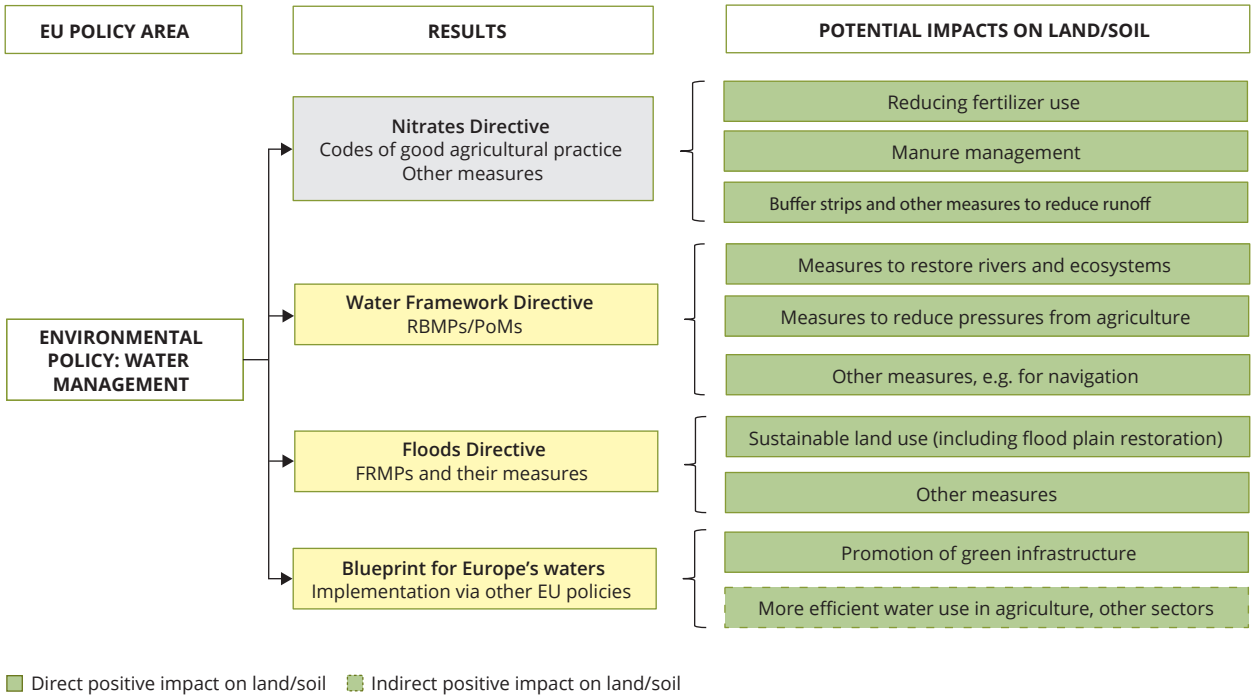
Similarly, the Blueprint does not directly cite EU land objectives, but it does highlight the role of land use with regard to the achievement of EU water goals, a topic that is also addressed in the impact assessment for this policy document.

5.2.4 Assessing impacts from policy implementation

EU water management policy and legislation provides several types of policy instruments that can affect land use (see also Figure 5.5):

- under the ND, Member States must make an area-based designation of NVZs;
- the ND sets a target for nitrate concentrations, and Member States will need to set codes and rules to ensure that farms meets it;
- the WFD and the FD contain planning requirements, namely the preparation of RBMPs and FRMPs;
- the WFD includes a requirement for the assessment of new projects that could affect water bodies.

Figure 5.5 Potential impacts of EU water policy on land and soil



Source: EEA/Milieu elaboration.

The ND calls on Member States to identify NVZs and set up voluntary codes for farmers in these areas, as well as mandatory actions in cases in which these are needed. Such codes and actions contain a range of measures, which can include limits on the use of mineral fertiliser and manure on fields, the creation of buffer strips along rivers, and other features that reduce the pollution of water bodies with nitrates, as well as actions to improve manure management on farms. These actions, while focused on water pollution, can indirectly improve soil quality and thus reduce land degradation.

Many of the RBMPs and PoMs under the WFD will go further in terms of actions to address pressures from agriculture. A broad range of measures was put in place in the first RBMPs, including the promotion of organic and other low-input farming, actions to reduce soil erosion and methods to increase the efficiency of water use in agriculture (EC, 2012c); these are also examples of actions that can improve soil quality and prevent land degradation.

Both the WFD and the FD set up planning mechanisms that can influence land use. In order to improve the ecological status of rivers, Member States have undertaken measures in their RBMPs and PoMs to restore wetlands and other natural features, by, for example, reversing morphological modifications that have changed river courses. These measures may influence land use by restricting areas for land take; they may also improve soil quality.

As noted in Section 5.2.1, the FD explicitly refers to sustainable land use as a tool for reducing flood risks. Measures that could be taken in FRMPs include the restoration of flood plains along rivers, as well as restrictions on land use, including restrictions on land take in flood plains. Measures might even seek to change land use and reverse soil sealing in flood plains, as sealing by artificial surfaces will reduce the capacity of soil to absorb water, increasing flood risks.

In addition, the WFD restricts actions that could reduce the status of water bodies; any investments that do so must undergo an assessment, under Article 4(7) of the Directive, to show that the proposals are of 'overriding public interest' and that alternatives are not available because of a lack of 'technical feasibility' or a 'disproportionate cost'. These provisions can affect major infrastructure projects, such as hydroelectricity dams, which could also have an impact on land; these projects may, however, be promoted under other EU policies, such as renewable energy or transport policies, that support inland navigation.

The Blueprint sets out actions to improve the implementation of these and other directives. As noted in Section 5.2.1, it has a focus on improving integration

Table 5.3 Summary of the assessment per evaluation criteria

Evaluation criteria	Summary of the assessment
Relevance	EU land objectives and EU water policy have many areas of synergy. These include agricultural practices, which affect both land and water, as well as the promotion of green infrastructure.
Coherence	Direct references to EU land objectives are not found in EU water legislation. The Blueprint for Europe's waters highlights the role that sustainable land use could play in achieving water objectives.
Effectiveness	While direct evidence was not found, implementation of the ND is believed to have improved soil quality. Measures detailed by some RBMPs may reinforce actions on nitrates and other agricultural sources of pollution, and also address soil erosion.
EU added value	The EU has an important role to play in water management, not the least because many river basins are shared among Member States. Planning under the WFD and the FD would be more effective if it was coordinated with spatial planning, and doing so may further contribute to achieving EU land objectives.

with other EU policy areas, such as the CAP and Cohesion Policy. The Blueprint also highlights the role of green infrastructure as a mechanism to reduce diffuse pollution from agriculture and provide natural water retention measures that can attenuate floods and droughts. Green infrastructure (which can include buffer strips and other measures promoted in the ND, WFD and FRMPs) could help to reduce land degradation and land take.

As yet, little information is available on how EU water directives have influenced land resources. The implementation of the ND has led to a reduction in the nitrate pollution of water bodies; in principle, this should have been accompanied by improvements in soil quality (EEA, 2012a). The role of the FD will not be evident until the first FRMPs are presented at the end of 2015 and are then implemented for the following 6 years.

A key issue in terms of the potential (and likely beneficial) impacts of EU water policy on land will be the extent to which river basin and flood risk planning is linked to spatial planning. An EEA review found that, in the first cycle of RBMPs, a few Member States have taken steps to ensure such links: Scotland, in the United Kingdom, is one example (EEA, 2012b). Another example of an area in which flood risk planning has been linked to spatial planning is the Flanders Region of Belgium; in this regions, the Sigma Plan to restore flood plains is linked with the regional spatial plan (Debeuckelaere and Goldenman, 2013). However, only a few other Member States have established strong links.

5.2.5 Drawing initial conclusions

Evaluation results

This brief review has identified several potential impacts that EU water policy could have on land, for example:

- the action to reduce nitrate pollution should improve soil quality, this reducing land degradation;
- planning under the WFD and the FD, and actions to, for example, restore river morphology and flood plains may contribute to reducing land take and land degradation.

The review did not, however, find any direct evidence for these potential impacts. Moreover, the analysis shows that the Member State context will play a key role in determining links with land use, land take and land degradation.

Links with other EU policy areas

EU water legislation is linked to the CAP; notably, the implementation of the ND is identified as being among the GAEC requirements for land (Regulation 1306/2013, Annex II). Moreover, reducing agricultural pollution, establishing green infrastructure and undertaking other methods for flood risk protection are identified as being among the spending areas for RDPs.

Issues for future assessments

It will be important to review the influence that RBMPs and, in particular, FRMPs have on land use, land take and land degradation. One approach could be to review the measures set out in the 2015 plans. However, to determine if and how these might actually lead to changes on the ground, selected case studies are also likely to be valuable.

6 Case studies: Spain and Poland

Photo: © Víctor Fernández Salinas

6.1 Spanish case study

6.1.1 Context

In the context of the present study, Andalusia in Spain is particularly relevant, as the region is both a large recipient of EU funds and a noteworthy example of rapid urban development (i.e. land take), particularly in coastal areas. This has been, to a great extent, the result of an economic growth model approach, based on land-intensive sectors (such as construction, transport and tourism). The case study focuses on EU Cohesion Policy spending on transport, in particular roads, although it also notes the results of designating protected areas as part of the EU Natura 2000 network. EU policies have played a major role in fostering forward-looking strategic planning in Andalusia (and Spain as a whole), as well as the development of a range of sustainability and environmental assessments. These policies appear to have been unable to curb the expansion model, which has resulted in an excessive growth rate with regard to urban sprawl and in large-scale infrastructure development.

The trends in land-use change and land take in Andalusia have been in line with those of Spain as a whole; however, trends have been more exacerbated in some regions, particularly in coastal areas. According to data provided by the Junta de Andalucía, urban and other artificial areas increased from 1.6 %, in 1991, to 4.7 %, in 2011, of the total territory ([75]), with most of this increase taking place after 2000 ([76]). Over the same period, another substantial change was a decrease in the total area of land devoted to agricultural activities. Table 6.1 provides data on the evolution of land cover in Andalusia from 1991 to 2011.

([75]) The total area of Andalusia amounts to 87 000 km^2.
([76]) It is not clear, however, the extent to which methodological changes may have distorted these figures.

Table 6.1 Land cover in Andalusia, 1991–2011 (percentage of total land cover)

Type of land cover	1991	1995	1999	2005	2009	2011
Artificial areas	1.6 %	1.8 %	1.9 %	4.2 %	4.5 %	4.7 %
Agricultural areas	46.8 %	47.0 %	47.2 %	40.4 %	40.2 %	40.0 %
Forested land and natural vegetation	50.2 %	50.0 %	49.4 %	51.9 %	51.8 %	51.7 %
Water bodies and wetlands	1.4 %	1.2 %	1.5 %	3.4 %	3.5 %	3.6 %

Note: There was a change in the methodology used to obtain these data between 1991 and 2011. From 1991 to 1999, the methodology used was that of the 'Mapa de Usos y Coberturas Vegetales del Suelo de Andalucía', which is used at regional level by the Junta de Andalucía. From 2005 to 2011, the methodology described in the 'SIOSE Andalucía', which is employed at national level, was used.

Source: Junta de Andalucía.

This growth in the percentage of the total land covered by artificial areas altered the region's development model. The outcomes of this new form of development are, according to the Observatorio de la Sostenibilidad en España (OSE, 2010), the occupation of new areas for, for example, the construction of new transport infrastructure linking previously non-connected areas, and the substantial increase in emission levels, energy use and the consumption of natural resources, such as water (OSE, 2010).

Three main drivers of the increase in artificial land in Spain, and, in particular, Andalusia, over the past decades have been identified (OSE, 2006):

- public policies in Spain during past decades have encouraged a shift from a traditionally compact urban model to an increasingly diffuse residential sprawl;
- the economic growth model approach used in the last decades has been increasingly based on land-intensive sectors (such as construction, transport and tourism) ([77]);
- there have been high levels of investment in infrastructures, including those of the energy, IT and water sectors, but particularly for transport infrastructures.

6.1.2 Applying the methodology

This case study applies the methodology presented in Chapter 2. As presented in the conceptual framework for the evaluation of the impacts of EU policies on land take and land degradation, a variety of stakeholders influence policy outputs at Member State, as well as regional, level and thus, ultimately, influence the results of sectoral policy. Understanding the processes associated with these outputs is, therefore, crucial for evaluating impacts. A set of key stakeholders have been identified that typically shape, either directly or indirectly, the processes of expansion of artificial land in Spain and, in particular, Andalusia. These are listed in Table 6.2 for illustrative purposes (stakeholders relevant to specific policies or sectors, as well as their interactions, need to be identified on a case-by-case basis).

Policy objectives and coherence

This section analyses the extent to which EU land objectives have been integrated with strategic planning in Spain and, particularly, in Andalusia. It focuses on two policy areas that, because of their direct impacts on land use and land degradation, are crucial for the analysis: (1) territorial and urban planning; and (2) transport infrastructure. In the following paragraphs, the legal framework for each of these policy areas is briefly presented and their coherence with EU land objectives is discussed.

Territorial and urban planning in Spain (the case of Andalusia)

In Spain, competences on **territorial planning** were devolved to autonomous communities in 1978. In Andalusia, **spatial planning** lies within the competence of the Ministry of Environment and Spatial Planning of the Andalusian regional government (Junta de

([77]) The pressure of these three land-intensive sectors on the environment and its associated risks (e.g. increased land use, habitat fragmentation and the degradation of ecosystems) were identified in the National Strategic Reference Framework for Spain (2007–2013) as main environmental challenges for the country.

Table 6.2 The key stakeholders that influence land-take trends in Andalusia

Type of stakeholder	Relevant stakeholders identified
Public authorities	National authorities
	Regional authorities
	Local authorities
Private sector	Construction and real estate sector
	Tourism sector
	Transport sector
	Agriculture sector
Private actors	Land owners
Non-governmental organisations (NGOs)	Environmental protection NGOs

Source: EEA/Milieu elaboration.

Andalucía), and is regulated in accordance with Law 1/1994 ([78]). Subsequently, several instruments have been put in place in order to implement this law, as described below.

- **The Spatial Plan of Andalusia (POTA)** ([79]), approved in 2006, establishes the general strategic vision and the legal framework for territorial planning and urban development in Andalusia. It has three main goals: (1) to enhance a model of compact, and functionally and economically diverse cities; (2) to boost the competitiveness of the different areas of the territory; and (3) to foster territorial cooperation. It comprises strategies of territorial development and strategies for systems of cities, which mainly refer to networks of cities; regional networks of transport, energy, IT and water provisions; the system of protection for the territory (e.g. risk prevention, and natural and cultural patrimony); and the integration of regional, national and European developments.

- **The Coastal Corridor Protection Plan of Andalusia** ([80]) is currently under development in accordance with Decree-Law 5/2012 ([81]). This is an emergency measure on urban development, the objective of which is to protect non-urbanised areas along the Andalusian coastline and thereby prevent the degradation of its valuable ecosystems and landscapes, as well as improve the quality of the coastal corridor. It affects 52 municipalities on the coast of Andalusia which have not adapted their spatial plans in accordance with the POTA.

- **Spatial plans at sub-regional level** define the territorial structure and the networks of articulation, such as transport and IT networks. They also regulate the functions of the territory and the systems of territorial protection and risk prevention.

- **The Urban Planning Law of Andalusia** ([82]) aims to regulate urban development and urban land use in Andalusia. Most competences in the area of urban planning lie with local authorities.

Transport planning in Spain (the case of Andalusia)

At the national level, the Strategic Infrastructures and Transport Plan ([83]) highlights that the construction of transport infrastructures has negative environmental effects, which are derived from increased land take and landscape fragmentation. The Environmental Impact Statement introduces several mitigation measures aimed at reducing the negative impacts of these infrastructures. Nevertheless, it is stressed that it is difficult to completely compensate for progressive land take and fragmentation, and its negative effects on biodiversity.

At the regional level, the Infrastructure Plan for Sustainable Transport in Andalusia (PISTA) ([84]) also

([78]) Ley 1/1994, de 11 de enero, de Ordenación del territorio de la Comunidad Autónoma de Andalucía.
([79]) Plan de Ordenación del Territorio de Andalucía (POTA). Decreto 206/2006, de 28 de noviembre.
([80]) Plan de Protección del Corredor Litoral de Andalucía.
([81]) Decreto-Ley 5/2012, de 27 de noviembre, de medidas urgentes en materia urbanística y para la protección del litoral de Andalucía.
([82]) Ley 7/2002, de 17 de diciembre, de Ordenación Urbanística de Andalucía.
([83]) PEIT: Plan estratégico de infraestructuras y transporte 2005–2020. Ministerio de Fomento.

acknowledges this. The PISTA incorporates a diagnosis of the sustainability challenges of the transport sector, and identifies land take and land fragmentation as negative externalities of transport infrastructure ([85]). The measures described in the PISTA take into consideration these concerns. For example, the plan indicates that, in metropolitan areas, urban planning and transport planning should be integrated; this is in line with EU objectives.

This analysis of the different strategic papers at national and regional levels indicates that strategic planning at regional level is coherent with EU objectives: the diagnosis of the environmental problems derived from the construction of transport infrastructure, the establishment of principles and the objectives of action are all entirely in line with relevant EU objectives. Nevertheless, as highlighted by some of the regional experts interviewed in the context of this study, few specific measures have been defined by these strategic documents with regard to addressing the environmental problems associated with transport infrastructure development. It must also be noted that planning documents seldom include specific targets regarding land use and land fragmentation, thus allowing a great amount of discretionary power at the implementation level.

SEAs and EIAs in Andalusia

Law 21/2013 ([86]) on environmental assessment establishes the rules for the environmental assessment of programmes, plans and projects which might potentially have significant effects on the environment ([87]). In Andalusia, Law 7/2007 ([88]) on the Integrated Management of Environmental Quality regulates environmental evaluation, and is an instrument for the prevention and control of the impacts that plans and programmes might have on the environment in the region Andalusia.

Plans and programmes related to transport, urban and territorial planning, or otherwise affecting land use, have to be evaluated in accordance with the requirements of the law. Such an evaluation also needs to be undertaken if it is required by Natura 2000 legislation ([89]).

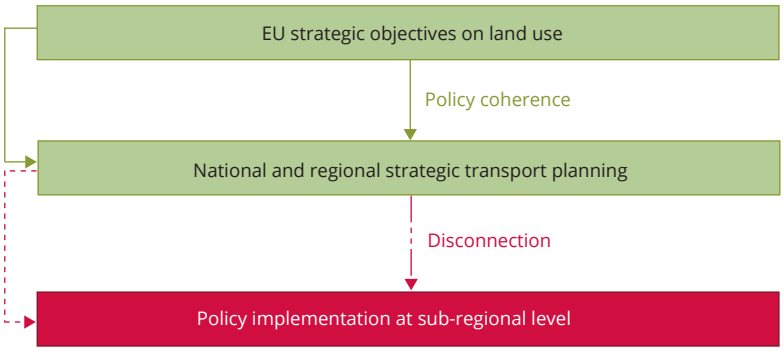
Nature protection in Andalusia

Law 42/2007 on Natural Heritage and Biodiversity ([90]) has transposed the EU Habitats and Birds Directives into the Spanish legislation. In addition to Natura 2000 sites, this law regulates natural protected sites designated at national level, as well as other areas protected by other international conventions or agreements.

In addition, Andalusia has developed its own nature protection legislation: the Andalusian Law of Natural Protected Areas ([91]), which regulates the Natural Protected Areas Network ([92]) — an integrated system of all natural spaces located in Andalusia that enjoy a special protection regime under regional, national or EU regulations, as well as international conventions. It encompasses the most valuable ecosystems of Andalusia, with a total area of about 2.7 million ha (2.67 million ha on land), which makes it the largest network of nature protection in Europe ([93]). According to the regional government officials consulted, this law plays a key role in defining territorial composition on a regional level, and has actively contributed to the improvement and preservation of the environmental values and resources of Andalusia. The objectives of these laws, which restrict land-use changes and seek to preserve ecosystems, are thus coherent with EU land-related objectives.

([84]) Plan de Infraestructuras para la Sostenibilidad del Transporte en Andalucía (PISTA 2007-2013): Decreto 457/2008, de 16 de septiembre de 2008. Consejería de Obras Públicas y Transporte, Junta de Andalucía.
([85]) See pages 37 and 38 of the Plan.
([86]) Ley 21/2013, de 9 de diciembre, de evaluación ambiental.
([87]) This law merges Law 9/2006, on evaluation of the effects of certain plans and programmes on the environment (which transposed Directive 2001/42/CE into the Spanish legislation), with Royal Decree 1/2008, approving the revised text of the law on the environmental impact assessment of projects and later modifications to the text.
([88]) Ley 7/2007, de 9 de julio, de Gestión Integral de Calidad Ambiental.
([89]) The areas subject to these evaluation procedures are listed in Annex I, categories 12.1 and 12.2, of Law 7/2007 on the Integrated Management of Environmental Quality.
([90]) Ley 42/2007, de 13 de diciembre, del Patrimonio Natural y de la Biodiversidad.
([91]) Ley 2/1989, de 18 de julio, por la que se aprueba el inventario de Espacios Naturales Protegidos de Andalucía y se establecen medidas adicionales para su protección.
([92]) Red de Espacios Naturales Protegidos de Andalucía (RENPA).
([93]) http://www.juntadeandalucia.es/medioambiente/site/portalweb/menuitem.f497978fb79f8c757163ed105510e1ca/?vgnextoid=007fee9b421f4310VgnVCM2000000624e50aRCRD&vgnextchannel=3bdd61ea5c0f4310VgnVCM1000001325e50aRCRD.

Figure 6.1 Policy implementation



Source: EEA/Milieu elaboration.

Policy implementation process

This section discuss the main implementation-related findings of the research (see Figure 6.1).

Transport infrastructure in Spain and Andalusia (Cohesion Policy)

Spain has been one of the main recipients of Cohesion Policy funds since its accession to the European Community in 1986 (see Table 6.3) ([94]).

Table 6.4 presents the percentage of the total Cohesion Policy funds allocated to each of the thematic priorities for the 2007–2013 programming period. Transport constitutes almost 22 % of the total, a percentage that is considerably higher than the EU-15 average ([95]).

Table 6.3 Cohesion Policy funds allocated to Spain and Andalusia, per programming period, 2004

	1986–1988 (million EUR)	1989–1993 (million EUR)	1994–1999 (million EUR)	2000–2006 (million EUR)	2007–2013 ([a]) (million EUR)
Spain	4 822	18 707	50 654	61 890	31 457
Structural funds ([b])	–	–	41 080	49 659	28 207
Cohesion funds	–	–	9 574	12 322	3 250
Andalusia	1 167	3 027	8 398	13 556	14 927
Share of national amount	24.2 %	16.2 %	16.6 %	21.9 %	47.5 %

Note: ([a]) Rural development and fishery funds are not included.

([b]) Data include the European Agricultural Guidance and Guarantee Fund (EAGGF) EAGGF and the Financial Instrument for Fisheries Guidance (FIFG) until 2006.

Data refer to EU funds, but do not include co-financing funds.

Source: European Commission, Ministerio de Economía y Hacienda, Junta de Andalucía, 2014.

([94]) It should be noted that differences might arise between the allocation at the planning stage and the actual expenditure at the implementation stage.

([95]) The percentage of funds devoted to transport infrastructure has been decreasing with respect to previous programming periods.

Table 6.4 Percentage of Cohesion Policy funds allocated to Spain by thematic priorities, 2007–2013

	Spain	EU-15	EU-27
Climate change	13.9 %	11.4 %	13.9 %
Innovation	25.9 %	30.1 %	24.9 %
Small and medium enterprises	9.7 %	10.6 %	7.8 %
Information society	3.3 %	4.2 %	4.4 %
Transport	**21.7 %**	**15.6 %**	**24.0 %**
Energy	1.3 %	3.0 %	3.1 %
Environment	34.6 %	25.8 %	30.3 %

Source: DG Regional Policy (2010).

Table 6.5 ERDF funds allocated to different transport modes, 2007–2013

	ERDF funds (million EUR)	Proportion of total ERDF (%)
Rail services	250.3	13.7
Rail services (TEN-T)	168.1	9.2
Highways	236.7	12.9
Highways (TEN-T)	191.7	10.5
National roads	55.4	3.0
Regional/local roads	453.7	24.8
Urban transport	20.7	1.1
Multimodal transport	20.7	1.1
Airports	43.5	2.4
Ports	390.0	21.3
Total	**1 830.8**	**100**

Source: Junta de Andalucía, 2014 (PO FEDER Andalucía 2007–2013).

As shown in Table 6.5, most of these investments were allocated to the construction of rail and road infrastructure (74 % of the total), both of which are high consumers of land. Urban transport and multimodal transport each received only approximately 1 % of the total.

Governments at national and regional levels have favoured large-scale infrastructure developments. Among other reasons, this is because large infrastructure projects have traditionally lent themselves to easier and quicker absorption of EU co-funding. In addition to bridging the gap between the Andalusian transport network and that of the EU ([96]), these investments are frequently seen as a way of fostering economic growth in peripheral areas. They are also a factor of political visibility.

This led to a rapid infrastructure expansion in Spain, and in Andalusia in particular, with an increase in artificial areas covered by transport infrastructure of 183 % between 2000 and 2006, according to OSE, 2010 ([97]). In addition, this expansion indirectly boosted urban sprawl: as relatively remote areas became more accessible, demand, and consequently incentives for urbanising these areas, increased.

([96]) Investments in transport infrastructures after the accession of Spain to the European Community were considered necessary in order to bridge the gap between the Spanish transport network and that of the other European countries.
([97]) In Spain, there was a 446 % increase in the land covered by transport infrastructure between 1987 and 2006, according to OSE (2012).

It could be argued that Cohesion Policy, through the provision of funds devoted to transport, has fostered the rapid development of transport infrastructure in Andalusia (and Spain as a whole), which has caused significant environmental impacts in terms of land take and land fragmentation, justified at the planning and implementation stage on the grounds of overriding public interest (i.e. the achievement of socio-economic development and territorial cohesion objectives). Nevertheless, there are other factors — the territorial planning framework, the role of key stakeholders and the particular structure of incentives — that have played a key role in shaping the impacts that Cohesion Policy has had in Andalusia. In addition, the expansion of transport infrastructure is only one of the drivers of land take in the region.

SEAs and EIAs in Andalusia: choice of policy options

According to the information provided by some of the experts consulted, these evaluations strictly follow the requirements set out in the law. They also argued that, as a general rule, the quality of environmental assessments is high (see Figure 6.2). However, other experts appear to be sceptical with regard to the extent to which these assessments are taken into account and referred to them as 'mere procedural requirements' with few practical effects (e.g. few options are ruled out altogether as a result). Potential positive socio-economic impacts are frequently considered to balance out potential negative impacts on the environment in general, and on land take and degradation in particular. For example, in the case of transport infrastructure, improvements in terms of accessibility and the achievement of other territorial development objectives are, in practice, given more weight than environmental concerns. Officials in the regional administration objected to this view and indicated that, whenever appropriate, correcting or compensatory measures are put in place.

Nature Protection Policy

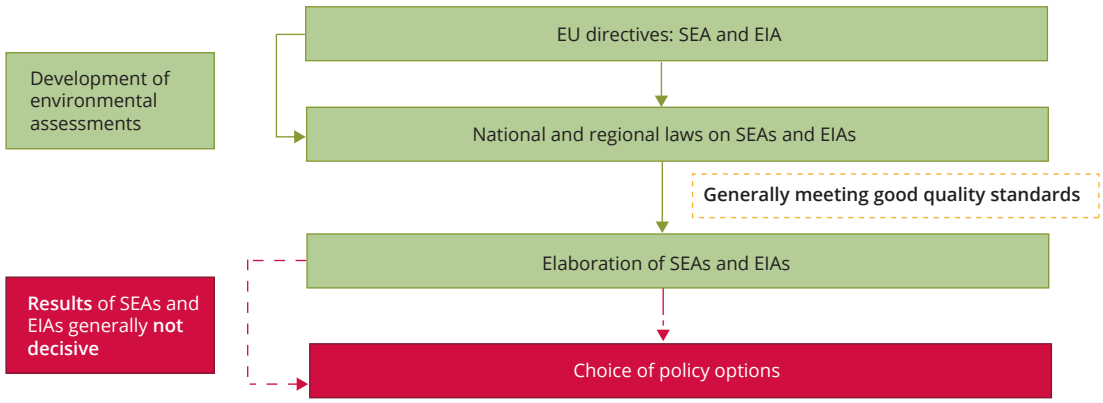
More than 27 % of Spanish territory (13.7 million ha) is covered by Natura 2000 sites (OSE, 2012). This percentage is slightly higher (30.5 %) in Andalusia (see Figure 6.3). In total, this amounts to 2.66 million ha and includes 63 SPAs for birds and 189 Sites of Community Importance (SCIs), of which 29 are declared SACs.

Cohesion Policy has supported biodiversity protection, including spending for Natura 2000 sites: funds of EUR 681 million were provided in the 2007–2013 programming period for Spain as a whole.

Monitoring and reporting of changes of land use and land degradation in Andalusia

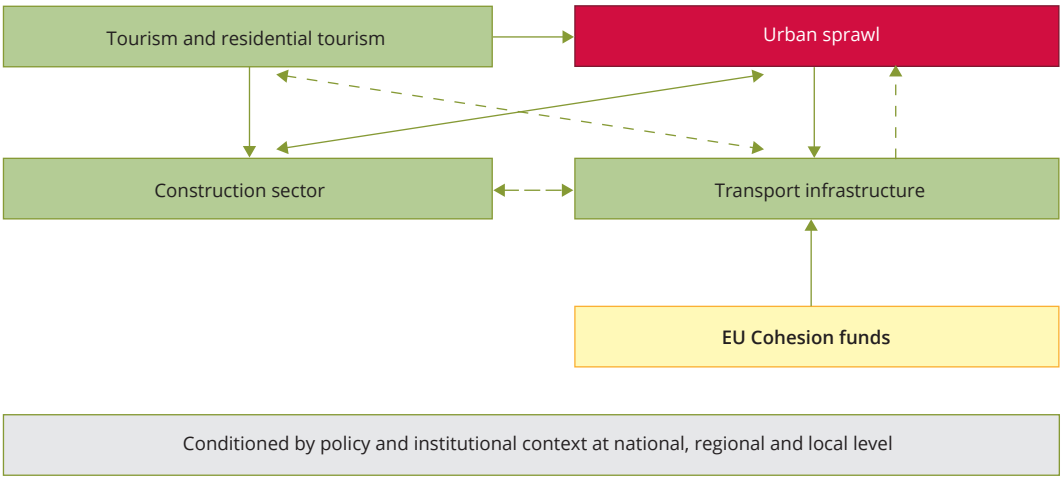
Motivated by, among other factors, the region's vulnerability to erosion and desertification, the regional administration of Andalusia has gathered data and information on land-use changes and land degradation in its territory since 1987. The region has been singled out by some of the experts consulted for this study as having pioneered some of these processes. The advanced techniques used and the accuracy of the data obtained have permitted the periodical release of reports aimed at feeding into policy development and evaluation.

Figure 6.2 SEA and EIA in Andalusia



Source: EEA/Milieu elaboration.

Figure 6.3 Interrelationship between drivers of land take and the role of EU Cohesion Policy



Note: Continuous arrows imply direct influence, whereas dotted arrows imply indirect influence. It is also important to note that some factors influence each other (bidirectional arrows), while the influence between others is unidirectional.

Source: EEA/Milieu elaboration.

Table 6.6 shows the different systems in place for the analysis of these changes. At the present time, the system used is the SIOSE (Sistema de Información de Ocupación del Suelo en España) Andalucía, which is integrated into the national system of information.

Andalusia has also participated, as a result of the high-quality systems of data gathering, processing and reporting, in a number of European research projects. However, there remains significant room for improvement with regard to the way in which the monitoring, reporting and assessment of changes in land use are perceived by relevant stakeholders. One of the experts consulted for this study highlighted the fact that public authorities (particularly at sub-national level) tend to think about, for example, the identification and geolocalisation of degraded or contaminated soils as something that can harm the local economy (Galacho, 2010) ([98]). Therefore, as a result, all of the relevant information may not be incorporated into policy making and evaluation. Public officials also pointed out that more could be done to harmonise the methodologies used to monitor land use and land degradation changes at regional, national and European levels.

Evidence of impacts on land

Cohesion Policy

The impacts of EU Cohesion Policy on land take cannot be easily traced given the multiplicity of factors influencing land use trends in Andalusia. As presented

Table 6.6 Systems of information used to monitor changes in land use and land degradation in Andalusia

Information system	Territorial coverage	Temporal coverage ([a])
Mapa de Usos y Coberturas Vegetales	Regional level	1956–2007
SIOSE Andalucía	Member State level	2005–2011
Corine Land Cover programme	EU level	1990–2006

Note: ([a]) Data are not available for every year.

Source: EEA/Milieu elaboration.

([98]) This concern has been seen in other Member States, including the United Kingdom (see Evans F., 2014).

earlier (Section 6.1.1), there are three main drivers of the increase in artificial land in Andalusia (and, more generally, in Spain). These factors are interdependent. In addition, they are influenced by EU policies and conditioned by the policy and institutional context at national, regional and local levels. Figure 6.3 shows the direct and indirect links between these factors.

Cohesion Policy has had a direct impact on land in Andalusia (and Spain in general) through the provision of funds that have been used to build an extensive network of transport infrastructure (mainly roads and rail). The expansion of transport infrastructure has directly contributed to the increase in artificial areas in the region (see Table 6.7) and, to a certain extent, urban sprawl ([99]). The indirect link between transport infrastructure and urban sprawl has been widely studied in other contexts as mentioned earlier. It must be noted that developments in the housing sector (in the form of residential sprawl) have also acted as drivers of transport infrastructure development, as demands for improved accessibility increase.

In parallel, the tourism and construction sectors have played key roles as drivers of land take. In many coastal areas of Andalusia, their roles have been mutually reinforcing. Indeed, in part as a result of EU interventions (infrastructure development including transport, social cohesion, employment, environment protection, etc.) (Garrigós Simón and Palacios Marqués, 2008), the region has become a major tourist destination and, in particular, it has increasingly attracted residential tourism. Consequently, municipalities have approved expansionary urban development plans and granted permits for a large number of construction projects which, often, did not sufficiently take into account, if at all, potential land-related implications. This has, in turn, reinforced the pre-eminent position of the construction sector as one of the main economic engines in the region (together with tourism). Moreover, opportunities to expand the tourism sector appear to have been one driver in the expansion of transport infrastructure, with regard to both regional and local roads, in order to facilitate the development or increase the attractiveness of rural and relatively remote areas, and national and international connections, in order to facilitate accessibility to the region.

At the same time, it should be noted that spending under Cohesion Policy has also been allocated to areas that might have had a positive impact on land, including biodiversity protection, as well as the rehabilitation of industrial and contaminated sites, for which EUR 185 million were provided in the 2007–2013 programming period (DG Regional Policy, 2010)

Nature Protection Policy

In Spain, 42 % of the areas covered by Natura 2000 sites (i.e. 5.7 million ha) overlap with the national network of protected areas (Europarc, 2012). This suggests that Natura 2000 has enhanced the protection of nearly 8 million ha that might otherwise have not been protected under Spanish legislation.

Furthermore, in Andalusia specifically, Natura 2000 has protected areas not previously covered by national or regional legislation. Only a small proportion of the total surface area of Natura 2000 sites in the Andalusian territory is covered by artificial areas (0.29 %, compared with 4.7 % of artificial areas in Andalusia as a whole (Rediam, 2014)). Overall, protected areas (many of which are poorly accessible, mountainous areas) have

Table 6.7 Land covered by road and rail infrastructures in Andalusia, 2005–2011 (ha) ([100])

	2005	2009	2011
Roads	53 321	56 447	58 682
Rail	6 831	6 929	7 325
Total	**60 152**	**63 376**	**66 007**

Note: Data for 2005 do not exactly match with data presented in Section 5.3.2. This is because of a change in the methodology used to monitor land cover changes.

Source: Junta de Andalucía, 2014 (SIOSE Andalucía).

([99]) Some areas of transport spending, for example urban and multimodal transport, may have reduced pressures for sprawl; these, however, have been a minor component of overall transport spending.

([100]) It should be noted that artificial areas covered a total of 4.7 % of the total territory of Andalusia in 2011.

not been as affected by the overall trend for sprawl as Andalusia as a whole has been. In addition, from the mid-1950s to 2007, 22.5 % of agricultural surfaces present in protected areas in Andalusia reverted to natural land (Bermejo et al., 2011).

6.1.3 Conclusions

Overall, EU policies have played a major role in fostering forward-looking strategic planning in Andalusia (and in Spain as a whole), as well as the development of a range of sustainability and environmental assessments. However, these policies appear to have been unable to curb the expansion of growth via a model excessively reliant on urban sprawl and large-scale infrastructure development, and, at least in the past, Cohesion Policy spending has contributed to infrastructure development. This has been, in part, because of a disconnection between the strategic orientations stated at national and regional level, and the incentive structures that apply at local level. Moreover, Cohesion Policy has played a central role in financing transport infrastructure in Andalusia, including the development of roads, and thus has contributed to sprawl and land take. Table 6.8 provides a summary of the assessment per evaluation criteria.

6.2 Polish case study

6.2.1 Context

The Polish case study focuses on the national level, rather than the regional level, as for the Spanish case study, as Poland has a more centralised structure of governance than Spain. At the same time, Poland provides an interesting example, as governance is shifting to the regions.

The study looks at one region, **Lower Silesia**, which is one of the fastest developing regions and is also heavily affected by land degradation due to industrial activities. Similar to the Spanish case study, this case study highlights the key roles of the national, regional and local context in shaping the impacts of EU spending. At the same time, EU policies, particularly support for investments in roads and other infrastructure have played major roles in shaping the country's land use patterns. The investments supported by EU finds have been subject to better planning, assessment and monitoring than other investments and this is considered to be a positive impact of EU policies.

However, a lack of effective legislation to protect land and local spatial policies that typically focus on short-sighted economic benefits for municipalities

Table 6.8 Summary of the assessment per evaluation criteria

Evaluation criteria	Summary of the assessment
Relevance	Land objectives are highly pertinent to respond to the environmental needs of Andalusia, and Spain as a whole, given the past and current trends of rapid expansion of artificial surfaces, as well as the levels of vulnerability to desertification and degradation of natural areas.
Coherence	Strategic planning at national and regional levels is broadly coherent with EU objectives for land; these objectives are not cited directly, in part because many of them have been formulated more recently than key strategic documents at national and regional levels. The OPs for Andalusia do not refer to EU land objectives. They do contain some relevant objectives for land — for example, the rehabilitation of former industrial or contaminated sites, as well as the protection of biodiversity and Natura 2000 sites.
Effectiveness	A disconnection has been found between strategic orientations stated at national and regional levels, and policy implementation at local level. At the same time, environmental assessments have been found to be, according to the experts consulted for this study, not decisive in the process of policy making in a number of cases. This is as a result of two main factors: (1) the perceived trade-off between environmental objectives, and socio-economic and territorial development objectives; and (2) the complex institutional setting and difficulties with aligning interests at local level with high-level policy objectives.
EU added value	The EU has played a major role in: • fostering forward-looking strategic planning, with a focus on environmental objectives; • the development of environmental legislation and enforcement, in relation, for example, to the protection of natural areas; • the development of a range of sustainability and environmental assessments.

Source: EEA/Milieu elaboration.

Photo: © magro_kr

seem to constitute a major hindrance in fostering sustainable spatial planning policies aimed at long-term protection of land against negative phenomena, such as soil sealing, land degradation and urban sprawl.

The most common designation of the acquired land is for built-up residential areas. Figure 6.4 shows a more detailed breakdown of the purposes for which taken land is destined.

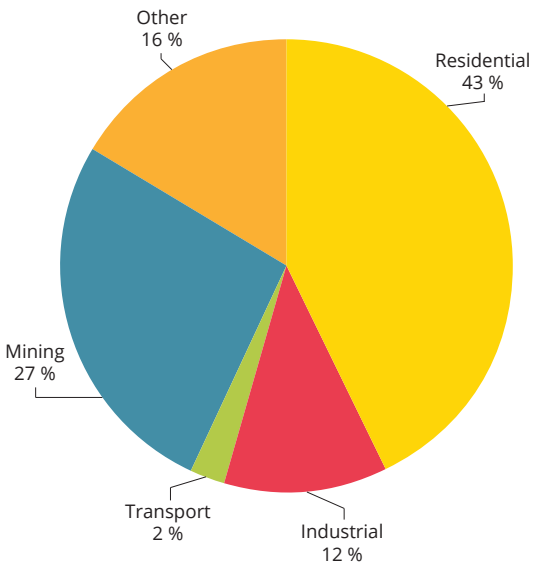
The expansion of built-up areas is expected to continue. The *Strategy of sustainable development of rural areas, agriculture and fisheries* (MRiRW, 2012b) forecasted that between 2008 and 2030, about 260 000 ha will be taken from agricultural areas and designated for residential purposes.

Lower Silesia is one of the most industrialised areas of Poland, with a high level of degraded land, due in part to extensive mining of copper, silver and lignite, and former military areas (GUS, 2013).

Several drivers have contributed to land-use changes, including the process of suburbanisation. Key economic factors have included:

- the large area of agricultural land and the low profitability of small-scale agricultural production;

Figure 6.4 Designation of land acquired from agricultural and forestry areas



Source: Main Statistical Office of Poland (GUS), 2013.

- the economic transition and increasing affluence in Poland, which has led to 'Western' consumption patterns, including a desire for more living space and single-family homes.

Several drivers are linked to the policy and institutional context:

- the better accessibility of suburban areas as a result of an improved transport network;
- municipal administrations seeking development to increase revenues;
- the lack of cadastral tax proportionate to the market value of land, which might discourage land conversion;
- the lack of an obligation for municipalities to prepare local spatial management plans;
- the lack of effective instruments to protect the best agricultural soils for other purposes.

6.2.2 Applying the methodology

This case study applies the methodology presented in Chapter 2. As mentioned in the Spanish case study, the conceptual framework for the evaluation of the impacts of EU policies on land take and land degradation includes a variety of stakeholders that influence policy outputs at Member State, as well as regional, level and thus, ultimately, influence sectoral policy results. The key stakeholders identified include the following government stakeholders:

- at national level, ministries that prepare sectoral strategies, and, in particular, the Ministry of Infrastructure and Development, which prepares, monitors and oversees strategies including those related to Cohesion Policy spending and those related to transport;
- the regional self-government institutions (voivodeship marshals), which prepare development strategies and spatial management plans ([101]), and prepare and implement OPs for Cohesion Policy spending;
- the municipal authorities, which oversee local land use, issue building consents and implement municipal investments, including those supported by Cohesion Policy funding.

Other key stakeholders include:

- investors that apply for building consents and implement projects;
- non-governmental organisations (NGOs); in Poland, there is a long tradition of environmental NGOs being involved in investment planning and criticising and, at times, blocking activities that might be damaging for the environment, including those that have potentially negative impacts on land and nature.

Policy objectives and instruments

This section presents an overview of the policy instruments (strategies and environmental assessments) that are relevant to land use and land degradation. Special attention is given to the planning of Cohesion Policy spending. The analysis also considers objectives related to land take and land degradation in Poland at different administrative levels, and then follows the process of their implementation.

Development strategy
Polish development policy is implemented at three different levels: national (Council of Ministers), regional (marshals of voivodeships) and local (provincial and municipal authorities) ([102]). The policy is coordinated by the Minister of Infrastructure and Development (i.e. the minister that is competent for regional development and transport) ([103]). The Polish development strategy at state level is organised within a framework of several documents, intended to be a coherent system consistent with both Polish development priorities and EU guidelines.

Table 6.9 contains a summary of the selected strategic documents relevant to land take and land degradation. The table comprises a short description of their provisions related to land use.

Strategic documents that guide Cohesion Policy spending
Cohesion Policy spending follows general strategic priorities established, first of all, at the national level (in the current financial perspective, these are set in so-called Partnership Agreements). These priorities follow both the principal objectives enshrined in

([101]) Regional spatial management plans are not established as legal acts but, according to the Act on Spatial Planning, their provisions have to be taken into account during the preparation of municipal spatial management plans and studies on building conditions.
([102]) Act of 6 December 2006 on rules of implementation of the development policy and the decision of the Council of Ministers of 24 November 2009 on development strategy of the country (OJ No 84, item 712; OJ No 157, item 1241, of 2009; and OJ No 279, item 1644).
([103]) Currently, this is the Ministry of Infrastructure and Development (Ministerstwo Infrastruktury i Rozwoju (MIiR)), which was created in November 2013 after merging the Ministry of Transport, Construction and Maritime Management with the Ministry of Regional Development.

Table 6.9 Summary of the aspects of selected national-level Polish policy documents that are related to land use and land degradation

Policy document	Key overall goals	Key objectives related to land
National spatial development concept 2030 (MIiR, 2011)	Efficient use of national territory for development goals, including social, economic and territorial cohesion	Preference of renewal and regeneration over acquiring new land for investments. Ecological compensation
Transport development strategy untill 2020 (with perspective till 2030) (MIiR, 2013a) ([104])	Increasing territorial accessibility and improving the safety and the effectiveness of transport sectors through the creation of a coherent, sustainable and user-friendly transport system in the national, European and global dimension	Promotes sustainable development, rational use of natural resources and spatial balance
National strategy of regional development 2010–2020 (MIiR, 2010)	Competitiveness of regions; territorial coherence, counteracting marginalisation of problem areas	Optimisation of the use of territory Protection of functioning of ecosystems Biodiversity protection Avoiding indirect negative impacts of the use of resources Housing and urbanisation processes should not lead to an imbalance between biologically active and built-up areas
Strategy of sustainable development of rural areas, agriculture and fishery (MRiRW, 2012b)	Key directions for the development of rural areas, agriculture and fishery for 2012–2020, indicating priorities for financing from both national and Community sources	The strategy stresses the need of rational use of soils and warns that lack of coordination on the conversion of agricultural areas can harm landscapes and nature

EU policy (in the current financial perspective with reference, primarily, to the Europe 2020 Strategy) and the general policies of the development strategy of the country. They are subsequently made more detailed within OPs, which can be devised on both national and regional levels.

A review of these documents reveals that they do not pay strong attention to the issues of land use and land degradation. This topic is typically mentioned along with issues related to environmental protection, both in introductory diagnostic sections and objective-related sections. However, it should be noted that the *Operational programme infrastructure and environment, the National Strategic Reference Framework for the years 2007–2013* (MIiR, 2007d), which provides the basis for the largest Cohesion Policy investments, contains a relatively well-developed description of problems related to land degradation and the need for land reclamation. The corresponding programme for the new financial perspective (2014–2020) treats this subject in a much more superficial way; however, support for the reclamation and environmental restoration of degraded areas is envisaged in both programmes.

Strategic documents at the regional level: Lower Silesia

The main goal of the *Development strategy of Lower Silesia 2020* (UMWD, 2014c) is to ensure a high quality of life for the citizens of Lower Silesia in an attractive environment. More detailed goals include sustainable transport, environmental protection, increasing social inclusion and a better level of education.

A review of the regional operational programmes for Lower Silesia leads to a similar conclusion as the review of the documents that apply at the national level: land use and land degradation issues are not treated as priorities, but soil protection appears to be one of the elements considered as part of the more broad category of environmental protection. In addition, the regional OP for 2014–2020 states that preference will be given to brownfield rather than greenfield development, green infrastructure will be

([104]) Hereafter referred to as the Transport Development Strategy.

encouraged and investments in public transport will have priority over investments in other modes of transport.

Environmental assessments

For projects co-financed by national or regional OPs, the Ministry of Infrastructure and Development has issued guidelines on environmental impact assessments (MIiR, 2009) to ensure consistent procedures for the implementation of the OPs and verification of the procedures for the projects applying for co-financing from EU funds. The impacts on the soil surface and landscape are among the elements that should be covered within the scope of the EIA.

EIA and SEA procedures often provide a good basis for the assessment of the environmental impacts of investments; however, the quality of the reports and procedures varies from one assessment to another. Moreover, some observers suggest that these assessments are, at least in some cases, treated rather as a formal requirement than as an instrument of practical importance.

Environmental NGOs, by questioning the potential environmental impact of infrastructure projects, help to make EIAs and SEAs more effective. The case of the Rospuda Valley and the Via Baltica provides a good example of the role of NGOs and the broader public in making EIAs more meaningful and effective with regard to the protection of valuable natural areas (see Box 6.1 for more details).

Policy implementation process

Since 2007, Poland has been the largest recipient of EU Cohesion funds. The following sections provide a short overview of the implementation of Cohesion Policy in three financial perspectives: 2004–2006 ([105]), 2007–2013 and 2014–2020 ([106]). Special attention is devoted to transport investments.

Cohesion Policy

The process of Cohesion Policy implementation in Poland can be followed from the state level, at which all the principal national strategies are created, to the local level, at which most of the planned investments are implemented. The general structure of policy implementation, evaluation and monitoring, including fund disbursement, is depicted in Figure 6.5.

It is worth noting that while the creation of the strategies, and their assessment and evaluation at the state and regional levels are well defined and seem to be followed quite rigorously, especially with respect to the

Box 6.1 Via Baltica and the Rospuda Valley

The construction of the Via Baltica motorway, as part of the TEN-T network connecting Warsaw with Helsinki, had been planned in north-eastern Poland since the 1990s. In 2006, one of the road segments, the Augustów bypass, was planned to cut through natural areas of the Rospuda Valley, including a wild moorland recognised as a Natura 2000 site.

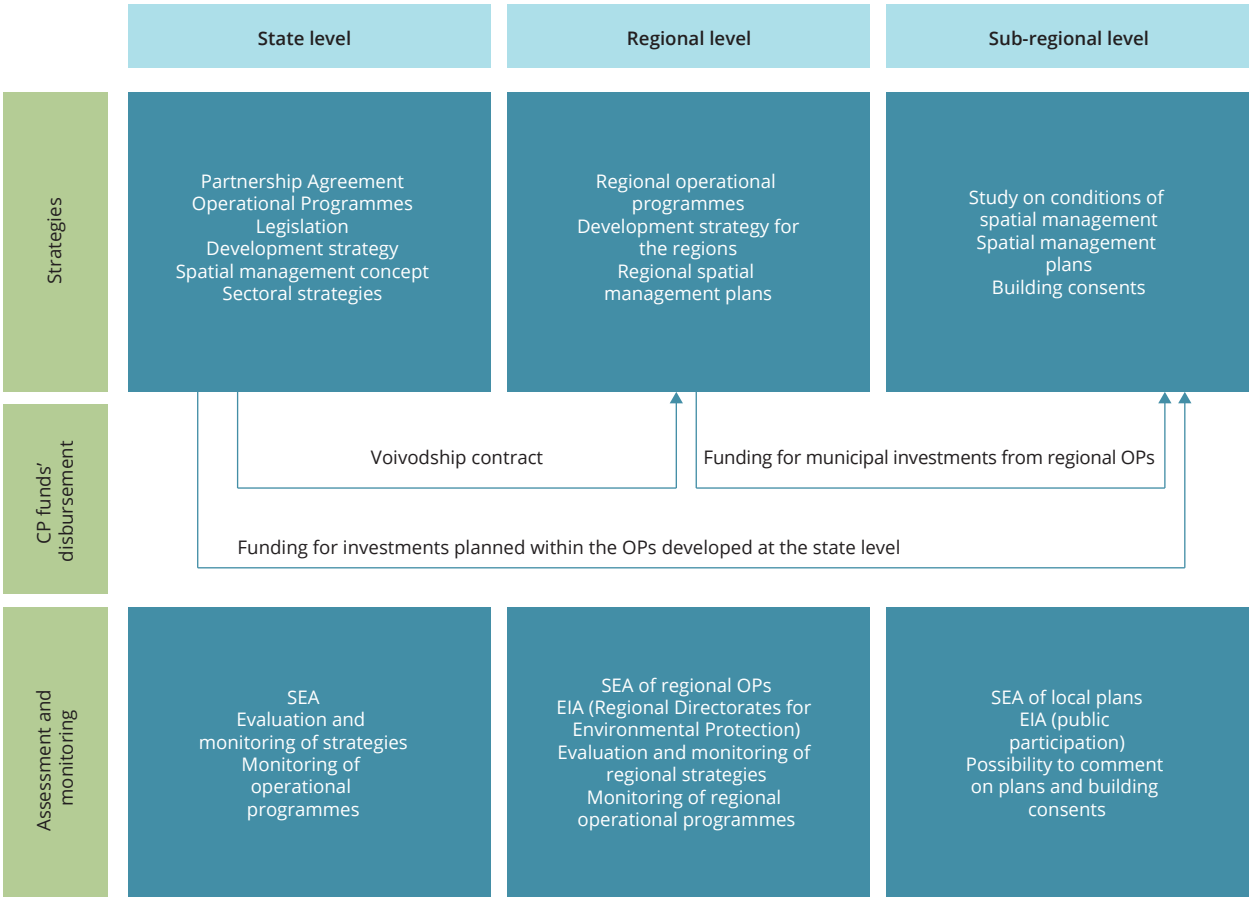
Public protests led to revisions of the EIA report, as it contained no real comparison of alternatives, and poor consideration of environmental impacts and risks. In December 2006, the European Commission opened an infringement procedure with regard to the project's potential damage to protected areas. Despite this, local authorities allowed construction to start in February 2007.

In 2008, when the public conflict escalated, the national government took the decision to conduct another EIA procedure connected with the SEA for the whole Via Baltica project. A new EIA report analysed various alternatives, and a new public consultation procedure was held. In 2009, the plan to build the motorway through the Rospuda Valley was abandoned, and the road has been rerouted to avoid the wilderness area, a choice that was less expensive than the initial project. The bypass has now been completed.

Source: Sas-Bojarska, 2010.

([105]) This spending period started in 2000, but since Poland joined the EU in 2004, only the 2004–2006 period was considered.
([106]) The description of this financial perspective relates to only the initial allocation.
([107]) Sub-regional level means mostly local level (municipalities). Another sub-regional level in Poland is a provincial (poviat) level, for which competencies are, however, very limited.

Figure 6.5 Implementation, evaluation and monitoring scheme related to Cohesion Policy in Poland



Source: EEA/Milieu elaboration.

OPs, the situation at sub-regional level ([107]) is much more loosely defined. There is a sort of disconnection between quite an extensive body of strategic guidelines created at higher administrative levels and their application at local level. One of the factors contributing to this situation is the wide possibility to allocate land for new construction on the basis of zoning decisions rather than local spatial plans. Moreover, there is no clear mechanism for supervision by higher administrative levels over the decisions made with regard to the placement of new investments in municipalities. The funding available within the regional OPs, and the possibility of accepting or rejecting the applications of local authorities for co-funding of specific investments using the Cohesion Policy funds available within the regional programmes, provides a temporary instrument, but will not solve the problem in the long term.

The evaluation and monitoring processes of local spatial management practices are quite limited. There is a requirement to conduct SEAs for local plans and the possibility of participation by the local community in EIA procedures, as well as the possibility to comment on individual building consents and plans; however, the practical significance of these measures is, typically, not very high.

Overall spending levels

During the first 2 years of Poland's EU membership (2004–2006), the implementation of Cohesion Policy in Poland involved costs of approximately EUR 20 billion, with approximately 70 % of these costs being met by EU funds. In the 2007–2013 financial perspective, the total amount of funds devoted to Cohesion Policy was approximately EUR 85 billion, which was 80 % of the EU funds (MSZ, 2014).

Table 6.10 presents a summary of the total financial outlays from the EU for Cohesion Policy-related investments, both total investments and those related to transport infrastructure. Annual averages are presented for comparison, as the first cycle ran for

Table 6.10 Cohesion Policy spending in Poland: cycles from 2004 to 2020

	2004–2006		2007–2013		2014–2020	
	Total	Annual average (billion EUR)	Total	Annual average (billion EUR)	Total	Annual average (billion EUR)
All spending	14	4.7	67.5	9.6	77.6	11.1
Transport	5.4	1.8	23.3	3.3	n/a	n/a

Notes: Annual averages are calculated based on the years indicated for each cycle; under EU rules, actual spending can be undertaken in a longer period. The data refer to EU outlays; national co-financing was approximately 40 % for the 2004–2006 cycle and 20 % for subsequent cycles. n/a: not applicable.

Source: MSZ, 2014.

only 3 years. (While total spending levels are readily available, those for transport in the 2007–2013 period are a rough estimate based on available information).

Overall, Cohesion Policy spending has been significant; annual averages have increased in each subsequent financial cycle. The allocation for the new financial perspective (EUR 77.6 billion for the 2014–2020 period) exceeds the allocation for the previous financing period. However, it is expected that the new financial perspective will be the final period with such high allocations of Cohesion Policy instruments for Poland.

Cohesion Policy provides the bulk of financing for transport infrastructure. According to Korolewska (2012), the proportion of funding for overall outlays for road transport investments in the country from EU sources has increased in recent years from approximately 50 % in 2009 to almost 80 % in 2011.

Cohesion Policy investments and achievements in the transport sector

The total Community contribution to investments in safe and clean transport infrastructure in the 2004–2013 period amounted to almost EUR 29 billion, with EUR 5.4 billion being invested between 2004 and 2006 and EUR 23.3 billion being invested in the 2007–2013 period. The outcomes achieved since 2004 include the construction of 673 km of highways and the construction or modernisation of 808 km of motorways. Consequently, since 2003, there has been an increase in the length of highways and motorways of 165 % and 357 %, respectively. Similar scale investments are planned for the next financial perspective, 2014–2020 (MSZ, 2014). The total length of the planned TEN-T network in Poland amounts to about 7 400 km, including 3 890 km of core network and 3 460 km of comprehensive network (MIiR, 2013). The bulk of transport investments in Poland follows TEN-T planning.

Cohesion Policy spending in Lower Silesia

Cohesion Policy investments in Lower Silesia have primarily been planned within its regional operational programmes. Table 6.11 presents a summary of Cohesion Policy spending during the financial perspectives 2004–2006 and 2007–2013, overall and in the transport sector.

The overall funding for the regional OPs in the 2014–2020 financial perspective is significantly higher than it was for the previous financial perspective; this reflects the general policy line of the Polish government, namely to gradually transfer more

Table 6.11 Cohesion Policy spending in Lower Silesia: cycles from 2004 to 2020

	2004–2006		2007–2013		2014–2020	
	Total	Annual average (million EUR)	Total	Annual average (million EUR)	Total	Annual average (million EUR)
All spending	223.6	74.53	1 240.18	177.2	,251.4	321.6
Transport	n/a	n/a	273.2	39.0	376.5	53.8

Notes: Annual averages are calculated based on the years indicated for each cycle; under EU rules, actual spending can be undertaken over a longer period. n/a, not applicable.

Source: ZPORR, 2004; UMWD, 2014a.

governance power from the state level to the regional administration level. This is also reflected in the financial allocation for the regional OP for Lower Silesia, which has more or less doubled since the previous period.

Evidence of impacts on land

While the impacts of EU policies on land take and land degradation cannot easily be traced, given the multitude of factors influencing land use, some direct and indirect effects can be identified. Two examples related to the Cohesion Policy in Poland are briefly described below, namely land take related to transport investments and suburbanisation around Polish cities.

Impact of transport

According to the SEA report accompanying the Transport Development Strategy 2020 (CDM Sp. z o.o., 2011), potential direct land take related to the construction or modernisation of roads and railways in Poland from the base year, 2010, until 2020 is estimated to amount to 1 800 ha. The expected change in the designation of agricultural and forestry areas (i.e. indirect impact on land) will affect about 36 000 ha. Figure 6.6 shows the forecasted spatial pressure of transport infrastructure per km^2 of land. The colours on the map indicate the percentage of land taken by transport infrastructure per 25-km^2 squares. The main areas of land take are along major transport routes, including those designated for the TEN-T network, as well as around large cities.

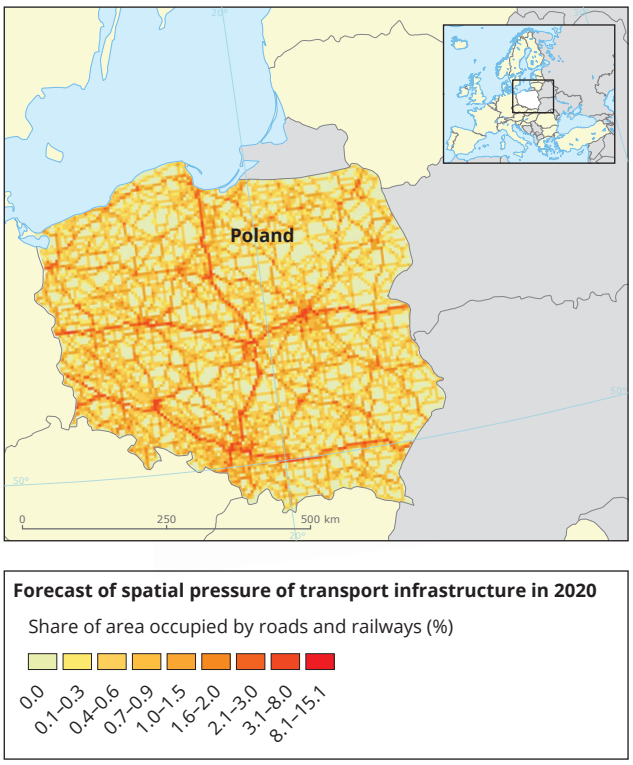
A study on the impact of the construction of highways and motorways on the socio-economic and territorial development of Poland (MIiR, 2013b) analyses, among other factors, the impact of the construction of highways and motorways on land use. One of the conclusions of this evaluation, made on the basis of statistical analysis, is that, in general, the areas with transport investments that are co-financed by EU assistance funds are characterised by a better coverage of spatial development plans than the areas without such investments. Another observation is that changes in the degree of urbanisation appear to be related to transport investments. According to the evaluation, the number of apartments built in 2010 was almost 70 % higher in the Polish municipalities that, in the 2004–2012 period, implemented road investments co-financed by EU assistance funds than in the municipalities which did not implement such investments. The highest number of apartments (53 per 1 000 inhabitants) was observed in suburban areas (as compared with 46 apartments per 1 000 inhabitants, on average, in the municipalities that implemented road investments supported by EU funds). This suggests that investments in roads and, specifically, investments supported by EU Cohesion Policy, induce, to some extent, urbanisation processes and, specifically, urban sprawl around these roads.

Impact of Cohesion Policy on the development of Polish cities

Suburbanisation, defined as migration of the population from the central cities to the suburban zones, is an inevitable process resulting from the social and economic development of Polish cities, particularly with regard to the largest metropolitan and regional centres. A study performed at a research institute of Warsaw University (Euroreg, 2010) investigated the impact of Cohesion Policy on the development of Polish cities and their relationship with regional surroundings. The survey covered all Polish cities with populations exceeding 90 000.

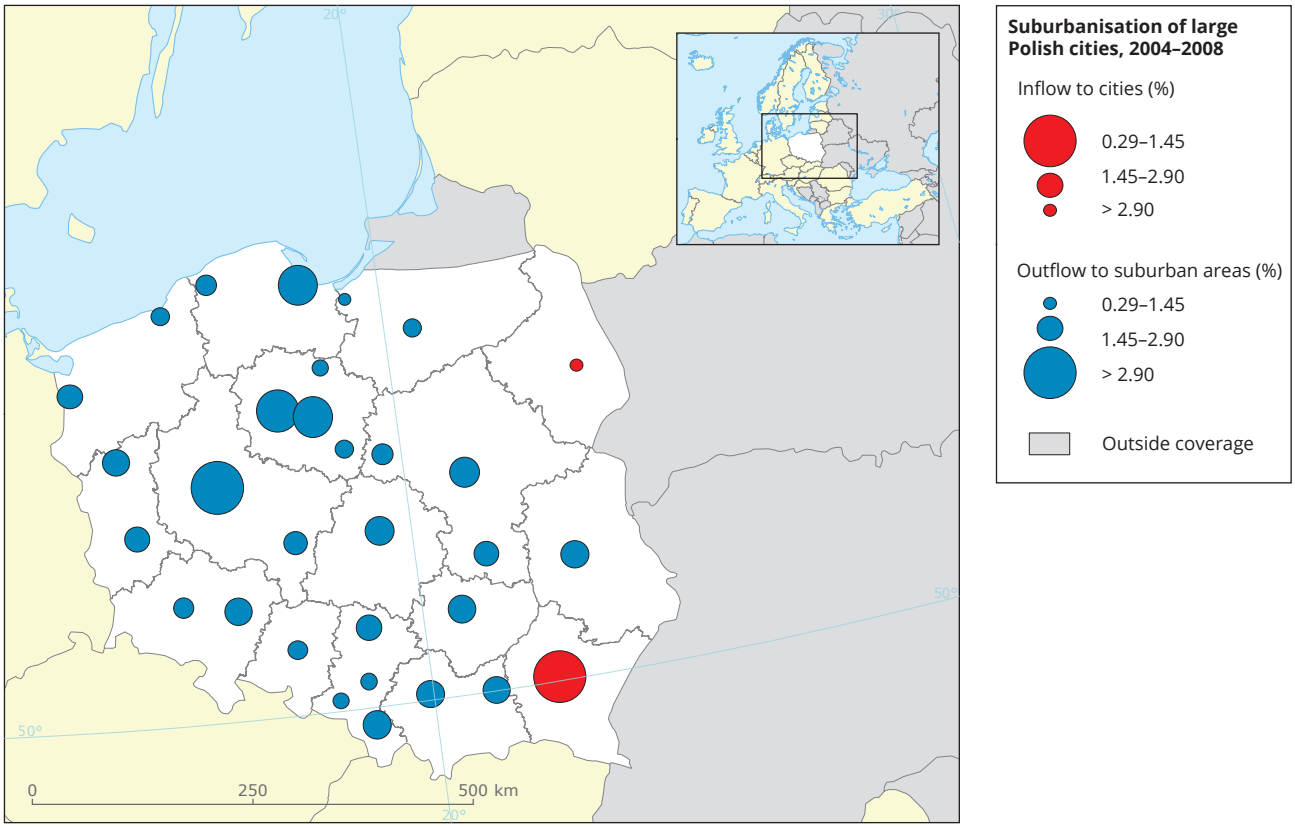
From this research, it is evident that in the 2004–2008 period, nearly all large Polish cities, with the

Figure 6.6 Forecast of spatial pressure of transport infrastructure in Poland in 2020



Source: CDM, 2011.

Map 6.1 Suburbanisation of large Polish cities, 2004–2008



Note: Blue dots indicate outflow to suburban areas; red dots indicate inflow to cities. The largest blue dots indicate areas in which there has been a 2.9 % or higher outflow of the urban population to the suburban area, medium-sized dots indicate a 1.45–2.9 % outflow and the smallest dots represent an outflow of 0.29–1.45 %. Red dots indicate the reverse phenomenon (i.e. the concentration of the population in city centres).

Source: Euroreg, 2010.

exceptions of Rzeszów and Białystok in eastern Poland, underwent significant suburbanisation processes. The most intensive migrations of populations to suburban zones were observed in Poznań, Tricity (the conurbation of Gdańsk, Gdynia and Sopot), Bydgoszcz and Toruń. Map 6.1 shows how the proportions of the population living in the large cities and the surrounding metropolitan areas have changed.

The financial assistance granted within Cohesion Policy programmes provided the possibilities to realise a significant number of infrastructure investments; it should be noted that investment outlays for projects under Cohesion Policy dominated the capital expenditures of the surveyed cities. This is clearly shown by the fact that PLN 31.5 billion was spent on Cohesion Policy-supported investments and PLN 35.7 billion of investment outlays were made overall by the self-governments of the surveyed cities in the years 2004–2008. Cohesion Policy interventions were devoted primarily to environmental protection infrastructure (over 40 % of the total value of these interventions) and transport infrastructure (over 25 % of the total).

The projects undertaken in the suburban zones concentrated, most of all, on fulfilling the current needs of their inhabitants (e.g. sewage treatment, transport and waste management). These projects improved the living quality and conditions for suburban zone inhabitants, contributed to a decline in the impacts on the local natural environment and also improved the attractiveness of housing in the municipalities which implemented them. The study found that, in the majority of cases, actions taken by individual municipal authorities were not coordinated at a higher level, they did not become, for example, a part of the spatial policy of metropolitan areas, since such a policy virtually does not exist in the Polish context. The individual projects, in most cases, did not consider possible future trends, or social and economic processes (e.g. an increase in the number of children in suburban communities). The projects could only temporarily improve living

conditions, and make up for the many years of deficits in terms of investment, and failed to comprehensively solve the problems arising as a result of suburbanisation ([108]). In the case of social infrastructure, these investments may increase the attractiveness of a community as a whole and, therefore, contribute to an increase in suburbanisation.

6.2.3 Conclusions

Cohesion Policy in Poland has influenced land take and land degradation in many ways. Cohesion Policy-funded transport investments, particularly the construction of new roads, have resulted in soil sealing and contributed to suburbanisation and urban sprawl. It should be stressed, however, that such impacts are characteristic of all road construction activities, regardless of the source of funding. A positive impact of EU Cohesion Policy funding has been the more thorough planning, assessment and monitoring of projects supported by EU funds than there are for projects undertaken in accordance with national practice.

Table 6.12 summarises the assessment of the impact of EU Cohesion Policy on land use in terms of the evaluation criteria proposed in the methodology part of the study (Chapter 2).

Table 6.12 Assessment of the impact of EU Cohesion Policy in Poland in terms of the proposed evaluation criteria

Evaluation criteria	Assessment
Relevance	In absolute terms, land take has increased in Poland; however, the rate of land take in recent years has shown a decreasing trend and has remained below the European average. CAP instruments have helped to increase the economic viability of farming and have stimulated good agricultural practices, which to some extent have prevented the abandonment of agricultural land and contributed to limiting the negative impacts of agriculture on soils.
Coherence	Key national policy documents refer to the protection of land, soil and landscape as being among environmental goals, and the National Spatial Development Concept and National Strategy of Regional Development in particular call for the better management of space and the preservation of the natural integrity of ecosystems. The national policy documents reviewed do not, however, contain direct references to the EU objectives on land as a resource. Moreover, these national policy documents present general guidelines and principles, but they are not legally binding. The SEAs for key policy documents consider impacts on land. For Cohesion Policy, OPs cite the need to protect land and soil, among other environmental goals. However, they do not refer to EU objectives on land.
Effectiveness	Although land-use objectives are mentioned in state-level strategies, many development actions at local level appear to go in an opposite direction. EU spending on transport appears to be linked both to direct impacts on land take and soil sealing and to indirect impacts, as it supports ongoing sprawl. EU policies, including Cohesion Policy, have as yet not led to greater attention or limits to land take. OPs at the regional level potentially provide, at least, an instrument for regional authorities to control, to some extent, chaotic spatial development on a local level. SEA and EIA procedures, including interventions of the NGOs and broader public, help to make this policy more effective with regard to environmental objectives, including land take and land degradation considerations. While EIAs and SEAs can address land issues, the 'streamlining' approach of the specustawas may hinder the effectiveness of these assessments.
EU added value	While EU spending plays a significant role in many policy areas, domestic drivers for land take and soil sealing, and the national, regional and local contexts are quite important. Cohesion Policy has led to more rigorous planning, monitoring and evaluation procedures for spending; however, it is not clear if these improvements affect land take. Given the importance of EU funding for Poland, greater EU policy attention, including guidelines and requirements related to land, could play an important role in raising awareness and catalysing action.

([108]) The observations made in the Euroreg (2010) study are consistent with the opinions expressed by Polish participants during the project workshop in Brussels on 16 October 2014. According to the representative of the Polish regional authorities, Cohesion Policy funding available within the framework of the regional OPs was often used 'to fix' the problems of urban sprawl, which happened because of a lack of appropriate spatial planning on a local level. Municipal authorities often applied to the regional Cohesion Policy funds' disbursement schemes for funds to finance investments in basic infrastructure in order to accommodate the needs of growing populations in suburban areas.

Several important factors exist at the national, regional and local levels of administration which hinder the uptake and implementation of EU and national goals related to land. One of the main observations coming from the study is that there is a sort of disconnection between the objectives stated at the national level and common practice at the local level. Legislation does not give sufficiently strong incentives for the stimulation of the sustainable use of land. Some policy instruments are in place (e.g. the Act on the Protection of Agricultural Soils), but they are not effective. Other possible instruments that could be used to regulate this area, for example cadastral tax or the obligatory creation of local spatial management plans, are lacking. In the absence of such mechanisms, the prevailing policy of local administration based on ad hoc building consents often wins over the long-term planning approach. The lack of procedures for evaluating and monitoring land-use changes on a local level aggravates the situation.

In the absence of strong mechanisms, under the Polish law, related to planning, monitoring and supervising land management at a local level, the funds available within the framework of regional OPs may provide at least a temporary instrument for the regional authorities to control spending that might contribute to negative impacts on land, such as urban sprawl. This opportunity is especially strong in the 2014–2020 financial perspective, during which the proportion of funding allocated at the regional level will be higher than it was for the previous financing period. In the longer term, however, more radical changes in legislation related to spatial planning and management are needed.

The adoption of the National spatial development concept 2030 (MIiR, 2011), the preparation of the National Urban Policy and the National Plan for Regeneration, as well as the planned amendments to the Act on Spatial Planning and Development aimed at reducing disorganised suburbanisation, provide some optimism with regard to positive changes to the Polish spatial management system. These changes are expected to limit, at least to some extent, the potential negative impacts on land of investments, including investments that result from the implementation of EU policies. However, it is equally important that educational and informational initiatives are aimed at creating awareness among land owners and managers that space is not a renewable resource and cannot be seen merely from the perspective of profit generation.

7 Conclusions

The evaluation presented here is preliminary. It sought to test the methodology across a range of EU policies (see Table 7.1) and also in two case studies (for Spain and Poland). The work suggests that the methodology provides a valid basis for more in-depth assessments and evaluations.

The results of the evaluation highlight the need to further integrate EU land objectives in sectoral policies. Other work under way at the European Commission includes the preparation of policy options for a communication on land as a resource. The review carried out here suggests a few elements for consideration in that regard:

- targets can play a role and have been employed in countries such as Germany, but these should not be stand-alone instruments; rather, a set of actions that provide an enabling framework will be needed to address land take and land degradation;
- EIA and SEA provisions to address land take and land degradation should be reinforced;
- natural capital accounting can put a monetary value on the ecosystem services lost through land take and land degradation; these values need to be considered during policy development, for EIAs and SEAs, and also during policy assessment and evaluation ([109]).

The process of integration can be lengthy and difficult, as seen in the example of the CAP; while further steps to integrate land issues are needed, this area of EU policy has been ahead of others, including Cohesion Policy, in terms of the coherence of its objectives with EU land objectives.

The study highlights the importance of the national, regional and local contexts in shaping patterns of land use in order to decrease land take and land degradation (pressures). The results show the importance not only of spatial planning systems but also of fiscal issues, as in both case studies (and other parts of the EU) development in land-intensive sectors (e.g. construction) is seen as a source of local government revenue. The economic and fiscal aspects of land issues, including land prices and taxes, therefore deserve further study.

7.1 Evidence of impacts

The review has shown that all four policy sectors have important impacts on land take and land degradation in Europe; while many of these are negative, the review also identified potentially positive impacts. Overall, quantitative results across the EU as a whole were not found and, moreover, such evidence may be difficult to gather for future assessments, as the impacts on land depend greatly on the context in each Member State. Another important issue is that EU policy in each of these areas has evolved over time; assessments will need to address these changes in their design.

7.2 Relevance

All four policy sectors are highly relevant for land take and land degradation, given their role as drivers for land-related impacts.

7.3 Coherence

The review found that the coherence of policy and legislative documents with the EU's land objectives varies across the four areas considered. Notably, coherence seems to be strongest, or at least more explicit, for the CAP, perhaps because of the political controversy over its environmental impacts, including the impacts on soil quality and land degradation. In contrast, coherence appears to be relatively poor for Cohesion Policy, the other major area of EU budget spending with potentially major impacts on land.

([109]) The land valuation aspect is touched upon in the EEA Report *Soil resource efficiency in urbanised areas — Analytical framework and implications for governance*.

7.4 Effectiveness

In the study's methodology, effectiveness is considered in terms of actions to limit land take or land degradation. This is seen in some policy actions, such as Cohesion Policy spending for brownfield redevelopment.

The CAP's cross-compliance requirements, as well as its new 'greening' component, seek to reduce impacts from direct payments; new rules on indirect land-use change may reduce impacts of renewables targets related to the promotion of intensive biofuel cultivation. In other areas, including Cohesion Policy, explicit actions to reduce potentially negative impacts were not identified.

7.5 EU added value

All four policy sectors can have major impacts on land and there are strong interactions between EU and Member State actions. Consequently, all four provide an opportunity to integrate and disseminate EU land objectives much more effectively than via separate Member State action. This opportunity is of particular importance in the case of cross-border impacts on land.

7.6 EU environmental policy

The review also looked at EU environmental policy and focused on two areas: nature and biodiversity protection, and water management. Both are closely linked to EU land objectives. The Natura 2000 network protects about 18.4 % of EU territory. The EU Biodiversity Strategy calls for, among other actions, the promotion of green infrastructure (EC, 2013c), which can reduce land fragmentation and support a range of ecosystem services.

The WFD and the FD both create planning mechanisms at the river basin scale. These plans can support actions that improve soil quality and combat land degradation, including measures to put green infrastructure in place.

A key challenge in both fields is integration: notably, linking these land designation and planning requirements with spatial planning.

Table 7.1 Overview of the influence of key sectoral EU policies on land

	Cohesion Policy (focusing on transport spending)	Transport Policy (focusing on TEN-T)	Energy Policy (focusing on TEN-E and renewables/biofuels)	Common Agricultural Policy
Evidence of impacts	• Project spending funds can have a broad range of impacts on land; some investments, such as those for road transport, can aggravate sprawl and land take trends, as seen in the case studies of Poland and Andalusia • Structured planning and assessment can, at least in some Member States, contribute to mitigating negative impacts on soil and biodiversity	• Transport infrastructure has had direct as well as indirect impacts, including land take, soil sealing and landscape fragmentation, as seen in the two case studies as well as in the literature	• TEN-E investments lead to direct land take and land fragmentation, although the scale of impacts appears lower than in other sectors, such as transport • Renewables targets that promote biofuels are linked to land-use changes, intensive agriculture and pressures on land degradation	• Direct payments have been a driver for the intensification of agriculture and land-related impacts, such as soil degradation • Decoupling has mitigated these direct impacts but appears to be linked to land abandonment, particularly for extensive farming • Cross-compliance has addressed degradation and land management • Spending for rural development can also have positive results

Table 7.1 Overview of the influence of key sectoral EU policies on land (cont.)

	Cohesion Policy (focusing on transport spending)	Transport Policy (focusing on TEN-T)	Energy Policy (focusing on TEN-E and renewables/biofuels)	Common Agricultural Policy
Relevance	• Cohesion Policy's overall objectives include resource efficiency • Spending by ESI funds can have major impacts on land use and land take, both positive and negative; EU land objectives are very relevant	• Because of high spending for transport projects, this sector is very important in terms of achieving EU land objectives	• The EU's biofuel targets have led to land-use changes that could affect degradation; consequently, EU land targets are relevant for this sector	• The CAP has a major influence on agriculture, forestry and rural development in Europe and thus CAP is vital for achieving EU land objectives
Coherence	• EU land objectives are not cited in the legislation governing Cohesion Policy • The impact assessments for the legislation governing ESI funds in the 2014–2020 period did not consider impacts on land or soil	• The Transport White Paper highlights environmental issues and sustainability but mentions land issues only briefly • The TEN-T legislation for 2014–2020 calls for the avoidance of land fragmentation and soil sealing, and thus there is at least a partial coherence with EU land objectives	• TEN-E policy documents refer to the need to reduce land take, although they do not directly cite EU land objectives; there is partial coherence • EU policy documents and legislation have paid increasing attention to the impacts of biofuel targets on land; coherence is growing	• The CAP has increasingly taken on objectives related to land management and addressed land degradation • Nonetheless, further action is needed for coherence
Effectiveness	• Programming requirements have fostered strategic planning • Spending on public transport or brownfield redevelopment, among others, can reduce negative impacts on land • EU land objectives have not been introduced into the 'chain' of implementation	• TEN-T Spending to reduce bottlenecks may reduce some pressures on land • The assessment did not identify any other mechanisms used in EU Transport Policy to reduce potentially negative impacts on land	• Information was not found on the land impacts related to TEN-E investments • For biofuels, information was not found to indicate how effective new provisions have been (or will be) in reducing impacts such as land degradation	• The CAP has, over time, reduced potential environmental impacts, including those on land; this brief review did not, however, find a definitive assessment of results over time
EU added value	• Cohesion Policy covers a broad range of funding areas, and it could be a key mechanism for disseminating and implementing EU land objectives	• EU policy provides an overall framework for transport in Europe, including the TEN-T network, and could play an important role in supporting the uptake of EU objectives related to land	• TEN-E builds cross-border connections, and is relevant for addressing EU land objectives • EU policy has been a key driver for the cultivation of energy crops across Europe; consequently, EU action is necessary to address potential land impacts	• As the CAP shapes agriculture across Europe, it is vital in terms of addressing land impacts and maintaining land as a resource, although other drivers, such as markets, play a growing role in shaping agricultural practices

References

Arcadis and VITO, 2010, *Mid-term evaluation of the implementation of the LIFE+ regulation: final report*.

Bański, J., 2014a, unpublished material and consultations, 2014.

Bański, J., 2014b, 'Structure and ownership of agricultural land in Poland in the first years of new millennium', *Journal of Agricultural Science and Technology*, (B4 A14) 85–93.

Bermejo, D., Clavero, F. and Y Moreira, J.M., (Coord.), 2011, *Medio siglo de cambios en la evolución de usos del suelo en Andalucía, 1956–2007*, Consejería de Medio Ambiente, Junta de Andalucía, Sevilla.

Bhatta, B., 2010, 'Causes and consequences of urban growth and sprawl', in: *Analysis of urban growth and sprawl from remote sensing data*, Springer-Verlag, Berlin, Heidelberg.

Brady, M., 2010, *Impact of CAP reform on the environment — some regional results*, Working Paper, Agrifood Economics Centre (http://www.agrifood.se/Files/AgriFood_WP20103.pdf).

CDM Sp. z o.o., 2011, *Prognoza oddziaływania na środowisko dla projektu Strategii Rozwoju Transportu do 2020 roku (z perspektywą do 2030 roku) [Prognosis of the environmental impacts for the draft Transport Development Strategy till 2020 (with perspective till 2030)*] (http://www.mir.gov.pl/transport/zrownowazony_transport/srt/strony/start.aspx).

Debeuckelaere, K. and Goldenman, G., 2013, 'Climate change, the EU Floods Directive and biodiversity protection: Lessons from the Scheldt on land use planning as an adaptive measure', in: Maes, F., et al. (eds), *Biodiversity and climate change: Linkages at international, national and local levels*, Edward Elgar Publishing.

EC, 1992a, Communication from the Commission 'The future development of the Common Transport Policy — A global approach to the construction of a Community framework for sustainable mobility' (COM(92) 494 final).

EC, 1992b, Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora (OJ L 206, 22.7.1992, pp. 7–50).

EC, 1996, 96/391/EC: Council Decision of 28 March 1996 laying down a series of measures aimed at creating a more favourable context for the development of trans-European networks in the energy sector (OJ L 161, 29.6.1996, pp. 154–155).

EC, 1997, *Compendium of spatial planning systems and policies*, European Union, Regional Policy and Cohesion, Office for Official Publications of the European Communities, Luxembourg.

EC, 1999, Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC.

EC, 2001a, Directive 2001/42/EC of the European Parliament and of the Council on the assessment of the effects of certain plans and programmes on the environment (OJ L 197, 21.7.2001, pp. 30–37).

EC, 2001b, *Guidance on EIA — EIS Review*. Office for Official Publications of the European Communities (http://ec.europa.eu/environment/archives/eia/eia-guidelines/g-review-full-text.pdf).

EC, 2001c, *Guidance on EIA — Scoping*, Office for Official Publications of the European Communities (http://ec.europa.eu/environment/archives/eia/eia-guidelines/g-scoping-full-text.pdf).

EC, 2001d, White Paper 'European Transport Policy for 2010: time to decide' (COM(2001) 370 final).

EC, 2003, Directive 2003/30/EC of the European Parliament and of the Council of 8 May 2003 on the promotion of the use of biofuels or other renewable fuels for transport (OJ L 123, 17.5.2003, pp. 42–46).

EC, 2004a, Analyse d'impact élargie 'Proposition de paquet législatif portant révision des règlements applicables à la gestion des fonds structurels et de cohésion' (SEC(2004) 924).

EC, 2004b, *Evaluating EU activities: A practical guide for the Commission services*. Directorate-General for the Budget, European Commission, Office for Official Publications of the European Communities, Luxembourg.

EC, 2005a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Common actions for growth and employment: The Community Lisbon Programme' (COM(2005) 330 final of 20 July 2005).

EC, 2005b, Communication to the Spring European Council 'Working together for growth and jobs — a new start for the Lisbon Strategy' (COM(2005) 242 of February 2005).

EC, 2006a, Annexes to the Communication from the Commission 'Halting the loss of biodiversity by 2010 — and beyond — Sustaining ecosystem services for human well-being' (SEC(2006) 621).

EC, 2006b, Communication from the Commission 'Halting the loss of biodiversity by 2010 — and beyond — Sustaining ecosystem services for human well-being' (COM(2006) 216 final).

EC, 2006c, Communication from the Commission to the Council and the European Parliament on 'Thematic strategy on the urban environment' (SEC(2006) 16).

EC, 2006d, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Thematic strategy for soil protection' (COM(2006) 231 final).

EC, 2006e, Regulation (EC) No 1080/2006 of the European Parliament and of the Council of 5 July 2006 on the European Regional Development Fund and repealing Regulation (EC) No 1783/1999 (OJ L 210, 31.7.2006, pp. 1–11).

EC, 2007a, *Cohesion Policy 2007–13: Commentaries and official texts*, European Commission (http://ec.europa.eu/regional_policy/sources/docoffic/official/regulation/pdf/2007/publications/guide2007_en.pdf).

EC, 2007b, Regulation (EC) No 614/2007 of the European Parliament and of the Council of 23 May 2007 concerning the Financial Instrument for the Environment (LIFE+), Annex II.

EC, 2007c, Regulation (EC) No 680/2007 of the European Parliament and of the Council of 20 June 2007 laying down general rules for the granting of Community financial aid in the field of the trans-European transport and energy networks (OJ L 162, 22.6.2007, pp. 1–10).

EC, 2008a, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Addressing the challenges of deforestation and forest degradation to tackle climate change and biodiversity loss' (COM(2008) 645 final).

EC, 2008b, Green Paper 'Towards a secure, sustainable and competitive European energy network' (COM(2008) 782 final).

EC, 2009a, Directive 2009/28/EC, art. 17.

EC, 2009b, Directive 2009/28/EC, art. 19.6.

EC, 2009c, Directive 2009/28/EC of the European Parliament and of the Council of 23 April 2009 on the promotion of the use of energy from renewable sources and amending and subsequently repealing Directives 2001/77/EC and 2003/30/EC (OJ L 140, 5.6.2009, pp. 16–62).

EC, 2009d, Directive 2009/30/EC of the European Parliament and of the Council of 23 April 2009 amending Directive 98/70/EC as regards the specification of petrol, diesel and gas-oil and introducing a mechanism to monitor and reduce greenhouse gas emissions and amending Council Directive 1999/32/EC as regards the specification of fuel used by inland waterway vessels and repealing Directive 93/12/EEC (OJ L 140, 5.6.2009, pp. 88–113).

EC, 2009e, Directive 2009/147/EC of the European Parliament and of the Council of 30 November 2009 on the conservation of wild birds (OJ L 20, 26.1.2010, p. 7–25).

EC, 2009f, *European Cohesion Policy in Poland*, European Commission (http://ec.europa.eu/regional_policy/sources/docgener/informat/country2009/pl_en.pdf).

EC, 2009g, Report from the Commission to the Council, the European Parliament, the European Economic and Social Committee and the Committee of the Regions on the application and effectiveness of the EIA Directive (Directive 85/337/EEC, as amended by Directives 97/11/EC and 2003/35/EC) (COM(2009) 378 final).

EC, 2010a, *Cohesion Policy and the Environment*, European Commission, (http://ec.europa.eu/environment/pubs/pdf/factsheets/cohesion.pdf).

EC, 2010b, Communication from the Commission 'Europe 2020: A strategy for smart, sustainable and inclusive growth' (COM(2010) 2020).

EC, 2010c, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Energy 2020: A strategy for competitive, sustainable and secure energy' (COM(2010) 639).

EC, 2010d, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions 'Smart regulation in the European Union' (COM(2010) 543 final).

EC, 2010e, *La política de cohesión 2007–2013 y el medioambiente — Red de autoridades mediambientales, Madrid*, European Commission DG Regional Policy (http://www.magrama.gob.es/es/calidad-y-evaluacion-ambiental/temas/red-de-autoridades-ambientales-raa-/politica_de_cohesion_y_medio_ambiente_tcm7–15144.pdf).

EC, 2010f, Report from the Commission on indirect land-use change related to biofuels and bioliquids (COM(2010) 0811).

EC, 2011a, Commission staff working paper 'Executive Summary of the impact assessment — Common Agricultural Policy towards 2020', Annex 2 (SEC(2011) 1153 final/2).

EC, 2011b, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'A roadmap for moving to a competitive low carbon economy in 2050' (COM(2011)112 final).

EC, 2011c, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Our life insurance, our natural capital: an EU biodiversity strategy to 2020' (COM(2011) 244 final).

EC, 2011d, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Roadmap to a resource efficient Europe' (COM(2011) 571 final of 20 September 2011).

EC, 2011e, Impact assessment accompanying document to the 'Proposal for a regulation of the European Parliament and of the Council establishing the Connecting Europe Facility' (SEC(2011) 1262 final).

EC, 2011f, Impact assessment accompanying document to the White Paper 'Roadmap to a single European transport area — Towards a competitive and resource-efficient transport system' (SEC(2011) 358 final).

EC, 2011g, Impact assessment accompanying the document 'Our life insurance, our natural capital: an EU biodiversity strategy to 2020' (SEC(2011) 540 final).

EC, 2011h, Impact assessment accompanying the document 'Proposal for a regulation of the European parliament and of the Council on specific provisions concerning the European Regional Development Fund and the investment for jobs goal and repealing Regulation (EC) No 1080/2006' and 'Proposal for a regulation of the European parliament and of the Council on the Cohesion Fund and repealing Regulation (EC) No 1084/2006' and 'Proposal for a regulation of the European parliament and of the Council on specific provisions for the support from the European Regional Development Fund to the European territorial cooperation goal' (SEC(2011) 1138 final) (http://ec.europa.eu/smart-regulation/impact/ia_carried_out/docs/ia_2011/sec_2011_1138_en.pdf).

EC, 2011i, Impact assessment accompanying the document 'Proposal for a regulation of the European Parliament and of the Council on Union Guidelines for the development of the trans-European transport network' (SEC(2011) 1212 final).

EC, 2011j, Impact assessment accompanying the 'Proposal for a regulation of the European Parliament and of the Council on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC' (SEC(2011) 1233 final).

EC, 2011k, Impact assessment accompanying the 'Proposal for a regulation on the establishment of a Programme for the Environment and Climate Action (LIFE)' (SEC(2011) 1541 final).

EC, 2011l, Impact assessment accompanying the 'Proposal for a regulation of the European Parliament and of the Council, laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund covered by the Common Strategic Framework and laying down general provisions on the European Regional Development Fund, the European Social Fund and the Cohesion Fund and repealing Regulation (EC) No 1083/2006' (SEC(2011) 1141 final).

EC, 2011m, Impact assessment 'Common Agricultural Policy towards 2020' (SEC(2011) 1153 final/2).

EC, 2011n, *Territorial agenda of the European Union 2020: Towards a more competitive and sustainable Europe of diverse regions*, agreed at the Informal Ministerial Meeting of Ministers responsible for Spatial Planning and Territorial Development on 19 May 2011, Gödöllő, Hungary (http://www.eu2011.hu/files/bveu/documents/TA2020.pdf).

EC, 2011o, White Paper 'Roadmap to a single European transport area — Towards a competitive and resource efficient transport system' (COM(2011) 144 final).

EC, 2012a, Commission proposal for a directive of the European Parliament and of the Council amending Directive 98/70/EC relating to the quality of petrol and diesel fuels and amending Directive 2009/28/EC on the promotion of the use of energy from renewable sources, p. 2 (COM(2012) 595 final).

EC, 2012b, Commission staff working document 'Guidelines on best practice to limit, mitigate or compensate soil sealing' (SWD (2012) 101 final/2).

EC, 2012c, Report from the Commission to the European Parliament and the Council on 'the implementation of the Water Framework Directive (2000/60/EC) river basin management plans' (SWD (2012) 379 final of 14 November 2012) (http://ec.europa.eu/environment/water/water-framework/pdf/CWD-2012–379_EN-Vol1.pdf).

EC, 2013a, Communication from the Commission 'Building the transport core network: Core network corridors and Connecting Europe Facility' (COM(2013) 940 final).

EC, 2013b, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions 'A new EU forest strategy: for forests and the forest-based sector' (COM(2013) 659 final).

EC, 2013c, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions 'Green infrastructure (GI) — Enhancing Europe's natural capital' (COM(2013) 249 final).

EC, 2013d, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions 'Strengthening the foundations of Smart Regulation — improving evaluation' (COM(2013) 686 final) (http://ec.europa.eu/smart-regulation/docs/com_2013_686_en.pdf).

EC, 2013e, Decision No 1386/2013/EU of the European Parliament and of the Council on a General Union Environment Action Programme to 2020 'Living well, within the limits of our planet' (OJ L 354, 28.12.2013, p. 171–200).

EC, 2013f, *Guidance on integrating climate change and biodiversity into environmental impact assessment*, European Commission (http://ec.europa.eu/environment/eia/pdf/EIA%20Guidance.pdf).

EC, 2013g, Overview of CAP Reform 2014–2020, Agricultural Policy Perspectives Brief, No 5*/December 2013, European Commission (http://ec.europa.eu/agriculture/policy-perspectives/policy-briefs/05_en.pdf).

EC, 2013h, *Public consultation on Commission guidelines for evaluation: November 2013*, Secretariat-General, European Commission, pp. 7–8.

EC, 2013i, Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009 (OJ L 115, 25.4.2013, pp. 39–75).

EC, 2013j, Regulation (EU) No 1293/2013 of the European Parliament and of the Council of 11 December 2013 on the establishment of a Programme for the Environment and Climate Action (LIFE) and repealing Regulation (EC) No 614/2007 (OJ L 347, 20.12.2013, pp. 185–208).

EC, 2013k, Regulation (EU) No 1300/2013 of the European Parliament and of the Council of 17 December 2013 on the Cohesion Fund and repealing Council Regulation (EC) No 1084/2006 (OJ L 347, 20.12.2013, p. 281–288).

EC, 2013l, Regulation (EU) No 1301/2013 of the European Parliament and of the Council of 17 December 2013 on the European Regional Development Fund and on specific provisions concerning the Investment for growth and jobs goal and repealing Regulation (EC) No 1080/2006 (OJ L 347, 20.12.2013, pp. 289–302).

EC, 2013m, Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development

and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006 (OJ L 347, 20.12.2013, pp. 320–469).

EC, 2013n, Regulation (EU) No 1303/2013, Section 5.2 of the Common Strategic Framework: Annex I.

EC, 2013o, Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005 (OJ L 347, 20.12.2013, pp. 487–548).

EC, 2013p, Regulation (EU) No 1307/2013 of the European Parliament and of the Council of 17 December 2013 establishing rules for direct payments to farmers under support schemes within the framework of the Common Agricultural Policy and repealing Council Regulation (EC) No 637/2008 and Council Regulation (EC) No 73/2009, Annex II (OJ L 347, 20.12.2013, pp. 608–670).

EC, 2013q, Regulation (EU) No 1315/2013 of the European Parliament and of the Council, of 11 December 2013, on Union Guidelines for the development of the trans-European transport network and repealing Decision No 661/2010/EU (OJ L 348, 20.12.2013, pp. 1–128).

EC, 2013r, Regulation (EU) No 1316/2013 of the European Parliament and of the Council of 11 December 2013 establishing the Connecting Europe Facility, amending Regulation (EU) No 913/2010 and repealing Regulations (EC) No 680/2007 and (EC) No 67/2010 (OJ L 348, 20.12.2013, pp. 129–171).

EC, 2013s, *Streamlining environmental assessment procedures for energy infrastructure 'Projects of common interest'* (PCIs), Guidance Document, European Commission (http://ec.europa.eu/energy/infrastructure/environmental_assesment_en.htm).

EC, 2013t, *The EU explained: Environment*, Directorate-General for Communication, European Commission, Publications Office of the European Union, Luxembourg.

EC, 2014a, Communication from the Commission to the European Parliament, the Council, the Economic and Social Committee and the Committee of the Regions 'A policy framework for climate and energy in the period from 2020 to 2030' (COM(2014) 15 final).

EC, 2014b, Commission Implementing Decision of 19 March 2014 on the adoption of the LIFE multiannual work programme for 2014–17 (2014/203/EU).

EC, 2014c, Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment, Annex II.A.3.

EC, 2014d, Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (OJ L 124, 25.4.2014, pp. 1–18).

EC, 2014e, *LIFE and soil protection*, Environment Directorate-General, European Commission (http://ec.europa.eu/environment/life/publications/lifepublications/index.htm).

EC, 2015a, *Better regulation guidelines*, Glossary, SWD(2015) 111 final. Available online at: http://ec.europa.eu/smart-regulation/guidelines/toc_guide_en.htm.

EC, 2015b, *Better regulation 'toolbox'*, European Commission (http://ec.europa.eu/smart-regulation/guidelines/toc_tool_en.htm).

EC, 2015c, Commission Staff Working Document 'Better regulation guidelines' (SWD(2015) 111 final) (http://ec.europa.eu/smart-regulation/guidelines/toc_guide_en.htm).

EC and JRC, 2012, *The state of soil in Europe — A contribution of the JRC to the European Environment Agency's Environment State and Outlook Report — SOER 2010*, JRC Reference Reports, Report EUR 25186 EN.

EEA, 2001, *Reporting on environmental measures: Are we being effective?* Environmental Issue Report No 25/2001, European Environment Agency.

EEA, 2005, *Policy effectiveness evaluation: The effectiveness of urban wastewater treatment and packaging waste management systems*, EEA Brochure No 3/2005, European Environment Agency.

EEA, 2006, *Urban sprawl in Europe — The ignored challenge*, EEA Report No 10/2006, European Environment Agency.

EEA, 2010a, *Land in Europe: prices, taxes and use patterns*, EEA Technical report No 4/2010, European Environment Agency.

EEA, 2010b, *The European environment — State and outlook 2010: Land Use*, Thematic Assessment, European Environment Agency.

EEA, 2011, *Survey of resource efficiency policies in EEA member and cooperating countries. Country profile: Poland*, European Environment Agency (http://www.eea.europa.eu/themes/economy/resource-efficiency/resource-efficiency-policies-country-profiles).

EEA, 2012a, *European waters — current status and future challenges — a synthesis*, EEA Report No 9/2012, European Environment Agency (http://www.eea.europa.eu/publications/european-waters-synthesis-2012).

EEA, 2012b, *Territorial cohesion and water management in Europe: the spatial perspective*, EEA Technical report No 4/2012, European Environment Agency.

EEA, 2013, *Land take*, CSI014/LSI 001, European Environment Agency (http://www.eea.europa.eu/data-and-maps/indicators/land-take-2/assessment-2).

EEA and Swiss Federal Office for the Environment, 2011, *Landscape fragmentation in Europe*, EEA Report No 2/2011, European Environment Agency.

Emilia-Romagna Region, 2000, Regional Law No 20/2000 of 24 March 2000 'General requirements for the protection of the use of territory'.

ESPON, 2014, 'ET2050 — Territorial Scenarios and Visions for Europe', Draft Final Report. Volume 5 Land use trends and scenarios. Research Institute for Knowledge Systems (2014). Available at: http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/ET2050.html.

Europarc, 2012, *Anuario 2011 — del estado de las áreas protegidas en España*, Europarc-España (http://www.redeuroparc.org/img/publicaciones/Anuario2011.pdf).

European Council, 2014, 'Conclusions — 23/24 October 2014' (EUCO 169/14, CO EUR 13, CONCL 5) (http://www.consilium.europa.eu/uedocs/cms_data/docs/pressdata/en/ec/145397.pdf).

European Parliament, 2013, *Possible effects on EU land markets of new cap direct payments*, IP/B/AGRI/IC/2012_66, Directorate-General for Internal Policies, European Parliament (http://www.europarl.europa.eu/RegData/etudes/etudes/join/2013/495866/IPOL-AGRI_ET(2013)495866_EN.pdf).

Euroreg, 2010, *Ocena wpływu polityki spójności na rozwój miast polskich [Evaluation of impact of Cohesion Policy on development of Polish cities*], Warsaw, October 2010 (http://www.ewaluacja.gov.pl/Ewaluacja_ex_post_NPR/Documents/raport_koncowy_expost9.pdf).

Evans, F., 2014, 'Land recycling in the United Kingdom', presentation at the EU Conference on Land as a Resource, Brussels, 19 June 2014.

Evers, D. and Tennekes, J., 2014, *De Europeanisering van de Nederlandse ruimtelijke ordening*, PBL Netherlands Environmental Assessment Agency.

Evers, D. and Tennekes, J., forthcoming, *Europeanization revisited: Influence of EU-sector policies on spatial planning governance in the Netherlands*.

FAO, 2000, 'Definitions', in: *Land Cover Classification System*, Food and Agriculture Organization of the United Nations (http://www.fao.org/docrep/003/x0596e/x0596e01e.htm) accessed December 2014.

Ferri, V. and Adobati, F., 2011, *Oneri di urbanizzazione, crescita urbana e debito pubblico di domani*, Università degli Studi di Milano Bicocca, RTBicocca — Note territori n. 3.

M. Fichter, 2010, *Environmental considerations related to EU funding: the case of Cohesion Policy* (Presentation given to the seminar on Environment and Sustainability Lessons Learned and Perspectives for the Future, organised by EEA Grants and Norway Grants, May 2010), available at: http://eeagrants.org/News/2010/Environment-and-sustainability-lessons-learned-and-perspectives-for-the-future.

Fleurke, F. and Willemse, R., 2014, *Effects of the European Union on national decision-making: Enhancement or constriction?* cited in Evers D. and Tennekes J., De Europeanisering van de Nederlandse ruimtelijke ordening, PBL, 2014.

Fogel, P., 2012, 'Wskaźniki oceny polityki i gospodarki przestrzennej w gminach' ['Indicators of evaluation of spatial policy and spatial management on local community level'], PhD thesis, Polish Academy of Sciences, Warsaw.

Galacho, F. B., 2002, 'Los usos del suelo en el espacio costero de la provincia de Málaga basados en un modelo de desarrollo urbano-turístico con importantes consecuencias ambientales', *Baetica. Estudios de Arte, Geografía e Historia*, (24) 21–61.

Galacho, F. B., 2010: 'La irrupción del proceso urbano en los espacios rurales. Reflexiones acerca de las características de una nueva forma de relación entre

territorio y economía', in: Delgado, C., Juaristi, J. and Tomé, S. (eds), *Ciudades y paisajes urbanos en el siglo XXI*, Ediciones de Librería Estudio, Santander, pp. 297–314.

Garrigós Simón, F. J. and Palacios Marqués, D., 2008, *El turismo residencial y las políticas públicas europeas*, Estudios de Progreso, Fundación Alternativas.

GUS (Main Statistical Office of Poland), 2013, Data from Statistical Yearbooks 2000–2013: (http://stat.gov.pl/obszary-tematyczne/roczniki-statystyczne/roczniki-statystyczne/rocznik-statystyczny-rzeczypospolitej-polskiej-2013,2,8.html).

IEEP, 2013, *Environment undermined in CAP deal*, Institute for European Environmental Policy (http://www.ieep.eu/work-areas/agriculture-and-land-management/2013/06/environment-undermined-in-cap-deal).

IEEP and Milieu, 2013, *The guide to multi-benefit Cohesion Policy investments in nature and green infrastructure*, a report for the European Commission, Brussels.

INE (Instytut na Rzecz Ekorozwoju) and Atkins, W. S., 2010, *Prognoza oddziaływania na Środowisko Projektu Koncepcji Przestrzennego Zagospodarowania Kraju 2030* [Prognosis of environmental impact of the National Spatial Development Concept], Warsaw.

Inforegio, 2014, 'Information on Cohesion Policy eligibility and allocations' (http://ec.europa.eu/regional_policy/what/future/eligibility/index_en.cfm).

Isocarp, 2008, *International Manual of Planning Practice*, ISOCARP, the Hague.

JRC, 2010, *Impacts of the EU biofuel target on agricultural markets and land use: a comparative modelling assessment*, Joint Research Centre Institute for Prospective Technological Studies, Seville.

JRC, 2013a, *Direct and indirect land use impacts of the EU Cohesion Policy: Assessment with the land use modelling system*, Joint Research Centre Institute for Environment and Sustainability, Seville.

JRC, 2013b, 'The possible contribution of agricultural crop residues to renewable energy targets in Europe: A spatially explicit study', Joint Research Centre Institute for Energy and Transport (http://iet.jrc.ec.europa.eu/remea/possible-contribution-agricultural-crop-residues-renewable-energy-targets-europe-spatially-explicit).

JRC IES, 2012, *The state of soil in Europe: A contribution of the JRC to the European Environment Agency's Environment State and Outlook Report — SOER 2010*, JRC Reference Reports, Report EUR 25186 EN.

Junta de Andalucía, 2013, *Datos básicos 2013 — Economía*, Instituto de Estadística y Cartografía de Andalucía, Sevilla.

Junta de Andalucía, 2014, *Medio Ambiente en Andalucía, Datos básicos 2014*, Consejería de Medio Ambiente y Ordenación del Territorio, Sevilla.

Korolewska, M., 2012, *Wydatki publiczne na infrastrukturę transportu lądowego w Polsce [Public spending on road transport in Poland*], Office for Parliamentary Studies BAS report No 4(32), pp. 79–124.

Kulikowski, R., 2012, 'Produktywność i towarowość rolnictwa w Polsce' ['Agricultural productivity In Poland'], *Barometr Regionalny*, (4) 17–29 (http://br.wszia.edu.pl/zeszyty/pdfs/br30_02kulikowski.pdf).

Lavalle, C. et al., *Coastal Zones: Policy alternatives impacts on European Coastal Zones 2000–2050*, March 2011, Available at: http://ec.europa.eu/environment/enveco/impact_studies/pdf/land_use_modelling%20adaptation_activities_coastal.pdf.

Lefebvre, M., Espinosa, M., Gomez y Paloma, S., 2012, *The influence of the Common Agricultural Policy on agricultural landscapes*, Institute for Prospective Technological Studies, Joint Research Centre, European Commission.

Malucelli, F., Certini, G. and Scalenghe, R., 2014, 'Soil is brown gold in the Emilia-Romagna region, Italy', *Land Use Policy*, (39) 350–357 (http://dx.doi.org/10.1016/j.landusepol.2014.01.019).

McDonald, R. I., Fargione, J., Kiesecker, J., Miller, W. M. and Powell, J., 2009, 'Energy sprawl or energy efficiency: climate policy impacts on natural habitat for the United States of America', *PLoS ONE*, (4) e6802.

McGowan, F., 2008, 'Can the European Union's market liberalism ensure energy security in a time of "Economic Nationalism"', *Journal of Contemporary European Research*, (4) 90–106.

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2007a, *National Cohesion Strategy (National Strategic Reference Framework 2007–2013*) (http://www.funduszeeuropejskie.gov.pl/WstepDoFunduszyEuropejskich/Documents/NSRO_an_20_07.pdf).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2007b, *Ocena postepow Polski w zakresie spojnosci z Unia*

Europejska, Raport 2007 [Evaluation of progress of Poland in reaching cohesion with the European Union, Report 2007].

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2007c, *Operational programme infrastructure and environment* (http://www.pois.gov.pl/English/Documents_POIS/Documents/7122008_POIiS_ENG.pdf).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2007d, *Operational programme infrastructure and environment, the National Strategic Reference Framework for the years 2007–2013* (http://www.pois.gov.pl/English/Documents_POIS/Documents/7122008_POIiS_ENG.pdf).

MIiR (Minister Infrastruktury i Rozwoju), 2009, *Narodowe Strategiczne Ramy Odniesienia 2007–2013, Wytyczne w zakresie postepowania w sprawie oceny oddzialywania na srodowisko dla przedsiewziec wspolfinansowanych z krajowych lub regionalnych programow operacyjnych [Guidelines regarding environmental impact assessment procedures for the undertakings cofinanced from national or regional operational programmes*], 5 May 2009 (http://www.mir.gov.pl/fundusze/fundusze_europejskie/OOS/Documents/WYTYCZNE_OOS_050509.pdf).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2010, Krajowa Strategia Rozwoju Regionalnego 2010–2020 [*National strategy of regional development 2010–2020*] (http://www.mir.gov.pl/rozwoj_regionalny/polityka_regionalna/ksrr_2010_2020/strony/default.aspx).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2011, *Koncepcja Przestrzennego Zagospodarowania Kraju 2030 [National spatial management concept 2030*] (http://www.mir.gov.pl/rozwoj_regionalny/polityka_przestrzenna/kpzk/strony/koncepcja_przestrzennego_zagospodarowania_kraju.aspx).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2012, *Strategia Rozwoju Kraju 2020 [National Development Strategy 2020*] (http://strateg.stat.gov.pl/strategie_pliki/Sredniookresowa_Strategia_Rozwoju_Kraju.pdf).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2013a, *Strategia Rozwoju Transportu do 2020 roku (z perspektywą do 2030 roku) [Transport development strategy till 2020 (with perspective till 2030)*] (http://www.mir.gov.pl/Transport/Zrownowazony_transport/SRT/Documents/Strategia_Rozwoju_Transportu_do_2020_roku.pdf).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2013b, *Wplyw budowy autostrad in drog ekspresowych na rozwoj spoleczno-gospodarczy i terytorialny Polski [Impact of motorways and expressways on socio-economic and territorial development of Poland*] (http://www.ewaluacja.gov.pl/Wyniki/Documents/Raport_koncowy_z_badania_autostrady_i_drogi_ekspresowe.pdf).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2014a, *Dokument implementacyjny do Strategii Rozwoju Transport do 2020 roku (z perspektywą do 2030 roku) [Implementation document for Transport Development Strategy untill 2020 (with perspective till 2030)*] (http://www.mir.gov.pl/aktualnosci/Transport/Documents/DI_do_SRT_24_09_2014_RM.pdf).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2014b, *Programming of the 2014–2020 financial perspective — Partnership Agreement* (http://www.mir.gov.pl/fundusze/Fundusze_Europejskie_2014_2020/Programowanie_2014_2020/Umowa_partnerstwa/Documents/UP_ang.pdf).

MIiR (Ministerstwo Infrastruktury i Rozwoju), 2014c, *Program Operacyjny Infrastruktura i Środowisko [Operational programme infrastructure and environment*], (https://www.mir.gov.pl/fundusze/Fundusze_Europejskie_2014_2020/Documents/POIS_2014_2020_08012014.pdf).

Ministerio de Fomento, 2014, *Programa operativo de Andalucía* (https://www.fomento.gob.es/MFOM/LANG_CASTELLANO/_ESPECIALES/FITE/FEDER_07_13/ANDALUCIA).

Ministerstwo Gospodarki, 2014, *Strategia bezpieczenstwa energetycznego i srodowiska [Strategy of energy safety and environment*], Ministry of Economy (http://bip.mg.gov.pl/files/upload/21165/SBEIS.pdf).

MRiRW (Ministerstwo Rolnictwa i Rozwoju Wsi), 2012a, *Strategia zrównowazonego rozwoju wsi, rolnictwa i rybactwa na lata 2012–2020* (http://www.minrol.gov.pl/Informacje-branzowe/Strategia-zrownowazonego-rozwoju-wsi-rolnictwa-i-rybactwa-na-lata-2012–2020/Dokumenty-analizy).

MRiRW (Ministerstwo Rolnictwa i Rozwoju Wsi), 2012b, *Strategia zrównowazonego rozwoju wsi, rolnictwa i rybactwa [Strategy of sustainable development of rural areas, agriculture and fishery*].

MSZ (Ministerstwo Spraw Zagranicznych), 2014, *Polskie 10 lat w Unii [Polish 10 years in the EU*], Warsaw (http://www.msz.gov.pl/resource/82971f69-d890–4394-aff7–01899c796784:JCR).

Moreira, J. M., 2011, 'Urbanismo expansivo: de la utopía a la realidad. Reflexiones desde la información ambiental', Ponencia presentada en el XXII Congreso de Geógrafos Españoles, Alicante, Octubre 2011, 31.

Mudgal, S., et al., 2014, *Support for the preparation of the impact assessment report on the Land Communication*, BIO by Deloitte, Institute for Environmental Studies, VU University Amsterdam, and Institute for European Environmental Policy (prepared for the European Commission, DG Environment on 2 May 2014).

Nilsson, M., et al., 2012, Understanding policy coherence: Analytical framework and examples of sector–environment policy interactions in the EU, *Environmental Policy and Governance*, (22) 395–423.

Nowakowski, M., 2006, 'Rozprzestrzenianie i rozpraszanie zabudowy warszawskiej metropolii' ['Urban sprawl of the Warsaw metropoly'], in: Kozlowski, S. (ed.), *Zywiolowe rozprzestrzenianie sie miast. Narastajacy problem aglomeracji miejskich w Polsce [Urban sprawl. Increasing problem of urban agglomerations in Poland*], Ekonomia i Srodowisko.

Oikonomou et al., 2014, *Understanding policy contexts and stakeholder behaviour for consistent and coherent environmental policies*, Apraise (http://apraise.org).

OSE, 2006, *Cambios de ocupación del suelo en España. Implicaciones para la sostenibilidad. Estudio realizado a partir del proyecto CORINE Land Cover*, Informe del Observatorio de la Sostenibilidad en España (OSE), Mundiprensa, Madrid.

OSE, 2010, *Sostenibilidad en España 2010*, Mundiprensa, Madrid.

OSE, 2012, *Sostenibilidad en España 2012*. Capítulo especial: energía sostenible para todos, Ministerio de Agricultura, Alimentación y Medio Ambiente, Madrid.

Rediam, 2014, 'Land use and cover monitoring and assessment in Andalusia (Spain)', Presentation from the project workshop held on 16 October 2014.

Rounsevell, M. D. A., Audsley, E. and Mortimer, D., 'The impact of the Common Agricultural Policy on land use in Europe', in: Verheye, W. H. (ed.), *Encyclopedia of life support systems: Land use, land cover and soil sciences, Volume IV — Land use management*.

Sas-Bojarska, A., 2010, *Landscape protection — the challenge for sustainable planning*, 46th ISOCARP Congress 2010 (http://www.isocarp.net/Data/case_studies/1684.pdf).

Śleszyński, 2013, *Analiza stanu i uwarunkowań prac planistycznych w gminach w 2012 roku [Analysis of the advancement and conditions of planning activities in the municipalities in 2012*], Institute of Geography and Spatial Planning, Polish Academy of Sciences (https://www.mir.gov.pl/Budownictwo/Planowanie_lokalne_i_zagospodarowanie_przestrzenne/Informacje_przestrzenne/Planowanie_przestrzenne/Documents/analiza_2012.pdf).

Stanford University, 2006, 'The impacts of large-scale biofuel use on land use and conversion', Stanford Woods Institute for the Environment.

Szafranko, E., 2010, 'Procedura związana z przygotowaniem inwestycji drogowej w świetle specustawy' ['Procedure connected with preparing of road investment in view of *specustawa'], Czasopismo Techniczne [Technical Transactions, Civil engineering*], 1-B/2010.

Union of Concerned Scientists, 2013, 'Environmental Impacts of Solar Power' (http://www.ucsusa.org/clean_energy/our-energy-choices/renewable-energy/environmental-impacts-solar-power.html#.VI6uImdOVjo) accessed December 2014.

UMWD (Urzad Marszalkowski Wojewodztwa Dolnoslaskiego), 2014a, *Regionalny Program Operacyjny dla wojewodztwa dolnoslaskiego na lata 2007–2013 [Regional operational programme for Lower Silesia 2007–2014*] (http://rpo.dolnyslask.pl/fileadmin/user_upload/documents/14maj/26/RPO_WD_30_04_2014.pdf).

UMWD (Urząd Marszalkowski Województwa Dolnośląskiego), 2014b, *Regionalny Program Operacyjny dla wojewodztwa dolnoslaskiego na lata 2014–2020 [Regional operational programme for Lower Silesia 2014–2020*] (http://rpo.dolnyslask.pl/fileadmin/user_upload/documents/14kwiecien/10/RPO_WD_projekt_08_04_2014.pdf).

UMWD (Urzad Marszałkowski Województwa Dolnośląskiego), 2014c, *Strategia Rozwoju województwa dolnośląskiego 2020 [Development strategy of Lower Silesia 2020*] (http://strateg.stat.gov.pl/strategie_pliki/dolnoslaskie_2013.pdf).

van der Linde, C., 2007, 'External energy policy: old fears and new dilemmas in a larger union', in: Sapir, A. (ed.), *Fragmented power: Europe and the global economy*.

van Delden, H. et al, 2010, 'Integrated assessment of agricultural policies with dynamic land use change modelling', *Ecological Modelling* 221, (18) 2 153–2 166.

van Delden, H. et al., 2012, 'Exploring land use trends in Europe: A comparison of forecasting approaches and results', in: Seppelt, R., Voinov, A.A., Lange, S. and

Bankamp, D. (eds), Proceedings of the International Environmental Modelling and Software Society (iEMSs) sixth biennial meeting, *Managing resources of a limited planet*, iEMSs, Leipzig, Germany.

van Delden, H. and Vanhout, R., 2014, 'Volume 5: Land use Trends and Scenarios', in: *ET2050 — Territorial scenarios and visions for Europe*, EPSON (http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/ET2050.html).

van Delden, H., Verzandvoort, S. et al., 2014, *Land take and soil sealing — Concepts, issues and examples from the RECARE project*, a presentation from the project workshop held on 16 October 2014.

Zamparutti et al., 2012, *Comparative study of pressures and measures in the major river basin management plans: Task 1 — Governance*, Final report prepared by WRc and partners for the European Commission (DG Environment), 28 November 2012 (http://ec.europa.eu/environment/archives/water/implrep2007/pdf/Governance-Pressures%20and%20measures.pdf).

Zathey, M., 2005, 'Wrocławska strefa suburbialna. Zmiany morfologiczne, funkcjonalne i społeczne' ['Wrocław suburbian zone. Morphological, functional and social changes'), PhD thesis, Department of Natural sciences, Institute of Geography and Regional Development, Wrocław University, Wrocław.

Zathey, M., 2014, 'Regional spatial planning policy', presented at Project Workshop held in Brussels on 16 October 2014.

ZPORR, 2004, *Zintegrowany Program Operacyjny Rozwoju Regionalnego [Integrated Operational Programme of Regional Development*], OJ No 166, item 1745 (http://www.funduszeeuropejskie.gov.pl/OrganizacjaFunduszyEuropejskich/Documents/ZPORR_2004_2006.pdf).

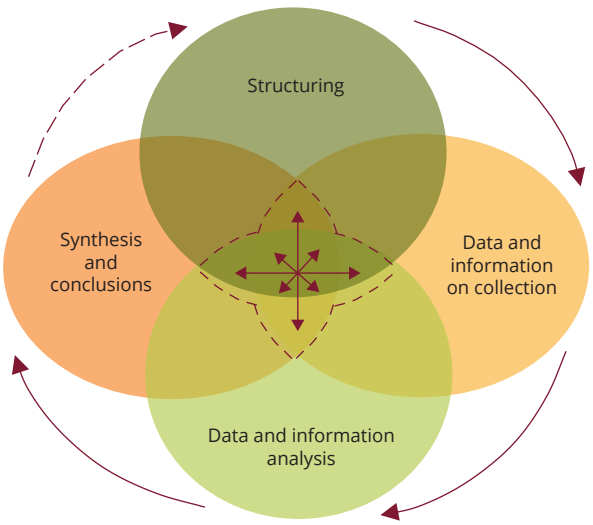
Annex 1 Planning, information gathering and analysis for policy evaluations

The work required to carry out an assessment can be divided into four key steps ([110]), as shown in Figure A.1: structuring, data and information collection, data and information analysis, and synthesis and conclusions. Although these are indicated as consecutive steps, there can also be iteration among them, as shown by the arrows in the centre of the figure. Iteration may be necessary particularly if unexpected problems arise, for example if data limitations are encountered, during the work ([111]). This is the case in particular if a series of evaluations are planned. For example, a major programme might have an ex ante evaluation, then a mid-term evaluation and a final evaluation; the latter evaluations could build on the results of the earlier ones.

Structuring

This phase sets out the approach to be used in the assessment. It involves preparing an initial overview of the EU policy or policies being evaluated, and adapting the overall conceptual framework presented in Figure 2.1 (Chapter 2) to the specific policy.

Figure A.1 Steps for an assessment



Source: EEA/Milieu elaboration.

It is important to set the time-frame for consideration in the assessment. EU policies evolve over time, as reforms can modify their objectives and implementation instruments; therefore, the assessment will need to define a clear time-frame.

The geographical approach for the analysis must also be determined at this stage. The overall geographical scope is likely to be defined before the start of work, that is whether the assessment will look at Europe as a whole, at a specific national context or address the regional or local level. Nonetheless, the framework set out in Section 2.1 highlights the importance of the national, regional and local context in shaping policy outputs and impacts — and these vary significantly across Europe. Consequently, an assessment at EU or national level may need to undertake analyses at lower scales (and potentially, drivers may need to be analysed on a global scale; for example, agricultural markets that influence farming in the EU would need to be considered at a global scale). Case studies and specific examples are among the ways of capturing the context in defined geographical areas.

The structuring phase is likely to require some literature review and background research. This will help to define and formulate the evaluation questions; for EU (and other) evaluations, these questions will be formulated in terms of a set of evaluation criteria, as described at the end of this section.

Once the questions are prepared, it will be useful to identify:

- key elements of the policy 'chain' at EU levels, such as the main EU policy and legislative documents to be considered in terms of outputs and objectives (as per the conceptual framework), including any impact assessments or ex ante assessments prepared for these documents;

([110]) Based on methodological guidance by the European Commission, for example EC, 2004b.
([111]) Data problems are common problems for assessment and evaluation (see, for example, EEA, 2005).

- an initial consideration of the context and the influence of other EU policies;
- the main elements of the implementation 'chain' at Member State level ('outputs' in the conceptual framework), and which elements of the chain will be the focus of analysis;
- an initial consideration of the potential impacts that policy results will have on land use, land take and land degradation (based, for example, on the initial literature review and expert analysis);
- the time-frame and administrative levels to be considered in the assessment;
- the expected data and information availability, and the methods that will be used for their collection and analyses.

The structuring and planning of the assessment will, of course, need to take into consideration the resources and time available for the work, as both can be important constraints.

Data and information gathering

The choice of data and information collection methods will depend on the research questions, as well as on the expected data and information availability.

The following are among the key types of data and information that may be assessed.

- The legislative and policy documents to be analysed, for example in terms of policy coherence, could be assessed.
- An assessment could be carried out of academic and policy literature, including:
  - academic literature on the policy area, on the context for implementation, and on land take and land degradation;
  - reports from EU and other research studies, such as projects implemented within the framework of the ESPON initiative, the Recare project funded by the Seventh Framework Programme (FP7) and other FP-funded projects.
- Other EU project results, including Interreg results, could be assessed:
  - reports and evaluations on policy planning (such as impact assessments of EU policies and SEAs of strategic documents on a national level) and implementation (mid-term and ex post monitoring and evaluation).
- Quantitative data, such as data on EU spending in the policy area, and monitoring data on land-use changes can be assessed. Some of these data may be available at EU level; notably, EEA maintains land use and land take indicators, based on Corine data. National and regional data can also be explored, in particular for case studies; for example, the case study of Andalusia (Chapter 6) describes this region's extensive land monitoring network. Quantitative data can also include forecasts and projections from, for example, research studies.
- Geospatial data, in particular with regard to land use, can be considered.
- Expert input, via interviews with experts and officials or via expert panels or workshops can be assessed. Because many other types of data and information may be scarce, experts and officials can be a key data source.
- Case studies could be carried out on certain Member States, and possibly also at regional and local levels. As the influence of EU policies on land is often indirect, and EU-wide data are likely to be incomplete, case studies can be an important for the investigation of trends and a better understanding of the causal pathways between policy interventions and their impacts. Moreover, national, regional and local conditions and policy frameworks are likely to play a crucial role in mediating the influence of EU policies on land; this is the case, notably, for spatial planning in terms of shaping land take.
- The availability (and use conditions) of impact assessment models can be assessed.

Data and information analysis

The choice of analysis methods will depend on the evaluation questions to be answered, the data available, and also the time and resources available for the evaluation. Several methods can be used and their results can be compared and integrated.

The following will be among the key methods:

- policy coherence analysis is expected to play a prominent role in these evaluations. Nilsson et al. (2012) provide methodology to assess the coherence between policy objectives and instruments;

- legal and policy analysis of EU, national or regional provisions for SEAs and other assessments that could influence policy implementation;
- the preparation of influence diagrams of direct and indirect policy linkages to land use, land take and land degradation (Chapter 3 presents simplified examples of such diagrams);
- qualitative analysis of case studies, interviews and expert panels;
- the analysis of quantitative data, which can vary from simple qualitative conclusions based on data to the use of analytical tools, such as correlation and regression analysis;
- the monetary valuation of costs and benefits; natural capital accounting can provide a tool to measure ecosystem services (Box 1.1 (Chapter 1) provides an example of the cost of ecosystem services lost as a result of soil sealing);
- the modelling of past and/or potential future impacts, including scenario development and analysis (see Box A.1);

Table A.1 Linking analysis methods with the conceptual framework (Figure 2.1)

Analysis method	Key stages of the conceptual framework	Key evaluation criteria
Policy coherence analysis	Objectives, inputs and outputs	Coherence
Legal and policy analysis	Objectives, inputs and outputs	Coherence
Influence diagrams	Results and impacts	Effectiveness and EU added value
Qualitative analysis	All	Relevance, coherence and EU added value
Quantitative analysis	All	Relevance, coherence, efficiency and EU added value
Monetary valuation	Impacts	Effectiveness and EU added value
Mapping analysis	Outputs, results and impacts	Effectiveness and EU added value
Modelling	Results and impacts	Effectiveness

Box A.1 Modelling to assess impacts on land

Box 1.2 (Chapter 1) describes the results of an ESPON study that forecasts land-use trends in Europe for the coming two decades. This work used a series of models:

- MULTIPOLES, which simulates demographic developments until 2030;
- MASST, for economic developments until 2030;
- MOSAIC, for transport developments until 2030;
- SASI, which provides long-term integrated simulations until 2050;
- Metronamica for land-use developments until 2050.

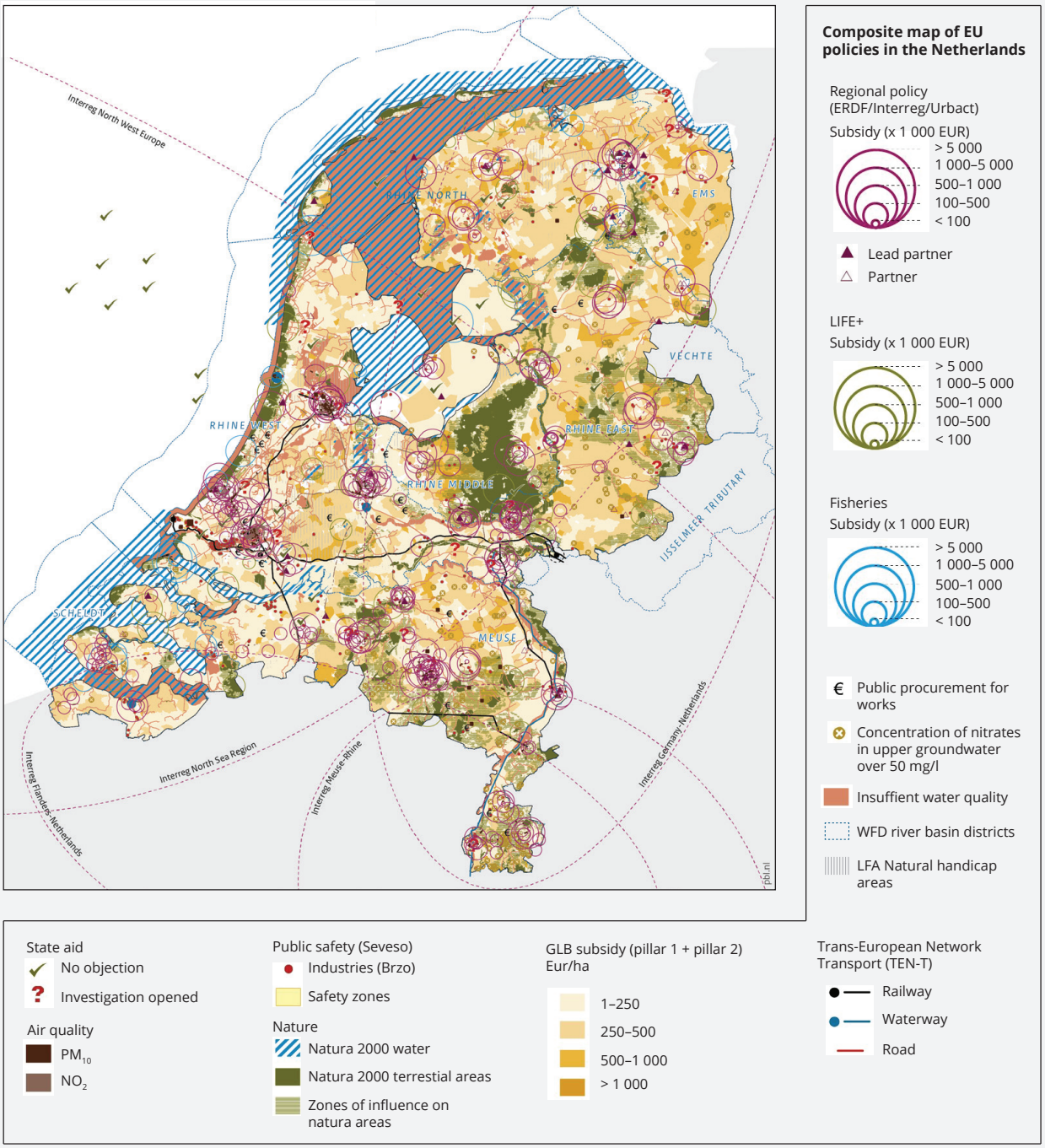
In addition, JRC has used LUMP to assess the potential impacts of both Cohesion Policy and the CAP (see Chapters 3 and 4), and the EUClueScanner model was used for an assessment of policies for coastal areas (Lavalle et al., 2011). The 'Dynamic land use change modelling for CAP impact assessment on the rural landscape' (LUMOCAP) policy support system was developed as part of the Sixth FP (FP6) project LUMOCAP, in order to assess potential impacts of the CAP on Europe's land use and landscape (van Delden et al., 2010); this system has subsequently been used to assess the impact of European policies on land-use change and soil organic matter ([112]). The land-use model included in LUMOCAP (www.metronamica.nl) was used in the ESPON ET2050 study mentioned above (van Delden and Vanhout, 2014). During the preparation of the SOER 2010, EEA conducted a comparative study of land-use scenarios for Europe, which also includes some of the abovementioned models (van Delden et al., 2012).

([112]) Results are available online (http://ec.europa.eu/environment/soil/som_en.htm).

Box A.2 Mapping analysis of EU policies

A recent analysis by PBL, the Netherlands Environmental Assessment Agency, has mapped key EU policies that influence land use in the Netherlands. Figure A.2 shows an example of this work.

Figure A.2 Mapping EU policies that influence land use in the Netherlands



Source: Evers and Tennekes, 2016, Netherlands Environmental Assessment Agency.

- mapping analysis can be used to identify the extent of influence a policy has; this tool has been used in the Netherlands to show the influence of EU policies (see Box A.2).

These methods can be valuable across many stages of the conceptual framework. Table A.1 provides an overview of the key stages at which specific methods will be most valuable, as well as the main evaluation criteria to which they could provide input.

In practice, the use of these methods will depend on the specific assessment. Furthermore, a key issue to be considered in any evaluation is how to use and integrate different sources of data and information, each of which will, as noted above, likely be incomplete. In many cases, for example, there may be only limited data available for quantitative analysis. The analysis will likely need to rely on a combination of quantitative analysis and qualitative, reasoned arguments. Any assessment will need to clearly identify any assumptions that are made to address data limitations.

More generally, the analysis and the conclusions are likely to use a system of 'triangulation' that compares

Table A.2 Evaluation criteria

Evaluation criteria	The European Commission's definitions of the evaluation criteria ([113])	Proposed definition of criteria for the evaluation of the impact of EU policies on land
Relevance	Relevance 'looks at the relationship between the needs and problems in society and the objectives of the intervention'. Key questions can include: • To what extent is the intervention still relevant?	To what extent do the EU objectives on land correspond to the needs within the EU in terms of protecting and appropriately managing land as a resource? To what extent are these objectives relevant for this sectoral policy and for this context?
Coherence	Key questions can include: • To what extent is the intervention coherent with other interventions which have similar objectives? • To what extent is the intervention coherent internally? • To what extent is the intervention coherent with wider EU policy (and with international obligations)?	To what extent do sectoral policy objectives and instruments take into account EU objectives for land use, land take and land degradation? Have safeguards, such as SEAs, taken these land objectives into account?
Effectiveness	Effectiveness 'considers how successful EU action has been in achieving or progressing towards its objectives'. Key questions include: • To what extent have the objectives been achieved?	To what extent did the sectoral policy affect (limit) land take and land degradation? To what extent can changes/effects observed be credited to the intervention?
Efficiency	Efficiency 'considers the relationship between the resources used by an intervention and the changes generated by the intervention'	Not identified
EU added value	EU added value 'looks for changes which it can reasonably be argued are due to EU intervention rather than any other factors'. Key questions include: • What is the additional value from EU intervention, compared with what could be achieved by Member States at national/regional levels?	What is the additional value from the EU objectives on land, compared with what could be achieved by Member States at national/regional levels without EU objectives?

([113]) The quotes in the table are taken from EC (2015), Section 3, pp. 55–61, which is available online (http://ec.europa.eu/smart-regulation/guidelines/toc_guide_en.htm).

the data and information obtained through multiple qualitative and/or quantitative methods to cross-check and help validate results. The extent of triangulation work will depend on available resources, as it can be time consuming. At a minimum, results obtained via different methods (or, if applicable, different sources) should be compared in order to identify key areas of agreement, as well as major contradictions. This will enable methodological and data verification if necessary, with a view to increasing the reliability of the overall assessment.

Synthesis and conclusions

In this last stage, the results of the analysis are pulled together to provide answers to the main evaluation questions, and to draw overall conclusions.

EU evaluations present conclusions with regard to a set of criteria, which typically include coherence, effectiveness, efficiency, EU added value and relevance. These terms — as set out in a recent Commission consultation document (EC, 2015c) — focus on the 'internal' evaluation of a single policy. Thus, they need to be adapted for the evaluation of EU policies in terms of an external objective that is embedded in other relevant EU policies and strategies.

A first step in doing so is to set out the EU objectives to be used in the evaluation. Key elements of this framework, as set out in the 7EAP (see Section 1.4), include:

- progress towards the target of 'no net land take' by 2050;
- a reduction in soil erosion;
- an increase in soil organic matter;
- the remediation of contaminated sites;
- the integration of land use in all levels of governments, including via the adoption of targets on soil and land as a resource.

Table A2 proposes criteria for the evaluation of the impact of EU policies on land including questions related to these criteria and the approach for assessment.

European Environment Agency

The direct and indirect impacts of EU policies on land

2016 — 118 pp. — 21 x 29.7 cm

ISBN 978-92-9213-731-1
doi:10.2800/05464

HOW TO OBTAIN EU PUBLICATIONS

Free publications:

- one copy:
  via EU Bookshop (http://bookshop.europa.eu);

- more than one copy or posters/maps:
  from the European Union's representations (http://ec.europa.eu/represent_en.htm);
  from the delegations in non-EU countries (http://eeas.europa.eu/delegations/index_en.htm);
  by contacting the Europe Direct service (http://europa.eu/europedirect/index_en.htm) or calling 00 800 6 7 8 9 10 11 (freephone number from anywhere in the EU) (*).

  (*) The information given is free, as are most calls (though some operators, phone boxes or hotels may charge you).

Priced publications:

- via EU Bookshop (http://bookshop.europa.eu).

TH-AL-16-008-EN-N
doi:10.2800/05464

European Environment Agency
Kongens Nytorv 6
1050 Copenhagen K
Denmark

Tel.: +45 33 36 71 00
Web: eea.europa.eu
Enquiries: eea.europa.eu/enquiries

Publications Office

European Environment Agency