ETC/ULS Report | 01/2018

Tourism and the environment

Towards a reporting mechanism in Europe

Authors:

Silvia Giulietti, Francesc Romagosa, Jaume Fons Esteve, Christoph Schröder

ETC/ULS consortium partners: Environment Agency Austria, ALTERRA Research Institute, The Institute of Geodesy, Cartography and Remote Sensing (FOMI), space4environment, GISAT, The International Council for Local Environmental Initiatives (ICLEI), Universitat Autònoma de Barcelona (UAB), Universidad de Málaga (UMA)

European Environment Agency
European Topic Centre on Urban, Land and Soil Systems

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Cover design: ETC/ULS
Cover photo: Coastal urbanisation in Mallorca (Spain), © Bing Maps
Layout: Francesc Romagosa (ETC/ULS)

European Topic Centre on Urban Land and Soil Systems (ETC/ULS)
Departament de Geografia
Universitat Autònoma de Barcelona (UAB)
08193 – Bellaterra
Spain

Tel.: +34 935813520
Web: uls.eionet.europa.eu

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Acknowledgements

Lead authors

Silvia Giulietti (formerly EEA), Francesc Romagosa (ETC/ULS – UAB), Jaume Fons Esteve (ETC/ULS – UAB), Christoph Schröder (ETC/ULS – UMA).

Contributing authors

Rastislav Stanik (formerly EEA), Nihat Zal (EEA).

Support from European Commission DG ESTAT

Christoph Demunter.

ETC/ULS production support

Francisco Domingues (UAB), Anna Marin (UAB), Raquel Ubach (UAB).

English revision

LinguaTracks, SL.

Report greatly benefitted from the feedback and technical support by

- The Working Group "Tourism and Environment" of the European Environmental Information Observation Network (Eionet), in particular through comments and contributions by National focal points/experts including René Biasone (Iceland), Giovanni Finocchiaro (Italy), Iulia Dangulea (Romania), Eric De Brabanter (Luxembourg), Ewa Bak-Filipek (Poland), Mélanie Gauche (France), Berit C. Kaae (Denmark), Ulrika Karlsson (Sweden), Eriks Leitis (Latvia), Nada Mlinar (Bosnia and Herzegovina), Pilar Lobo Montero (Spain), Daniela Nenkova (Bulgaria), Leonor Picao (Portugal), Kati Pitkanen (Finland), Tereza Ponocna (Czech Republic), Alban Prifti (Albania), Mary Stack (Ireland), Ádám Takács (Hungary), Jan Hendrik Voet (Belgium), Ulrike Wachotsch (Germany), Barbara Engels (Germany), Pavol Weiss (Slovakia), Mira Zovko (Croatia), Ioannis Spilanis (Greece), Zeynep Fikran Yenice (Turkey).
- EEA members including Almut Reichel, Andrus Meiner, Andy Martin, Martin Adams, Ronan Uhel, Alfredo Sánchez Vicente (formerly EEA).
- The International Network on Regional Economics, Mobility and Tourism (INRouTe) including Antonio Massieu.
- Copenhagen Business School (CBS) including Adriana Budeanu.

Executive summary

Tourism has always been – from a historical perspective – a societal response to the human need for wellbeing and personal development, through interaction with other people and the environment. Globally, demand for tourism and recreation opportunities has grown steadily over the last decades and tourism development, beyond its contribution to national economies, is a major driving force that impacts essential environmental assets (air, water, biodiversity, soil, land), both in tourist destinations (locally) and on a global scale.

The surge in specific types of tourism (ex. cruise tourism) and the increased frequency of holidays have serious environmental impacts at the regional and local level, also depending on the seasonality of tourist flows. Particularly, major tourist destinations are faced with challenges related to water supply, pressure on local water sources, waste generation and management, as well as wastewater generation and treatment, which may exceed, in some cases, the carrying capacity of the territories (especially small and medium-sized islands). Also, land take and soil sealing, air and noise pollution from local means of transport, as well as visual pollution by the ever-expanding built-up areas, represent other – quite common – traceable consequences of tourism development.

Tourism is of major importance to European economies, but a damaged environment could undermine tourism in the future, because tourism needs a clean and attractive environment. Therefore, it is necessary to monitor and measure the impact of tourism on the environment, and implement tourism-related policies to ensure greater sustainability of the sector.

Global and European statistics from the United Nations World Tourism Organization (UNWTO) and EUROSTAT confirm that Europe is both the world's top tourism destination and the main source of tourists worldwide. Beyond these figures, however, thorough statistical monitoring of the environmental performance of the sector does not yet exist.

Tourism does, however, feature in policy instruments at all levels. Globally, it is included in UN Sustainable Development Goals 8, 12 and 14 as a key sector that can play a crucial role in inclusive and sustainable economic growth, sustainable consumption and production practices, and the conservation and responsible use of oceans, seas and marine resources.

At the European level, tourism policy is mainly focussed on the competitiveness of the sector worldwide, while tourism- and environment-related policies in Europe are not about specific legislation and targets. All environmental aspects and references to the sustainability challenges of the tourism sector (which includes tourist accommodation establishments, food and beverage establishments, tourism-related transport, recreational activities, travel agencies, tour operators, etc.) are fragmented and dispersed across sector-based policies and the *acquis communautaire*. At the same time, many EU environmental sector-based policies, such as those on waste, water, terrestrial and marine biodiversity, air, soil and climate change, identify tourism as a sector whose environmental sustainability is becoming more and more essential.

This situation negatively affects data collection and availability, and there are still gaps in the evidence base that make it difficult to track progress towards sustainability. This lack of information on the environmental impact of tourism has profound consequences on tourism planning and the coordination of activities between government agencies, industry, and the public and private sectors.

In 2013, in order to contribute to improving the evidence base, the European Environment Agency (EEA) began to develop an indicator-based reporting mechanism (TOUERM or *Tourism and Environment Reporting Mechanism*) that links tourism and the environment. As part of the EEA's monitoring of the

environmental performance of several distinct European economic sectors (i.e. transport, energy, agriculture and industry), TOUERM will provide a more comprehensive picture of tourism.

This activity falls within the context of the Seventh Environment Action Programme – 'Living well, within the limits of our planet', and contributes to monitoring the progress made towards a resource-efficient, green, low-carbon economy. More specifically, it meets the demands of the EEA multiannual work programme 2014–2020, which foresees the development of data sets and indicators to track sustainability trends and the environmental and territorial impacts of *land-use-dependent economic sectors* such as tourism.

Since 2013, the EEA has been working in collaboration with an Eionet Expert Group that represents all EEA member and cooperating countries and the European Topic Centre on Urban, Land and Soil systems (ETC/ULS). They 'explored the feasibility and political relevance of TOUERM as a coherent framework to identify the connections between tourism and environment in Europe and to identify the main topics and indicators that can address them'.

This joint work has resulted in the identification of five key policy questions:

1. What characterises and drives the demand for tourism?
2. What are the environmental impacts of tourism?
3. Are we getting better at managing tourism demand to preserve natural resources?
4. Are we moving towards a better internalisation of the external costs of the tourism sector?
5. How effective are environmental management and monitoring tools towards a more integrated tourism strategy?

These policy questions were complemented by a list of ancillary questions. This led to the identification of 25 data sets, prioritised according to 1) data availability, 2) methodology, 3) processing, 4) policy relevance and 5) clarity of the message. The indicators also address the driver–pressure–state–impact–response (DPSIR) analytical framework, which is used as a standard in the work of the EEA to organise interactions between society and the environment.

It is essential for sustainability-related analysis to focus on those components that change the environmentally harmful trend in the cause–effect chain of drivers (D), pressures (P) and resulting impacts (I) to a new system where impacts are minimised through actions taken as a response (R) that connects back to the initial driving forces (D), resulting in their modification.

As applicable for the sustainability analysis of a sector, such as tourism, the assessment of state (S) component of the DPSIR model is not the key focus here. This is because the main scope of this work is the identification, monitoring and reduction of sectoral pressures, while state analysis is more relevant to environmental resources, such as water or biodiversity (and related ecosystem services), that are used by tourism activities. As a result, corresponding indicators are largely omitted from the proposed indicator set for the reporting mechanism. Of the 25 priority data sets identified, 19 have been developed to produce nine indicators.

The indicators developed aim to cover a wide range of tourism-related aspects, such as attractiveness of place, water consumption, biodiversity disturbance, spread of sustainability practices through the adoption of environmental certification schemes and labelling, potential for ecotourism and – to some extent, initially – land take for the development of specific tourism and recreational facilities (ski slopes, marinas and golf courses).

Indicators used in the report show that:

- Europe is confirmed to be the first travel destination worldwide, with a large internal flow. Moreover, tourism arrivals in Europe are steadily increasing, and this is important as these increase potential pressures and impacts. However, there are important regional differences. Even countries with a higher number of arrivals have an uneven internal distribution, with tourists tending to concentrate in very few regions (especially on the Mediterranean coast of Spain, France, Italy and Croatia).

- Arrivals only provide part of the picture. The number of overnight stays shows the duration of those trips. The most attractive regions for tourists are mainly concentrated in coastal areas, and in particular in south-western Europe, including the Spanish Mediterranean coast, southern France (and Ile de France as well), the Alpine region, northern Italy, and coastal Croatia. Domestic tourism is predominant in the rest of the European regions.

- There is a seasonal pattern in tourist movements, which is linked to socio-economic aspects (e.g. cultural behaviour, time for holidays), but also to climatological constrains (e.g. snow in winter and sun during summer). Seasonality has implications for the economy and the environment, leading to a concentration of activity, increased use of infrastructures and heightened number of people over a short period of time. However, the impact remains present throughout the year. There is a general marked seasonality, with a peak in summer, which is most pronounced in Mediterranean countries.

- The means of transport used are strongly linked to the type of trip. Motor vehicles are most commonly used (64%), followed by air and rail transport (15.6% and 11.6%, respectively). In this context, tourism is the biggest contributor to the increase in air traffic, with a clear impact on touristic areas around the Mediterranean Sea and in large cities.

- Cruise ships are also growing in popularity, and so is tourism activity itself, with an annual increase of 7% since 1990. Being of significant economic importance, cruise tourism also leads to unwanted externalities. For example, cruise ships generate air emissions, waste and noise in EU ports and seas. These externalities are located both at the cruise ships' ports of call and along their routes. Local pressures depend on the intensity of cruise traffic, which is measured by the number of passengers per port.

- Several regions are under great pressure from tourism demand, with more than 400 arrivals per 100 inhabitants, while very few face that high pressure from tourism supply, which has a highly localised pattern. These figures do not yet account for new forms of accommodation based on social networks, which could be dominant in certain cities.

Indicator-related assessments in the report were also complemented, for specific aspects, by information provided by a scientific literature review. This showed that:

- At the local level, tourism impacts through the concomitant physical development of the tourism destination and through tourist activities, thus determining different gradients of impacts also according to a temporal scale (ex. seasonality); physical development can lead to permanent, long-term or medium-term impacts, whereas activities may have medium-term, short-term and temporary impacts in local economies and ecosystems.

- Even though tourism is not the largest water consumer compared to other economic sectors in Europe, pressures on local freshwater resources accelerate water scarcity conditions, particularly in certain areas where tourism activities are highly concentrated. In addition, peak tourism periods require additional investments in developing water supply and water treatment systems to tackle the high water demands caused by tourism.

- Electricity consumption in tourist destination is, like other consumption variables, sensitive to seasonal variations and geographic and climatic conditions, as well as being influenced by the age and type of the building, the number of facilities provided (sauna, swimming pool, restaurants, etc.), the types of energy systems installed, the management and maintenance, the types and amounts of energy resources available locally, as well as energy-use regulations and cost. Behavioural aspects also play a role, in terms of both guest- and staff-related electricity use.

- On a global scale, and at the current pace of development, tourism, if not well managed, can play a role in the loss of biodiversity due to excessive use of land and resources, and by exceeding the carrying capacity of regional ecosystems. This is a global impact that starts at the local level, having a cascade effect that grows larger in scale and that is reflected in the loss of ecosystem integrity through a number of processes: fragmentation, ecosystem degradation or changes in species composition. Furthermore, the role played by tourism in the introduction of alien species, causing the disruption and destruction of ecosystems, is not to be overlooked.

Other policy-relevant indicators – identified as priority by Member States – are yet to be fully developed. The composite nature of the sector and the lack of statistical data from official sources make it difficult to determine what share of the data (on waste and waste water generation, air pollution by transport, energy and water consumption, land take, etc.) can be attributed to the tourism sector.

Another challenge addressed in the report is the integration of socio-economic information, which is usually aggregated at the administrative level, with environmental data, which has a spatial dimension that goes beyond administrative boundaries and is scale-dependent.

Several of the indicators rely on EUROSTAT databases and are consistent with the European Commission's European Tourism Indicator System (ETIS). Moreover, work with the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) and Directorate-General for Eurostat – European statistics (DG ESTAT) suggest that it could be possible to improve environment-related tourism data in the medium–long term, as recently recommended by the European Commission in its report on the implementation of Regulation (EU) No 692/2011 of the European Parliament and of the Council concerning European statistics on tourism.

Equally, enhanced cooperation with the UNWTO within the framework of the recently launched initiatives for measuring sustainable tourism provides opportunities for synergies with and mutual contributions to the proposed Regional Tourism Information System (R-TIS).

Cooperation with EEA member countries, through the National Focal Points and experts in the Eionet Working group on tourism and environment, has the potential to provide solutions to overcome the above-mentioned methodological challenges to completing a core set of robust indicators for TOUERM, while building on national experience and initiatives, as well as on the existing data flows within the network. At the same time, TOUERM has the potential to become the environmental component of a broader, integrated information system on tourism at the European level, in connection with existing platforms such as the European Commission's Virtual Tourism Observatory.

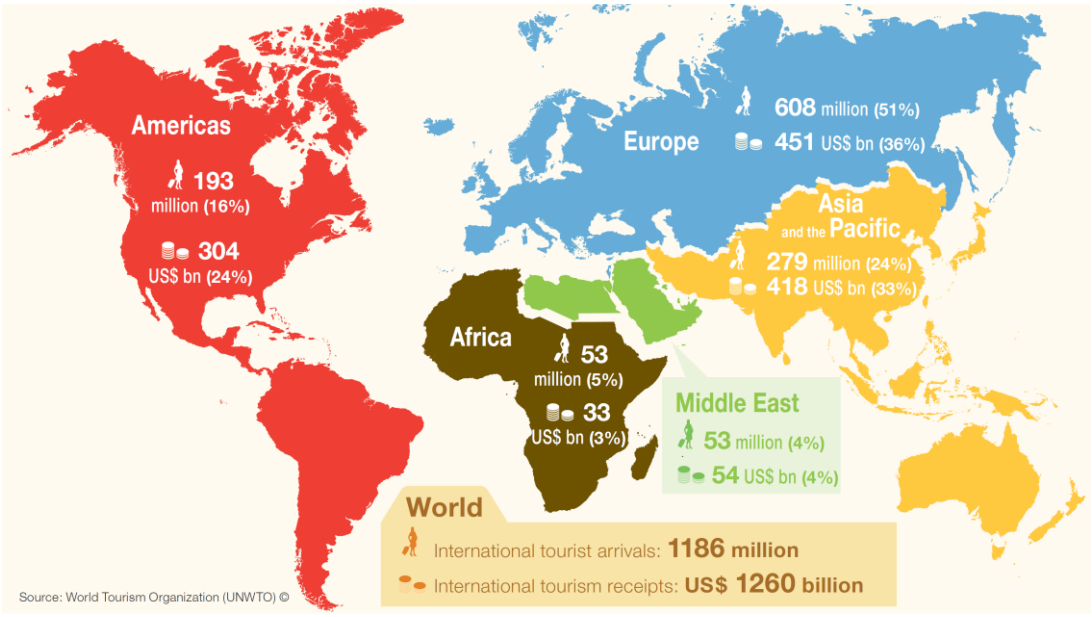
1 Tourism in multiple contexts

1.1 Tourism in the global context

More than any other sector, tourism is responsible for the movement of people across the globe. Tourism is also one of the world's largest and fastest-growing economic sectors, responsible for 9% of the global gross domestic product (GDP) and for the creation of 1 in 11 jobs worldwide. The international tourism sector ranks fourth behind fuels, chemicals and food and, at 6% of all global exports, higher than automobiles. Total international tourism arrivals[1] reached 1.18 billion in 2015 (UNWTO, 2016).

These people are called visitors and tourism can be defined as the totality of the activities carried out by them. A visitor is usually classified (mainly for statistical reasons) as a tourist if his/her trip includes an overnight stay. If there is no overnight stay, the visitor is called excursionist or same-day visitor. Thus, tourism has implications for the economy, for the natural and built environment, for the local population at the place of destination and for the tourists themselves.

Figure 1.1 International tourism arrivals and receipts



Source: UNWTO, 2016.

Using this frame of reference, Europe is the world's primary tourist destination, largely due to its combined natural and cultural attractiveness, as well as other economic and social features. It boasted 608 million international tourism arrivals in 2015, or 51% of total arrivals worldwide (see Figure 1.1), with France, Spain, Italy, Turkey, Germany and the United Kingdom among the top ten countries.

Tourism has a large and broad impact on the environment. The way tourists travel from one place to another, their activities and mobility within a specific region, the development of accommodation establishments, the supply of food and beverages, water and energy, and consumption patterns all have impacts at both global and local levels that can undermine tourism destinations from a socio-cultural and

[1] International tourism arrivals is the most common unit of measure used to quantify the volume of international tourism. It refers to tourists who spend at least one night in a collective or private accommodation in the country visited. The same person who makes several trips to a given country during a given period will be counted as a new arrival each time, and a person who travels through several countries on one trip is also counted as a new arrival each time (UNWTO).

environmental point of view. Many of the most popular tourist destinations are UNESCO World Heritage Sites, 40% of which are in Europe.

Tourism is becoming more and more specialised as a result of globalised cultural and communication trends, an internet-based economy, and the affordability of holidays and travel for greater numbers and strata of the population. Each specialised type of tourism has its own impact on the environment, with some having more impact than others, e.g. nature-based tourism or ecotourism, agritourism and rural tourism. The different types of tourism currently practiced by visitors are listed in Table 1.1.

Table 1.1 Types and forms of tourism according to different criteria

Criteria for different types of tourism	Examples (not exhaustive)
Origin of tourists	International tourism Domestic tourism Long-distance tourism Proximity tourism
Motivation/main activity of tourists (tourism products)	Recreational/leisure tourism Cultural tourism Business tourism Educational tourism Nature-based tourism/ecotourism Sport tourism Adventure tourism Health tourism Religious tourism
Geographical characteristics of destination	Urban tourism Rural tourism Coastal tourism Mountain tourism
Spatial concentration of tourists and tourism facilities	Mass tourism Alternative tourism
Sociodemographic and economic characteristics of the demand	Youth tourism Family tourism Senior tourism LGBT tourism Accessible tourism Luxury tourism Low-cost tourism Social tourism
Management of destinations and businesses	Sustainable tourism Responsible tourism Community-based tourism

Source: Own elaboration.

From a European statistical perspective, all the different and emerging forms of tourism fall into the business, leisure and “any other purpose” categories. Moreover, European tourism statistics do not cover topics that are related to the environmental aspects of tourism (e.g. waste generation, water

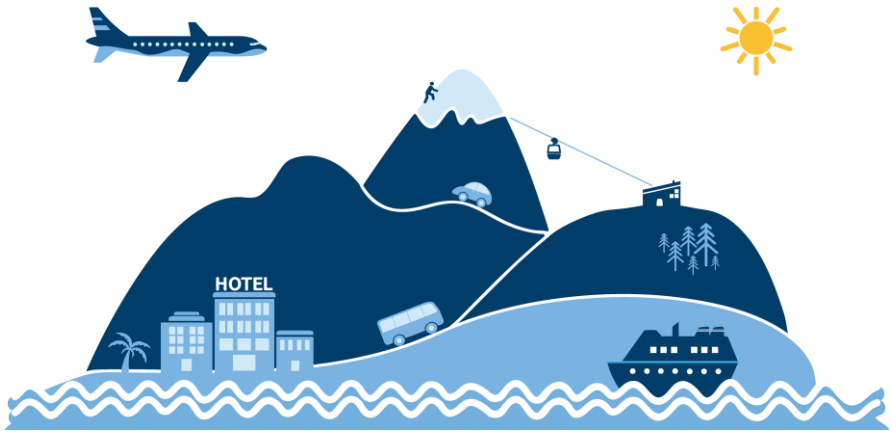
consumption, energy consumption, land take), as they are mainly designed to assess the socioeconomic performance of the sector[2], rather than the environmental pressures and impacts related to tourism.

In this regard, section 3 of the report explores the existing potential in the current structure of the European tourism statistics, as well as in the work of the European Commission's Directorate-General Enterprise and Industry and of the EEA, to progressively move towards an integrated European information system on tourism that may also embed an environmental dimension. The environmental dimension can be created by improving existing data sources and reporting mechanisms, including the tourism and environment reporting mechanism (TOUERM) proposed by the EEA, based on indicators, and developed in cooperation with Eionet.

1.2 Tourism as a land-use-dependent socio-economic sector

In the context of this report, land is considered to be the environmental asset with which tourism has the closest relationship. Therefore, tourism is regarded as a land-dependent socio-economic sector, and land delivers multiple values and ecosystem services for tourism.

Figure 1.2 Multiple values of land for tourism



Source: ©altournativ.com

Two main categories of land can be identified:

1. Land as a physical support resource for tourism-related functional and operational services:

    - transport networks such as roads and railways, and infrastructure such as stations, airports and ports, together with their respective annexed facilities;
    - sport infrastructure and facilities, such as golf courses, pools, marinas, beach and ski resorts;
    - accommodation establishments.

2. Land that is naturally attractive (beaches, grasslands, forests, wetlands, heath and scrub, lake and river ecosystems) and culturally interesting (urban areas, agro-ecosystems), and that provides different ecosystem services, is used in the following types of tourism:

[2] According to Eurostat "For tourism statistics, a traveller is someone who moves between different geographic locations, for any purpose and any duration. A visitor is a traveller taking a trip to a main destination outside of his/her usual environment, for less than a year, for any main purpose (business, leisure or other personal purpose) other than to be employed by a resident entity in the country or place visited. These trips taken by visitors qualify as tourism trips. A visitor is classified as a tourist (or overnight visitor), if his/her trip includes an overnight stay, and as a same-day visitor (or excursionist), if his/her trip does not include an overnight stay". http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Tourist

- Cultural/aesthetic landscape tourism: land use expresses various cultural or aesthetic values (e.g. agricultural land such as groves, vineyards), or showcases specific types of spatial organisation (e.g. Alpine farmsteads);
- Farm/rural/food tourism: land with a productive function that allows city inhabitants to reconnect with nature, e.g. attractive farms with produce and products that are environmentally-friendly, sustainable and very closely linked with nature;
- Ecotourism/forest tourism: a niche market, although important in forest management planning, where tourism revenues can often be an incentive for sustainable forest and natural park management. This type falls within the broader category of nature-based tourism;
- Waterfront/coastal tourism: the primary destination for summer holidays, covering also inner lakes and river banks;
- Some forms of urban tourism: different urban landscapes (open spaces, gardens and parks in cities).

The Common International Classification of Ecosystem Services (CICES), developed from the work on environmental accounting undertaken by the European Environment Agency (EEA), identified three main categories of ecosystem services: provisioning, regulation and maintenance, and cultural services. According to this classification, a certain number of processes and biotic and abiotic outputs providing "cultural services" are at the core of tourism and recreation.

Among these cultural services, several specific services can be distinguished, some of which have a direct relation to tourism (recreation and ecotourism), while others are more indirect (spiritual services, educational values, aesthetic values, etc.). At the same time, ecosystems can also provide cultural "disservices" that can be barriers for tourism development (Table 1.3).

Table 1.3 Cultural ecosystem services and disservices

Cultural ecosystem services	Definition
Spiritual services	Sites of spiritual, religious, or other forms of exceptional personal meaning
Educational values	Sites that widen knowledge about plant and animal species
Inspiration	Sites that stimulate new thoughts, ideas or creative expressions
Aesthetic values	Sites of particular beauty
Social relations	Sites serving as meeting points with friends
Sense of place	Sites that foster a sense of authentic human attachment
Cultural heritage values	Sites relevant to local history and culture
Recreation and ecotourism	Sites used for recreational activities (walking, dog walking, horse riding, swimming, gathering wild foods, angling, hunting, etc.)
Disservices	**Definition**
Unpleasantness	Sites that are neglected, abused, damaged, or unpleasant
Scariness	Sites that feel dangerous or threatening
Noisiness	Sites that are disturbingly noisy

Source: Plieninger et al., 2013.

However, as tourism is a multi-layered phenomenon, a first reflection on its relationship with ecosystem services would have to at least distinguish between: 1) tourism as a "sociological/cultural" process that

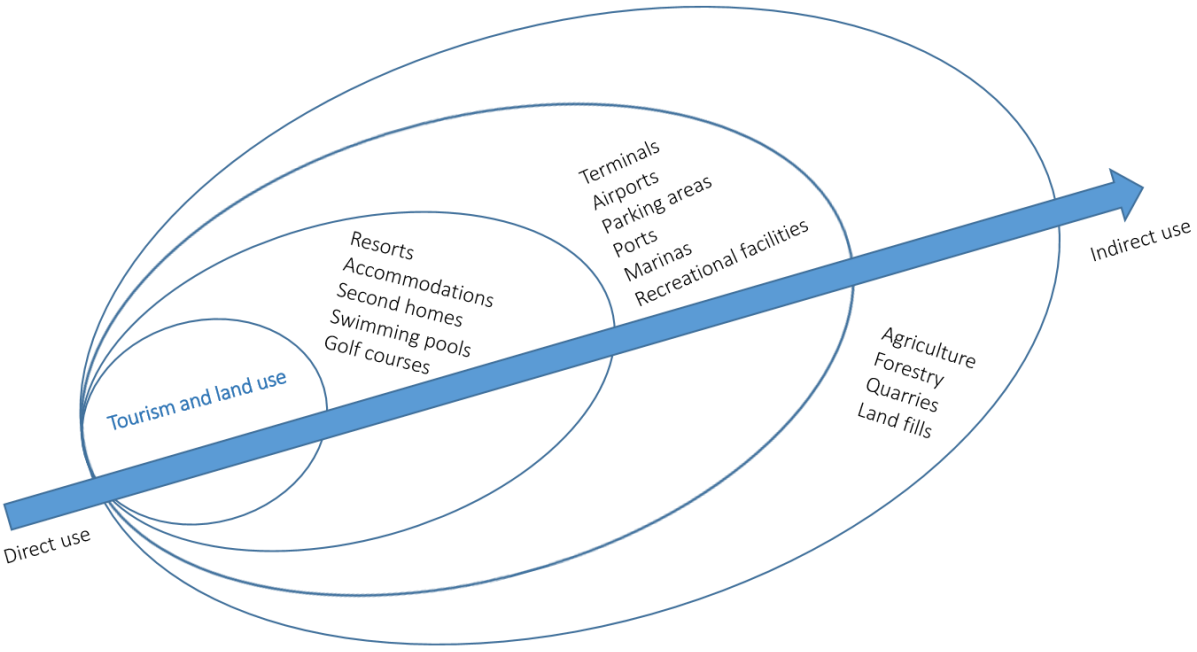
relies heavily on high-quality landscape functions and forms (note the disservices previously mentioned), and 2) tourism as an industry made of different sub-sectors dependent on other ecosystem services, such as provisioning and regulating.

These definitions position land as a supplier of cultural ecosystem services that sustain the development of tourism and recreational activities. Often, these cultural services are combined with other ecosystem services such as "provisioning" (e.g. game, berry picking, honey harvested from wild bees) and "regulation and maintenance" (e.g. micro and regional climate regulation, storm protection, natural or planted vegetation that serves as a shelterbelt). As long as the relationship between tourism-related functional/operational services and the attractive natural and cultural features of the landscape is maintained such that the former doesn't harm the latter, then the future of tourism as a healthy and resilient socio-economic sector is not undermined. This is the principle behind sustainable management – a key element in achieving the sustainability of the tourism sector.

Education and awareness-raising about ecosystem services, and the monitoring and measuring of the impacts of tourism on land are key to the sustainable development of the tourism sector. For example, pervasively on European coastlines, islands and in mountain valleys, a divide between the tourism sector and land-planning authorities has resulted in a significant issue in terms of sustainable development (INRouTe, 2016).

In 2010, an attempt was made to assess global land used for tourism accommodation establishments, the most significant factor in direct land use change due to tourism. It was estimated that an average of 42 m^2 per bed was required, with values ranging between 25 m^2 and 4,580 m^2, the latter in the case of luxury resort hotels. The total estimate of land take by tourism for accommodation, transport infrastructure and activities (ski resorts, golf, parks) is 62,000 km^2, or 11.7 m^2 per tourist (Gössling and Peeters, 2015). Generally, it can be argued that the land needed for tourism activities goes far beyond that required for core-sector activities (recreation, accommodation and mobility), if other aspects of the tourism value chain are considered (Figure 1.3).

Figure 1.3 Direct and indirect land use forms by tourism



Source: Own elaboration.

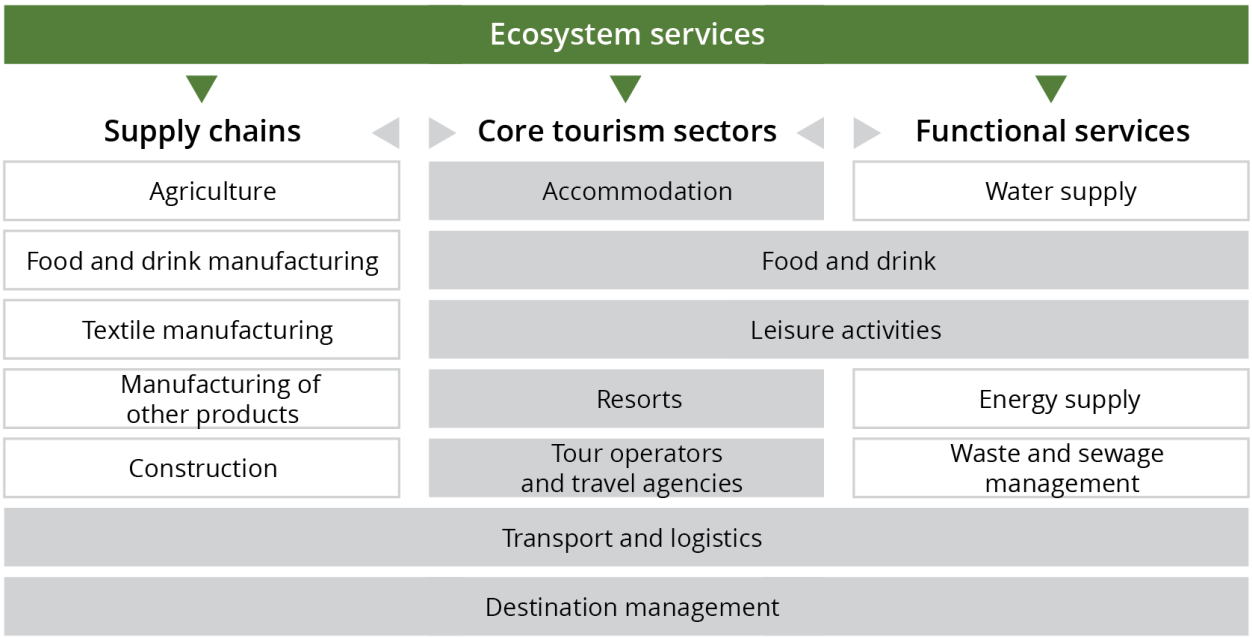
1.3 Overview of the crosscutting elements of tourism

Tourism is a composite industry (Figure 1.4), made of sub-sectoral industries that can be grouped into accommodation, transport, leisure activities, food, etc. and that rely on different ecosystem services. Consequently, the policy responses to environmental challenges encountered by the sector encompass all these subsectors. These challenges mainly include:

- energy consumption and supply, as well as greenhouse gas emissions linked to transport, accommodation, leisure activities and food production;
- water quality, consumption and management, and wastewater treatment;
- waste generation and management;
- loss of biodiversity linked to land conversion for tourism infrastructure, overexploitation of natural resources for food, materials, freshwater and recreation, the introduction of invasive alien species, pollution and the disturbance of wildlife;
- landscape, natural and cultural heritage management.

In all of these areas, the tourism sector has great potential to improve its environmental impact. Tourists have a large environmental footprint compared with residents; they travel long distances and concentrate in destination "hotspots" where they can put increased pressure on the local environment. Resource consumption per guest is high in accommodation, and food and beverage establishments, and the eco-efficiency of such establishments varies greatly, indicating a high potential for improvement through the dissemination of best practices.

Figure 1.4 Components of the tourism system



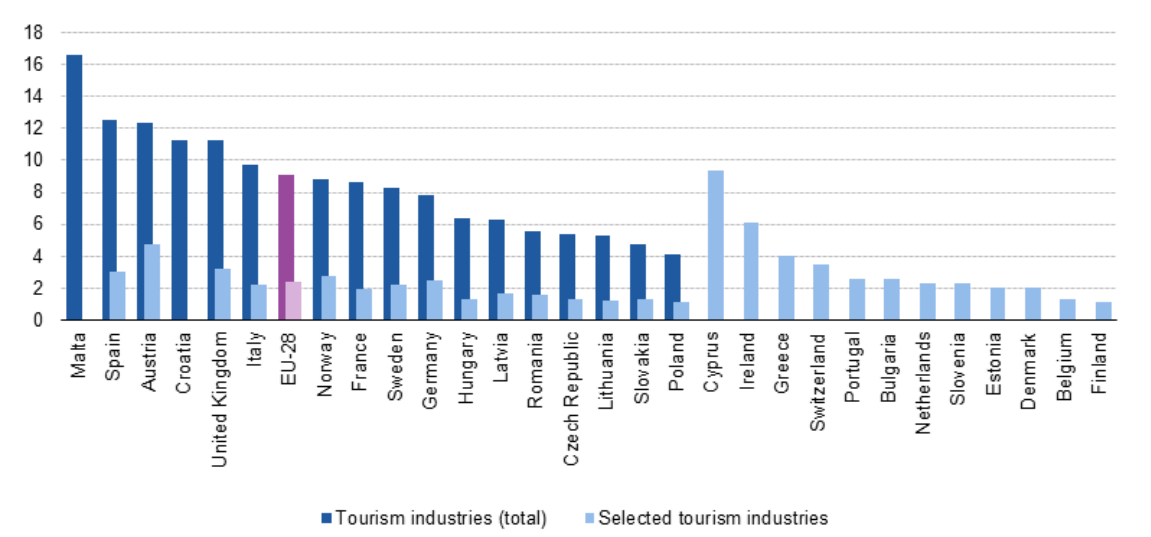
Source: EEA.

Box 1.1 Key figures on tourism creating jobs and growth in Europe

The tourism industry has proven to be a key sector of the European economy and one of the most resilient. In 2008 the economic crisis led to a fall in overall employment, but this was not the case for the services sector – including the core tourism industries, such as accommodation – which has been growing at an annual rate of 0.9% on average. The accommodation sector accounts for 2.4 million jobs in the EU; travel agencies and tour operators account for nearly half a million. Three selected tourism sectors that rely almost entirely on tourism (accommodation, travel agencies/tour operators, and air transport) employ 3.3 million people in the EU. According to Eurostat data, in 2014, economic activities related to tourism (but not necessarily relying only directly on tourism) employed just over 12 million people in the European Union. Most of these people (ca 7 million) were working in the food and beverage industry, while 2 million were employed in transport.

The tourism industries[3] account for 22% of people employed in the services sector. When looking at the total non-financial business economy, the tourism industries account for 9% of people employed. Among the Member States for which data are available, Malta recorded the highest share (one in six people employed). In absolute terms, the United Kingdom and Germany had the highest employment in the tourism industries (2.1 million people each), followed by Italy (1.4 million), Spain and France (1.3 million each). These five Member States account for 68.5% of employment in the tourism industries across the EU, while they sum up the 62% of the population (see Figure 1.5). The selected tourism industries that are considered to rely mainly on tourism are air transport (including freight air transport), accommodation (including other accommodation) and travel agencies, tour operator reservation services and related activities (including other reservation service and related activities).

Figure 1.5 Persons employed in total tourism industries and in selected tourism industries as share of those employed in total non-financial business economy, 2013 (%)



Source: Eurostat, 2015.

[3] For Eurostat, tourism industries (total) include the following NACE Rev.2 classes: H4910 – Passenger rail transport, interurban; H4932 – Taxi operation; H4939 – Other passenger land transport n.e.c; H5010 – Sea and coastal passenger water transport; H5030 – Inland passenger water transport; H5110 – Passenger air transport; I5510 – Hotels and similar accommodation; I5520 – Holiday and other short-stay accommodation; I5530 – Camping grounds, recreational vehicle parks and trailer parks; I5610 – Restaurants and mobile food service activities; I5630 – Beverage serving activities; N7710 – Renting and leasing of motor vehicles; N7721 – Renting and leasing of recreational and sports goods; NACE division N79 – Travel agency, tour operator reservation services and related activities.

1.4 European policy on tourism

There is very little specific EU legislation governing tourism. The Lisbon Treaty specifically acknowledges the importance of tourism (Article 195). Therefore, the EU works to promote tourism in order to maintain Europe's standing as a leading destination, and to maximise the industry's contribution to growth and employment. This is reflected in relevant EU policy. However, the role played by the tourism sector in generating specific environmental impacts is also recognised. This is addressed in numerous sector-based environmental policy instruments, although there is currently no mechanism for monitoring and assessing these impacts.

Current specific EU policy on tourism only partially reflects the socio-economic and environmental dimensions of the sector, including the composite nature of the tourism industry and the related sustainability challenges. There is no specific legislation on the issue, while the strategic direction currently being followed has been provided by two European Commission Communications on tourism, which mostly address the economic dimension and only deal with the environmental impacts of the sector in general terms.

The sole legislative exception is the new regulatory Package Travel Directive (2015/2302/EU) that was adopted in 2015, and which will be applicable from 1 July 2018. This takes into account developments in the travel market, reinforcing consumers' rights and reducing the administrative burden on businesses and market operators.

The first Communication – an "Agenda for a sustainable and competitive European tourism" [COM(2007) 621] – sets the principles for achieving sustainability and emphasises the need to:

- "undertake continuous monitoring [since] sustainability is all about understanding impacts and being alert to them all the time, so that the necessary changes and improvements can be made" and;
- recognise "the carrying capacity of individual sites and wider areas, with a readiness and ability to limit, where and when appropriate, the amount of tourism development and volume of tourist flows".

EC Communication 30.6.2010 COM (2010) 352 "Europe, the world's No 1 tourist destination – a new political framework for tourism in Europe" represents the most recent general policy reference for the sector, and establishes and reconfirms certain priority actions:

- To stimulate competitiveness in the European tourism sector;
- To promote the development of sustainable, responsible, and high-quality tourism;
- To consolidate Europe's image as a collection of sustainable, high-quality destinations;
- To maximise the potential of EU financial policies for developing tourism.

The Communication was accompanied by an implementation rolling plan[4] that should be regularly updated.

In this context, the European Commission encourages a coordinated approach to European or multinational initiatives in the tourism sector (such as the Knowledge Networking Portal for Sustainable & Responsible Tourism – Destinet, or the European Destinations of Excellence – EDEN), including a consolidation of the socioeconomic and environmental knowledge base (with the European Tourism Indicators System – ETIS (European Commission, 2016b)). It is also working on establishing a new framework for action to increase both the competitiveness of tourism and its capacity for further sustainable growth. The recently published Communication "A European strategy for more Growth and

[4] http://ec.europa.eu/DocsRoom/documents/10155/attachments/1/translations

Jobs in Coastal and Maritime Tourism" (COM(2014) 86 final), which covers a specific and important geographic segment of European tourism, provides one example of this.

In May 2015, the Commissioner for DG GROW publicly outlined the future European Tourism Strategy, based on eight priorities:

- Streamlining the regulatory and administrative framework impacting tourism;
- Digitalisation of tourism SMEs – building on the Digital Single Market initiative;
- Upgrading skills and competences across the tourism sector;
- Promoting sustainable tourism through, for example, the adoption of a European Charter for Sustainable and Responsible Tourism;
- Promoting tourism in the low and medium seasons, in particular for senior and young
- tourists;
- Improvement of intermodal passenger transport and transport connectivity;
- Joint promotion of Europe as a tourist destination;
- Improvement of the governance structure, both within the EU institutions and within the industry.

In particular, the main objective of the European Charter for Sustainable and Responsible Tourism is to contribute to ensuring sustainable and responsible tourism development, while reflecting the commitment of public authorities, destinations, businesses, tourists and other stakeholders to developing tourism in the EU following a set of agreed objectives and principles.

In parallel, in 2007, the Tourism Sustainability Group initiated a process that aims to develop an indicator-based system to monitor the sustainability of tourism destinations. This led to the launch of the previously mentioned European Tourism Indicators System (ETIS) in 2013 (see section 3), with a new revision in 2016 (European Commission, 2016b).

1.5 Tourism in other policies

1.5.1 European context

At the European level, tourism policy is mainly focussed on boosting the competitiveness of the sector worldwide, while tourism- and environment-related policy in Europe is not about specific legislation and targets. All environmental aspects and references to sustainability challenges related to the tourism sector[5] (which includes accommodation establishments, food and beverages, tourism-related transport, recreational activities, travel agencies, tour operators, etc.) are fragmented and dispersed across sector-based policies and the *acquis communautaire.* The environmental dimension of policies on transport and tourism-related transport, for example, do not yet fully reflect the inherent environmental characteristics of tourism-related transport in terms of pressures, impacts and responses (see Table 1.4).

At the same time, however, many EU environmental sector-based policies such as waste, water, terrestrial and marine biodiversity, air, soil and climate point to the environmental sustainability of the tourism sector as increasingly essential. Overall, this policy fragmentation negatively affects data collection and availability, and there are still gaps in the evidence base for tracking progress towards sustainability. This lack of information on the environmental impacts of tourism has profound consequences on tourism planning and the coordination of activities between government agencies, industry, and the public and private sectors.

[5] http://ec.europa.eu/eurostat/statistics-explained/index.php/File:List_of_tourism_characteristic_activities_2015.png

Table 1.4 Links between relevant EU policy areas and tourism

EU policy areas	EU policy areas: specific legislation, initiatives and tools related to tourism aspects	Policy relevance (y/n)	Direct/ Indirect reference	Provisions for the sector (mandatory)	Recommendations or voluntary measures for the sector
Environment	Bathing Water Directive	Yes	Indirect	Yes	Yes, indirect
	EU Biodiversity Strategy	Yes	Direct	No	Yes
	7th Environment Action Programme	Yes	Direct	No	Yes
	Ecolabel Regulation	Yes	Direct	Yes	Yes
	Water Framework Directive	Yes	Direct	No	Yes
	Waste Framework Directive	Yes	Indirect	No	Yes, indirect
	Packaging and Packaging Waste Directive	Yes	Indirect	No	Yes, indirect
	Directive on Strategic Environmental Assessment	Yes	Direct	Yes	Yes
	Integrated coastal zone management	Yes	Direct	No	Yes
Mobility and transport	Regulation (EC) No 261/2004 on compensation and assistance to air travel passengers	No	n/a	n/a	n/a
	Regulation (EC) No 1107/2006 concerning the rights of disabled persons and persons with reduced mobility when travelling by air	No	n/a	n/a	n/a
	Regulation (EC) No 1371/2007 on rail passengers' rights and obligations	No	n/a	n/a	n/a
	Regulation (EU) No 1177/2010 concerning the rights of passengers when travelling by sea and inland waterway	No	n/a	n/a	n/a
	Regulation (EU) No 181/2011 concerning the rights of passengers in bus and coach transport	No	n/a	n/a	n/a
	Regulation (EU) No 1315/2013 on guidelines for the development of the trans-European transport network	Yes	Indirect	No	No
Climate change	EU Action on Climate Change, strategies and targets	Yes	Indirect	No	Yes
Energy	Energy Performance of Buildings Directive	Yes	Indirect	Yes, by 2020	Yes
Maritime affairs	Maritime Spatial Planning Directive	Yes	Direct	Yes	Yes
	Marine Strategy Framework Directive	Yes	Direct	Yes	Yes

	The Blue Growth Strategy	Yes	Direct	No	Yes
	Communication on growth and jobs in coastal and maritime tourism	Yes	Direct	No	Yes
Regional policy	Strategy for the Baltic Sea Region	Yes	Direct	No	Yes
	Strategy for the Danube Region	Yes	Direct	No	Yes
	Strategy for the Adriatic and Ionian Region	Yes	Direct	No	Yes
	Strategy for the Alpine Region	Yes	Direct	No	Yes

Source: Own elaboration.

1.5.2 The international and regional policy context

There are several international treaties and programmes for the protection of the environment and biodiversity that include explicit or indirect provisions or recommendations affecting the tourism sector and relating to its relationship with environmental assets, ecosystems and biodiversity. It is important to be aware of these recommendations and the initiatives already undertaken in the context of such international treaties and programmes in order to ensure the necessary synergies and consistency at the different scales of governance, while exploring the possibility of developing a monitoring mechanism for the environmental impacts of tourism in the EU. These are as follows:

- the United Nations Environment Programme (UNEP) Convention on Biological Diversity (CBD);
- the Convention on Wetlands (Ramsar Convention);
- the World Heritage Convention;
- the 10-year framework of programmes on sustainable consumption and production patterns;
- the 2030 Agenda for Sustainable Development and SDGs;
- the Convention for the Protection of the Marine Environment and the Coastal Region of the Mediterranean (Barcelona Convention) and its protocols;
- the Convention for the protection of the Alps (the Alpine Convention); and
- the Convention for the protection and sustainable development of the Carpathians.

1.6 Tourism stakeholders

The complexity of the tourism industry is reflected in the multitude of actors that have specific competence in the sector besides national, local and regional governments. Each of these actors has a potential role to play in making tourism sustainable. To this end, the UNWTO has produced an exhaustive overview of tourism stakeholders and their contributions to sustainable development (UNWTO, 2013) (see Table 1.5).

Despite their different roles, the actions of tourism stakeholders are interlinked. Policy and strategic frameworks are provided by governments at national and local levels. Their legislation and regulations set targets and objectives that inform the work of stakeholders in the business sector. Research institutes, education bodies and NGOs help to strengthen relationships and coordinate stakeholders, and provide evidence-based knowledge, advice and expertise on the environmental profiles of destinations to local communities and tourists. Moreover, as the UNWTO highlights, all actors also have the potential to contribute to sustainable development, as well as to cause negative impacts or inhibit the

achievement of certain objectives by simply failing to meet their responsibilities or by meeting them poorly.

Table 1.5 Tourism stakeholders

	Stakeholder type	Role in contributing to achieving sustainable tourism
Policy/governance	International development assistance agencies - Multilateral agencies and programmes - Bilateral agencies	Integrating tourism in development policies and agreements Financial and technical assistance to sustainable tourism and individual programmes and projects Establishing a general monitoring and reporting framework
	European institutions - European Commission services - European Parliament - European Council	Ensuring coherent, comprehensive and integrated European policy on tourism Ensuring monitoring and reporting of socio-economic and environmental performance of the sector at regional level
	National Government - Tourism Ministry - Other Ministries - Tourism agencies, e.g. Tourist Board - Other government delivery agencies - Resource management bodies e.g. National Parks	Tourism policy and strategy development and implementation Relating tourism to wider policies and strategies Legislation, standards and regulation relating to the sector Infrastructure planning and development Resource management Communication, information and marketing
	Local Government and destination bodies - Regional government - Local authorities e.g. District Councils - Destination management organisations - Public-private	Local strategic direction and planning Implementation of policy and regulations Local infrastructure development and management Stakeholder engagement, coordination and support
Business/jobs	Private sector businesses - Tourism trade associations, national and local - Tourism service providers. e.g. hotel businesses - Tour operators – international and incoming - Suppliers to the sector, e.g. food producers - Investors – international and domestic - Tourism-related transport suppliers (air, road, water), including rental companies	Representation of, and influence on, the tourism sector Operation of tourism services Link to domestic and international markets Product development, investment and improvement Employment creation and generating local income Reflecting economic, social and environmental sustainability issues in development and operations Engaging in the use of environmental friendly technologies and operations
	Employees and related bodies - Labour unions - Individual workers in the sector	Representing interests of employees Human resources planning and development Provision of a reliable service in return for income
Knowledge/training	NGOs – International, national and local - Environment, conservation and cultural NGOs - Social and community NGOs	Representing different stakeholder interests Engaging in strategic planning and development Stakeholder coordination and supporting implementation Capacity building and provision of expertise
	Education and training bodies - Universities, colleges and teaching bodies - Research institutions - Technical experts and advisory bodies	Knowledge gathering and dissemination Supporting policy and strategy development Capacity building and training Specific advice and expertise
Hosts and guests	Local community - Community councils and representative bodies - Traditional structures - Organised groups, e.g. women, youth - Local formal and informal traders - Individual households	Engaging in planning and decisions on tourism at a local level Representing and communicating local community interests Pursuing equitable benefit sharing within communities Interacting with tourists to mutual benefit Receiving income from tourist spending
	Consumers/tourists - Individual tourists - Consumer networks, clubs and societies - Travel media and social media users	Providing the main source of income to the sector Behaving responsibly towards the environment and local communities in travel choice and actions Communicating information and opinions on destinations and sustainability issues accurately and fairly

Source: Own elaboration from UNWTO, 2013.

EU level

European Commission

The Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs plays a major policy role through:

- Enhancing what European tourism has to offer in a global context;
- Providing support to tourism businesses;
- Promoting Europe as a destination;
- Fostering international cooperation.

In this context, the environmental dimension of tourism policy is addressed through a specific set of initiatives within the "sustainable tourism" file, in combination with initiatives in other areas such as "coastal and maritime tourism", "cultural tourism", "low-season tourism" and "accessible tourism". The "sustainable tourism" file managed by the EC is characterised by the main following actions:

- diversification of the EU tourism offer through sustainable transnational tourism products and services, in areas such as environmentally friendly tourism – including cycling routes – sports and wellbeing tourism, nature tourism, and cultural routes crossing Europe that can contribute to tourism growth;
- the European Tourism Indicators System (ETIS), developed as a simple method for measuring the sustainability performance of tourists;
- the EU Ecolabel and EMAS, as a voluntary tool available to tourism accommodation services willing to prove and promote their environmental excellence. Specific EU Ecolabel criteria have been developed for tourist accommodation and campsite services.

Furthermore, in 2015, European public and private tourism stakeholders united to present and promote a European Tourism Manifesto for Growth & Jobs, a document which highlights EU policy priorities for the sector over the coming years. The initiative responds to the need "to formulate effective tourism policies", and for a holistic European approach that takes into account the multiple impacts of the sector as well as the wide spectrum of stakeholders involved or affected by tourism.

European Parliament

The European Parliament addresses tourism-related policy issues specifically through a Committee on transport and tourism. The Committee on Transport and Tourism is tasked with ensuring mobility, while at the same time protecting the climate and guaranteeing clean, safe and affordable transportation means within Europe – particularly across borders. The Committee attempts to ensure the environmental sustainability of the sector in Europe also through the works of a dedicated Task Force on Transport and Tourism.

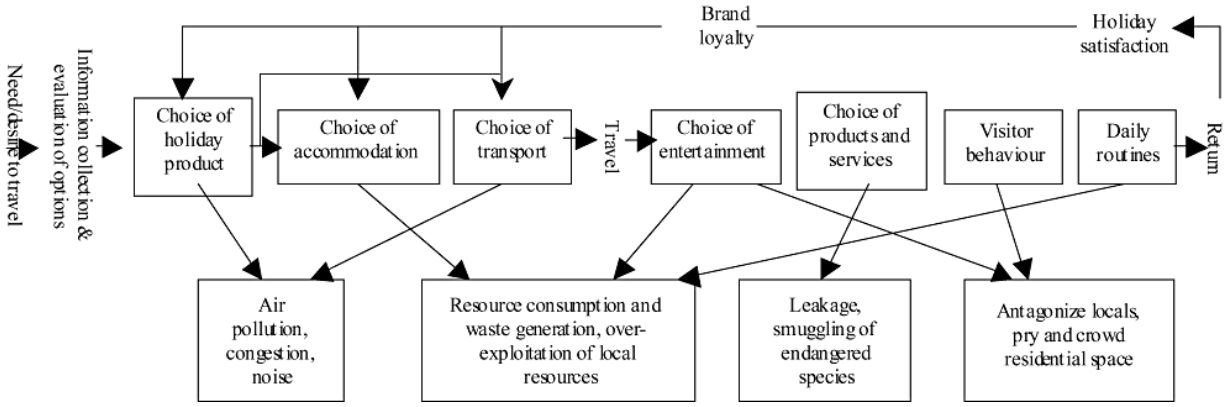
National level

Among EEA member countries, policy competencies on tourism at the national level are organised differently and split across a variety of Ministries, regional administrations and other institutions. Coordination and cooperation between the government institutions responsible for tourism and environment-related policies on the one hand, and national statistical institutes on the other, has rarely been observed at the national level.

1.7 Brief review of prevailing consumption attitudes

The relationship between tourism and the environment can be investigated by examining how tourist behaviour can add to related pressures, impacts and the subsequent sustainability responses (See Figure 1.6).

Figure 1.6 Tourist holiday choices and associated environmental impacts



Source: Budeanu, 2007.

Tourist behaviour and consumption patterns are complex phenomena, which have been studied in surveys on the attitudes of European citizens towards environmental protection, biodiversity and tourism:

- Survey on attitudes of the European citizens towards the environment (European Commission, 2015a);
- Survey on attitudes of European citizens towards biodiversity (European Commission, 2015b);
- Survey on attitudes of European citizens towards tourism (European Commission, 2016a).

The results of these surveys are available from Eurobarometer. While there were undoubtedly methodological limitations to these surveys (for example, the survey on attitudes towards tourism does not aim to investigate the sustainable behaviour of tourists), they do point to the importance of protecting the environment in general, and highlight the environmental impact of the choices involved in the consumption of goods and services in tourism.

The surveys suggest that travelling or going on holiday is not yet perceived as a way to protect and improve environmental conditions. This is very much in line with research outcomes that indicate that, while 70–80% of tourists report high levels of concern about the environmental impact of their holidays, only about 10% make purchasing decisions based on this concern (Budeanu, 2007). Moreover, most tourists are reluctant to change their own behaviour in support of sustainability goals.

In addition, as already highlighted by research in the tourism sector, surveys showed that beliefs or good intentions are not enough to bring about a more sustainable way of practicing tourism, if not accompanied or followed by actual, consistent behaviour (Juvan and Dolnicar, 2016). Conversely, it appears that some people may engage in unintentionally environmentally friendly behaviour or be willing to avoid harm to the environment if driven to do so by economic reasons (i.e. it may be cheaper to take a train rather than a plane).

It may be argued that tourism is not yet being perceived as an important contributing factor in environmental pollution or degradation that could be increased or decreased through personal consumption choices. Similarly, environmental protection is not yet, by and large, perceived as

something achievable through precise, purposeful consumption patterns in the tourism sector. This is in contrast with survey results that indicate that tourists are largely aware of the environmental and social problems caused by tourism and have a positive attitude towards efforts to reduce them. Other internal factors, such as a lack of knowledge and ability to understand the consequences of acts and habits, and the belief that one person cannot make a difference may prevent people from acting in environmentally friendly ways. External factors, such as the non-availability of appropriate products and services or their cost may also have the same effect (Budeanu, 2007).

One possible explanation for the discrepancy between the environmental attitudes of people, as reported in studies, and their actual behaviour may be social desirability bias. This leads people to reply favourably to questions about their concern for socially sensitive subjects such as environmental protection. For example, in addition to environmental concerns, other variables also play a role in the choice of transport and accommodation – such as duration of travel, flexibility, comfort, convenience, relaxation, vicinity to attractive places, a sense of freedom and the avoidance of stress; however, replies may focus on the environmental issues because these favourable attitudes towards environmental protection are seen as socially desirable. Furthermore, the fact that some destinations are preferred by tourists for their natural features or climate doesn't necessarily imply a concern for the protection of the environment in these places. The two are related but not equivalent (Budeanu, 2007).

The protection of natural capital in tourist destinations is an important element for the healthy future of the tourist industry. To this end, studies have shown that when tourists stay in environmentally certified accommodation establishments, this should require the managers to provide clear explanations of the reasons for – and ways of – reducing water and energy consumption or waste generation (Juvan and Dolnicar, 2016).

In the broader context of the international debate on sustainable tourism, there is abundant scientific literature on how to bring about a shift towards more sustainable consumption choices. Sociological studies have shown that people's habits, convenience and personal preferences are the main reasons for not embracing environmentally sustainable behaviour. Such studies underscore that, in order to overcome the conflict between tourists' motivations for making choices based on convenience and their environmental concerns, a better understanding of the dynamics between the different factors influencing the sustainable behaviour of tourists is essential. This may lead to the design of targeted measures that may also maximise the environmental benefits of increased unintended environmentally sustainable tourist behaviour. One suggestion is to equip holiday apartments with a relatively large recycling bin and a relatively small normal garbage bin. The need to empty the larger bin fewer times would ultimately influence their behaviour and consumption patterns.

Finally, studies also argue that the use of stronger dissuasive mechanisms (e.g. taxes, fees) and incentives may lead to quicker and more effective behavioural changes that would improve environmental conditions in certain destinations.

2 Key tourism trends in Europe

2.1 Overview of tourism demand

The combination of globalisation, access to technology and social media, the rapid growth of low-cost airlines and the emergence of new economies have led to increased access to travel for larger numbers of people and increasingly diverse layers of the world's population. This shift has been reshaping the travel and tourism industries, perhaps nowhere more so than in Europe (World Economic Forum, 2015).

Due to its natural and cultural attractiveness, variety of landscapes and a long-standing tradition of hospitality, Europe is the most popular tourism destination in terms of arrivals and overnight stays for international tourists. It is also the number one source of travellers worldwide. As a consequence, in recent decades European tourism and tourism in Europe have changed substantially. People travel further, more frequently and in all seasons, while the average duration of trips has decreased. Moreover, special interest trips (e.g. rural tourism, industrial heritage tourism, ecotourism, etc.) are on the rise, and the average age of tourists has steadily increased (Eurostat, 2016).

Moreover, better air connections between European cities, higher levels of education and longer periods of leave from work mean Europeans have become more cosmopolitan, or 'hypermobile'[6] (Gössling el al., 2009). This is further analysed in detail in the following subsections (mainly based on Eurostat data).

Number of trips

In 2014, residents of the EU-28 made 1.183 million trips (for personal or professional purposes) and spent 6.2 billion nights away from their homes. Some 88.5% of these trips were made for personal purposes (including pilgrimages and health treatments). Nearly half (48.4%) had holidays, leisure and recreation as the main purpose, and slightly over a third (35.9%) were to visit relatives and friends, showing a constant trend compared to previous years (Eurostat, 2016).

The highest number of trips was made by residents of Germany (236.9 million trips) and France (226.3 million trips). The residents of these countries accounted for 63.4% of all EU residents' trips. France recorded also the highest number of domestic trips, with nearly 200 million accounting for 22.4% of all domestic trips made by Europeans, whereas German tourists did the highest number of trips abroad (83 million, 28.0% of all outbound trips made by Europeans), although German population is less than 16% of the European Union's total population.

Preferred destinations within and outside Europe

For most EU countries, the domestic market was dominant in 2014, accounting for more than 3 out of 4 trips (75.3%); only for Belgium, Luxembourg, Malta and Slovenia outbound trips accounted for more than half of tourism trips, whereas in three Member States, more than 90% of trips made by their residents had a main destination within the country: Romania (94.1%), Spain (91.9%) and Portugal (90.0%).

[6] "A process driven by a relatively small part of society, but increasingly comprising new societal groups with "new" mobility motives. Visiting friends and relatives, frequent business trips, second homes in more remote locations, long-haul short breaks for leisure, as well as low-cost short breaks all boost the distances travelled in industrialized societies" (Gössling et al., 2009).

On average, trips to a foreign country accounted for 25.0% of total trips (18.8% to another EU Member State, 6.2% outside the Union). Spain was the number one foreign destination for EU residents, followed by France and Italy. A neighbouring or nearby country was the preferred foreign destination for nearly all European tourists.

Generally, differences across Europe often correlate with transport accessibility and affordability, relative price and proximity of the main generating markets. Destinations outside Europe made up only 14.6% of all outbound trips: 5.4% to America, 4.7% to Asia and 4.0% to Africa. Only 0.5% of trips were to Oceania (Eurostat, 2016). In most cases, the choice of destination may be determined by proximity and/or relative attractiveness (e.g. in terms of climate). However, historical migrant flows, former colonial ties or language may also influence the choice of destination.

Preferred type of destination

Cities (urban tourism) were reported as the most attractive destinations (52%) in 2013. They are also the most frequently reported commonality when analysing the countries separately (see Table 2). The seaside is the second most popular destination (36%), followed by the countryside (23%) and mountains (17%) (see Table 2.1).

Table 2.1 Share of intra-EU trips for personal purposes, by type of destination and by destination country, 2013 (%)

Destination country	City	Seaside	Countryside	Mountains	Cruise ship	Other
EU-28	52	36	23	17	3	10
Belgium	60	9	23	9	:u	12
Bulgaria	40	77	7(u)	9	:u	8
Czech Republic	73	5	20	17	:u	9
Denmark	39	43	38	7(u)	12(u)	13
Germany	58	5	17	19	1(u)	13
Estonia	89	28	10	:u	35	6
Ireland	60	21	31	5	:u	24
Greece	33	76	16	10	3	10
Spain	44	71	14	9	2	11
France	55	29	31	20	1	5
Croatia	27	78	16	6	4	5
Italy	49	33	28	23	3	12
Cyprus	42	72	18	13	:u	17
Latvia	72	18	10	:u	:u	27
Lithuania	82	14(u)	18	:u	:u	6(u)
Luxembourg	54	:u	21	35	:u	10(u)
Hungary	68	4(u)	25	2(u)	:u	11
Malta	54	73	26	8(u)	:u	7
Netherlands	54	34	30	4(u)	:u	7
Austria	35	4(u)	38	62	:u	8
Poland	74	20	25	7	:u	9
Portugal	52	60	19	10	:u	11
Romania	83	4	32	14	:u	16
Slovenia	46	28	20	15	:u	9
Slovakia	56	:u	26	31	:u	4
Finland	69	31	40	9	:u	9(u)
Sweden	68	24	11	4	22	7
United Kingdom	78	16	12	5	1(u)	10

(') No data available for trips made by residents of Sweden.
":" - data not available.
"u" - low reliability.

Source: Eurostat.

Analysing the preferred destination in each country is of relevance here, since it already provides a first indication of the offer and attractiveness in each case:

- *Cities* were reported as an attraction for more than 4 out of 5 trips to Estonia (89%), Romania (83%) and Lithuania (82%).
- *Seaside* was an attraction, among other features, for European tourists in over 70% of their personal trips to Croatia (78%), Bulgaria (77%), Greece (76%), Malta (73%), Cyprus (72%) and Spain (71%).
- In Finland (40%), Denmark and Austria (both 38%) the *countryside* was an attraction for more than 1 in 3 inbound trips.
- *Mountains* were reported as one of the attractions for 62% of personal trips to Austria.

Box 2.1 Urban tourism

In the relationship between tourism and cities, it can be observed that the latter are the origin of many tourists, the gateways to tourism destinations for many more tourists, as well as the major focal points in tourist itineraries (Ashworth, 2003). Some European cities are world cities and major tourist destinations that act as nodes in the transport infrastructure and locations of airline hubs that connect them to other world cities. This international air connection affects the economic dynamics of cities to such a degree that, even though each of them is a potential gateway to the national tourism system, the integration at international level makes them better connected to other world cities than to their national economy.

Urban tourism within Europe has experienced a huge upsurge in the last 15 years, thanks especially to the growing affordability of air travel for larger strata of the population, due to both low-cost airlines that redirect tourists towards cities, as well due to relatively low-cost accommodation solutions, available all year round. In particular, low-cost airlines that have selected small regional airports have somehow triggered an urban tourism economy and contributed to the development of a new geography of tourism, with previously unknown tourism destinations now on the rise. Cruise tourism, even though more sensitive to seasonal fluctuations, also contributes nowadays to a major tourist presence in Mediterranean and northern European coastal cities.

Photo: Waste bins in Barcelona (Spain). Author: Jordi Boixareu (Flickr).

Cities, like other destinations, experience social and environmental pressures due to particularly intense tourism, causing an increase in air and noise pollution, CO_2 emissions, conflict in the use of outdoor urban space and local resources (i.e. water and food supply), and traffic congestion and waste production, especially in historical centres. This has become an issue to such an extent that local communities in some destinations, such as Barcelona in Spain or Venice in Italy, have taken action to show their disapproval towards certain forms of tourism. Other cities, such as Paris, Brussels, London and Prague, are experiencing water stress when tourist intensity is at its peak, during summer.

Especially in the urban context, tourist and local residents make heavy use of the same urban facilities, even though tourists use only a small part of what the city has to offer in a relatively short time, and tend to not make repeated trips to the same city. Despite the growing importance of city tourism, it has been observed that experts in urban planning as well as urban tourism operators are both still neglecting their respective research work (Ashworth and Page, 2011), i.e. on the role of tourism in the city and the role of the city in tourism development. This has led to a suggestion that urban tourism management should be merged with an efficient and wider urban management. In some cities, in particular geographical and socio-economic contexts, waste can be a major problem from an environmental perspective. If the destination is not equipped to or cannot manage a massive presence of people who drink and eat using disposable containers, in a market context of increasing plastic food and beverage packaging (especially of water), this waste may become dispersed and contribute to visual and environmental pollution.

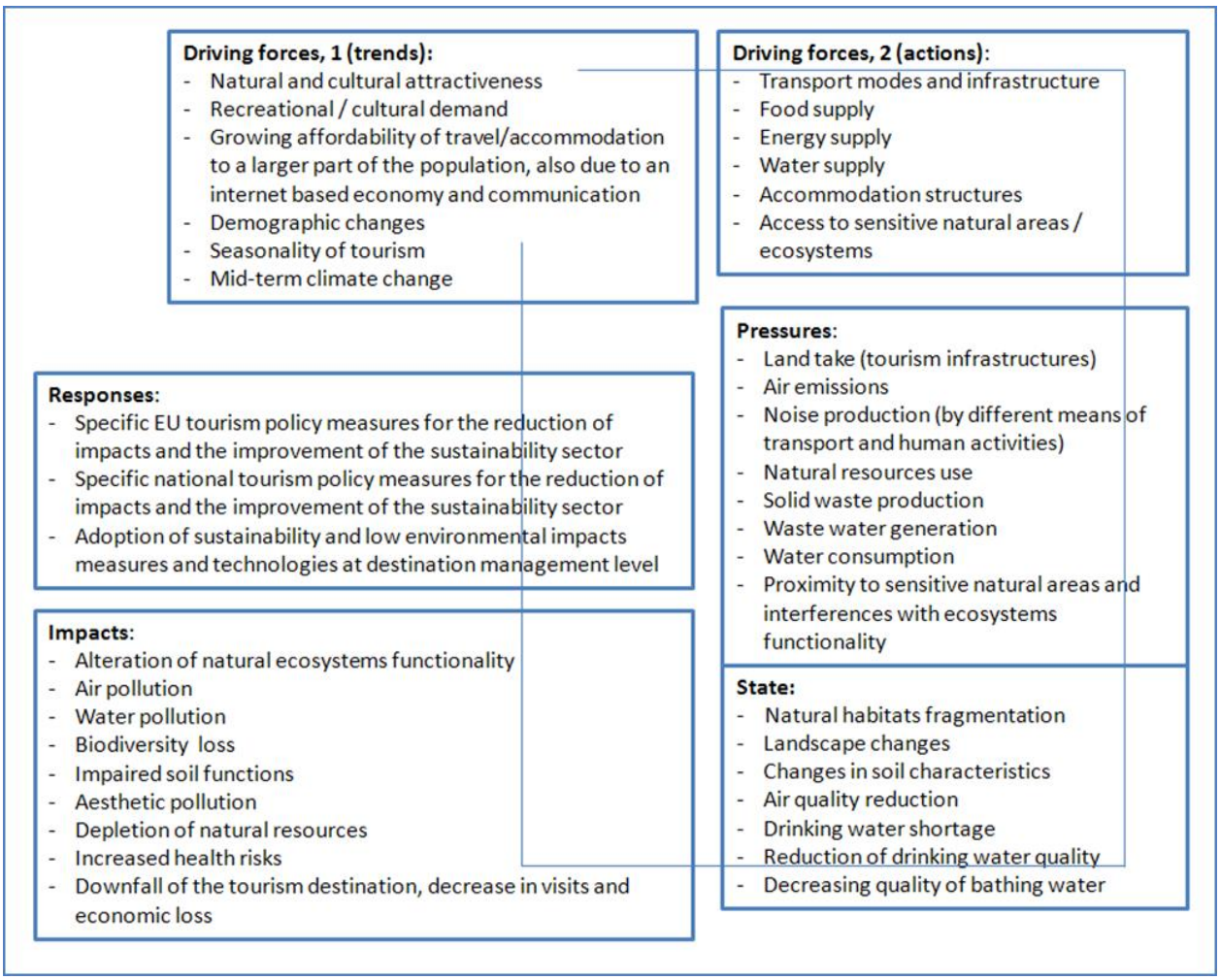
2.2 Tourism and the environment: an indicator approach

Given the complexity of actors and interactions involved in tourism, it is useful to define a broad framework for analysing the links between tourism and the environment. The driver–pressure–state–impact–response (DPSIR) framework has been widely used to analyse the links between different processes and the environment. According to this systems analysis view, social and economic developments act as drivers that exert pressure on the environment, causing environmental changes. This can affect the provision of adequate health conditions, resource availability and biodiversity. This leads to impacts on human health, ecosystems and materials, which may elicit a societal response that feeds back directly into the driving forces, state or impacts, through adaptation or curative action (EEA, 1999) (Figure 2.1).

Furthermore, whereas the DPSIR analytical framework approach applied to a certain environmental asset (water, air, soil, etc.) may address all components of the framework evenly, it can be argued that, in the specific case of a DPSIR approach applied to the interaction between tourism-related activities and the environment, the assessment of state (S) component is not the key focus. This is because the main scope is the identification, monitoring and reduction of sectoral pressures, while state analysis is more relevant to the environmental aspects, such as water or biodiversity (and related ecosystem services), of tourism activities. As a result, respective indicators are largely omitted from the proposed indicator set for the reporting mechanism.

It is key for the sustainability-related analysis to focus on those components and practices that change the negative trend in the D–P–I to a new system where impacts are minimised. Awareness of this chain is crucial to identify where actions could be taken: either on D or P (also S). A specific example of how a DPSIR approach can be used for an even more detailed and specific analysis is provided for ski resorts in the section on impacts.

Figure 2.1 General relevance of DPSIR approach to tourism and the environmental context



Source: Own elaboration.

2.2.1 Main driving forces of tourism activities

Building on specific indicators, this section provides a more detailed overview of some of the main driving forces that characterise tourism trends in Europe, and of the interplay between socio-economic factors and the environment. The main findings are shown in Table 2.2.

Tourism arrivals

Europe is the top destination worldwide in terms of international tourism arrivals. The number of tourist arrivals has been steadily increasing from 2000 to 2015. However, this increase is unevenly distributed between countries (see Figure 2.2). In 2014, there were 906 million tourist arrivals in all the EU-28 countries, 567 million of which were residents (domestic tourists), and 339 million of which were non-residents (international tourists). These numbers include arrivals at tourist accommodation establishments, and do not include border arrivals.

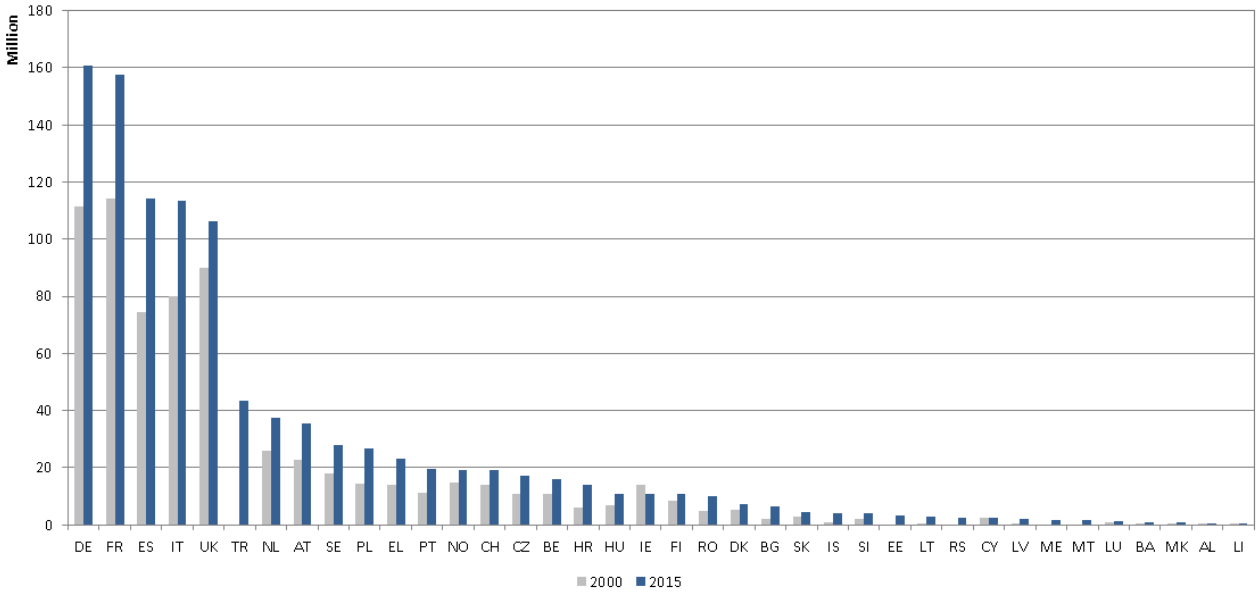
Table 2.2 Main questions and answers about tourism drivers

Question	Indicator data set	Main messages	Trends
How many tourists?	Tourism arrivals[7]	Europe is the top tourist destination worldwide, with an important internal flow. However, there are important regional differences. Even countries with higher number of arrivals have an uneven internal distribution.	Tourist arrivals in Europe are steadily increasing. This is important to consider in order to make progress on identifying potential pressures and impacts.
	Overnights spent	This indicator complements the tourism arrivals, showing the length of stay of those trips. Regional patterns: more concentrated in coastal areas, particularly in the Mediterranean.	Similar to tourism arrivals
How do tourists move?	Means of transport	Strongly dependent on the travel distance. There are some country specificities related to socio-economic aspects (share of public vs private transport) or geographic setting (islands).	Not evaluated
Where do tourists go?	Attractiveness of place	Different attributes define the attractiveness. Here we differentiate urban from rural areas, with a clear regional pattern of preferred or attractive destinations. Capital cities and most mountain areas (Pyrenees, Alps, and Carpathian) emerge as attractive places.	Not evaluated
When do tourists travel?	Seasonality	Implications for economy and environment: concentration of activity, infrastructure and people over a short period of time. Impacts remain present throughout the year. There is a general marked seasonality, with a peak in summer. Most pronounced in Mediterranean countries.	Remains present over time

Source: Own elaboration.

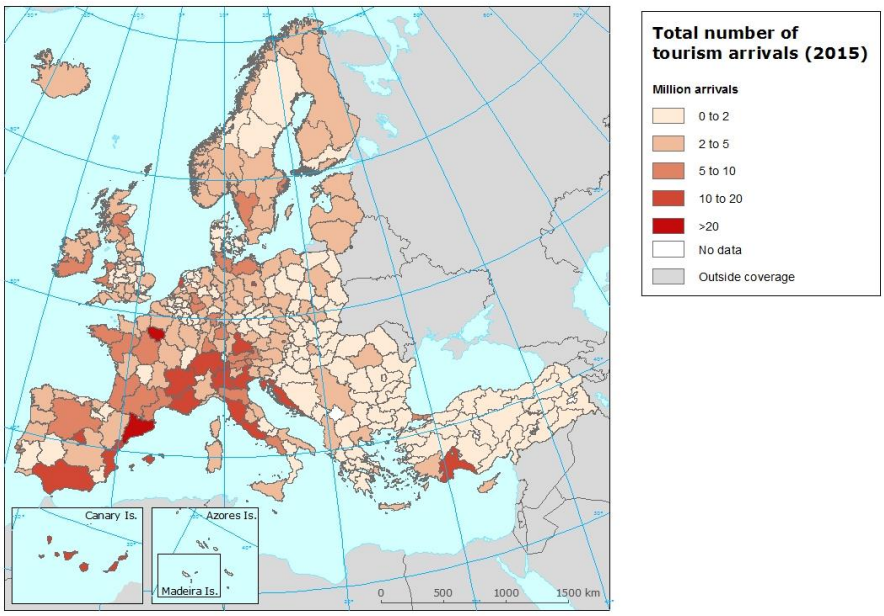
[7] According to Eurostat, an arrival is defined as a person (tourist) who arrives at a tourist accommodation establishment and checks in or arrives at non-rented accommodation.

Fig. 2.2 Total tourism arrivals per country, between 2000 and 2015



Source: Own elaboration from Eurostat, and Albania, Bosnia and Hercegovina, and Switzerland national tourism statistics.

Map 2.1. Total number of tourism arrivals (domestic and international) at NUTS 2 level, 2014



Source: Own elaboration from Eurostat, and Albania, Bosnia and Hercegovina, Switzerland, and Turkey national tourism statistics. UK and Belgium data are from 2013.

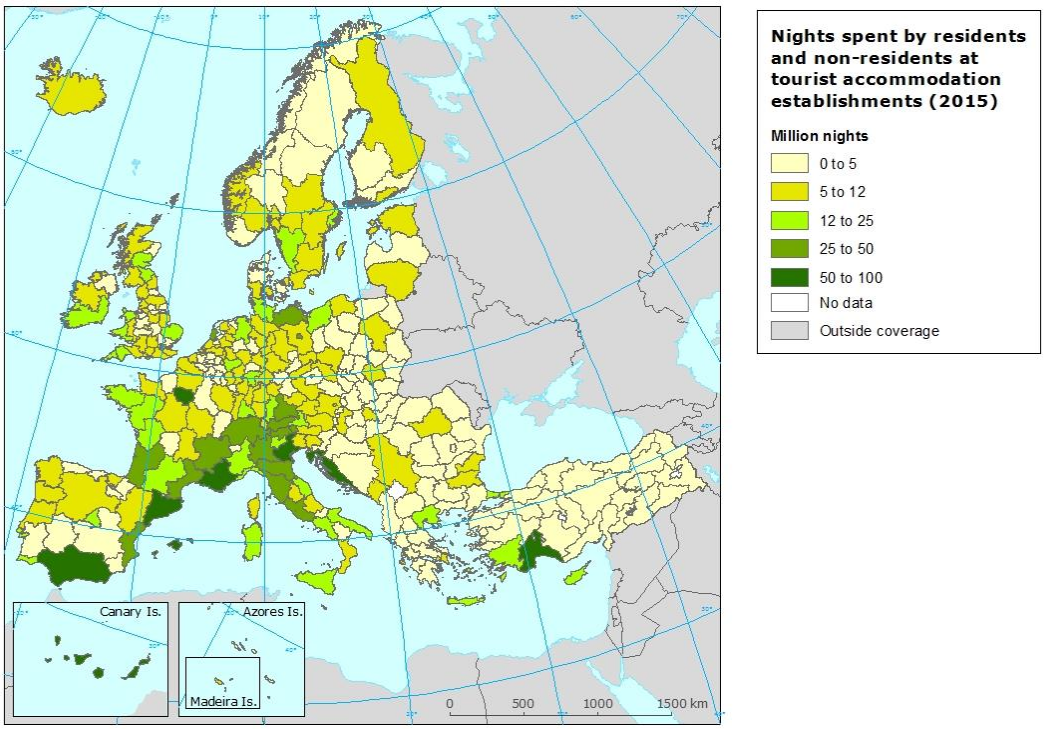
When analysing these numbers at the regional level, it can be seen that there are also big internal differences for each country. The countries that receive the highest number of tourists concentrate a good number of them in very few regions. This is the case for Germany (Berlin and Munich regions), France (Ile de France, Provence-Alpes-Côte d'Azur, Savoie), Spain (Catalonia, Andalusia, Madrid, Canary Islands), Italy (Tuscany, Lazio, Lombardia, Veneto), United Kingdom (London region) and Turkey (Istanbul and Antalya regions) (see Map 2.1). Combining these values with overnights stays and tourism intensity values enables the identification of hotspots for potential tourism pressures.

Overnight stays

Overnight stays provide an indication of the length of stay of the trips made. Potential pressures could be determined based on the number of people staying in a determined area for a certain length of time. Some destinations receive less arrivals than others, but register more overnight stays. This is the case of Spain, which in 2015 registered a total of 421 million overnight stays by residents and non-residents, more than France (413 million), Italy (392 million), Germany (378 million) and the UK (269 million) (Eurostat, 2016).

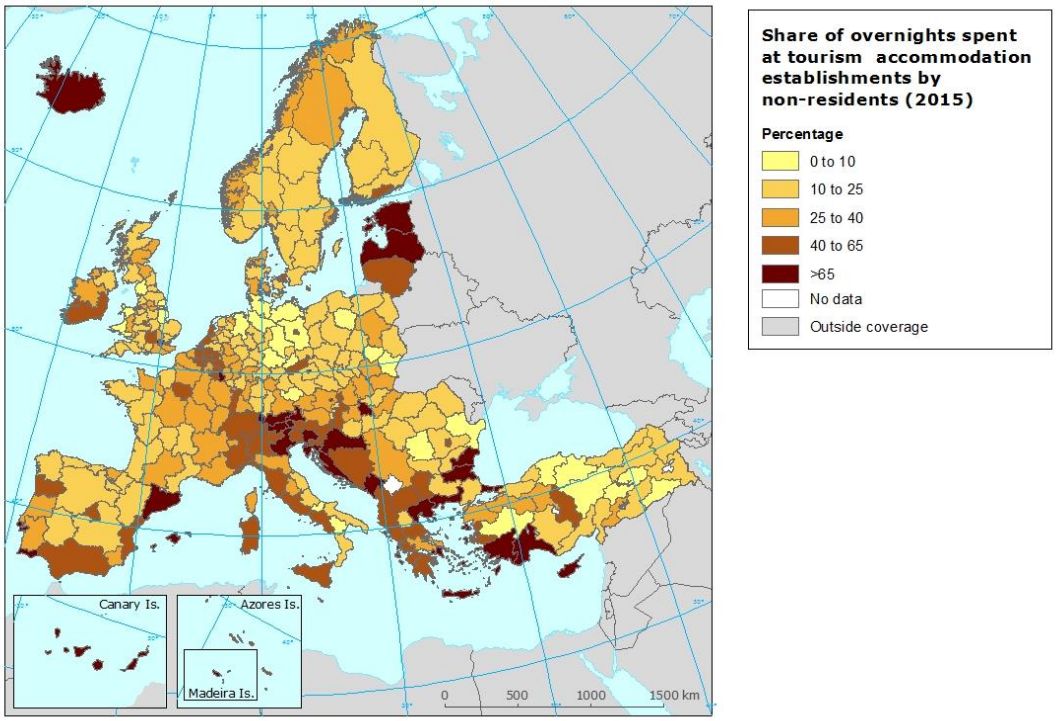
Following a similar pattern to arrivals, nights spent by tourists are unevenly distributed in Europe at the regional level. Data show significant differences between territories, as well as in the distribution of resident and non-resident nights spent at tourist accommodation establishments. The most attractive regions for tourists (assessed as the total number of overnight stays at official tourist accommodation establishments in 2015) are mainly concentrated in south-western Europe, including the Spanish Mediterranean coastline, southern France (and Ile de France), the Alpine region, northern Italy and the Croatian coast. Four of them are in Spain (Catalonia, Andalusia, Balearic Islands and Canary Islands), two in France (Ile de France, and Provence-Alpes-Côte d'Azur), one in Italy (Veneto), and one in Croatia (coastal Croatia). A good number (or the majority) of regions in Portugal, Spain, France, Italy, Austria, Germany, the Netherlands, United Kingdom and Ireland register more than 5 million annual overnight stays, which means a relatively high level of tourism attractiveness. On the contrary, some Scandinavian regions and most Eastern European regions register less than 5 million overnight stays (see Map 2.2).

Map 2.2 Nights spent by residents and non-residents at tourist accommodation establishments, NUTS 2 level, 2015



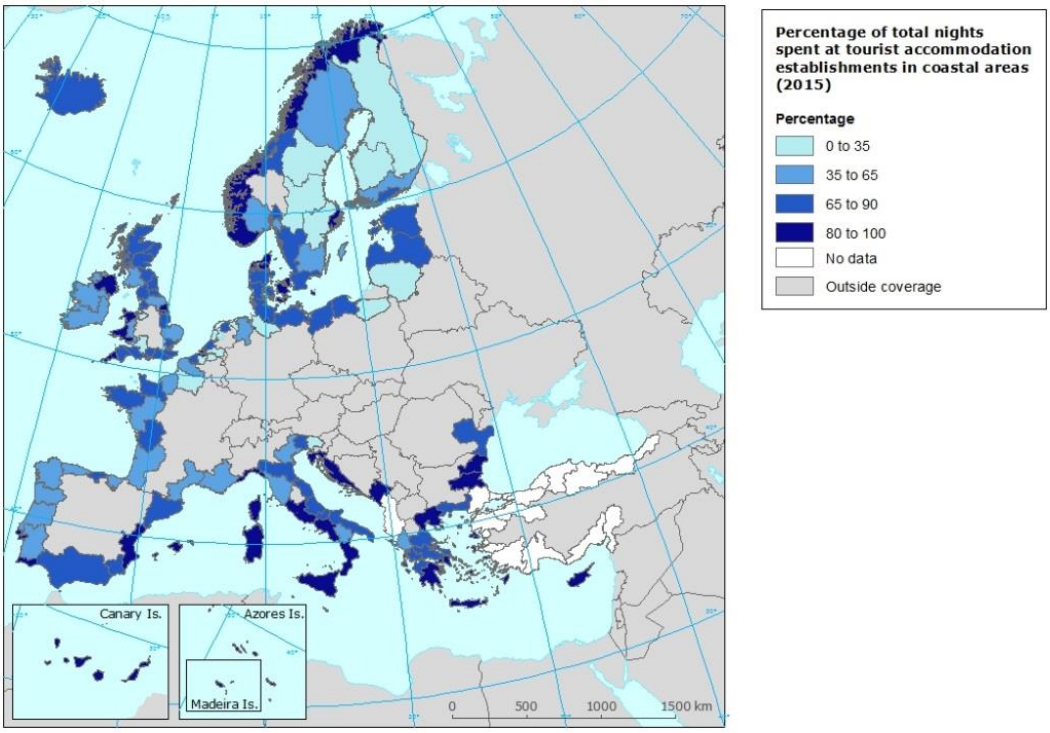
Source: Own elaboration from Eurostat, and Albania, Bosnia and Hercegovina, Switzerland, and Turkey national tourism statistics. UK and Belgium data are from 2013.

Map 2.3 Share of overnights spent at tourism accommodation establishments by non-residents, NUTS 2 level, 2015



Source: Own elaboration from Eurostat, and Albania, Bosnia and Hercegovina, Switzerland, and Turkey national tourism statistics. UK and Belgium data are from 2013.

Map 2.4 Percentage of total nights spent by residents and non-residents at tourist accommodation establishments in coastal areas, NUTS 2 level, 2015



Source: Own elaboration from Eurostat. UK and Belgium data are from 2013.

Most European regions receive more residents (domestic tourists) than non-residents (international tourists). Exceptions use to be those regions that receive the highest number of total overnight stays, previously mentioned, as well as some countries such as Iceland, Estonia, Latvia, Cyprus or Croatia (see Map 2.3).

In the case of coastal NUTS 2 regions, overnight stays used to be highly concentrated in coastal municipalities. This shows the high attraction factor that the seaside has for tourists. This happens in a very clear way (concentration of more than 65% of the total overnight stays at the region level in coastal municipalities) on all of the Mediterranean islands, Portuguese and Spanish Atlantic islands (Azores, Madeira, Canary Islands), and in the coastal regions of southern Italy (and some northern regions too), Mediterranean regions of Spain, the United Kingdom (most of its coastal regions), Denmark, Germany, Poland, Iceland, Estonia, Romania, and in an even more intensive way in Norway, Croatia and Bulgaria (see Map 2.4).

Most attractive places

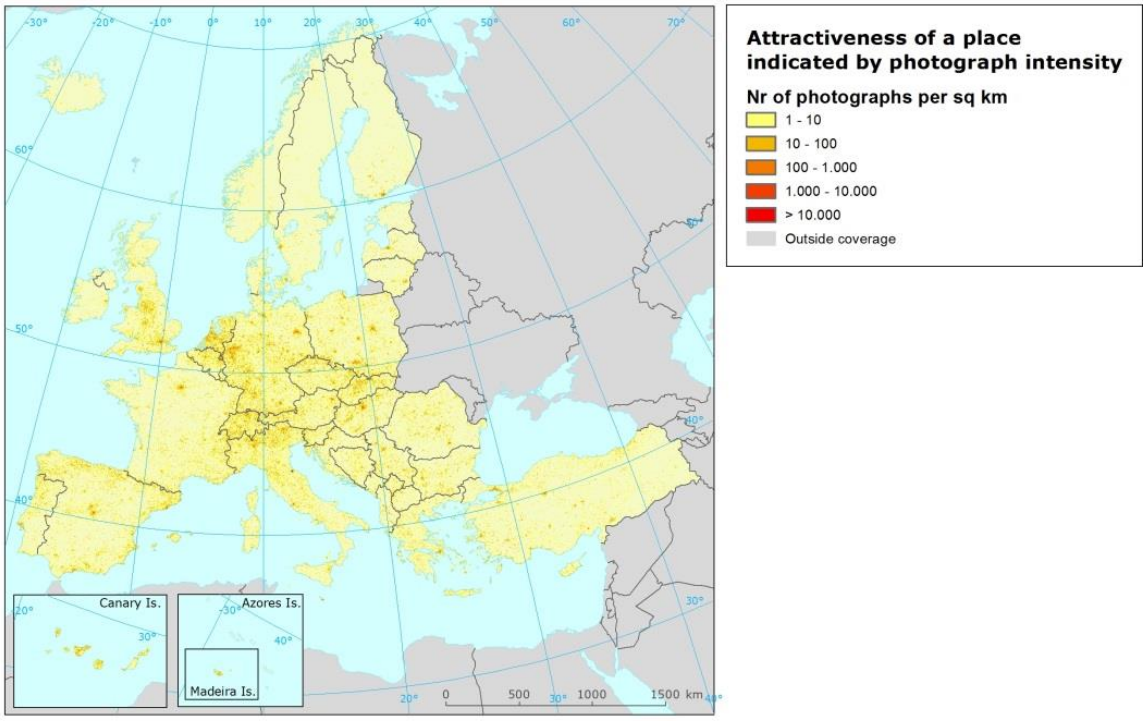
People are attracted by different aspects of travel destinations, some of them inherent to the place. These include nature, cultural values and aesthetics, but also the possibility to carry out certain leisure activities (e.g. playing golf or hiking). The combination of these elements results in tourism hotspots.

Besides traditional statistics (tourist arrivals and overnights), the intangible concept of tourism attractiveness is indicated by spatially locating those places that are more attractive for tourists. Accordingly, attractive areas –measured here as the number of pictures posted to social media platforms such as Panoramio per km^2 – show a spatial pattern in Europe. There is a clear concentration in Central Europe, in particular the fringe that goes from England to northern Italy, crossing Belgium and the Netherlands, the western part of Germany and Switzerland. This is an important economic area, which includes the Alps. Other attractive mountain areas also emerge, such as the Carpathian Mountains or the Pyrenees. In general terms, large metropolitan areas also stand out on the map (see Map 2.5).

In order to better capture attractiveness, a hotspot indicator has been applied. Hotspots are areas with significantly higher concentrations of pictures posted on social media compared with the rest of the region. Two types of hotspots have been identified: hotspots in cities and hotspots in rural areas. The majority of capital and large cities appear as hotspots. These appear in red on the map. Blue areas reflect coldspots, i.e. spots with fewer pictures posted (see Map 2.6). Rural hotspots include several regions of the Pyrenees, the Alps and the Carpathian mountain ranges. The interior of the Netherlands is attractive, while Spain, France, Greece and Croatia emerge as having the most attractive coasts. In the case of Italy, the pressure on the coast seems lower.

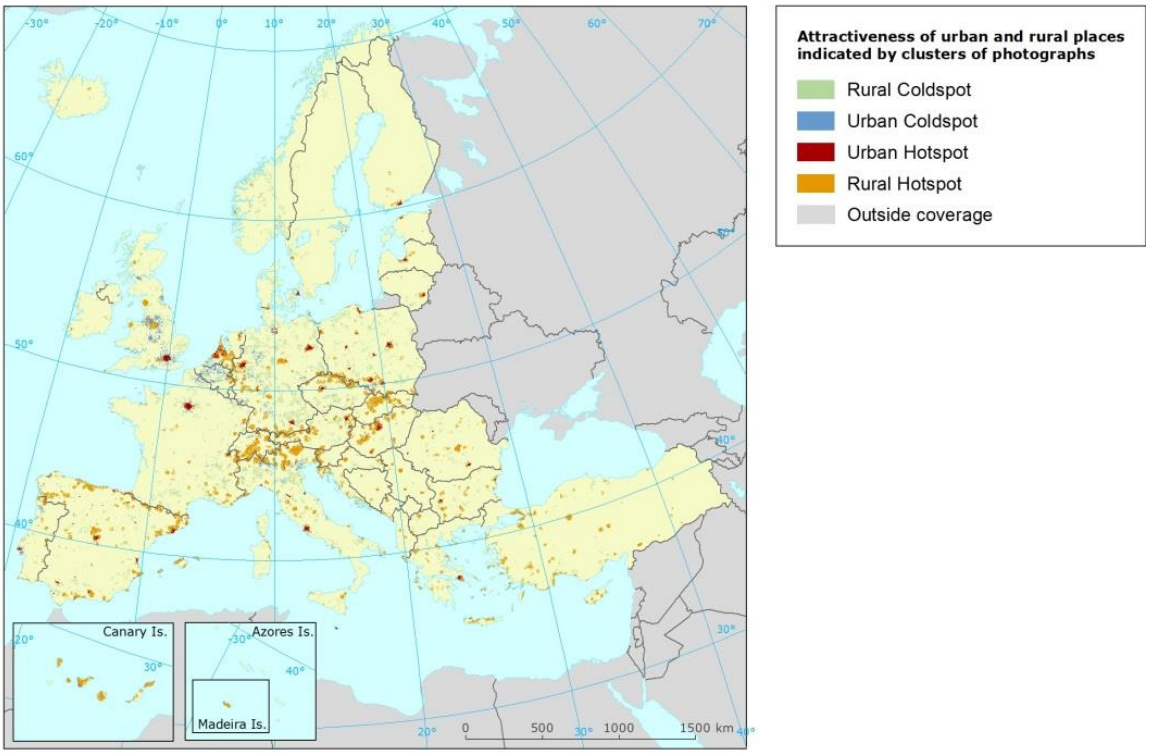
Finally, a new analysis consisting of calculating the percentage of the regional area covered by the previously mentioned hotspots, has allowed us to identify those NUTS 3 regions that have a major part of their territory considered attractive for tourism. NUTS 3 regions with more than 25% of their territory made up of tourist hotspots are the Netherlands, Austria, Italy or Spain (see Map 2.7).

Map 2.5 Attractiveness of the territory according to the number of pictures



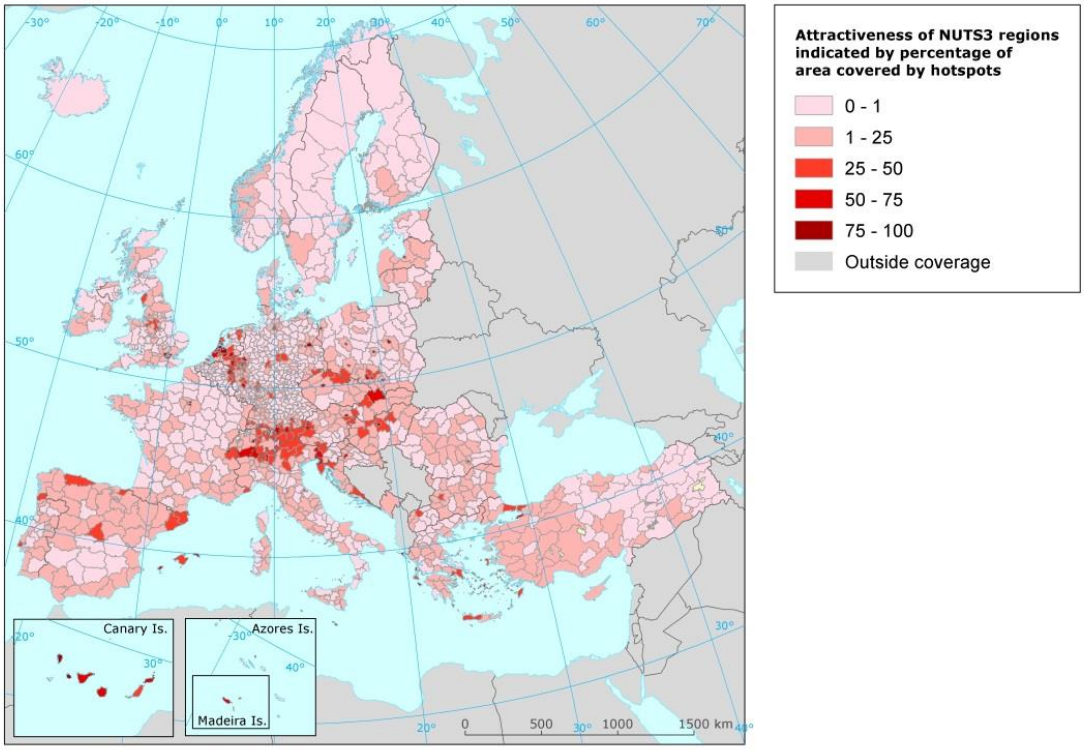
Source: Own elaboration based on Panoramio pictures (2007-2016).

Map 2.6 Attractiveness of urban and rural areas from clustering of pictures



Source: Own elaboration based on Panoramio pictures (2007-2016).

Map 2.7 Attractiveness of regions by percentage of area covered by hotspots



Source: Own elaboration based on Panoramio pictures (2007-2016).

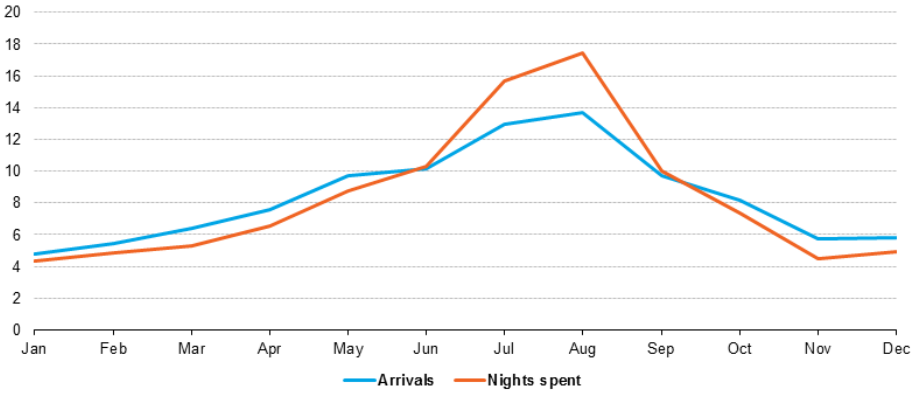
Seasonality

Seasonality is an important element to consider in examining the interrelation between socio-economic aspects and the environment. Seasonality implies a large number of tourists, as well as temporary workers, during certain seasons in tourism areas. From an environmental perspective, for a short period of time there is an increased need for the use of infrastructures (i.e. roads, parking spaces, etc.) and services (waste management, water supply and wastewater treatment) at these destinations. Despite these infrastructures (roads, airports, buildings, parking places) only being operational for a short period, the environmental impacts resulting from their development remain present following the departure of tourists. This concentration of tourism in certain periods of the year has a major effect on sustainability. It places increased strain on communities and natural resources at certain times, while leaving surplus capacity at others. On the other hand, from an environmental sustainability perspective, seasonality can be seen as positive, since at certain times of the year, wildlife is not under tourism pressure (i.e. some mountain areas are closed to tourists during some parts of the year, which is crucial for the reproduction of some animal species).

Seasonality also has a spatial dimension, particularly at the country level. For example, in winter, tourism tends to concentrate in ski resorts, while in summer coastal tourism takes over. However, mountain areas suffer less from seasonal fluctuations compared to seaside destinations, due to the continued presence of holidaymakers in mountain areas throughout the summertime as well as the winter.

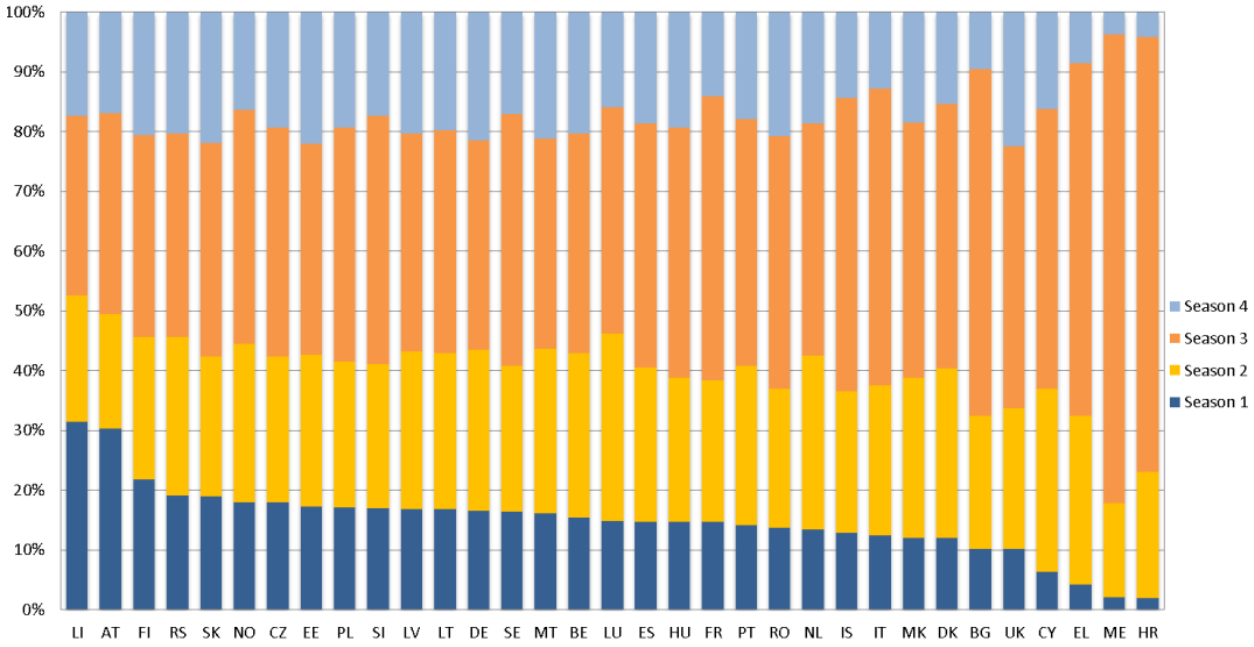
Most European countries' tourism destinations are affected by seasonal dynamics. Looking at the breakdown by tourist nights per season per country, and taking Europe (EU-28) as a whole, the number of tourist overnights in August is on average four times higher than in January. July and August accounted for one third of all nights spent in tourist accommodation in 2015. The period from June to September represented more than half of all nights spent during the year (see Figure 2.3).

Figure 2.3 Monthly distribution of the total number of arrivals and nights spent at tourist accommodation establishments, EU-28, 2015 (%)



Source: Eurostat, 2016.

Figure 2.4 Nights spent at tourist accommodation establishments, per country and season, 2015



Source: Own elaboration from Eurostat, 2016.

The summer peak is more acute in eight countries, including typical Mediterranean destinations (Croatia, Greece, Cyprus, Italy and France) but also Bulgaria, Denmark and Macedonia (see Figure 2.4). It should be noted that these statistics are aggregated at country level, therefore low seasonality at country level does not preclude high seasonality within a certain region. Finally, the Alpine countries of Austria and Liechtenstein show a false low seasonality, since in fact they have two clearly marked high seasons (winter and summer).

When analysing the ratio between the peak and bottom month, it can be seen that the EU average is 4.0 (the nights spent in the peak month of the year is 4 times the number of the bottom month). However, there are some countries that have a much higher ratio (especially Croatia, but also Greece, Cyprus and

Bulgaria). At the other extreme, countries like Slovakia, Finland, Serbia, the Czech Republic, Germany, Switzerland, Estonia, Latvia, and Poland, have a ratio below 3.0 (see Table 2.3).

Table 2.3 Seasonal variation in occupancy of tourist accommodation establishments, 2015

	Nights spent in the peak month		Nights spent in the bottom month		Ratio peak/bottom
EU-28(¹)	483 756	Aug	121 358	Jan	4.0
Belgium	5 496	Jul	1 563	Jan	3.5
Bulgaria	5 160	Aug	583	Nov	8.9
Czech Republic	6 880	Aug	2 522	Jan	2.7
Denmark	6 573	Jul	977	Jan	6.7
Germany	49 351	Aug	18 390	Jan	2.7
Estonia	874	Jul	320	Feb	2.7
Ireland	:u	:u	:u	:u	:u
Greece	23 432	Aug	1 172	Jan	20.0
Spain	68 265	Aug	18 351	Jan	3.7
France	85 627	Aug	14 823	Nov	5.8
Croatia	23 655	Aug	354	Jan	66.9
Italy	82 455	Aug	12 412	Nov	6.6
Cyprus	2 261	Aug	209	Jan	10.8
Latvia	593	Jul	218	Feb	2.7
Lithuania	954	Jul	346	Feb	2.8
Luxembourg	476	Jul	135	Dec	3.5
Hungary	4 534	Aug	1 220	Jan	3.7
Malta	1 135	Aug	403	Jan	2.8
Netherlands	16 500	Aug	4 147	Jan	4.0
Austria	15 537	Aug	4 191	Nov	3.7
Poland	10 829	Jul	3 865	Jan	2.8
Portugal	9 326	Aug	2 136	Jan	4.4
Romania	3 986	Aug	989	Jan	4.0
Slovenia	1 745	Aug	472	Nov	3.7
Slovakia	1 662	Aug	679	Jan	2.4
Finland	2 949	Jul	1 259	Nov	2.3
Sweden	11 455	Jul	2 709	Jan	4.2
United Kingdom	:	:	:	:	:
Iceland	1 460	Jul	236	Jan	6.2
Liechtenstein	13	Feb	5	Nov	2.5
Norway	5 644	Jul	1 417	Dec	4.0
Switzerland(²)	4 124	Aug	1 867	Nov	2.2
Montenegro	4 005	Aug	75	Jan	53.7
FYR of Macedonia	290	Aug	61	Feb	4.7
Serbia	897	Aug	366	Nov	2.4

(¹) EU-28 aggregate including estimates for the United Kingdom.
(²) Includes only Hotels and similar accommodation establishments (NACE I551).

Source: Eurostat, 2016.

Trips made by European residents by main means of transport

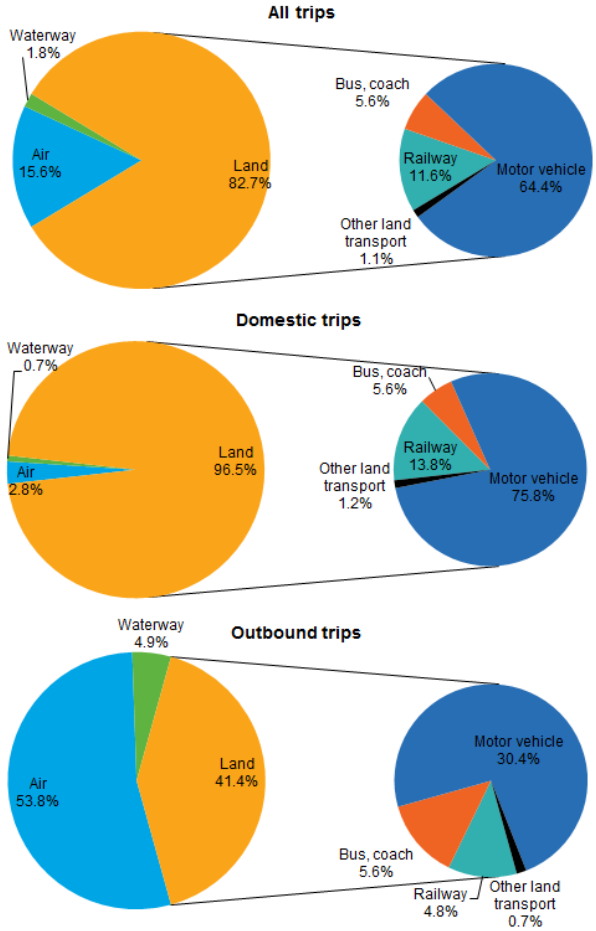
Generally, means of transport is strongly linked to the trip type and distance. Trips of over 1,500 km are mostly served by air transport, whereas for shorter distances all means of transport are involved, with the percentage of air travel approaching nearly zero for travel distances of less than 200 km (Peeters and Landré, 2012). Distance travelled and travel speed are important drivers of CO_2 emissions. Currently, tourism statistics for Europe, mostly based on Eurostat data, do not provide information on the distance travelled between the origin and destination of the outbound trips recorded at national level; thus, any estimates regarding emissions linked to kilometres travelled can only be approximations. In 2011, some estimates of the average number of kilometres travelled per one-way domestic trip for countries with the largest domestic tourism demand worldwide – including Europe – were calculated. It was found that the distance travelled ranged from 200 to 1,300 kilometres per one-way domestic trip (Peeters and Landré, 2012) (see Table 2.4).

Table 2.4 One-way trip distance travelled in the largest domestic tourism markets in Europe

Country	Distance (km) for one-way trip		
	Maximum	Minimum	Average
France	1200	400	536
Germany	1000	200	399
Italy	1200	400	610
United Kingdom	1300	200	343

Source: Peeters and Landré, 2012.

Figure 2.5 Trips made by EU-28 residents by main means of transport, 2014



Source: Eurostat.

For all trips made by Europeans in 2014, motor vehicles (private or rented) were the main means of transport used by 64.4% of travellers, followed by air and railway transport (15.6% and 11.6%, respectively). When Europeans travel inside their own country (domestic trips), they travel mainly over land, and more precisely by motor vehicle (75.8% of all domestic trips), followed by rail (13.8%). When they go abroad, (outbound trips, to any country of the world) they tend to fly (53.8% of all outbound trips) (see Figure 2.5). Significant differences, though, are observed between countries. For example, the highest number of bus users was found in Romania, where bus travel accounts for 23.5% of land trips. Islands also present specific patterns: for instance, waterways were the main means of transport for 36.1% of trips made by residents of Malta and air travel accounted for almost 64% of trips.

The main trends in EU residents' trips for the 2005–2014 period show the effects of the financial and economic crisis started to become evident in 2009, with a drop in total overnight stays on trips for personal purposes. However, this was counterbalanced by the number of trips continuing to increase during that year, partly also due to the growing appreciation for short breaks. This translates in Europeans going on more but shorter trips, with an increase in the environmental impacts of tourism-related transport.

If length of stay is also considered, out of 223 million outbound tourism trips made by EU citizens in 2014 of at least one overnight stay, 46% of those trips were by air transport as the main means of transport, followed by (rented or private) motor vehicles (36%). Bus (6%), train (6%) and transport using waterways (5%) were less common. When considering the countries visited, air transport accounted for more than 80% of all intra-EU inbound flows into Malta (87%), Cyprus (97%), Greece (88%) and Spain (84%), arguably for geographical reasons. In Austria, Croatia, Denmark, Slovakia and Slovenia, the share of inbound trips made by motor vehicle was 60% or more. Only in one country, Estonia, was waterway the dominant means of transport for inbound visitors (most likely because of the popular ferry connection between Tallinn and the Finnish capital Helsinki, its main generating market). Railway transport was relatively common for visitors to Belgium (25% of intra-EU inbound trips) and France (16%), while buses were relatively common for Latvia and Lithuania (both 17%), Poland (16%), Czech Republic (15%) and Croatia (14%).

Air passengers

Tourism is the most important contributor to the increase in air traffic, with a clear impact on touristic areas around the Mediterranean Sea and in bigger cities. When looking at the overall distribution of air passengers carried by NUTS-2 regions, those with major airports stand out, e.g. Paris, London, Frankfurt, Munich, Barcelona, Madrid and Rome. Catalonia, Andalusia, the Balearic and Canary Islands and the French region of Provence-Alpes-Côte d'Azur have an elevated number of air passengers carried in comparison to other neighbouring regions (see Map 2.8).

The number of passengers per airport provides a more detailed overview of the local/regional trends in air traffic. While there is a general increase in the number of passengers carried by plane in Europe, this increase is taking place mostly in airports with more than 10 million passengers per year, with the exception of Madrid and Athens, for different operational and economic reasons. Most Turkish airports stand out, with an increase over 30% between 2009 and 2013. Small, regional airports, in turn, have been losing passengers despite the steady growth in the number of low-cost airlines that use them (see Map 2.9).

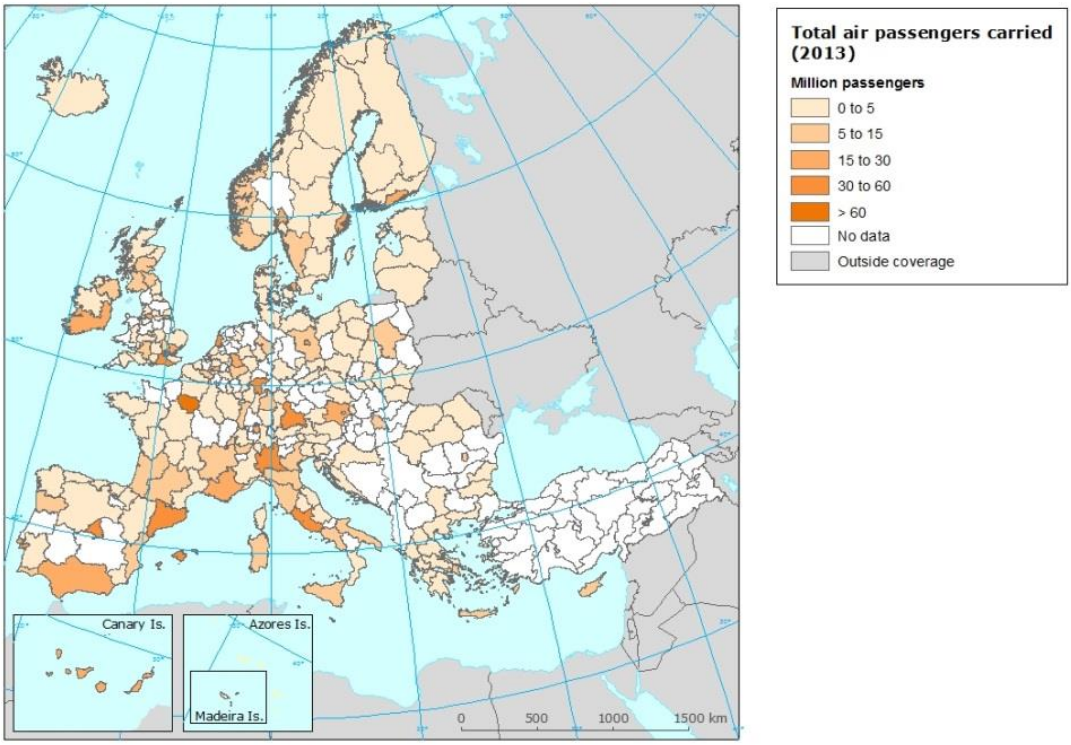
Cruise passengers

Cruises are actually a form of tourism in itself, and are mainly made up of short sea journeys of about one week. The international market for cruise tourism was about 18.3 million tourists in 2010, with an annual growth rate of over 7% since 1990. The main cruise markets in Europe are the Mediterranean, followed by the northern Europe fjords.

The impacts of cruise tourism on the local economy are mitigated, as the strategy of cruise companies is to retain as much income as possible. This means that tourists spend most of their money on the cruise ship itself (gift shops, entertainment, casinos, bars, etc.) or on island facilities owned by cruise shipping companies. The world's two largest twin cruise ships (Oasys and Allure of the Seas) are 362 meters long, weigh 225,300 tons (the equivalent of 9,000 tanks) and can accommodate 6,296 passengers – in addition

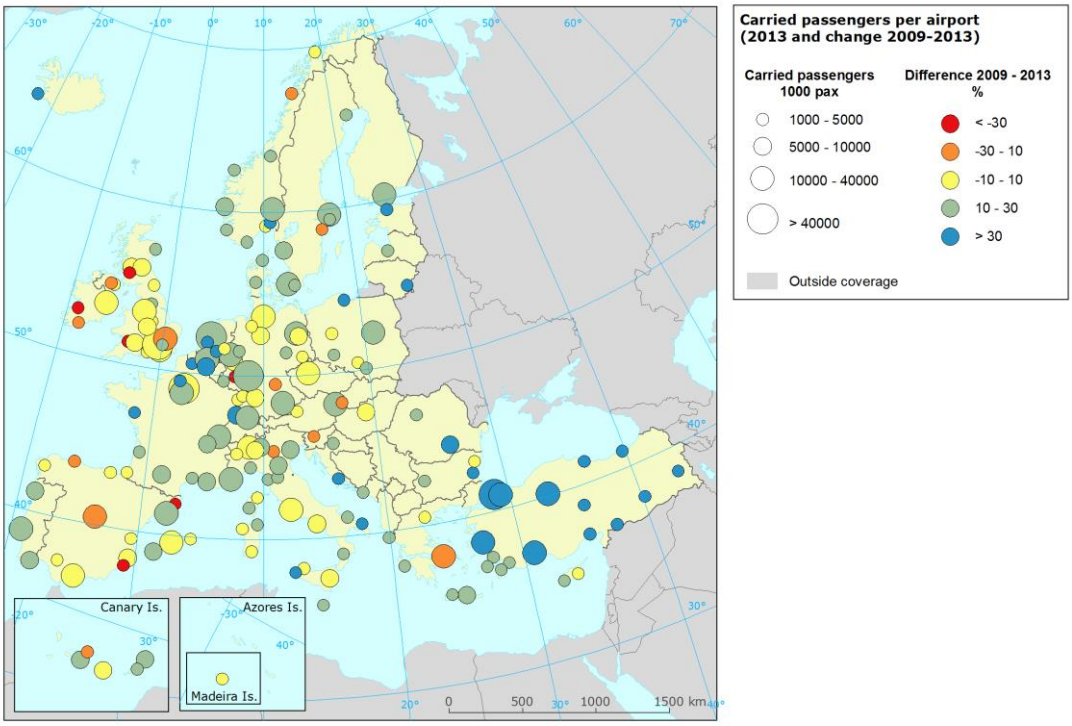
to the 2,384 crew members – for a total of 8,680 people. A medium-sized cruise ship accommodates 3,000 people and has a weight equivalent to 21,200 double-decker buses.

Map 2.8 Total air passengers carried (million), NUTS 2, 2013



Source: Own elaboration from Eurostat data.

Map 2.9 Carried passengers per airport in 2013, and changes in 2009–2013



Source: Own elaboration from Eurostat data.

Cruise tourism also leads to unwanted externalities, as cruise ships generate air, waste and noise emissions. These externalities are located both at the ports where cruise ships call and along shipping routes. Local pressures depend on the intensity of traffic, which is measured by the number of passengers per port. Remarkably, it is estimated that most cruise destinations (ca 70%) are located in proximity of ecologically sensitive protected areas and biodiversity shrines, such as marine and coastal habitats, especially in the Mediterranean sea, which are crucial for the protection of marine species (Sweeting and Wayne, 2006).

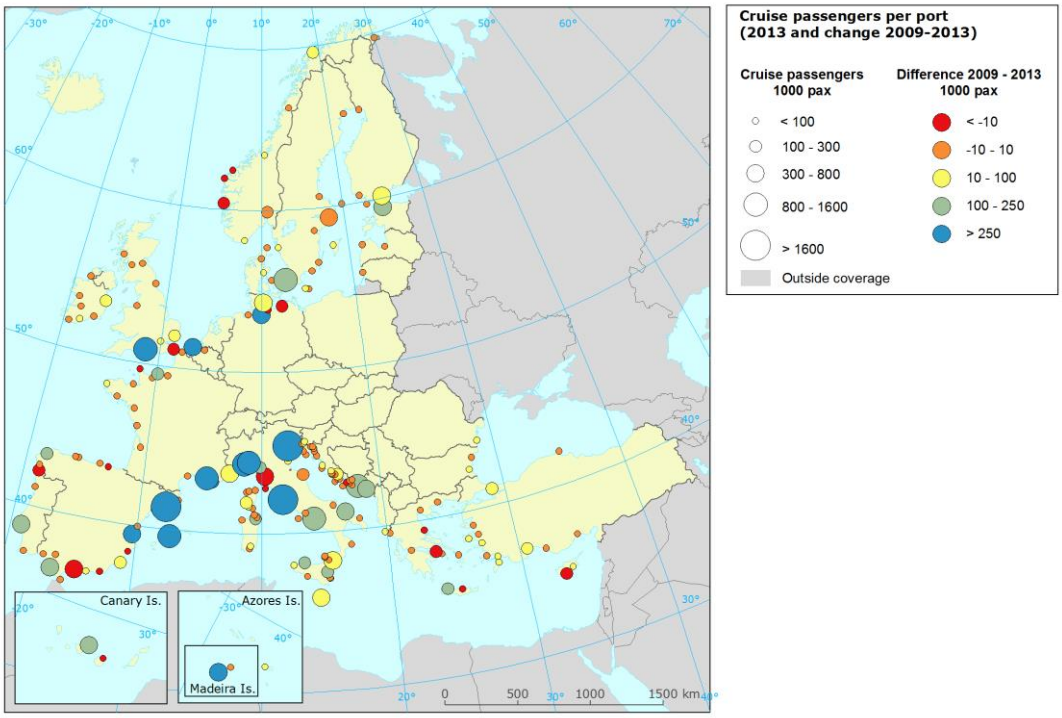
Due to the lack of accessible data on cruise ship routes, the numbers of passengers visiting or embarking/disembarking is a reasonable approximation of the pressure cruise tourism is exerting on ports and the surrounding areas in terms of air pollution, waste and noise.

Photo: A cruise ship © Mustang Joe.

There is an uneven distribution of the more than 27 million passenger visits to one of the 313 ports that receive cruise ships in Europe. Nine out of the ten ports with most cruise passengers (> 900,000 pax) are located in the Mediterranean Sea, with Barcelona leading the European ranking (2.6 million passengers in 2016). There are only four northern European ports (Southampton, Copenhagen, Hamburg and Tallinn) in the top 20. This concentration of high numbers of passengers (and calls) within a relatively short distance and with the semi-closed situation of the Mediterranean Sea leads to potentially very high pressure on marine and coastal ecosystems, as well as cities. Over the 2009–2013 period, it is clear that Mediterranean ports have had the highest increase in the number of passengers. It can also be observed that a significant concentration of passengers has been moving away from smaller ports towards the ports that already had the highest numbers of passenger visits (see Map 2.10).

However, when attempting to identify the impact of cruise ships at ports, especially due to the emissions caused by their 'hoteling' functions, passenger capacity should be complemented by the size of the ship, in order to measure the ship's storage capacity. Some bigger ships may in fact not necessarily accommodate more passengers per volume unit, but instead have more leisure facilities and services (shops, theatre, cinema, pools), resulting in a much bigger energy consumption while docked in the port despite relatively small increments in the number of passengers. For example, a ship of 75,000 gross tonnes can accommodate 2,000 passengers and require an energy consumption of ca 55,000 kWh while in port, compared to a ship of 120,000 tonnes that can accommodate 2,700 passengers and require up to 131,000 kWh under the same conditions, leading, in this example, to emissions of 54.4 and 204.4 kg NOx per hour, respectively (Simonsen, 2014).

Map 2.10 Number of cruise passengers per port in 2013, and changes in 2009–2013



Source: Own elaboration from Eurostat.

2.2.2 Increasing environmental pressures from tourism

Pressure is the result of a driver-initiated mechanism causing an effect on any part of an ecosystem that may alter its environmental state. Despite the difficulties of quantifying cause–effect relationships, any increase in the number of tourists undoubtedly exacerbates the pressure on the environment in the form of emissions, waste generation or water consumption. Specific indicators can help to analyse tourism density and intensity, combined with information on seasonality and overnight stays (see Table 2.5). This, in turn, can help identify regions, areas or hotspots where it is more likely for tourism to cause environmental pressures.

Tourism intensity

Some European regions (regardless of their specific geographical, natural and cultural context) have a high intensity of tourist arrivals and overnight stays per inhabitant. This potentially exerts high pressure on residents, the local environment and resources. By contrast, other regions have a low or very low intensity.

A number of regions have more than 400 annual tourist arrivals per 100 residents, e.g. the Balearic and Canary Islands in Spain; Corsica in France; several Greek islands; Algarve in Portugal; the coast of Croatia; some Italian and Austrian Alpine regions; most of the Norwegian regions; Cumbria, North Yorkshire, Cornwall and the Highlands in the UK; Mecklenburg-Vorpommern in Germany; and Iceland, among others. These are considered to be high-intensity regions. At the other end of the scale, Lithuania, most of Poland, Slovakia, Hungary, Romania, Bulgaria, Macedonia, Serbia, southern Italy, and Turkey, have less than 100 annual tourist arrivals per 100 residents, equating to a low tourism intensity or pressure (see Map 2.11).

Table 2.5 Questions and answers about pressures

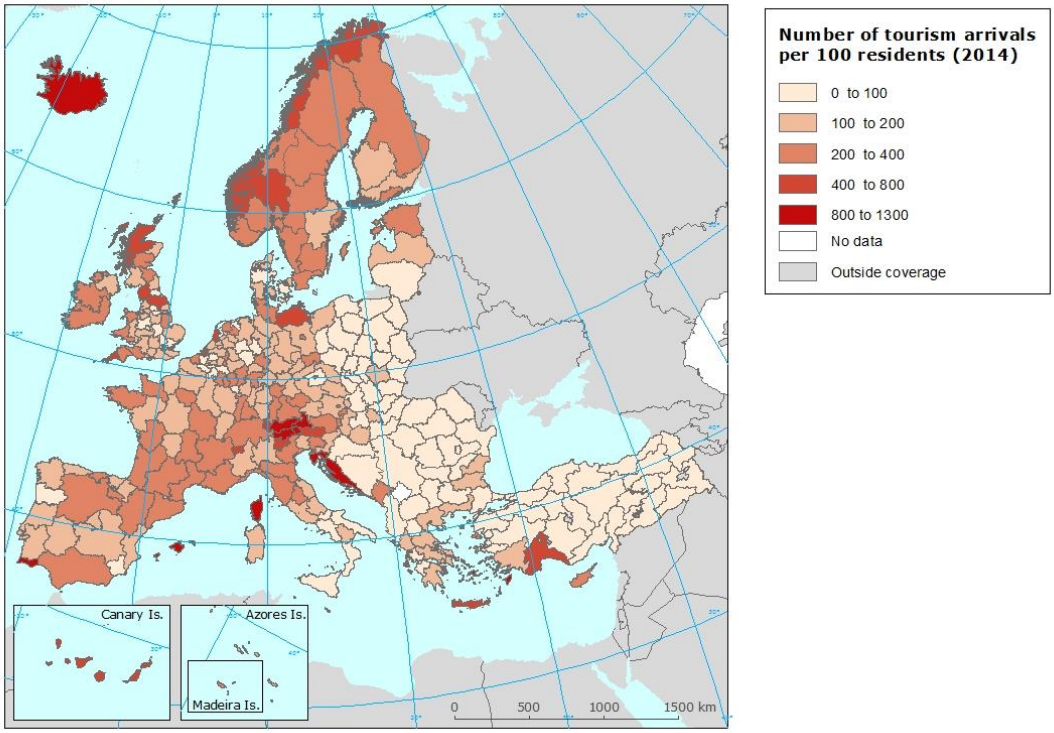
Question	Indicator	Main messages	Trends
What is the pressure on the local population?	Tourism intensity	This indicator is the result of combining the number of annual tourism arrivals, overnight stays, and bed places per number of residents at the destination (regional level). Several regions have a high pressure because of tourism demand, with more than 400 arrivals per 100 inhabitants, while very few have that high pressure due to tourism supply. It has a highly localised pattern.	Not evaluated, but probably increasing pressure on hotspots.
What is the pressure on the territory?	Tourism density	This indicator establishes the relationship between tourism demand (overnight stays) and/or tourism supply (bed places) and the region's surface. In this case, as density is linked to the spatial dimension of the region, very small (urban and metropolitan) regions tend to have higher tourism density. Some coastal and mountain regions also have a high tourism density.	Not evaluated, but probably increasing pressure on hotspots.
What is the efficiency in the use of resources?	Occupancy rate	This indicator establishes the relationship between tourism accommodation supply and its actual utilisation by tourists.	Not evaluated

Source: Own elaboration.

Another way to measure pressure is the intensity of tourism accommodation. This is the number of tourist beds per 100 residents. The intensity of tourism accommodation in relation to the population is relatively high (i.e. more than 25 bed places per 100 residents) in only a few European regions (Cornwall in the United Kingdom, Algarve in Portugal, the Balearic Islands in Spain, Corsica in France, Valle d'Aosta, Trento, and Bolzano/Bozen in Italy, Ionia Nisia, Kriti, and Notio Aigaio archipelago regions in Greece, Tirol, Kärnten, and Salzburg in Austria, and Zeeland in the Netherlands) (see Map 2.12).

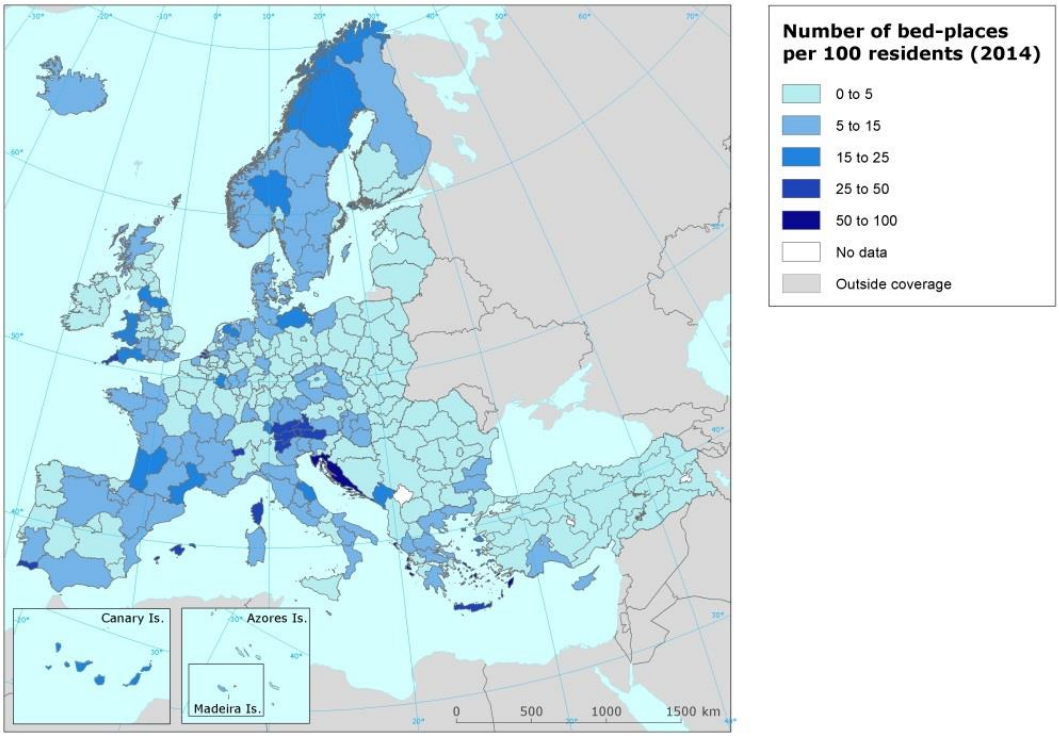
These assessments are based on official statistics based on Eurostat data, although they don't reflect new forms of tourism accommodation (e.g. Airbnb). Some specific destinations have a lot of this type of accommodation compared with officially registered accommodation establishments. The potential environmental consequences for such destinations require a change in the way data are collected and environmental pressure is measured.

Map 2.11 Number of tourism arrivals per 100 residents, NUTS 2, 2014



Source: Own elaboration from Eurostat.

Map 2.12 Number of bed places per 100 residents, NUTS 2, 2014



Source: Own elaboration from Eurostat.

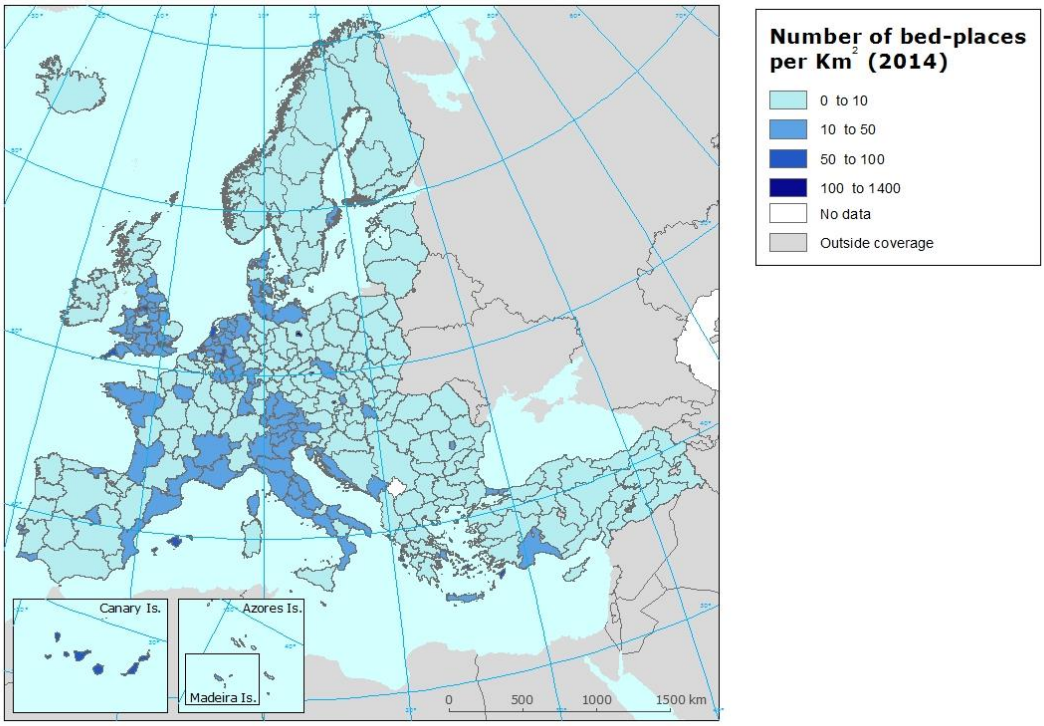
Tourism density

Density of tourism accommodation is measured in bed places per km^2. At the regional level in Europe, it is relatively low (i.e. below 10 bed places per km^2) for the majority of regions and countries. Higher densities (i.e. between 10 and 50 bed-places per km^2) can be found in most regions in England, the Netherlands, continental Italy, Montenegro, and in some regions of Spain, France, Germany, and Austria, among other countries. The highest densities – more than 50 bed-places per km^2 – appear in very small (metropolitan) NUTS 2 regions, with the exception of the Balearic and Canary Islands in Spain (see Map 2.13).

In regions with high tourism density, such as certain mountainous, rural and coastal regions, further growth should be controlled in order to avoid exceeding social carrying capacity. On the contrary, in some rural regions with low tourism density, future growth is possible, though specific territorial and environmental assessments should be done beforehand.

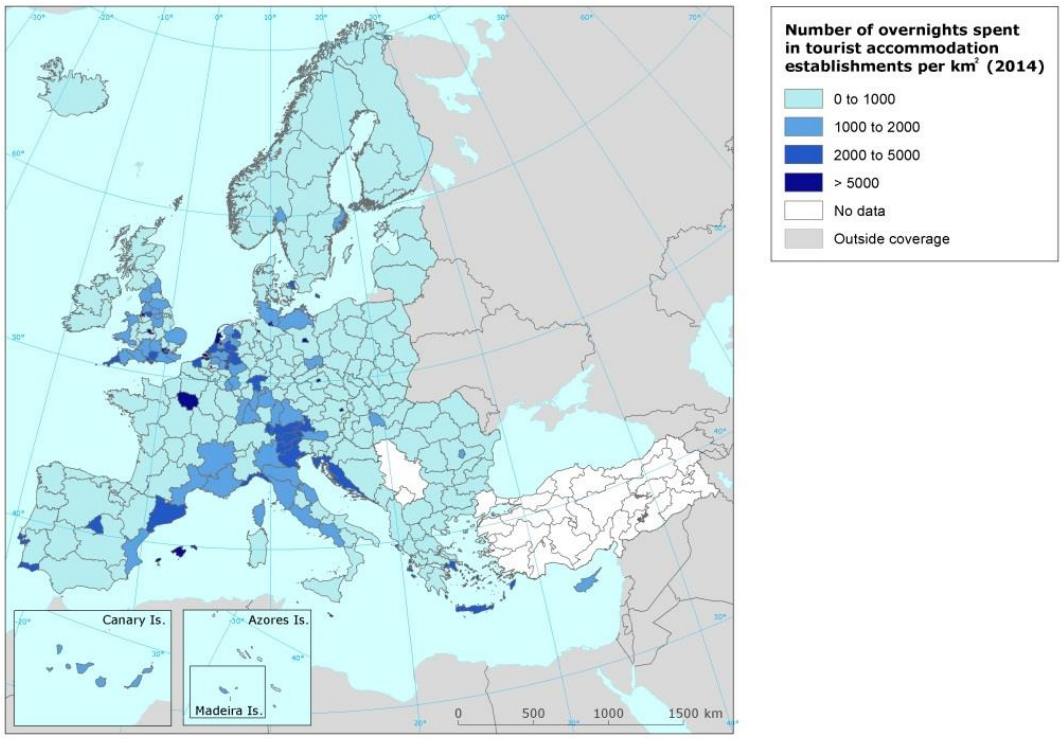
Tourism demand, measured as total overnight stays per km^2, is relatively low in most European regions (i.e. below 2,500 annual stays per km^2). Higher numbers are mainly concentrated in urban and metropolitan regions, in some cases within a very small territory. These are the cases of country capitals such as London, Paris, Berlin, Madrid, Lisbon, Brussels, Amsterdam, Prague, Copenhagen, or Vienna, but also other metropolitan areas, such as Greater Manchester, Merseyside (Liverpool), and the West Midlands (Birmingham) in the United Kingdom; Bremen and Hamburg in Germany; or Zuid Holland (Rotterdam) in the Netherlands. Apart from these urban areas, only a few regions had more than 2,500 overnight stays per km^2 in 2014. Most, but not all, of these are located in southern Europe: the Algarve and Madeira islands in Portugal; the Balearic and Canary Islands in Spain; the Veneto and Trentino–Alto Adige regions in Italy; the coastal region of Croatia; the Greek insular regions of Notio Aigaio, Kriti, and Ionia Nisia; the Tirol and Salzburg regions in Austria; Zeeland and Lindburg in the Netherlands; and Cornwall in the United Kingdom. Of these regions, only the Balearic Islands and Zeeland had more than 5,000 overnight stays per km^2 in 2014 (see Map 2.14).

Map 2.13 Number of bed places per km^2, NUTS 2, 2014



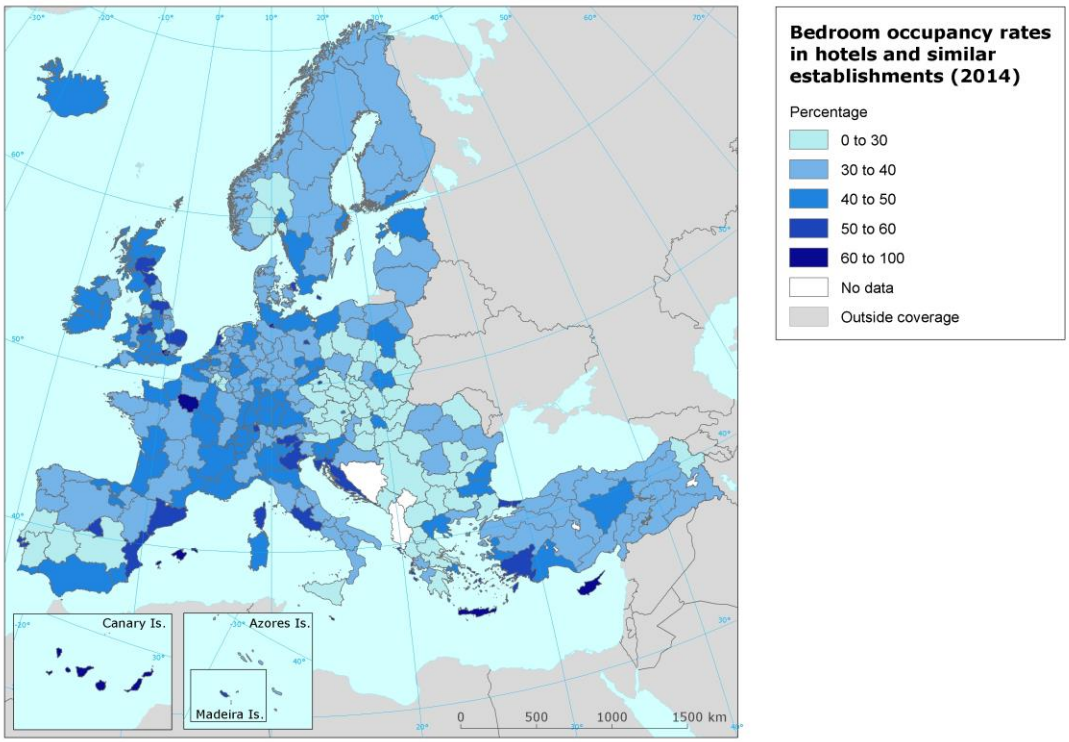
Source: Own elaboration from Eurostat.

Map 2.14 Number of overnights spent in tourism accommodation establishments per km^2, NUTS 2, 2014



Source: Own elaboration from Eurostat.

Map 2.15 Bedroom occupancy rates in hotels and similar establishments, NUTS 2, 2014



Source: Own elaboration from Eurostat.

Occupancy rate

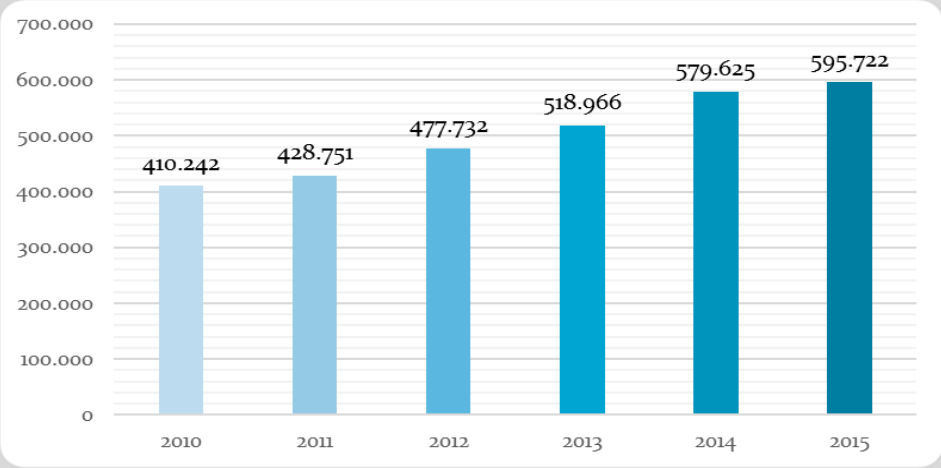
Occupancy rates can be used to determine pressures on the environment caused by tourism. The regional analysis of bedroom occupancy rates in hotels and similar establishments in 2014 shows that these bedroom occupancy rates were particularly high in western Europe, although with several regional disparities – most of the regions registered a rate of below 50%. Further south, there were several traditional tourist destinations that recorded relatively high rates, principally the insular regions of Spain, France, Malta, Greece and Cyprus. Note that some hotels in these holiday destinations may close during the off-season, while others seek to keep their occupancy rates high through special offers which may, for example, encourage pensioners (typically from northern and western EU Member States) to spend longer periods on vacation during the winter months. In general, though, urban and metropolitan areas (i.e. regions of London, Paris, Berlin, Hamburg, Prague, Amsterdam, etc.) tend to record higher occupancy rates than rural regions (see Map 2.15). The regions with occupancy rates of less than 30% were mainly located across eastern and southern regions of the EU, although some of them there were also located in north-western Europe. Low occupancy raises efficiency and resource-use questions.

Box 2.2 Case study: Tourism intensity in Kołobrzeg city, Poland

The city of Kołobrzeg is a popular seaside resort located in Zachodniopomorskie voivodeship. It lies at the mouth of the river Parsęta and has a registered population of 46,000 inhabitants. The city is also a seaport. In addition, Kołobrzeg has mineral water and brine springs, as well as medicinal peat deposits. The *spa* specialises in treating diseases of the upper respiratory system, circulatory system and of the joints. The city is also a regional cultural centre. European Union funds made a number of investment projects possible, which have greatly improved living standards, as well as the standard of tourist facilities.

The number of tourists visiting Kołobrzeg has been rising sharply in recent years, mainly because of *spa* tourism. Other popular types of tourism in Kołobrzeg are beach tourism and sport tourism. Between 2010 and 2015, the Kołobrzeg district experienced an increase in both occupancy rates (45%) and the number of overnight stays (35%) (see Figure 2.6). At the same time, there was an almost two-fold increase in the number of accommodation facilities, from 128 in 2010 to 260 in 2015 (Główny Urząd Statystyczny, 2016).

Figure 2.6 Evolution of tourism overnight stays in Kołobrzeg district in the period 2010-2015



Source: Główny Urząd Statystyczny, 2016.

The occupancy rate in the Kołobrzeg district also increased significantly, from 59.4% in 2010 to 63.9% in 2015, due to an increase in the rented rooms in existing buildings. In comparison to Poland as a whole, the bed occupancy rate in the Kołobrzeg district is high, because of the large share of hotels that operate all year round, whereas other accommodation facilities are more affected by seasonality. The average tourist stay duration in the Kołobrzeg district was 7.2 days in 2015, half a day less than in 2010. The tourism intensity index for the Kołobrzeg district, which includes the municipalities of Kołobrzeg, Gościno, Dygowo, Rymań, Siemyśl and Ustronie Morskie, is 6.5 which means that the average annual number of persons using accommodation facilities is more than 6.5 times the number of the permanent residents. Thus, Kołobrzeg may be considered a tourism destination with a very high tourism intensity.

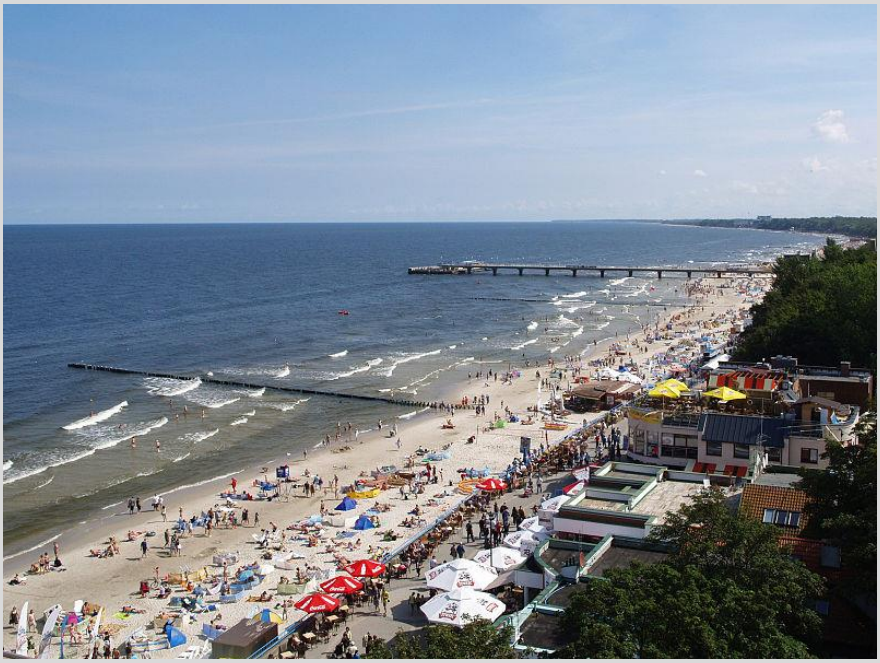


Photo: Beach in Kołobrzeg. Author: Olek Remesz (Wikimedia Commons).

Despite the fact that the capacity of accommodation facilities is growing year after year, the level of public investment in spaces used for tourism purposes should be further increased in the future. Cycling paths and routes are being built, but this is still not enough considering the high and growing tourism intensity index. Tourist traffic concentrates along beaches, around the pier, in the passenger harbour, on the main promenade, and in Żeromski Park, resulting in massive traffic congestion and noise pollution and jeopardizing air quality. The public investment in public spaces that could serve both the tourists and the city's residents should also be increased in the next 5 years. The city's accessibility by car is good, but accessibility by rail is insufficient (outside the summer season, accessibility by rail is greatly reduced). Among the city's weaknesses, as pointed out in the SWOT analysis included in the Kołobrzeg 2020 Development Strategy, are the following: incompatibility of spa and tourism functions, short summer tourism season, which results in low rate use of bed places, inadequate number of parking places, poor quality of the city's green areas, poorly organised outdoor urban spaces, and leisure tourism's strong dependence on the summer/beach season. The Kołobrzeg Development Strategy provides details about the development of recreational areas and points out main objectives for tourism development, such as: increasing the number of spa facilities in the city, augmenting sea tourism, protecting the environment, creating tourism products, increasing the function and reputation of Kołobrzeg as a cultural centre and further developing recreational areas.

2.2.3 Environmental impacts of tourism

The environmental impacts of tourism can be negative and positive – in the sense that they may trigger different types of responses from different stakeholders – on both a global and local scale (see Table 2.6). Given the complexity of the interactions and sectors involved, it is difficult to identify and assess:

a) the contribution of tourism to overall impacts (e.g. loss of biodiversity that can be attributed to tourism, air pollution caused by tourism-related transport);

b) global impacts as a consequence of a concatenation of factors (e.g. ozone depletion); and

c) off-site impact (e.g. marine litter).

Table 2.6 Environmental impacts of tourism

	Local scale		Global scale
Negative effects of tourism on societies and ecosystems	Depletion of natural resources	- Water resources - Local resources - Land degradation - Loss of ecosystem integrity	- Loss of biological diversity
	Pollution	- Air pollution and noise pollution - Solid waste and littering - Sewage - Loss of ecosystem integrity - Aesthetic pollution and cultural impacts	- Depletion of the ozone layer - Greenhouse effect and climate change
	Physical impacts	- Physical impacts of tourism development - Physical impacts from tourist activities	- Habitat fragmentation and loss of biological diversity
Positive effects of tourism on societies and ecosystems	- Environmental awareness-raising - Contribution to conservation (by entry fees, indirectly through revenues) - Contribution to protection and preservation (through identification of the value of pristine natural areas and their subsequent protection) - Improved environmental management and planning - Introduction of regulatory measures		- Environmental awareness-raising - Environmental protection

Source: Own elaboration based on Sunlu, 2003; Wong, 2004; Bevan and Rhodes, 2005; Ghulam et al., 2013.

On a global scale, and at the current pace of development, if not well managed, tourism can play a role in the loss of biodiversity, as a result of the excessive use of land and resources, as well as by exceeding the carrying capacity of ecosystems. This is a global impact that starts at the local level and is reflected in the loss of ecosystem integrity due to fragmentation, ecosystem degradation, or changes in species composition. Tourism also plays a role in the introduction of alien species, which can cause the disruption and destruction of entire ecosystems.

The depletion of the ozone layer due to ozone depleting substances (ODS), which have been widely used until recently in the hotel and tourism industry (e.g. in refrigerators, air conditioners and propellants in aerosol spray cans) and emitted by jet aircraft, is also linked to the sector's impacts. On a global scale,

tourism accounts for about 50% of air traffic movements. The recent, rapid increase of air traffic has contributed significantly to increasing concentrations of greenhouse gases in the atmosphere. From a DPISR perspective, the effects of greenhouse gases on climate are a direct result of the increased number of tourists/movements (drivers), which modulate the emissions depending on the mode of transport and efficiency (pressures).

At the local level, infrastructure development can result in permanent, long-term or medium-term impacts, whereas tourism activities themselves may have medium-term, short-term or temporary impacts on local economies and ecosystems. More specifically, tourism-related construction activities and infrastructure development contribute to sand mining, beach and sand erosion, soil erosion and extensive paving, resulting in land degradation, loss of wildlife habitats and deterioration of scenery, habitat/ecosystem alteration and fragmentation.

Deforestation and intensified or unsustainable use of land may follow the clearing of forested land for ski resorts, whereas the draining and filling of coastal wetlands for tourism facilities and infrastructure causes disturbance and erosion of local ecosystems. Marina development may also lead to changes in currents and coastlines, resulting in the erosion and destruction of habitats, and in the disruption of land-sea connections. Anchoring and other tourist maritime activities in marine areas can be a direct cause of the degradation of marine ecosystems, with subsequent impacts on coastal protection and fisheries.

Outdoor activities carried out by tourists may result in wildlife disturbance and have negative impacts on vegetation (trampling, breakage and bruising of stems, reduced plant vigour, reduced regeneration, loss of ground cover, change in species composition) as well as on soil (loss of organic matter, reduction in soil macroporosity, decrease in air and water permeability, increase in run-off, accelerated erosion).

Generally speaking, the tourism industry has been shown to exert pressure on natural resources by increased consumption in areas where resources are already scarce (e.g. the Mediterranean region). It generally overuses water resources, resulting in impacts such as water shortages, degradation of water supplies (ex. over-pumping for golf courses, which can cause saline intrusion into groundwater) and generation of a greater volume of wastewater. It can contribute to impacts such as environmental pollution (through pressures such as air emissions, solid waste and littering, release of sewage, oil and chemicals into soil or water), as well as architectural and visual pollution due to failures in integrating structures (such as facilities, roads, employee housing, parking, service areas and waste disposal facilities) with natural features and indigenous structures and architecture.

According to the EEA air quality report for 2016, emission reductions have led to improvements in air quality in Europe, but not enough to avoid unacceptable damage to human health and the environment (EEA, 2016). In this regard, tourism-related transport contributes to air pollution due to increased emissions by air and land vehicles. Additionally, noise pollution from airplanes, cars, buses and recreational vehicles, such as snowmobiles and jet skis, can cause annoyance and distress to wildlife.

In areas with a high concentration of tourist activities and natural attractions, improper disposal can cause damage to the natural environment, rivers, scenic views and roadsides, degrade the appearance of water and shorelines, as well as threaten marine life. An increased number of recreational facilities often leads to impacts such as increased sewage pollution, which can threaten the health of humans and of animals living in seas, lakes and rivers surrounding tourist attractions; it can also result in damage to flora and fauna and damage to marine ecosystems due to increased nutrients flow and algae growth. Another possible danger is the change in the salinity and transparency of water, with impacts on coastal environments. The following sections will provide an analysis of some types of tourism impacts more specifically for Europe.

Depletion of natural resources

Impacts from water use

Water consumption by tourists can be split into direct and indirect consumption (food, fossil fuels, energy use in hotels, biofuels, construction of tourism-related infrastructures), for personal care (showering, toilets) and for activities (snowmaking for ski, spas, saunas, wellness areas, swimming pools). A literature review made by Gössling (2015) provided figures for direct and indirect water consumption globally in 2010:

- Tourism is responsible for ca 17% of global domestic water consumption (42 km^3). Accommodation and services alone are responsible for around 7% of this.
- Direct water use may range between 84 and 2,425 litres per night, with an average of 350 litres estimated per guest per night, in accommodation, including water use in the room, and water use for the irrigation of gardens and pools.
- Consumption due to activities such as skiing or visits to wellness areas may range between 10 and 875 litres, with an average of 20 litres per guest per night and golf as the tourism activity with the most intense water use.
- For food production, only one study was carried out on a European destination so far, reporting 3.1 kg of food (with a high share of high-protein food) and 1.8 litres of water per day in Greece. Globally, the amount of water used for tourist food production ranges between a minimum of 4,500 and a maximum of 8,000 litres per day, with an average estimate of 6,000 litres per day.

Despite the fact that tourism is not the largest water consumer compared to other economic sectors in Europe, and despite the services sector consuming only 11% of total water use compared to agriculture (60%) and public water supply (32%), related tourism pressures over local freshwater resources accelerate water scarcity conditions, particularly in certain areas, where tourism activities are highly concentrated.

Tourism, together with agriculture, and urban populations, is responsible for dramatic changes in the water regimes of many inland waters, often as a result of modifications to watercourses or water abstraction, resulting in water scarcity, drought or floods. The heavy modification of watercourses, in particular, is one of the main threats to the biodiversity of lakes and rivers. In dryer regions like the Mediterranean region, the issue of water scarcity is of particular concern. Because of the warm climate and the tendency of tourists to consume more water when on holiday than they do at home, the volume of water consumed can rise up to 440 litters a day (WWF, 2004). In addition, existing literature indicates that water consumption by tourists is nearly two times higher than that by local residents.

Also, tourism activities engage large volumes of water for recreational facilities, such as for swimming pools, water parks, golf courses and for other activities. However, in some countries such as Spain, France, and Germany, the amount of water used by tourists has been substantially reduced close to the level that the local residents use (Gössling et al., 2012). It should be noted that some countries have already decoupled the number of tourists from water use, while some others still need to improve their water management practices.

The water abstracted to meet the needs of the tourism sector can be divided into consumptive and non-consumptive. Consumptive water use is that utilised mainly for accommodation services, swimming pools, water parks, extensive landscaping and golf courses etc., while non-consumptive water use is mainly consisting of aquatic sports (e.g. canoeing, diving, sailing, etc.).

The EEA has made an attempt to provide an assessment of the pressures exerted by tourism over freshwater resources, on a European scale; several indicators have been developed for this purpose.

However, distinguishing between water use by “tourists” and water use by “local residents” presents certain methodological challenges, which are further compounded by the fact that while each tourist increases water use at the travel destination point, there is a potential related reduction of water use at the point of origin. On the other hand, there is no such data available on a European scale. Thus, the analysis presented in this report has been developed based on rough estimates.

In Europe, around 60% of tourist overnight stays take place during summertime, while the remaining 40% take place in winter. In addition, summer months are also associated with high water scarcity conditions. Receiving around 560 million of overnight stays over only a few summer months in a limited number of locations is creating tremendous pressure over local water resources. For example, the Canary and Balearic Islands, Catalonia and Andalusia in Spain are typical examples of areas with a dense tourism population, associated with water exploitation index[8] (WEI) values of over 40% in the summer months. Estimations indicate that around 50-80% of total water use (water abstraction for public water supply) in these regions is attributable to tourists. Similarly, the Adriatic coastal areas of Croatia, Cyprus, Malta, as well as the Greek Islands, also experience higher water scarcity conditions during summer (higher than WEI> 20) due to the fact that more than half of water is abstracted for tourism. During the winter, similar conditions in terms of tourism pressure on water resources still continue, but with a slight geographical shift to the Alpine region and coastal areas of the Mediterranean.

Pollution

Impacts by wastewater

The tourism peak periods require additional investments in developing water supply and treatment systems to tackle high water demands caused by tourism. For instance, the local population of the Balearic Islands (Spain) is around 1,150,000 inhabitants (in 2014). However, these groups of islands receive approximately 2.5 times more tourists compared to the number of local residents. The Spanish government has made huge investments in constructing urban wastewater treatment plants to address these needs.

In addition, in many cases, meeting such a high water demand requires additional water supply measures to be taken, such as inter-basin water transfer, desalination of sea waters or over-exploitation of local resources, particularly groundwater resources – measures that have irreversible environmental impacts. Taking into account the fact that seasonality is a characteristic shared by several of the world’s leading tourist destinations (i.e., Canary Islands, French coast, etc.), and that major efforts are being made by local governments to reduce it, an analysis of its potential effects on water consumption is fundamental.

Necessary investments in the sewage system and wastewater treatment plants have already been made, leading to Europe's bathing waters being much cleaner today than they were 30 years ago. Minimum water quality standards have been met by 96% of all EU bathing water sites, as reported for the 2015 bathing season. The share of poor quality bathing water sites dropped to 1.6% in 2015 from 1.9% in 2014, whereas the share of bathing water sites in the EU with excellent water quality increased from 78.1% in 2011 to 84.4% in 2015 (EEA, 2016).

[8] The water exploitation index plus (WEI+) of European River Basin Districts is the percentage of total freshwater used compared to the renewable freshwater resources available. The EEA indicator shows that around 20 river basin districts, mainly in the Mediterranean, face structural water stress issues (WEI > 20%). These include Cyprus, Malta, Crete, the Balearic Islands and Sicily. The situation is even worse in summer. The average WEI for the summers 2002–2012 were 81% and 55% for Cyprus and Segura, Spain respectively, which suggests severe water stress and clearly unsustainable resource use.

Impacts by energy use and electricity consumption emissions

An ideal assessment of energy consumption by tourism should take into consideration three main aspects running through the entire life cycle of a touristic trip: the energy used for the round-trip to and from the destination, the local mobility at the destination and, at the very least, the energy consumption at the accommodation establishment.

Due to the lack of data availability, as well as the scarcity of research on the tourism impact on energy consumption, the scope is limited to accommodation establishments; in this case, scientific literature research shows that hotel facilities rank among the top five energy consumers in the tertiary building sector, following food services and sales, healthcare and certain types of offices.

According to an estimation made by the CHOSE project, in 2000, European hotels – i.e. almost 50% of the world total hotel rooms – used a total of 39 TWh, half of which was in the form of electricity. It was found that most of this energy came from fossil sources, with annual releases between 160 and 200 kg of CO_2 per m^2 of room floor area, depending on the fuel mix used to provide energy. In 2001, global hotel-generated CO_2 emissions were estimated to reach 55.7 Mt, which together with the estimated annual energy consumption of 39 TWh would result in emissions of more than 10 Mt of CO_2 each year for European hotels. The most energy-consuming activities in the hotel industry are:

- Heating and cooling rooms
- Lighting
- Hot water use and other energy consuming activities by guests
- Food preparation
- Swimming pool and other facilities

Heating/cooling, ventilation and air-conditioning are the activities with the largest consumption of energy in hotels, representing as much as approximately half of the total. Heating up hot water is commonly the second most energy-consuming task, accounting for up to 15% of the total energy demand. Lighting can fluctuate between a range of 12-18% and up to 40% of a hotel's total energy consumption, depending on the category of the establishment. Services such as catering and laundry are also responsible for a considerable share of energy consumption, particularly considering that they are usually the least energy-efficient.

Electricity consumption in tourist destination is, like other types of consumption, sensitive to seasonal variations and geographic and climatic conditions, as well as being influenced by the age and type of the building, the number of facilities provided (sauna, swimming pool, restaurants, etc.), the types of energy systems installed, the management and maintenance, the types and amounts of energy resources available locally, as well as energy-use regulations and cost. Behavioural aspects also play a role in terms of the electricity use habits of both guests and staff.

As for electricity consumption in Mediterranean destinations, several studies conducted in 2011 by Plan Bleu report no major problem in terms of the energy supply required for tourism. However, several destinations have experienced an impressive increase in overall electricity consumption. In Cabras and Castelsardo (Italy), where tourism accounts respectively for 10% and 16% of total consumption, the electricity consumed annually by the tourism industry increased by 68% in Castelsardo, from 718,229 Kwh in 2001 to 1,209,812 Kwh in 2005, and by 63% in Cabras, from 570,121 Kwh in 2001 to 929,809 Kwh in 2009, due to a combination of increased numbers of final users and increased use of electrical equipment, mostly for air-conditioning (Plan Bleu, 2011). Even higher growth rates have been registered elsewhere, for example in Torremolinos (Spain), where electricity consumption (tourism accounts for about 40% of this) increased by 160% between 1989 and 2008.

Impacts caused by waste generation and management

The relationship between tourism activity and municipal solid waste has been largely neglected by official statistics both at the national and European levels. Several studies have reported increases in municipal solid waste (MSW) in mountain areas such as the Carpathian mountains (Murava and Korobeinykova, 2016) and in islands such as the Balearic, the Canary and the Egadi archipelagos, as the seasonal tourist population rises. The studies also pointed out that tourism could act as a catalyst for improvement in MSW generation and management due to the fact that environmental damage may negatively impact the image/attractiveness of tourism destinations (Arbulú et al., 2015).

This has particularly been the case in small islands, which are environmentally more vulnerable to increases in MSW, and where any negative effects on health may spread more quickly, also due to temperatures rising as high as 40 ^{o}C in the months of July and August (WHO, 1996). Increased generation of waste during the peak tourism season requires major management efforts from the local authorities and leads to increased use of local resources, such as water use for the cleaning of bins, and increased frequency of waste collection and road transportation, with a concomitant increase in fuel consumption and air emissions.

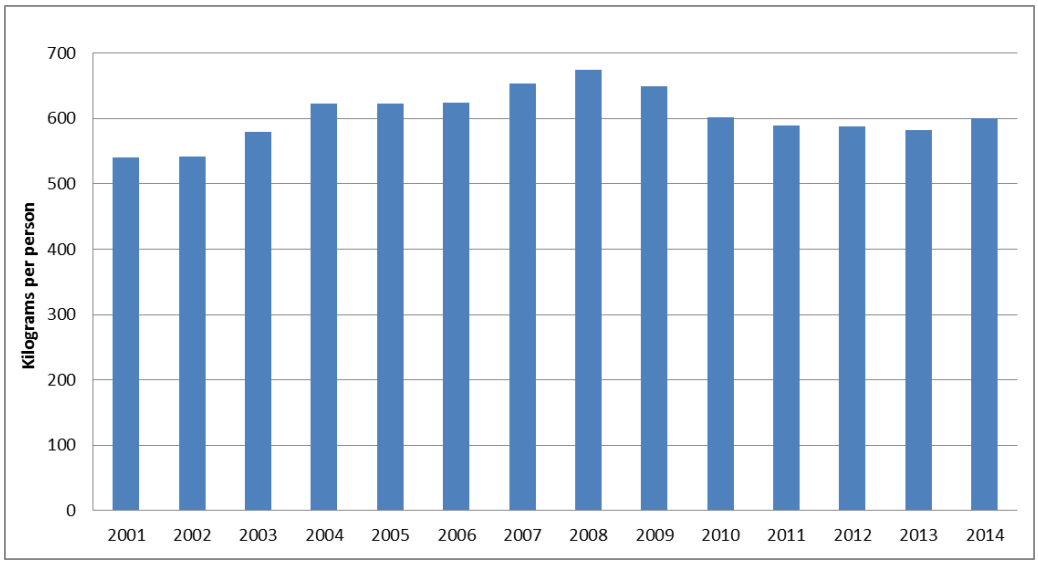
Empirical findings of pilot projects report that for example in Menorca, during the period 1998 to 2010, the daily average of MSW generated in August by tourists was higher than that generated by residents, whereas in Mallorca they showed that a 1% increase in the rate of tourist arrivals would result in a 1.25% increase in waste generation (Arbulú et al., 2016).

Table 2.7 Total number of nights spent by non-residents in hotels and similar establishments in Malta, 2003–2014

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Million nights spent in Malta	7.3	7.4	7.2	7.0	7.5	7.4	6.4	7.1	7.2	7.3	7.9	8.2

Source: Own elaboration from Eurostat, 2015.

Figure 2.7 Municipal solid waste generation per person in Malta, 2001–2014



Source: Own elaboration from Eurostat, 2015.

The generation of MSW in Malta increased continuously during the first decade of this century, reaching a peak in 2008, which was followed by a downward course over the next five years. An important parameter that affects MSW generation in Malta is the tourism sector, which constitutes a large share of the national gross domestic product (GDP). The 2003 Malta's National Statistics Office Hotel Waste Survey indicates that, on average, a tourist generates almost double the waste generated by a Maltese resident. While a Maltese resident living in a household generates an average of 0.68 kg of waste daily, a tourist residing in a hotel produces an average 1.25 kg of waste each day (EEA, 2013). Consequently, the reduction in MSW can largely be directly linked with the observed drop in tourist arrivals and nights spent in hotels during 2009 and 2010, followed by a substantial increase towards 2014 (Eurostat, 2015). Table 2.7 shows the development of tourism in Malta, represented as nights spent by non-residents in hotels and similar establishments. However, while tourism activity increased after 2011, MSW generation decreased even further (see Figure 2.7).

Box 2.4 Marine litter

In the Mediterranean, marine litter has been confirmed as a critical issue. The problem is exacerbated by the basin's limited exchanges with other oceans, its densely populated coasts, highly developed tourism, 30% of the world's maritime traffic passing through and various additional inputs of litter from rivers and very urbanised areas (UNEP-MAP, 2015). Additionally, most of the marine litter in the Mediterranean originates from land-based rather than sea-based sources. On beaches in the Mediterranean, it originates from tourism and recreational activities, and consists mainly of plastics (bottles, bags, caps/lids, etc.), aluminium (cans, pull tabs), and glass (bottles). Arguably, the amount of litter originating from recreational/tourism activities increases greatly during and after the tourism season. During the summer season, the populations of seaside towns are sometimes double what they are in wintertime. In some tourism areas, more than 75% of the annual waste production is generated in summer. According to statistics from holiday destinations in the Mediterranean (Bibione/Italy and Kos/Greece), tourists generate an average of 10% to 15% more waste than inhabitants. In the case of Kos Island, the tourism period is from April to October, with 70% of the total annual waste produced during this period (UNEP-MAP, 2011). Malta, where over 20% of the Global Net Production is generated by tourism, registered an increase in the use of packaging (37% of municipal solid waste) in 2004, so that in 2002 it introduced "bring-in sites", with 400 stations installed by 2006 to enable the public to deposit clean, source-segregated recyclable materials.

Photo: Marine litter on a Norwegian pebble beach © bo eide.

Research funded by the Balearic Government in 2005 (Martinez-Ribes et al., 2007) focused on the origin and abundance of beach debris in the Balearic Islands, including Mallorca, Menorca, and Ibiza,

which are all main tourism destinations. This fundamental study shows similarities to other tourism areas and is therefore very helpful in determining the sources of littering, which are highly connected to tourism. The volume of litter found in August is twice as high as that found in the beginning of the tourist season, in April. Finally, data from a monitoring experiment on a sample of 52 beaches in France confirmed that tourism and fishing-related activities are the main sources of litter; food-related litter, food wrappers, hygienic products and smoking-related items are the most frequently encountered.

This phenomenon has a wide range of economic and social impacts and negative environmental effects that are often interrelated and frequently dependent upon one another. Despite the fact that there is little or no reliable data on what the exact costs are, the loss of tourism-related revenues due to marine litter has been recognised and considered significant, since tourism needs a clean and safe environment that is not aesthetically polluted. It remains unclear at what density litter starts to deter tourists, but it has been shown, though not specifically within the context of the Mediterranean Sea, that a drop in beach cleanliness standards could reduce revenue by up to more than 50% (Ballance et al., 2000). It was found that 85% of beach users would not visit a beach with two or more large debris items per metre. In extreme cases, such as urban beaches, marine litter can also lead to the closure of beaches. Marine litter can also result in impacts such as economic damage: losses for coastal communities, and the tourism, shipping and fishing industries. The potential cost of coastal and beach cleaning across the EU was assessed at almost € 630 million per year (European Commission, 2017).

Impacts caused by tourism-related transport emissions

The current level of development of European and global tourism is hardly imaginable without the existence of a widely developed network of connections, especially in terms of air and land travel. It is a symbiotic relationship, where both tourism and transport have mutually aided and influenced each other: the existence of a capillary road network since ancient times in Europe, at a later time complemented by the railway network built over the course of the 19th century, has initiated and stimulated the growth of tourism while, on the other hand, the evolution of tourism has triggered new mobility patterns and developments in transport infrastructures (Gyr, 2010). In 2015, it was estimated that travel for holidays, recreation and other forms of leisure accounted for just over half of all international tourist arrivals (53%) (UNWTO, 2016).

Globally, tourism is heavily reliant on energy-intensive modes of transport, including aeroplanes and cars. Currently contributing approximately 5% of the global total, carbon emissions due to tourism are predicted to more than double within 25 years (UNESCO and UNEP, 2016).

The demand for transport in Europe is significantly higher today than it was in 2000, and by 2050 passenger transport is projected to grow by more than 50% (EEA, 2016). European tourism trips constitute a significant share of this demand. Between 15% and 20% of all passengers' kilometres within Europe by car, rail and coach modes were due to tourism, whereas for air travel they represent the main motive (Peeters et al., 2007).

As is the case for transport in general, tourism-related transport causes emissions that can negatively affect human health and the climate, and to some extent nature and biodiversity. Despite their increasing impact, considering the growing numbers of both trips and distances travelled for tourism purposes, these emissions have not been regularly calculated either in geographical or temporal terms. However, the review of some ad hoc research and essays carried out in the last 15 years provides basic information which will be useful for further investigating and increasing our knowledge in coming years.

Photo: Panels from the Thomas Cook Building in Leicester, displaying excursions offered by Thomas Cook ©wikigallery.org.

Land transport

Worldwide, car transport is the dominant means of transportation in world tourism (77% of all journeys) (Rodrigue et al., 2006), as is also the case for intra-European tourism trips. Tourists often rent cars to journey within their destinations, which has triggered an active clustering of car rental companies, which have emerged in recent years. These are usually adjacent to main transport terminals (airports, train stations) and touristic venues. There is limited official data on the exact size of the European car rental market, but some estimates are available. The top five European markets for the industry are France, Germany, the UK, Spain and Italy (representing roughly 70% of the total market). Demand from holidaymakers is estimated to increase the leisure segment of the European car rental markets by 3%-4% per year, with 55% of the current demand for the biggest company in Europe driven by leisure motives (Nedrelid Corporate Advisory, 2016). It has been estimated that tourist transport by car has the highest impact on air quality. In 2002, emissions of PM, NO_x and GHG by tourism transportation means were estimated[9] at, respectively, 1,590, 570,000 and 210,000.000 tonnes; private cars accounted for 87%, 54% and 41% of this, respectively. As for the PM, the remaining 13% was estimated to be equally shared between ferries, coaches, air and rail (Peeters et al., 2007). Rail, coaches and ferries accounted for almost 20% of all tourism trips, and were responsible for a very small percentage of environmental impacts in terms of air quality. A forecast developed for the year 2020 predicted an increase in rail and car passenger volumes, with a moderate and low demand increase, respectively, whereas the strongest demand increase between 2000 and 2020 was forecast for air travel holidays (Peeters et al., 2007).

It can be supposed that, as the majority of all tourism trips (64.4%) and domestic ones (75.8%) in Europe are done by motor vehicles, these vehicles (especially cars) are still the cause of the largest impacts on air quality in terms of tourism transport.

[9] Calculation method within the MuSTT data model: Multistakeholder European Targeted Action for Sustainable Tourism and Transport, initiative by the former European Commission's DG Enterprise (2004).

Air transport

Globally the demand for air transport continues to double every 15 years, with around six billion passengers a year expected by 2030, and the sector already accounting for 2% of man-made CO_2 emissions. Air passenger/km are expected to rise from 5 billion to more than 13 billion over the period 2010 to 2030, while intra-European travel is projected to remain among the world's top five travel patterns between 2030 and 2040 (ICAO, 2013).

Already in 2000 it was estimated that European tourism transport volumes by car had the largest impacts on air quality, whereas air transport showed the largest share in GHG emissions (80% in 2000) in the EU-25. It can be concluded that climate change is one of the main environmental costs of tourism transport (Peeters et al., 2007), especially when taking into consideration that air traffic and number of air passengers carried are steadily increasing in Europe. Total GHG emissions by tourism in the EU-25 were approximately 15% and forecast to increase as high as 30% by 2020, assuming the European Union will still have just 25 member states.

Photo: A plane taking off. Source: wallpaperscraft.com.

In 2007, there were ca 600 million estimated air passengers in Europe, of which 400 million were leisure passengers (81% carried by low-cost airlines). In 2030, Europe is expected to have international tourist arrivals corresponding to almost 99% of its population (UNWTO, 2011), with increased environmental impacts that have both a global (climate change) and local (noise) dimension as far as aviation is concerned. Also in 2010, approximately 65% of the global aviation fuel consumption was generated by international aviation, which is expected to grow to nearly 70% by 2050 (ICAO, 2016).

The aviation industry is likely to come under increasing pressure to reduce greenhouse gas emissions, as this extraordinary growth, especially in long-haul travel, and the sector's reliance on fossil fuels are incompatible with the need to decarbonise the global economy enshrined in the 2015 Paris Agreement (Scott et al., 2016). Also, the sector's successful and progressive shift towards biofuels seems to be paved with numerous uncertainties, due to the lifecycle emissions of biofuels, as well as related social and wider environmental impacts caused by direct and indirect land use changes and the fact that a large share of the available bioenergy resources would be devoted to producing aviation fuel (ICAO, 2016). One small step forward has been taken since the Climate Conference in Paris in December 2015. In February 2016, the Committee on Aviation Environmental Protection of the International Civil Aviation Authority issued, for the first time ever, a recommendation for a CO_2 emissions standard for aircraft that could be strengthened over time (ICAO, 2016). It is also recognised that the European aviation sector brings significant economic and social benefits, even though it has been argued that the growth of the

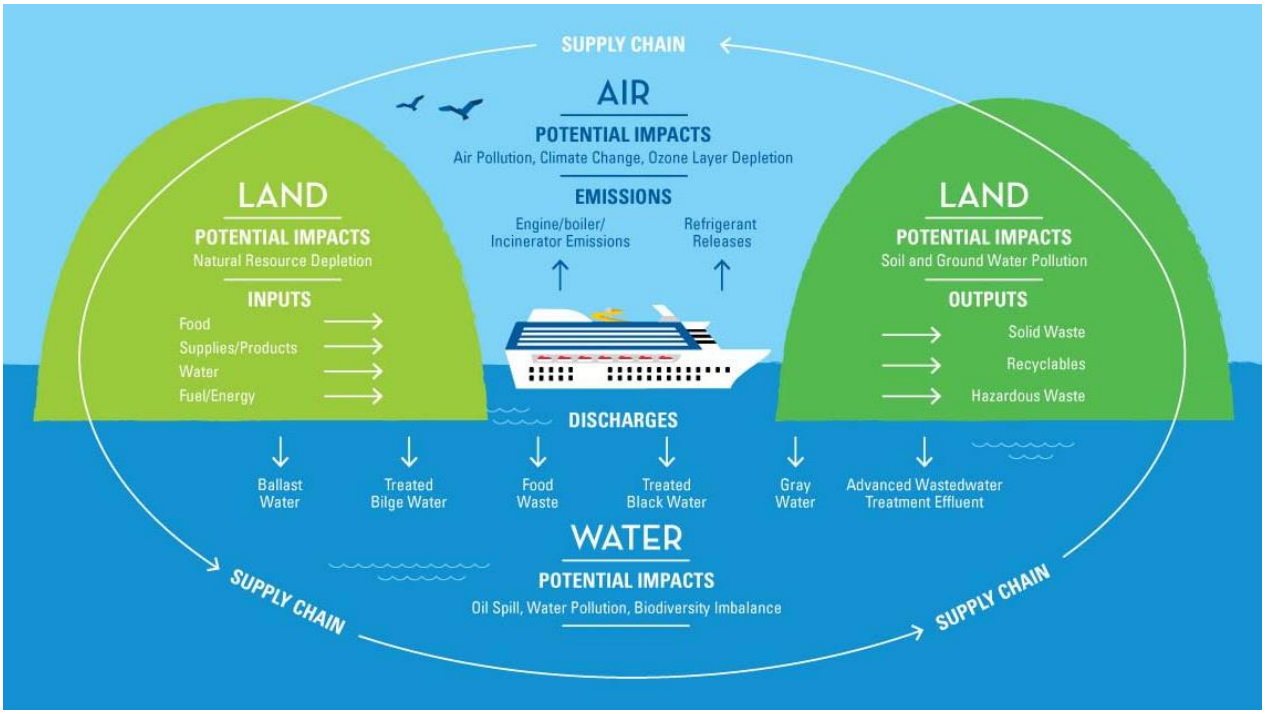
aviation sector may partly have entailed losses in other travel sectors, such waterways and railways, and that it is mostly transport in general that is able to generate multipliers (Gössling and Peeters, 2007).

Cruise tourism

Cruise ships are the most emission-intense[10] means of transport per kilometre travelled: average direct air emissions of 0.330 kg CO_2 per ALB KM (Available Lower Berth KM)[11] have been estimated (Carnival Corporation & PLC, 2008). Furthermore, most cruise holidays start with flights to reach harbours, adding between 10% and 30% to the total emissions caused by the cruise (Eijgelaar et al., 2010).

Ad hoc research and studies have been carried out on emissions by cruise ships both at berth and at cruising speed. Emissions and impacts at berth, due to the "hoteling" functions (restaurant, pools, air conditioning, etc.) that the engines have to secure continuously, even when not sailing, are also considered to be different and greater in a turnaround port than in a transit port. Indeed, home ports not only have to provide the appropriate infrastructures to enable embarking/disembarking operations at the beginning/end of the itinerary but also have to be able to provide additional transport-related services such as parking lots and buses, shuttles and taxis in order to cover distances from the port to city centres, airports and train stations. A study commissioned by the European Commission in 2009 focused on one year of activity of cruise tourism in Europe in order to assess environmental impacts by cruise ships. The study addressed 177 ships for about 144 itineraries covering EU cruise tourism destinations (Policy Research Corporation, 2009).

Figure 2.8 Potential environmental impacts caused by cruise ships



Source: http://carnivalsustainability.com.

[10] Emissions are calculated by multiplying transport distances with averaged emission factors (i.e. averaged amount of CO_2 emitted for transporting one person over one kilometre).
[11] The ALB occupancy is based on two passengers per cabin.

The Mediterranean Sea basin resulted to be the most affected by cruise ships emissions both at sea and at berth (see tables 2.8 and 2.9), with more than 70% of the total cruise tourism emission in the EU. The top fifteen ports in EU with the highest emission levels of NO_x, SO_2, CO_2 and PM correspond to five top Mediterranean tourism destinations: Barcelona, Civitavecchia, Naples, Piraeus and Livorno. In some cases, emissions were also compared to the total emissions generated by activities in the port area and it was found that in Barcelona and Piraeus, the shares of SO_2, CO_2 and PM emissions by cruise ships were less than 0.4% of the total and the shares of NO_x were, respectively, 2.8 and 2.4 (Policy Research Corporation, 2009).

However, a more recent study estimated cruise ship emissions of NO_x, SO_2 and PM2.5 –and their associated health effects– across five of the busiest Greek cruise ports (Corfu, Katakolo, Mykonos, Piraeus and Santorini) throughout 2013 (Maragkogianni and Papaefthimiou, 2015). All those ports received altogether 2,565 visits and over 4 million passengers from 134 cruise ships, which were at berth for more than 26,000 hours. Almost 60% of the emissions were released during the peak cruise tourism in summer months, over the course of a tourist season that extends from April to October. The total emissions of all ports equalled 2,742.7 tons, with NO_x emissions accounting for the highest volume (1,887.5 tons), followed by SO2 (760.9 tons) and PM2.5 (94.3 tons).

Table 2.8 Emissions in Europe due to cruise tourism

Emissions (tonnes)	NO_x		SO_2		CO_2		PM	
	absolute	%	absolute	%	absolute	%	absolute	%
At sea	156521	89	96288	99	6091920	85	15006	87
At berth	20296	11	677	1	1076411	15	2277	13
Total	176817	100	96965	100	7168331	100	17283	100

Source: Policy Research Corporation, 2009.

Table 2.9 Total annual emissions per sea basin due to cruise tourism

Total emissions At sea and berth (tonnes)	NO_x		SO_2		CO_2		PM	
	absolute	%	absolute	%	absolute	%	absolute	%
Baltic sea	18463	10	6181	6	750109	10	1796	10
North sea	9382	5	3113	3	381597	5	923	5
Atlantic ocean	22981	13	13895	14	923574	13	2228	13
Mediterranean sea	125584	71	73524	76	5096899	71	12296	71
Black sea	406	0	252	0	16153	0	39	0

Source: Policy Research Corporation, 2009.

The potential costs of these ports for residents, in terms of adverse health effects arising from air pollution, were also estimated according to two different methodologies; the total health costs according to the estimates are €24.25 (method 1) and €12.42 million (method 2), which means health costs per cruise passenger of between €2.5 (method 1) and €5.3 (method 2).

However, when it comes to CO_2, emissions can vary according to differences in the typologies of cruise ships (age, size, occupancy, services on board), a fact that may lead to huge differences in values. An analysis of 28 cruise ships sailing Northern European seas and arriving in Bergen (Norway) resulted in a minimum value of 0.198 kg CO_2 per passenger per km, up to a maximum of 1.315 Kg CO_2 per passenger per km (Walnum, 2011). Also on a sub-regional scale, when compared to other modes of transport, cruise ships are estimated to be the most CO_2 emitting mode of transport per passenger per kilometre, ahead of cars, buses, trains and aircraft. Also if compared to container ships in the OECD countries,

average cruise ships consume from 20% up to 60% more energy. The latter require a power level of around 30-40 MW, versus 25 MW required by the former. Because of the recreational and comfort facilities of cruise ships, especially when at berth (20-30% of the total engine power), an average cruise-ship requires a power equivalent to that required by around 4700–7000 households (Policy Research Corporation, 2009)[12].

Physical impacts

Ski resorts

Ski resorts and their related infrastructure (slopes, lifts) have a major impact on sensitive mountain environments. The construction of ski slopes and lifts consistently damage the existing high mountain ecosystems and increase the risks for avalanches. At the same time, high mountain ecosystems are protected widely through the Natura 2000 network, which leads to a potential pressure exerted by skiing activities and their infrastructures on protected areas.

Table 2.10 DSPIR approach applied to ski resorts

Drivers	Pressures		State	Impacts			Responses	
Snow availability throughout the season (Natural D)	Water consumption for artificial snow (local component)	Seasonality. Concentration of pressure (intensity) over time	Not relevant	Land degradation (loss of vegetation cover) Erosion	Loss of biodiversity	Fragmentation	Implementation of water management plan (Efficient use of water resources)	Develop additional activities along the year
Attractive Landscape (Natural D)	Land take • Development of additional infrastructure • Hotels and apartments Development of ski lifts		% of natural and semi-natural classes % HNV forests				Develop activities related to nature awareness	
Reduced costs of skiing (Socio-economic D)			Not relevant					
Accessibility (Socio-economic D)	Development of transport infrastructure (land take)		Not relevant				Provide other means of accessibility (e.g. buses)	

Source: Own elaboration.

On the other hand, skiing is one major pillar of economic development in mountain regions and is concentrated at specific points in the different mountain ranges in Europe. The seasonal increase of population in skiing resorts also raises questions about resource use, waste and pollution in these areas. The interaction of these different elements has been structured in order to provide a more integrated view of the sustainable dimension (see Table 2.10).

Ski slopes and lifts are concentrated in Europe's high mountain ranges such as the Alps, Pyrenees, Carpathian and Scandinavian mountain ranges, as well as a number of lower mountain ranges over central, eastern and south-eastern Europe, Spain and Italy, as well as the British Islands (see Map 2.16).

[12] Assuming that an average household needs 20.5 kW per day and has an hourly demand of 1.28 kW over 16 hours per day.

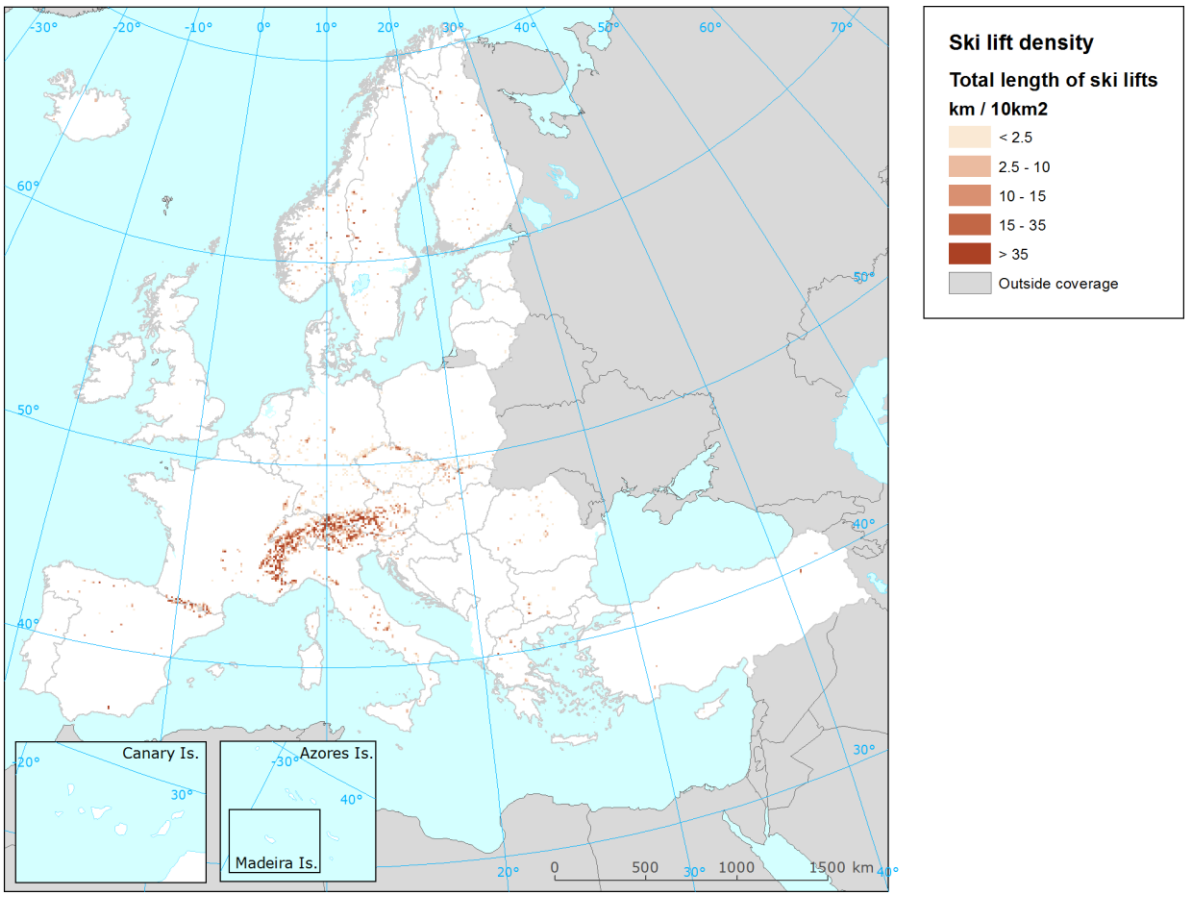
The French, Swiss, Italian and Austrian Alpine regions stand out, containing the first ten regions in terms of length of ski slopes and lifts per NUTS3 regions.

The potential pressure of ski resorts on protected areas of the Natura 2000 and the Emerald Networks, calculated for the Pyrenees and the Alps, shows the percentage of the protected area that is potentially affected by ski resorts.

In the case of the Alps, the protected areas with the highest impact are located in the French Alps, particularly in the Savoie and Haute-Savoie departments, as well as in the Italian valleys of the Torino region on the border to France, where the Natura 2000 site with the highest pressure value (Col Basset, 94.5) due to the high density of ski resorts is also located. The northern Italian NUTS-3 regions of Belluno, Bolzano and Trento also include several Natura 2000 sites with relatively high (> 25%) pressure values. Both Austria and Switzerland do not show major pressure on protected areas (see Map 2.17).

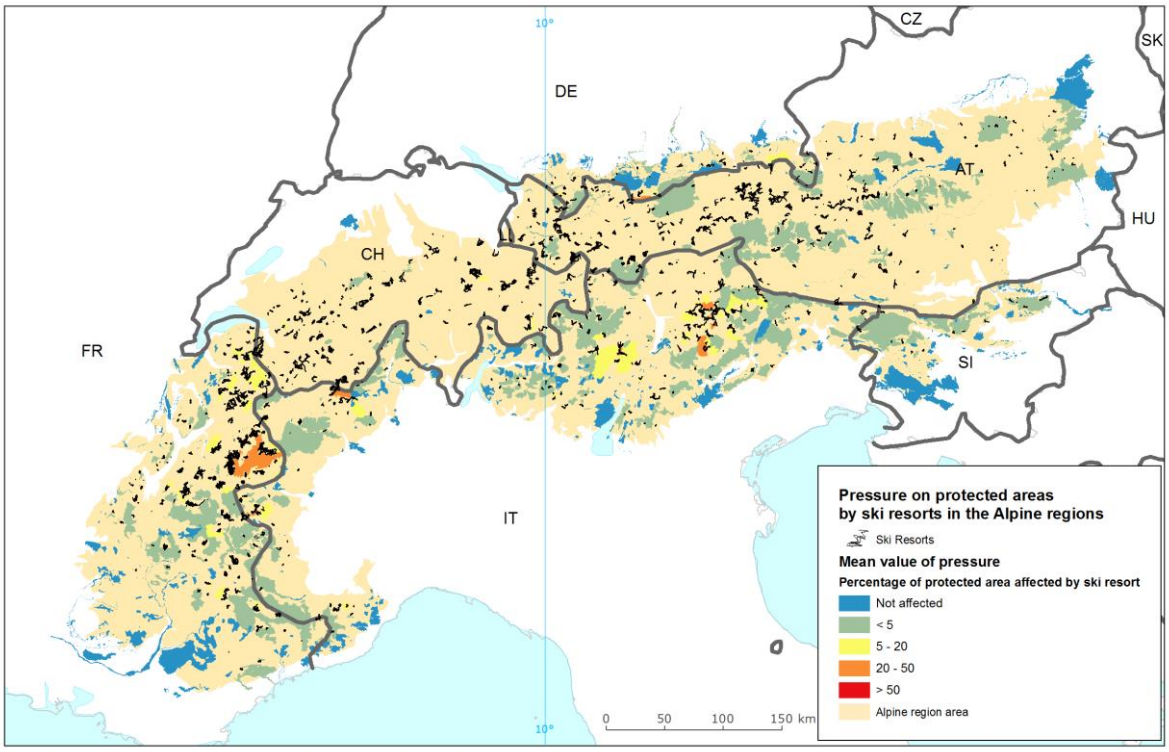
In the case of the Pyrenees, the overall values are much lower compared to the Alps, as the Natura 2000 network is denser there. Ski resorts are also much smaller and more dispersed. The highest pressures can be observed in the French region of Hautes-Pyrénées. Generally, the Natura 2000 sites in the Spanish Pyrenees have lesser pressure than on the French side (see Map 2.18).

Map 2.16 Ski lift density in Europe



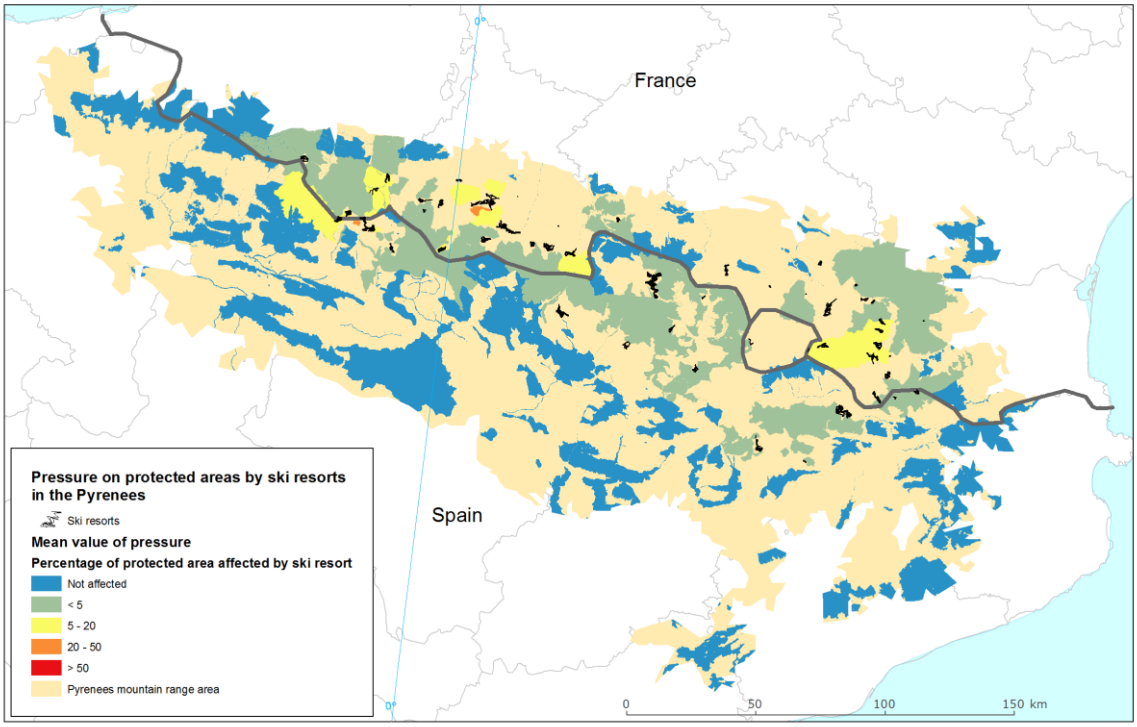
Source: Own elaboration based on OpenStreetMap and EEA data.

Map 2.17 Pressure on protected areas by ski resorts in the Alps



Source: Own elaboration based on OpenStreetMap and EEA data.

Map 2.18 Pressure on protected areas by ski resorts in the Pyrenees



Source: Own elaboration based on OpenStreetMap and EEA data.

Marinas

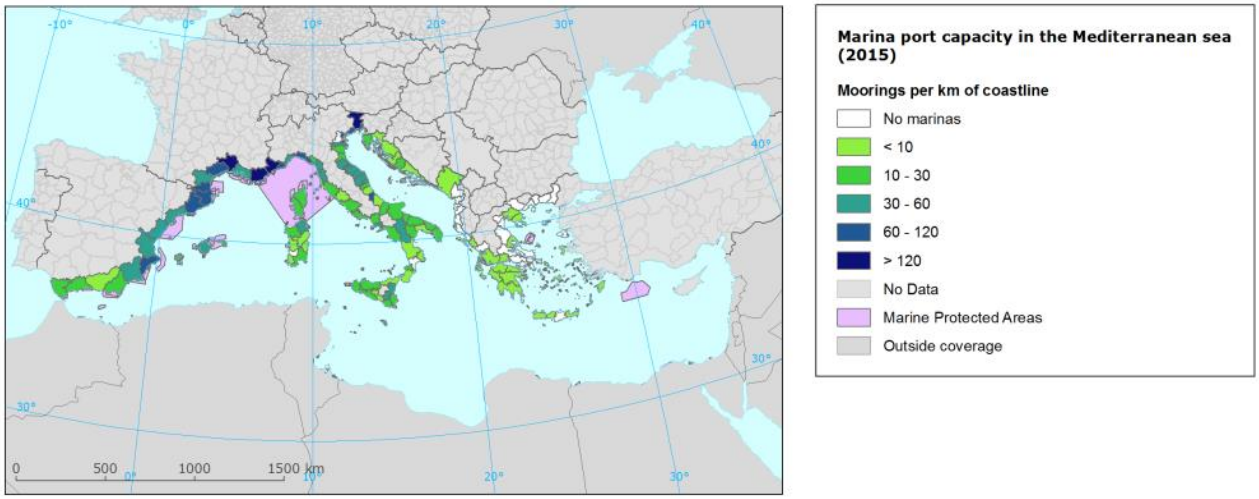
Europe has the highest number of marinas (ca 9,000) worldwide, despite the fact that its boat fleet is generally smaller compared to other regions. In 2010, in the Mediterranean alone, 946 marinas were recorded: 860 in Southern Europe and the remaining along the North African coast, in Middle East countries and in Turkey (Plan Bleu, 2011). The density of boats was estimated per kilometre of coastline, resulting in 8,000 in Italy and 10,000 in France (79,000 in the USA), whereas the highest density of boats per 1,000 inhabitants was recorded in Scandinavian countries (ca 170 boats per every 1,000 inhabitants in Norway, versus ca 10 boats in the UK), probably due to a historically well developed maritime tradition (Plan Bleu, 2011).

Recreational boating infrastructures, in particular marinas, have a strong impact on the coastal and marine environment if not properly designed, managed and monitored. Marinas can modify coastal dynamics (changes in terms of erosion and sediments deposition), with a strong impact on the coastal morphology. The maintenance of yachts and recreational shipping activities also have an impact on the quality of water and the seabed ecosystems in the vicinity of yachting harbours (e.g. due to the application of anti-fouling materials, cleaning of boats, oil discharges, etc.) (Cassi et al., 2008).

The highest pressure of marinas, considering the number of moorings per km of coastline, in the case of the Mediterranean Sea, is concentrated in the coastal NUTS3 regions of the Gulf of Lion (S of France and NE of Spain). The lowest pressure occurs on Greece and Western Balkans. In terms of the islands that constitute important tourism destinations in the Mediterranean, the highest pressures can be observed in Mallorca, while the pressure is lower on the Easter Mediterranean coast (see Map 2.19).

A large amount of Marine Protected Areas (MPAs) can be found along the Mediterranean coastline, and yet many marine ecosystems are not properly protected. Recreational shipping activities, including anchorage, can have a major impact on sensitive marine sea beds close to the coast, if not regulated. The pollution caused by antifouling present in many port sediments may also affect sensitive ecosystems close to marina ports.

Map 2.19 Marina port capacity in European countries on the Mediterranean sea, NUTS 3, 2015

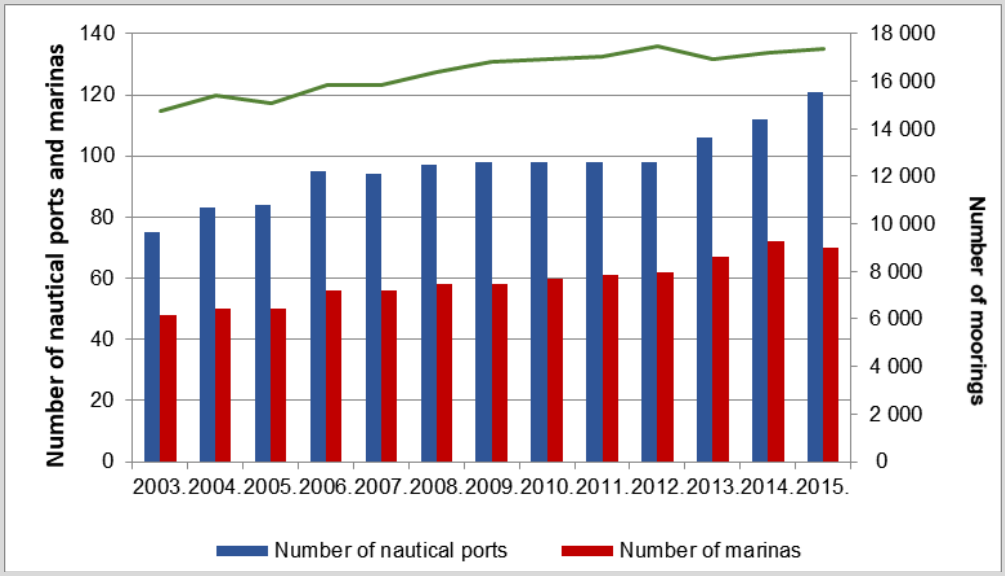


Source: Own elaboration based on Plan Bleu, Spanish Yachting Club Association, PortBooker, and EEA data.

Box 2.5 Case study: Sustainable development of nautical tourism in Croatia

The natural basis for the development of nautical tourism is the Adriatic Sea, with its indented, 6,176 km long coastline, 4,398 km of which belong to the islands' coastlines, and with 1,244 islands, islets and cliffs, 50 islands being inhabited. The average of nautical tourists' stay in Croatia is 16 days and the most attractive area to them is the Middle Adriatic, which is partly under different categories of protection. Given the pressure from an ever-increasing demand for new moorings (see Figure 2.9) in the Mediterranean and the short seasonality (concentration of a large number of tourists) in a particular area, this type of tourism can threaten the natural basis, i.e. reduce the value of land and the environment, and thus the value of the nautical offer.

Figure 2.9 Nautical ports and number of moorings in the Republic of Croatia



Source: Croatian Bureau of Statistics.

Natural potential, which obviously has its limitations, has been recognised as the foundation of the value and development of the tourism sector, which is the reason why Croatia has developed a plan for the development and management of nautical tourism that is in line with the principle of sustainability. This means that a compromise has to be found between preserving the natural space and fostering economic development, since poor environmental quality and locations devastated in their natural attractiveness cannot support tourism. Measures that have to be implemented in this sense are:

- increasing competitiveness and extending the tourist season;
- activating the less visited nautical corridors by building new marinas (balanced regional development);
- reviewing spatial planning documents for the construction of new marinas, including determining the carrying capacity of the area and the boundaries of such carrying capacity;
- increasing capacities through rehabilitation, reconstruction and renovation of existing ports and coastal parts (e.g. adaptation of part of the shipyard capacity and of abandoned industrial facilities);
- equipping vessels and nautical ports with devices and equipment for the protection of marine waters from pollution and for environmental monitoring;
- boosting the local economy so that residents may participate in nautical tourism;

- reviving the traditional local crafts and skills which can provide additional attractiveness;
- applying new technologies and environmental standards;
- providing continuing education.

According to the Nautical Tourism Development Strategy of the Republic of Croatia 2009–2019, it is envisaged to implement a moderate development plan for the construction of new marinas (Republika Hrvatska, 2008). Based on this plan, the capacity for reception at moorings should be increased by 2020 in order to accommodate an additional 15,000 vessels. Thus, 5,000 new moorings will be built in the existing ports, with an additional 5,000 moorings in new locations (proportionally deployed along the Croatian coast and islands) and 5,000 locations for the accommodation of vessels ashore. In other words, 2/3 of the mooring locations developed will be at sea and 1/3 will be ashore. Furthermore, the data relating to the use of space for the construction indicate a moderate trend of "exploiting" the existing natural capital. In 2010, 98 ports specifically designated for nautical tourism benefited from a 3,313,110 m^2 surface water area and a 756,538 m^2 land area (a total of 4,069,648 m^2), while in 2015 a total of 121 nautical tourism ports benefited from a 3,614,784 m^2 surface water area and a 787,562 m^2 land area (a total of 4,402,346 m^2).

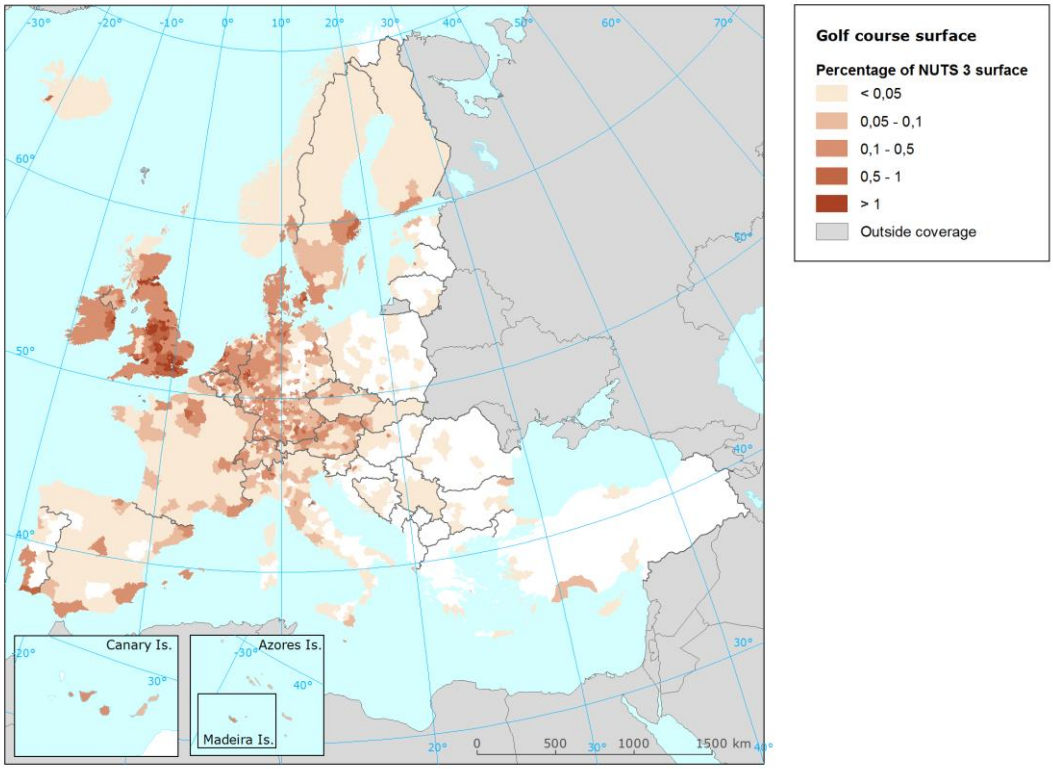
Golf courses

In recent years, golf tourism has increased in popularity and the number of golf courses has grown rapidly. Despite Europe covering only 7% of the total land area of the earth, it hosts 22% of all golf areas around the world, second only to North America, which has 53% of the world's golf courses (R&A, 2015). There are around 8,000 golf facilities in Europe, and most of them are important tourism attractions. Such infrastructures may have a major impact on the surrounding environment. Golf resorts do not only include the greens, but also – and most importantly, in Mediterranean countries – they are the central part of second-home developments. Resource consumption (e.g. water extraction, land occupation) and pollution generation (e.g. use of pesticides) are major concerns. Golf course maintenance can also deplete fresh water resources. Golf courses require an enormous amount of water every day and, as with other causes of excessive water abstraction, this can result in water scarcity. If the water comes from wells, over-pumping can cause saline intrusion into groundwater. Golf resorts are more and more often situated in or near protected areas, or areas where resources are limited, exacerbating their impacts.

United Kingdom hosts 35% of all golf courses (by area) in Europe followed by Germany (13%), France (8%), Sweden (7%), Spain (6%) and Ireland (5%). These six countries have three out of four of all golf facilities in Europe. The average area of golf facilities is approximately 40 ha. However, the size is site-dependent and shows a great variation from 10 to 700 ha.

The spatial representation of the indicators is expressed as the ratio between the area covered by golf courses and the area covered by the corresponding NUTS 3 region (see Map 2.20). The distribution shows a high concentration of courses in NUTS 3 regions, with a relatively high share in Great Britain, particularly from around the Greater London area northwest-wards to the Liverpool area. Similarly, high shares can be observed along the Firth of Forth Bay in Scotland and in the metropolitan Area of Dublin. There is also a high share of golf courses on both sides of Oresund (DK, SE). Finally, the central European countries of Switzerland, Austria, Germany and the Netherlands show also high shares of golf course areas, partially due to the small area of the corresponding NUTS3 regions. Though with lower shares (between 0,5 and 1% of the total NUTS 3 area), several Mediterranean NUTS3 regions such as Algarve (PT), Cádiz, Málaga, Murcia, Valencia and Girona (ES), Alpes Maritime and Var (FR), as well as Antalya Province (TR), stand out. The large area of golf courses in these regions that is prone to water stress, particularly in summer, is of major concern.

Map 2.20 Ratio between the area covered by golf courses and the area covered by the corresponding NUTS3 region



Source: Own elaboration based on OpenStreetMap.

Second homes

A second home is a dwelling used by its owner and possibly other visitors for leisure or holiday purposes, and which is not the usual or permanent owner's place of residence. Consolidated tourism destinations (in mountain, rural or coastal areas) are usually places with a considerable second-home offer.

The rapid growth in the number of second homes during the 1990s created more intensive pressures on land and the environment, especially in coastal and mountain zones, e.g. in Sweden around one third of the second homes are 100 m from the shore. In some countries, this trend continued during the first decade of the 21st century. The most recent available data shows that Mediterranean countries hold the highest numbers of second homes in Europe, although the rate of second homes per inhabitant also shows that Nordic countries (especially Finland, Norway, and Sweden) have a relatively high presence of second homes in relation to their population (see Table 2.11). Finland, with 91 second homes per 1,000 inhabitants is one of the countries with the highest number of second homes in Europe, in relation to its population (see Box 2.6). In Europe, many second homes are owned by people resident in other countries. For example, the breakdown of the location of second homes owned abroad by residents of the United Kingdom is 27% in Spain, 26% in France and 23% in the rest of Europe.

Negative environmental impacts from second homes consist of, among others, wildlife disruption due to the clearance of vegetation, disposal of human waste, and aesthetics and uptake of the land. High densities of second homes can increase the potential for environmental degradation and increase competition between locals and second-home owners for shared natural resources. The extended construction of new buildings has also resulted in huge pressures on infrastructure such as water supply, sewage and roads. In the case of the Balearic Islands (Spain), there have been studies on the urban

sprawl partly caused by second-home expansion on the island of Mallorca, moving from the established coastal tourism resorts to the interior of the island, contributing to the rural landscape change (Hof and Blázquez-Salom, 2013).

Table 2.11 Number of second homes and intensity in selected countries

Country	Number of second homes	Per 1,000 population	Year
Finland	498,700	91	2013
Portugal	929,936	90	2001
Norway	423,000	87	2010
Greece	924,877	84	2001
Spain	3,681,565	79	2011
Sweden	680,000	75	2005
Switzerland	513,000	65	2010
France	3,318,000	51	2016
Croatia	182,513	41	2001
Denmark	220,448	39	2012
Czech Republic	396,000	38	2001
Iceland	10,570	33	2011
Netherlands	362,000	23	2000

Source: Adamiak et al., 2015, and Institut National de la Statistique et des Études Économiques, 2017.

On the positive side, the owners of second homes tend to favour land use control and preservation and are interested in hindering further large-scale tourism development. Second homes may also contribute to the conservation of the rural housing stock, bringing empty and redundant properties back into use and enhancing the visual quality of rural areas. However, the purpose-built second homes are often poorly designed and do not integrate well with the townscape (Brida et al., 2011).

Efforts have been made to regulate the construction of second homes. In Switzerland, 2,500 second homes were built each year between 2000–2010; however, following a referendum confirmed by a ruling of Switzerland's highest court in 2013, construction of second homes was banned in communities with a share of second homes over 20%, though there are exceptions to the ban.

Box 2.6 Case study: Second homes in Finland

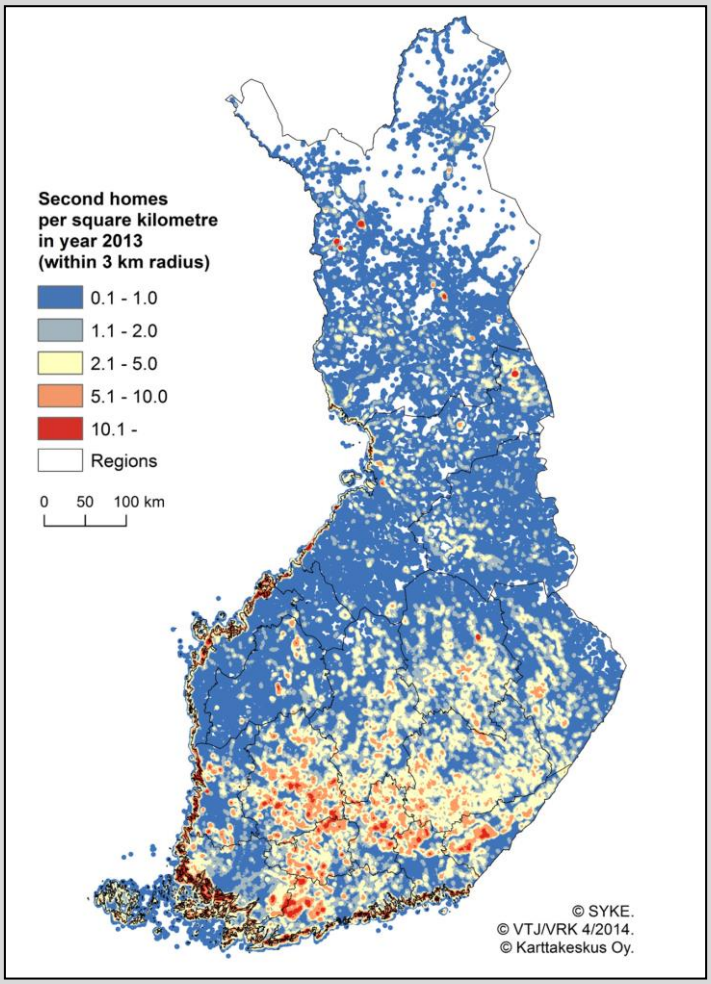
Second homes play a central role both in leisure mobility and rural space of Finland. Over half of the Finnish population uses them, and second homes are the most visited type of tourist accommodation in the country. Their number, which is placed at 499,000 according to Statistics Finland, is probably underestimated, and does not illustrate the fact that currently over half of Finns use the leisure opportunities offered by second homes on a regular basis. According to a Finnish survey (Adamiak et al., 2015), 36% of the respondents own, and a further 26% use a second home belonging to their family or their friends.

Finnish second homes are typically located relatively close to the place of permanent residence of their users, in the forest and by the water, in scattered rural settlements. Second homes are unevenly distributed across the country (see Map 2.21). They are mainly concentrated in three areas. The first is Lakeland in the south of the country, with the highest density concentrated in a belt between the cities of Tampere and Lappeenranta, and the western Helsinki metropolitan area; lower-density areas stretch

north towards central Finland. This concentration is shaped by the availability of lakeside locations on the one hand, and proximity to large urban areas, primarily Helsinki, on the other. The second concentration is in the coastal areas of southern and western Finland, particularly along the coastlines and on the islands of the Turku and Vaasa regions. The third concentration consists of several ski resorts in the north of Finland, e.g. Ruka, Levi, and Ylläs.

Across most of the country the density of second homes is low (less than one second home per km^2). Yet, this low density of second homes is caused by the overall low density of population in most parts of Finland. In the majority of Finnish areas, including the sparsely populated northern parts of the country, lake and coastal areas, second homes outnumber permanent dwellings, which make them a key issue in local policy and planning. In every fifth Finnish municipality there are more second homes than permanent residences. Permanent dwellings only outnumber recreational dwellings in urban and suburban areas, as well as in the western rural region, which has few lakes and where farming is the predominant land use. The number of second homes in the whole of Finland has seen a 6% increase over the last ten years. The most dynamic growth occurred in some coastal areas, some places in the Lakeland regions and in the northern Finnish tourist resorts. The relative increase in the number of second homes has been greater in sparsely populated areas in the north of the country than in most parts of central and southern Finland. The number of second homes has decreased in some urban and suburban areas as a result of the conversion of second home properties into permanent dwellings.

Map 2.21 Second homes density in Finland, 2013



Source: Adamiak et al., 2015.

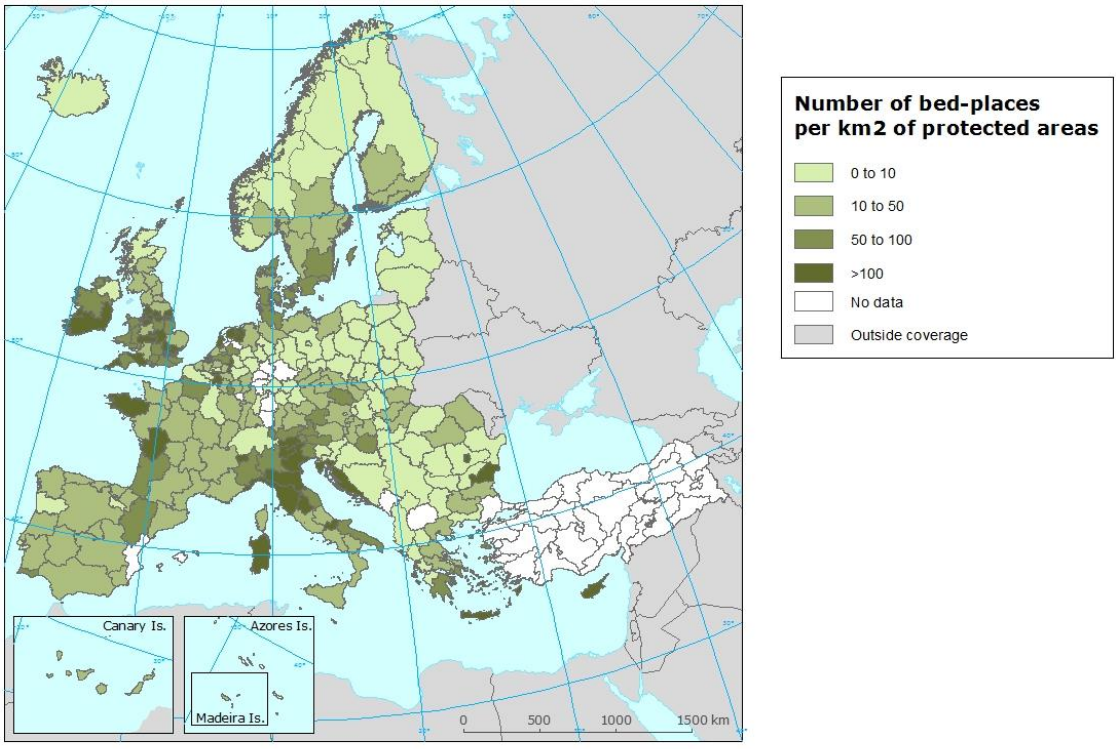
Biodiversity and human health

Potential disturbance of biodiversity caused by tourism and recreation

Protected areas constitute some of the main recreation and tourism destinations worldwide; jointly with rural areas in general, they provide opportunities for tourists to come into contact with biodiversity and enjoy the natural environment. As they are fragile ecosystems, these places should take special care to avoid the potential harmful effects of large number of visitors. Different measures have proven to be successful in managing large influxes of visitors, such as zoning, i.e. planning in such a way that different zones are established (including certain buffer areas outside the protected areas that act as a filter to the core of protected areas), while at the same time determining which kinds of activities can or cannot be developed in the different parts of the protected areas. Other measures include regulating the carrying capacity of the most vulnerable areas, regulation of specific activities, etc.

One of the approaches that can be used to understand the potential disturbance of recreation and tourism to biodiversity and the natural environment is to examine the tourism supply located around the most vulnerable and attractive areas, that is, the protected areas. In this regard, a first proxy has been calculated by combining the number of bed places offered by tourist establishments located in rural areas, with the land's protected surface (in this case, the Common Database on Designated Areas or CDDA, which includes the entire Natura 2000 network, as well as other national protected areas). The results of this exercise show that, in the majority of EU regions, there is a relatively low pressure on natural sites (although we are referring always to the regional level without look in detail at specific cases of concrete protected areas). In any case, most of the NUTS 2 regions have an average of less than 1 bed place per km^2 of protected area. The exceptions, with higher numbers – and potentially higher pressures – are found in Ireland, Northern Italy, Western Austria, the coastal region of Croatia, among other specific regions in other countries (see Map 2.22).

Map 2.22 Number of tourism bed places per km^2 of protected areas, NUTS 2



Source: Own elaboration from Eurostat, Common Database on Designated Areas (CDDA) and EEA data.

Invasive alien species and the spread of diseases

In an ever-globalising world, together with increased trade and travel, tourism is also responsible for an unintentional upsurge in the number and type of invasive alien species (IAS) arriving in Europe (EEA, 2015). The introduction of IAS can have various impacts on main environmental assets, such biodiversity and ecosystems, as well as on crucial economic sectors (including tourism) and lead to threats to human health (see Table 2.12).

An extensive review and analysis of existing research on the topic reveal the availability of quantitative evidence that tourism is a vector for the spread of invasive alien species across the planet, in both terrestrial and aquatic habitats (Anderson et al., 2015). In addition, the success of invasive alien species seems to be increasing in already disturbed habitats.

Table 2.12 Different impacts caused by invasive alien species

Assets	Main impacts by invasive alien species
Biodiversity	- Competition for food and habitat - Predation - Vector of disease - Hybridisation - Changes in habitat conditions
Ecosystem services	Interference with: - supporting services (e.g. nutrient cycling, soil formation) - provisioning services (e.g. timber production) - regulating services (e.g. water regulation, erosion control, pollination) - cultural services (e.g. landscape and aesthetic values)
Economy and infrastructure	Damage to: - commercial crops, leading to significant losses in yield (e.g. agriculture, forestry, aquaculture) - infrastructure (clogging of water pipes, erosion of dams, bridges, river banks, fouling of ship hulls and other equipment, etc.) Disruption of recreational activities (blocking of water ways, damage to fishing nets, damage to landscape leading to loss in tourism)
Human health	- Vector of disease - Source of allergies and asthma - Source of dermatitis and skin abrasions

Source: European Commission, 2014.

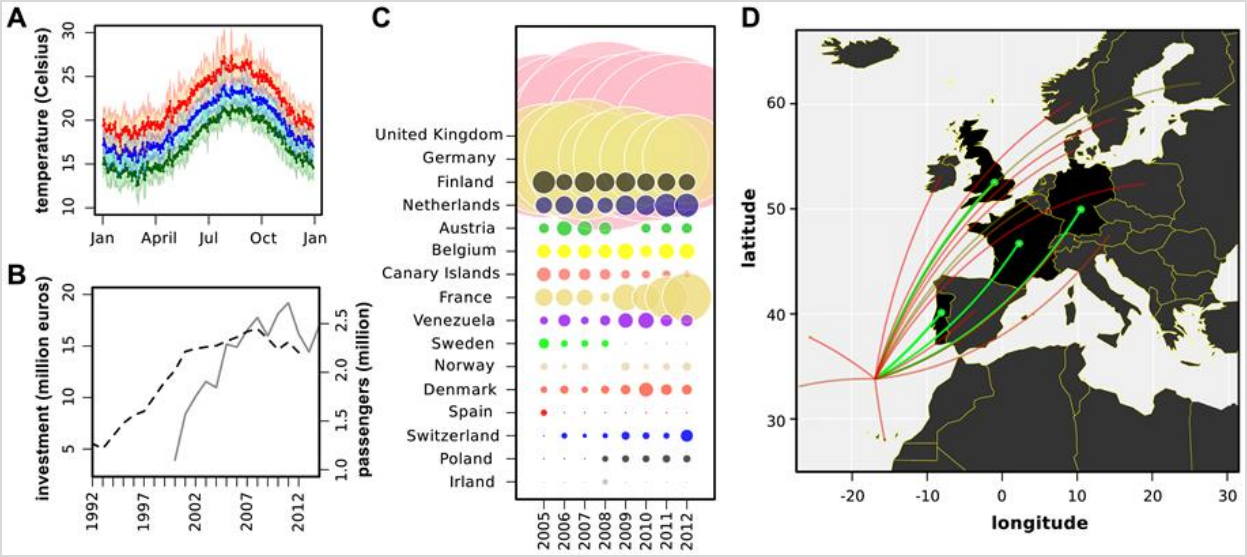
In terrestrial environments, tourism and recreational activities such as hiking, mountain biking or off-road driving are considered to potentially facilitate the proliferation of such species versus native ones due to the higher rates of adaptation and reproduction of the former in disturbed areas (Jauni et al., 2014). In marine areas, as well, recreational boating and fishing in particular have been increasingly studied as activities that facilitate non-native species spread and that have been identified as responsible for more than a third of non-native species introductions in Europe, with impacts on fisheries, water treatment works and aquatic transport industries, especially in England, Ireland and also in the Alps. Examples of these species include mussels and shrimps. Downscaling at the European regional level, a study on 37 Mediterranean islands highlights that tourism infrastructure development (gardens, pathways, lodges, etc.) has acted as the main “intentional” vector for the large spread of alien vegetation species (Pretto et al., 2012).

In a world where currently no place is more than a day of air travel distance from any other place, the increased speed and scale of global human movement has also enhanced opportunities for the spread of disease. Diseases such as Middle East respiratory syndrome (MERS), influenza, the Chikunguya virus and dengue fever, with relatively short incubation periods, have provided unprecedented opportunities for rapid spread by human travel and tourist movement. In 2014, travel-associated cases of MERS have been linked to the fact that the Middle East is very interested in global travel, including tourism, due to, for instance, foreign workforce flows and religious events that each year bring millions of visitors to Saudi Arabia (i.e. the pilgrimage to Mecca).

Box 2.7 Dengue fever spread due to the combination of multiple factors, including tourism

A characteristic case showcasing the combination of such factors as geographical context, climate trends, urbanisation and global tourism travel patterns that act as driver for vector-borne diseases is the dengue outbreak in Madeira (Portugal) in October 2012. This was the first such outbreak in 100 years, since the mosquito *Aedes aegypti* (dengue's main vector) re-established itself on the island in 2005. In the following seven months, the dengue outbreak affected more than 2,000 people and caused 81 cases exported to mainland Europe, due to the strong tourism links between the island and the continental land (see Figure 2.10). It was estimated that the introduction of dengue to Madeira took place approximately a month before the first official cases, during the peak period of airline travel, mainly from Europe but also from South America. Declining temperatures in autumn naturally put an end to the outbreak on the island in early December 2012 (Lourenço and Recker, 2014).

Figure 2.10 Tourism and temperature data for the island of Madeira (Portugal)



(A) Mean of minimum (green), average (blue) and maximum (red) temperatures per day between 2002 and 2012. Coloured areas show the standard deviation. (B) Number of airline passengers entering Madeira per year (dashed, black) and local investment in tourism per year (solid, grey). (C) Relative weight (bubbles) of each country in terms of the total number of passengers arriving at Madeira per year (columns). Data compiled from the 30 most frequent cities of origin for airline passengers per year. Portuguese cities were excluded – Oporto, Lisbon, Porto Santo (Madeira) and Ponta Delgada (Azores). (D) Map representation of (C), including Portugal. Colours match the weight of each country with the 4 highest highlighted in green.

Source: Lourenço and Recker, 2014.

Even though exotic mosquito-transmitted infections, particularly malaria and dengue fever, have always constituted major travel health concerns, nowadays several mosquito-transmitted viruses have expanded geographically through the movement of infected animals (mosquitoes or reservoir hosts such as birds), or infected people. As with the translocation of the West Nile virus into the Western

Hemisphere in 1999, the Chikungunya virus was, until the 21st century, largely confined to East Africa and Asia but has recently spread in the Western Hemisphere. Measles is also an issue. In February 2014, an outbreak of measles occurred in Europe on a cruise ship sailing the western Mediterranean. A total of 27 cases of measles were identified, mostly among the crew. The virus strain responsible for the cruise ship outbreak is similar to measles viruses circulating in the Philippines.

In addition to the expected increase in the number of flights worldwide in the coming years, facilitating the movement of an unprecedented number of people from one part of the globe to another, the increase in popularity of some forms of tourism may lead to travellers being exposed to more "exotic pathogens" (ECDC, 2014). Interestingly, the European Centre for Disease Prevention and Control mentioned "adventure/eco" tourism to remote areas in tropical countries as a driver that may trigger possible future transmissible disease outbreaks, as this is a form of tourism that is bringing more and more tourists into direct contact with wild species of animals and potentially with their infectious agents. Also "health" tourism or cross-border healthcare are considered to pose new challenges as far as healthcare-associated infections – such as for example some recent cases of medical tourists to Jordan exposed to MERS – are concerned.

2.2.4 Responses to increase the sustainability of tourism

According to UNEP and UNWTO, in a Business-as-Usual (BAU) scenario by 2050, at the global level, tourism growth will entail an increase of energy consumption (154%), greenhouse gas emissions (131%), water consumption (152%), for the tourism sector, the largest potential for the improvement of resource efficiency lies in the area of CO_2 emissions, with a projected 52% improvement over BAU scenarios, followed by energy consumption (44%), water consumption (18%), net waste disposal (17%) and solid waste disposal (251%) (UNWTO and UNEP, 2012). In addition, the enormous potential of the sector in the preservation of biodiversity (benefit/cost ratio of 3 to 75) was calculated. This high ratio has not been found in any other economic sector, thus offering a huge opportunity for reducing biodiversity loss.

Recent surveys by the EC show that the natural features of the destination continue to be the main reason for wanting to return to the same place for a holiday. That shows once more the persistent importance, on the one hand, of natural capital for tourism, and, on the other, of the sector sustainability for the environmental integrity of the destinations, especially in areas with high proportions of sensitive ecosystems, particularly coastal or mountain regions.

From an EU level policy perspective, sustainability in tourism is not a legislative prescription although it is highly relevant for the sector itself and for the environment. Many ongoing EU initiatives targeting sustainability in tourism, both from the monitoring and the management perspective, still rely on the willingness and voluntary actions of the various stakeholders involved. This is particularly the case with the ETIS indicator system, and many EU-funded projects addressing different aspects (energy, waste, mobility) linked to the sustainability of the sector (see Box 2.8).

Responses are quite varied and differentiated by public and private sector, and theoretically should cut across all the components of the tourism system in order to lower pressures and reduce impacts; some are often also driven by consumer (tourist) demand and behaviour, for which some indicators have been developed, which will be presented in the following pages.

Newly developed social attention, behavioural changes in the way tourism is produced and consumed and a more integrated European tourism policy, fiscal measures and voluntary initiatives such as the eco-environmental labelling and certification of enterprises and destinations may pave the way forward with regard to the progressive greening of tourism, which will hopefully not be limited only to alternative tourism and niche market segments but affect the whole sector (see Box 2.9).

Box 2.8 Examples of EU projects promoting the sustainability of the tourism sector

Nearly Zero Energy Hotels (neZEH)

In response to the 2010 Energy Performance of Buildings Directive (EPBD), the European initiative Nearly Zero Energy Hotels (neZEH) aims to accelerate the rate of large-scale renovations of existing hotels into Nearly Zero Energy Buildings (nZEB). The initiative ran for three years (2013-2016) and was co-funded by the Intelligent Energy Europe Programme (IEE) of the European Commission. The Nearly Zero Energy Hotels (neZEH) is led by a consortium of 10 committed partners from 7 EU Member States, including two European associations and UNWTO.

Sixteen pilot cases of hotels in Europe benefited from technical assistance to become neZEH, resulting in up to 70% reduction of their primary energy consumption using best practices: energy efficiency measures, renewable energy sources and behavioural changes of staff and clients. Commitment to the environment and sustainability was a key prerequisite for hoteliers to achieve nearly zero status. The pilot cases were implemented in the 7 neZEH countries: Croatia, Greece, France, Italy, Romania, Spain and Sweden, through the following actions of support:

- Access to technical expertise
- Energy audits suggesting technical solutions
- Feasibility studies for financial decision-making
- Advice on national financing alternatives
- Training of hotel staff
- Promotional tools to communicate efficiently their neZEH profile to potential customers and increase visibility at the national and EU level.

The "Sustainable Transport for Areas with Tourism through Energy Reduction" (STARTER) project

The rationale of the STARTER project, co-funded by the Intelligent Energy – Europe (IEE) programme, builds on the evidence that the seasonality of tourism demand leads to rising demand for transport and mobility services during the high season, which heavily impacts traffic and life quality in specific touristic regions, which thus have a great need to improve the effectiveness and efficiency of local transport.

In order to deal with the challenges posed by seasonal traffic, the project brought together the local authorities, main players of the transport sector, environmental organisations and private stakeholders in the tourism sector of five tourist destinations in Greece (Kos), Austria (Werfenweng), Hungary (Lake Balaton), Spain (Fuerteventura) and the Netherlands (Noordwijk), as project leader.

The concept of 'Local Travel Plan Networks (LTPN)' was applied to engage stakeholders in the adoption of a common strategy to shift tourists from private cars to more sustainable mobility options, by providing residents and tourists with alternative solutions for transport and increased their awareness regarding energy and environmental impacts.

Among the main results of the project, it is worth mentioning:

- In all sites, members of the LTPNs included representatives of the local authorities, tourism and transport sectors, actively involved in the formulation of the Local Travel Plans, in terms of identifying the local mobility problems and possible solutions to those problems (bottom-up approach).
- Three soft mobility measures were implemented in each site with the goal of reducing car pollutant emissions and achieving energy savings: online information; policy and promotion measures; fleet-related measures and promotion of sustainable modes of transport (bicycles, e-vehicles, public transport and walking).
- The tourists who were influenced by the implemented measures in all pilot sites have altogether saved approximately 0.4 tons of energy (fossil fuel savings) and have reduced CO_2 emissions by 1.1 tons CO_2e. In percentages of savings – among the sample of tourists – this is interpreted as 11% for Kos, 8% for Noordwijk, 16% for Balaton, 0.5% for Fuerteventura and 1.2% for Werfenweng. These differences are the result of the different measures chosen in each of the sites and the local context.

The projects coordinators report that participants in the LTPNs reported their willingness to continue the network in their region after the end of the project.

Box 2.9 Best Environmental Management Practices (BEMP) in the tourism sector

Tour operators, accommodation and food and beverage establishments, destination managers, as well as local authorities are the primary target groups of a sectoral reference document on best environmental management practices (BEMP) for the tourism sector, within broader efforts towards the "identification of best environmental management practice and development of EMAS Sectoral Reference Documents for different sectors" by the Joint Research Centre of the European Commission (Styles et al., 2013). The related EMAS sectoral reference document on BEMP for the tourism sector is currently undergoing the legislative process required for its adoption by the European Commission. BEMPs cover:

- Destination management. These include development planning and conservation measures, and the provision of adequate services to cope with peak season tourist demands (e.g. modular, high capacity wastewater treatment plants).
- Tour operators and travel agents. This includes collaboration with destination managers to improve the environmental condition of destinations, optimisation of transport to reduce emissions, leveraging the eco-efficiency improvements made by accommodation suppliers, and marketing of more sustainable tours.
- Energy consumption in accommodation establishments. This includes improving the thermal insulation of the building envelope, optimisation of heating, ventilating and air conditioning systems, improved lighting efficiency and use of renewable energy sources.
- Water consumption in accommodation establishments. This includes system monitoring and maintenance, installation of efficient fittings, optimisation of laundry processes, environmentally sound landscaping and irrigation, efficient swimming pool management and use of greywater.

- Waste in accommodation establishments. This includes waste minimisation through green procurement, onsite sorting and recycling, and wastewater treatment.

- Food and drink providers. This includes efficient procurement and management of food, optimised waste management, efficient washing and cleaning processes and efficient cooking processes.

- Campsites. This includes environmentally friendly site management, efficient washrooms, use of renewable energy sources, and provision of waste management facilities.

Photo: Water point (public dispenser of still and sparkling water) in San Mauro Torinese (Italy). © F. Ceragioli.

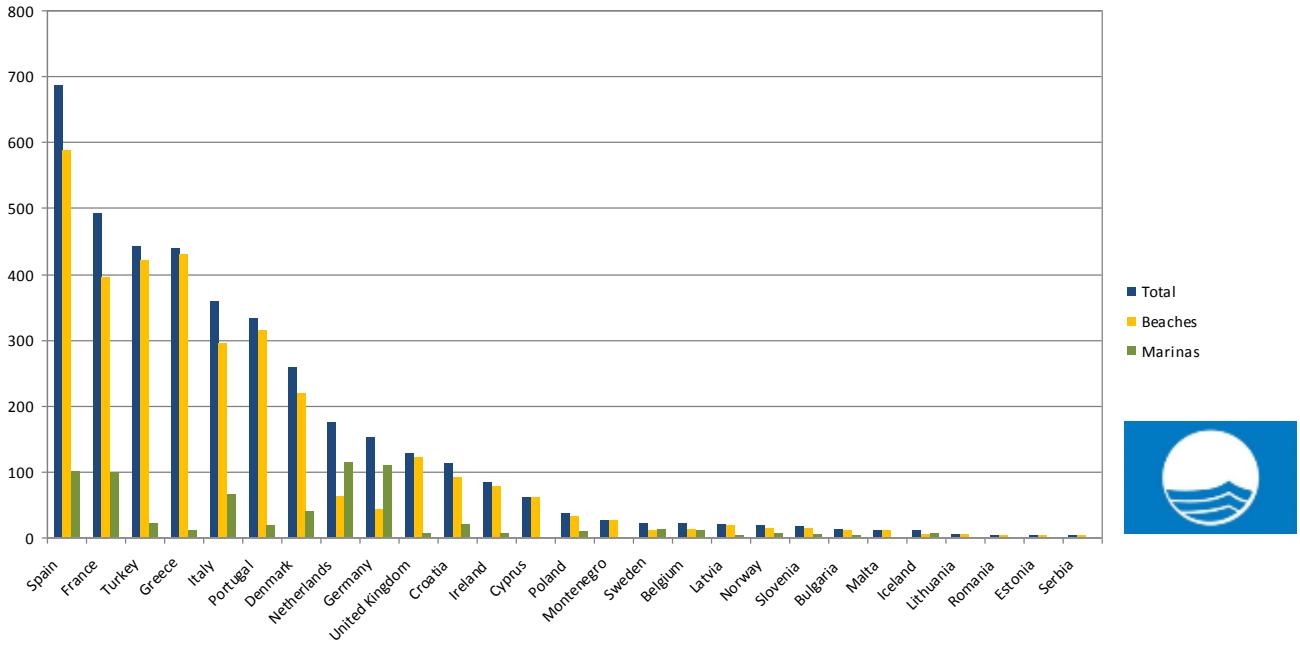
Responses influencing consumer behaviour and demand

Blue Flag awards for beaches and marinas

Among the indicators used to help tourists choose a coastal destination, the Blue Flag programme – coordinated by the Foundation for Environmental Education – has a significant international presence and recognition, as a certification tool for beaches and marinas in many European (and non-European as well) coastal tourism destinations, especially (but not only) in the Mediterranean basin. Spain, Turkey, France, Greece, Portugal, Italy and Denmark were the countries with the highest number of Blue Flags for beaches in 2016 (more than 200 per country). Regarding marinas, the countries with the largest number of awards (more than 50) were the Netherlands, Germany, Spain, France and Italy (see Figure 2.11).

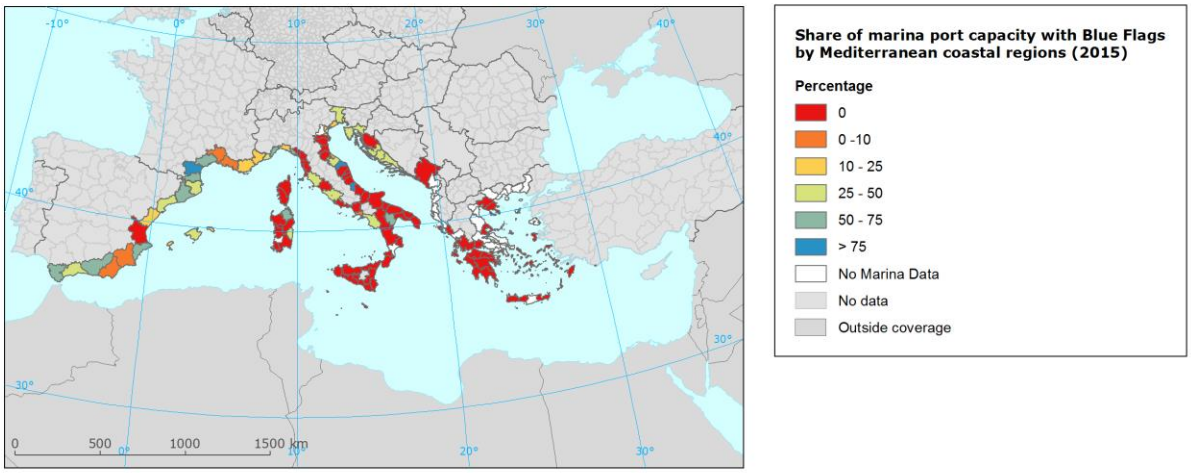
In terms of the percentage of the marinas' capacity awarded with the Blue Flag in the Mediterranean sea countries, there is an uneven territorial distribution of this certification tool. Most of the coastal NUTS 3 regions of Spain have a certain percentage of their port capacity under the Blue Flag award. The French NUTS 3 regions included in the NUTS 2 region of Languedoc-Roussillon have high percentages, while in the Provence-Alpes-Cote d'Azur region these numbers are lower. In Italy, most of the regions do not have awarded marinas, although a few number of regions have a relatively high percentage of port capacity under the Blue Flag certification. In the case of Croatia, most of its NUTS 3 regions have between 25% and 50% of their port capacity awarded with the Blue Flag certification. Finally, Montenegro does not have any marinas with Blue Flags, and most of the Greek NUTS 3 coastal regions have not been awarded this certification either (see Map 2.23).

Figure 2.11 Number of Blue Flag awards per country in Europe, 2016



Source: Own elaboration from www.blueflag.global data.

Map 2.23 Share of marina port capacity with Blue Flags by Mediterranean coastal regions, NUTS 3, 2015



Source: Own elaboration based on www.blueflag.global, Plan Bleu, the Spanish Yachting Club Association, PortBooker, and EEA data.

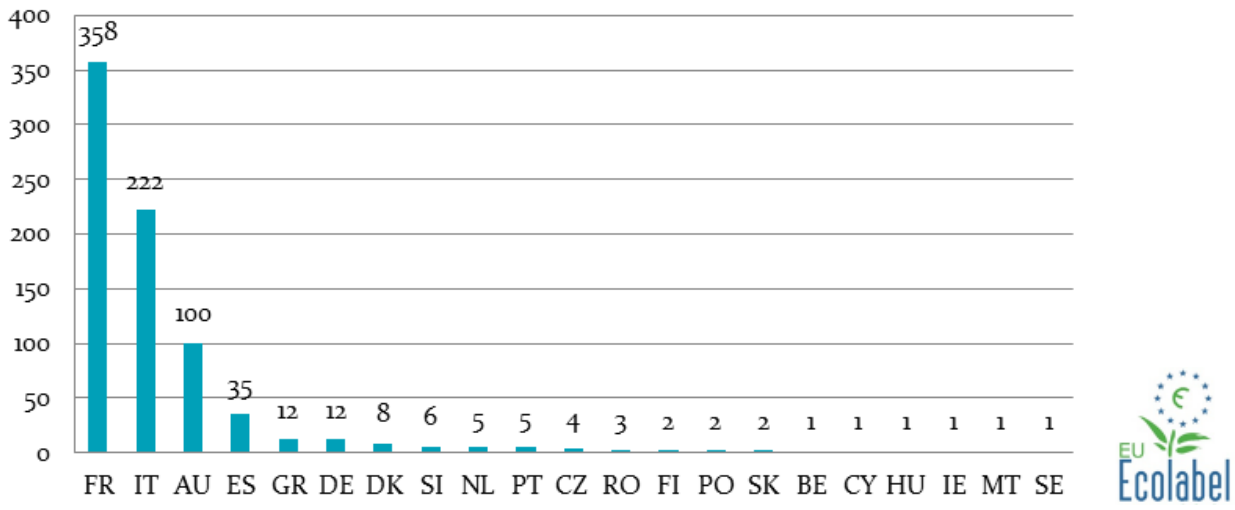
Environmental certification/labelling in the tourism sector

Environmental certification or labelling in the tourism sector is one of the ways to assess the extent to which enterprises (especially in the tourist accommodation subsector) are actively incorporating sustainability principles into their operations and whether they are involved in recognised (or qualified) eco-certification programmes and sustainability reporting procedures. An increase in the percentage of certified/labelled tourism enterprises will mean a more generalised commitment towards environmental management on behalf of the tourism sector in particular, and destinations and countries in general.

As far as the eco-labelling sector is concerned, Europe has far more "green" certification programmes than any other region of the world. Eco-labelling is used for all types of tourism suppliers in the region, which show a great diversity of characteristics and operating conditions. However, many are showing limited effectiveness in terms of significant cost savings and increased consumer demand. Accordingly, the challenge is now to provide more coherence and increase confidence in labelled services and products. To this effect, EU-funded projects such as VISIT and ECOLNET have been working to achieve agreement with leading initiatives on standards, criteria and indicators for effective eco-labels and ecotourism services in Europe, in order to contribute to a genuine conservation and sustainability effort.

Although there are many different types of Ecolabels for the tourism sector that can be found in Europe, the European Commission has promoted a common Ecolabel for the tourism accommodation sector in Europe, the so-called EU Ecolabel, which has also been implemented in other industries. The implementation of the EU Ecolabel for tourist accommodation services and campsites (the two categories created by the European Commission specifically for the tourism sector) has been growing since its creation in 2003. However, in April 2016 there were a total of 782 tourist accommodation establishments and campsites awarded with the EU Ecolabel, according to DG ENV registers. This is equivalent to 0.14% of the total number of tourist accommodation establishments in Europe (570,268 establishments). Moreover, there is an uneven distribution of certifications throughout Europe (most of these certifications are concentrated in only a few countries, i.e. France, Italy, Austria, and to a lesser extent, Spain) (see Figure 2.12).

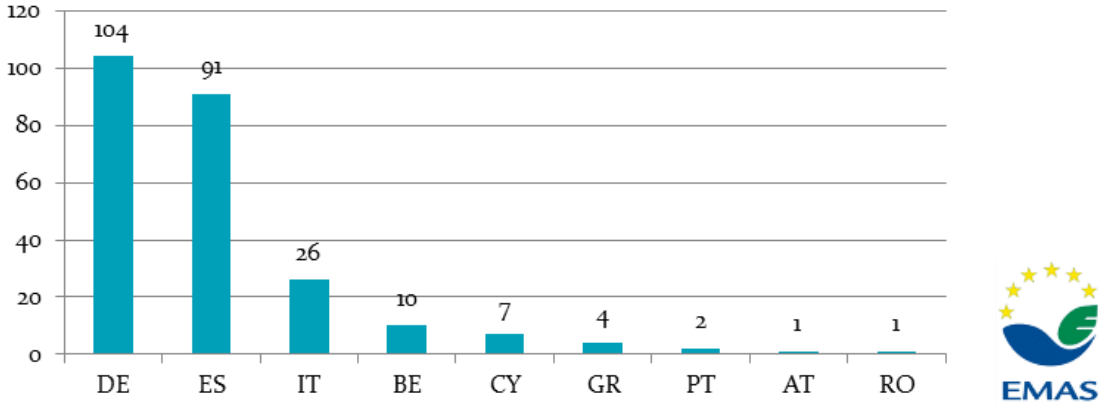
Figure 2.12 Number of tourism accommodation establishments awarded the EU Ecolabel, 2016



Source: Own elaboration from data provided by the European Commission.

In the case of the implementation of the EMAS certification (EU environmental management system) in the tourist accommodation sector, numbers are even lower than for the EU Ecolabel. The European Commission (DG ENV) reported 236 tourist accommodation establishments registered with the EMAS system throughout Europe in May 2016 (including hotels, campsites, and other types of short-stay accommodation), meaning a 0.04% of the total number of European tourist accommodation establishments. Again, this number is also concentrated in only three countries (Germany, Spain, and Italy), while six other countries have very few registered tourist accommodation establishments (see Figure 2.13).

Figure 2.13 Number of tourism accommodation establishments with EMAS, 2016



Source: Own elaboration from data provided by the European Commission.

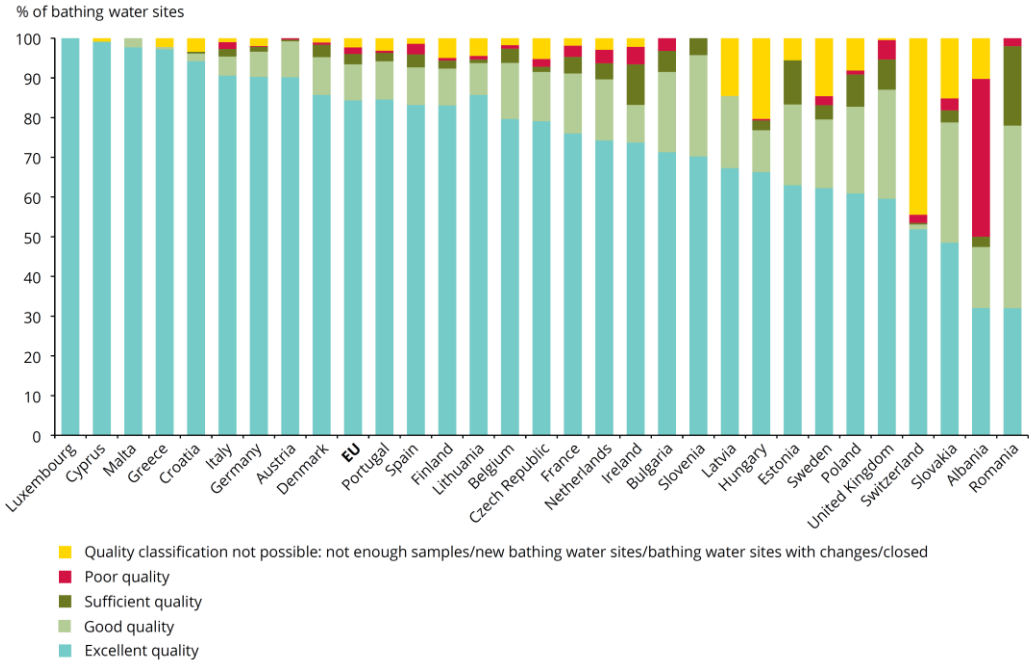
Examples of sector-based responses

Increasing bathing water quality

As highlighted in the 7th EAP, "access to water of satisfactory quality remains problematic in a number of rural areas in the Union. Yet ensuring the good quality of Europe's bathing waters benefits both human health and the Union's tourism industry" (priority objective 1, par. 46, page 46). Eventually, many years of investment in the sewage system and better wastewater treatment have led to Europe's bathing waters being much cleaner today than they were 30 years ago, when large quantities of untreated or partially treated urban and industrial wastewater were discharged into water. Tourism has benefited from this trend, although there are still some bathing areas that have poor water quality. This can negatively affect tourism activity in those areas. In 2015, 96.1% of all bathing waters in the EU met the minimum water quality standards (meaning they were of at least 'sufficient' bathing water quality) set by the Bathing Water Directives.

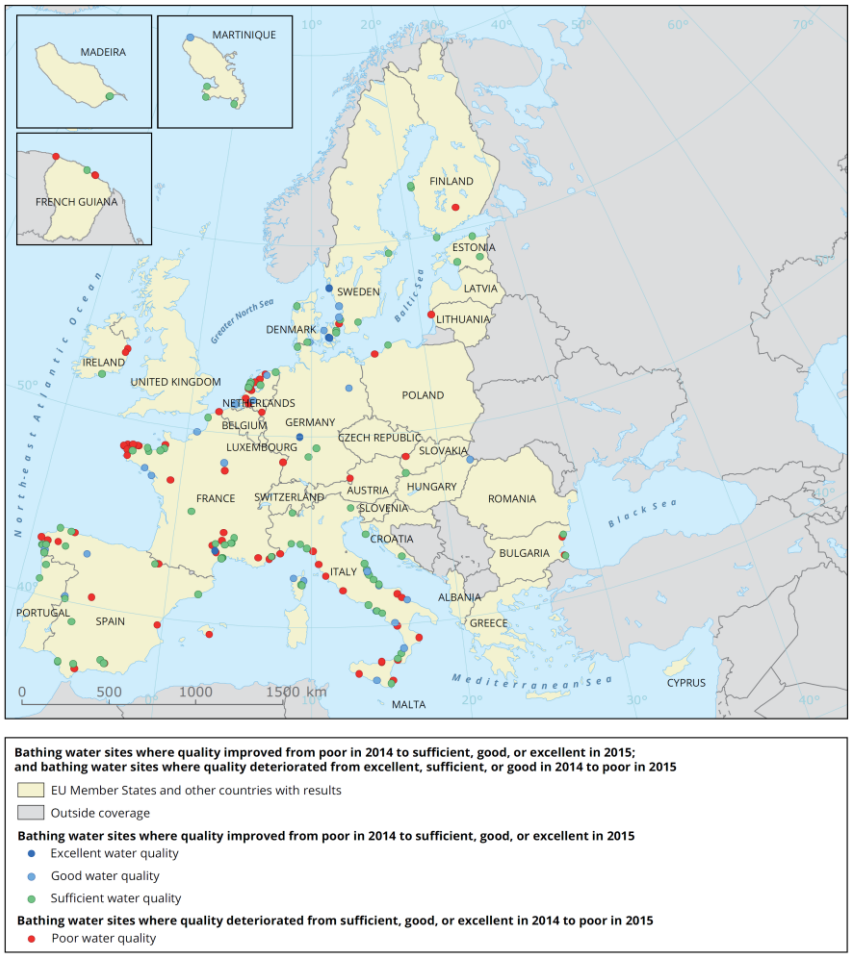
Figure 2.14 shows European bathing water quality results for each country in 2015. All reported bathing water sites in Cyprus, Croatia, Estonia, Greece, Latvia, Luxembourg, Malta and Slovenia achieved at least sufficient quality in 2015 (according to the minimum quality standards set by the Bathing Water Directive). Moreover, over 90% of bathing water sites were of excellent quality in eight Member States: Luxembourg (all 11 reported bathing water sites), Cyprus (99.1% of sites), Malta (97.7%), Greece (97.2%), Croatia (94.2%), Italy (90.5%), Germany (90.3%) and Austria (90.2%). In 2015, there were 383 sites with poor quality bathing water in Europe. Italy (95 bathing water sites or 1.7%), France (95 sites or 2.8%) and Spain (58 sites or 2.6%) are the countries with the highest number of poor-quality bathing water sites. In some EU Member States, more than 3% of the bathing water sites had poor quality: 4.9% or 31 bathing water sites in the United Kingdom, 4.4% or six sites in Ireland, 3.4% or 24 sites in the Netherlands and 3.2% or three sites in Bulgaria. In Albania, assessed under provisions of the revised Bathing Water Directive for the first time, 31 bathing water sites (or 39.7%) were classified as poor. Between 2014 and 2015 (see Map 2.24), 125 bathing water sites changed status from poor to sufficient quality or better. The countries with the highest number of bathing water sites where the water quality improved from poor to at least sufficient were France (32 sites), Italy (24 sites) and Spain (20 sites). However, in the same period, 76 bathing water sites changed their status from at least sufficient to poor quality. This deterioration has been most significant in France, where the quality at 29 bathing water sites changed from sufficient to poor (12 of these in the Bretagne region alone). Deterioration in quality is also significant for Spain, Italy and the Netherlands, where the quality of more than 10 bathing water sites was downgraded from sufficient to poor.

Figure 2.14 Quality of bathing waters in European countries, 2015



Source: EEA, 2016.

Map 2.24 Change in quality of bathing water from 2014 to 2015



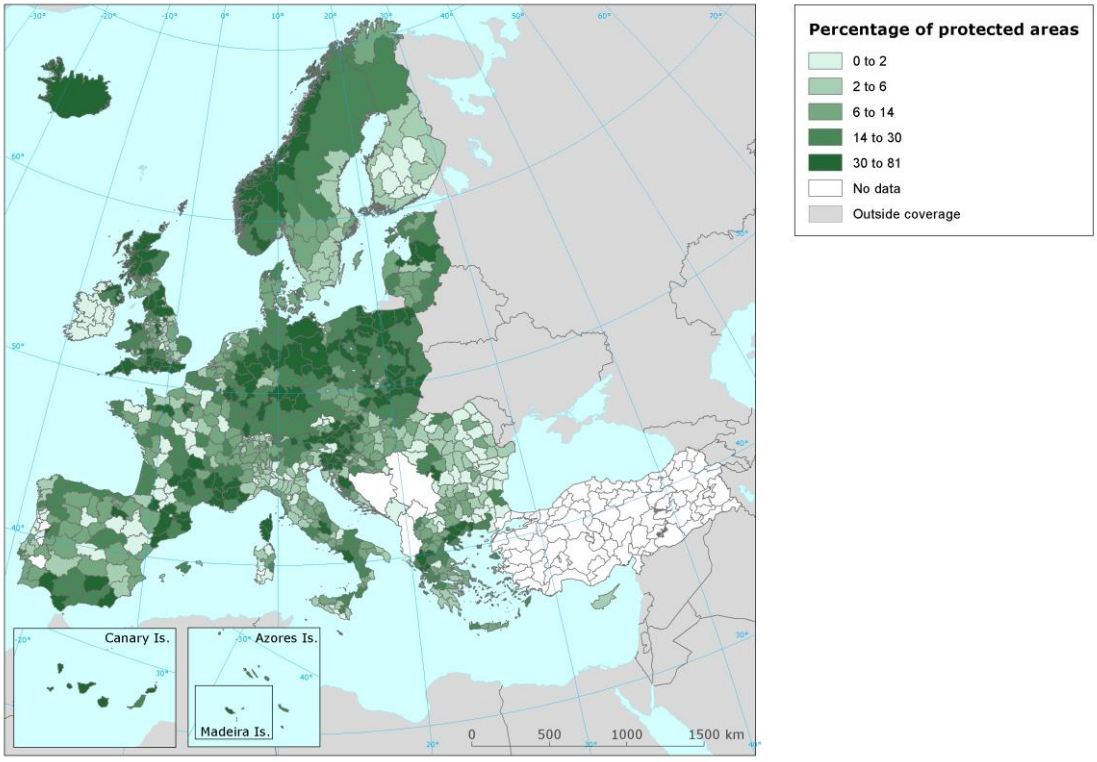
Source: EEA, 2016.

Ecotourism

Ecotourism includes all nature-based forms of tourism in which the main motivation of the tourists is the observation and appreciation of nature, as well as of the traditional cultures prevailing in natural areas. In this sense, ecotourism responses generally rely on the natural capital of a certain area or territory, but they may vary from country to country according to the specific biogeographical characteristics, as well as governance and institutional frameworks.

Although the protection of nature is not strictly a response to – or at least not a response uniquely due to – tourism development, in many cases protected areas were created also in order to help control recreational and tourism pressure on natural sites with high levels of social attractiveness, while they could also help manage visitation, and control the negative impacts of visitors. In this regard, as protected areas have become the most commonly visited places for nature-based tourism and ecotourism activities in Europe, it can be assumed that the level of nature protection of any territory can be also linked to the potential level of ecotourism use of that territory.

Map 2.25 Percentage of protected areas, NUTS 3, 2015



Source: Own elaboration based on the Common Database on Designated Areas (CDDA) and EEA data. NUTS 2 applied for Belgium, the Netherlands and Germany.

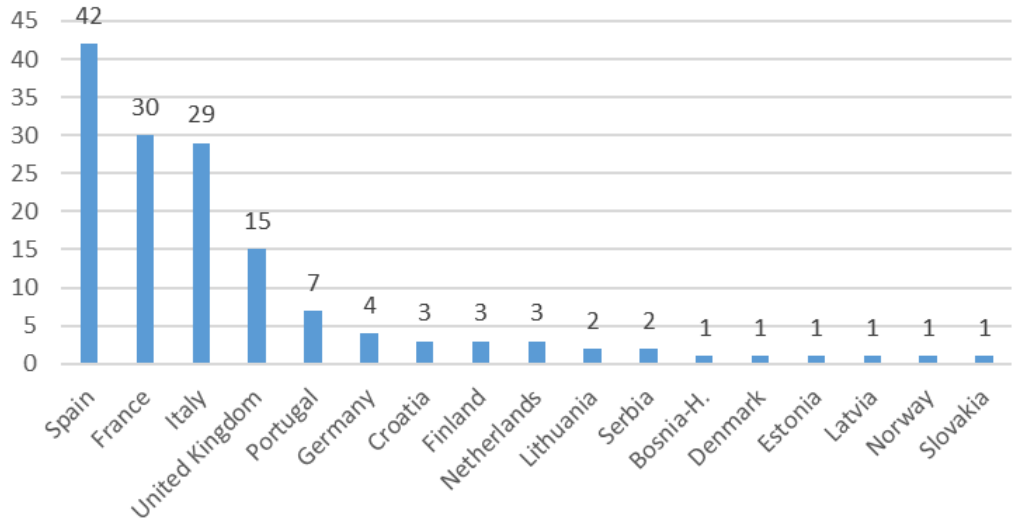
Europe has different levels of nature protection in terms of protected surface, depending on the country and the region inside each country. About 1,121,500 km^2 – or 25.6% of the EU-28 terrestrial land – are protected under Natura 2000 or national designations, or some combination of the two. Sites in the Natura 2000 network now account for 18% of the EU's land territory, not only providing invaluable protection for vulnerable wildlife and habitats, but also constituting some of the most valued destinations for ecotourism or nature-based tourism. Protected areas more generally (including nationally and locally designated sites) now cover 21.8% (excluding Greenland) of the land territory of the European Environment Agency's member countries and collaborating countries – i.e. 39 countries in total. At the national level, however, these percentages present significant differences: countries like Ireland, Finland, Romania or Bulgaria have low percentages of protected surface, while others such as

Germany, Poland or Slovenia have higher percentages. There are also other countries with big regional differences (i.e. France, Spain, Greece, UK, etc.) (see Map 2.25).

A certification tool for protected areas

The European Charter for Sustainable Tourism (ECST) is a certification tool for protected areas created and awarded by the Europarc Federation. The Charter reflects the wishes of the authorities managing protected areas, as well as of local stakeholders and representatives of the tourism business, to support and encourage tourism that accords with the principles of sustainable development. In this sense, the ECST can be seen as a booster for sustainable nature tourism in the places where it has been implemented. 146 protected areas throughout Europe hold this certification so far (2016), although more than 100 are concentrated in only three countries (Spain, France, and Italy) (see Figure 2.15). This shows the potential increase in the implementation and consolidation of this award throughout the continent.

Figure 2.15 Number of parks ECST awarded per country, 2016



Source: Own elaboration from data provided by the Europarc Federation.

However, not all the ecotourism and nature-based tourism activity takes place inside protected areas, nor do all protected areas receive the same level of tourists, and not all protected areas that promote sustainable tourism have been awarded with the ECST. In any case, the ECTS can be considered as an indicator of commitment towards sustainability from management authorities and related stakeholders.

National case studies on responses to increase tourism sustainability

Use and benchmarking of certification schemes for sustainable tourism in Germany

In Germany there are numerous certifications issued by many organisations related to tourism that are not well known to the public. Thus, consumers may find it difficult to orientate themselves within this environment-friendly offer. The Centre for Sustainable Tourism at the Eberswalde University for Sustainable Development wanted to contribute to better informing travellers about environmentally friendly tourism products and examined certification schemes for sustainable tourism and their use in Germany. A study was published in June 2016 and highlighted that there are 33 certificates in use, which offer 43 different certifications issued by 18 main organisations that are awarded to a broad range of tourism businesses and organisations for their sustainability or environmental performance (see Table

2.13). The majority of certification systems are intended for accommodation businesses (see Figure 2.16).

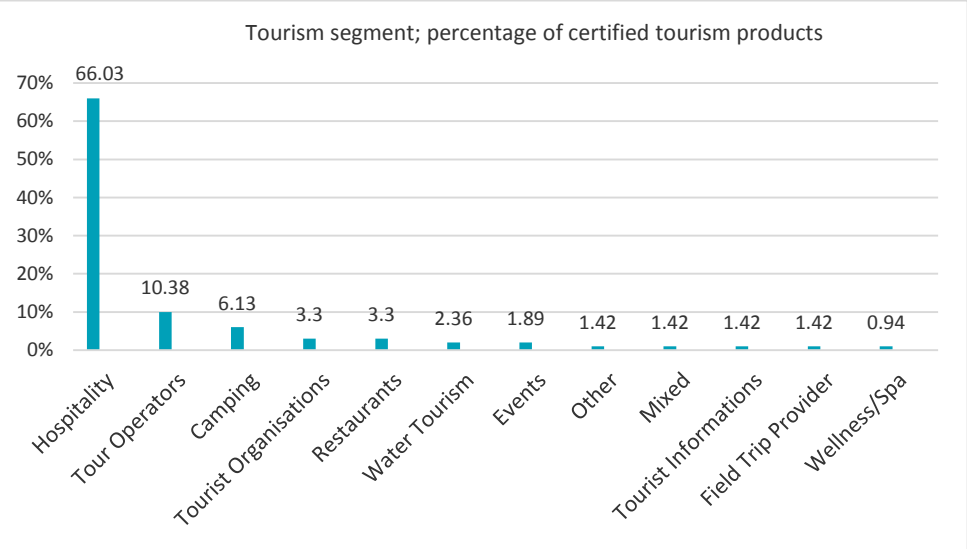
Table 2.13 Tourism certifications in Germany and their founding year

Founding year	Certificates
1953	Qualitätsstandards für die Prädikatisierung von Kurorten, Erholungsorten und Heilbrunnen
1987	Blue Flag
1989	Blaue Schwalbe/Blue Swallow
1991	Ökoprofit
1994	Green Globe, Green Key
1995	Umweltgütesiegel Alpenvereinshütten
1996	ISO 14001
1997	Bayerisches Umweltsiegel, Wellnesshotels & Resorts Qualitätsstandards
2001	BIO-Hotels, Viabono
2002	Ecocamping, Europarc-Charta
2003	EU Ecolabel, Wellness-Stars
2005	Qualitätsmanagement Golf & Natur, TUI Eco Resorts, Wanderbares Deutschland
2006	Qualitätsoffensive Naturparke
2008	Partner Nationale Naturlandschaften
2009	Berlin Green Meetings, DGNB, TourCert
2011	Certified Green Hotel, DEHOGA Umweltcheck, Deutscher Nachhaltigkeitskodex
2012	Green Pearls
2014	Green Sign/Infracert, Qualitätsmanagement Wassertourismus (QMW) Kanu, Tripadvisor Green Leaders

Source: Stradas et al., 2016.

The certification organisations set different minimum criteria. There are no general patterns or basic models for all certificates under which sustainable tourism labels are granted. The majority of the analysed certification systems are classic environmental labels with a focus on ecological criteria. The most utilised criteria are resource and energy management, followed by mobility. Their degree of market penetration in the hospitality sector is estimated to be up to 5% of all companies, with campsites reaching up to 7%.

Figure 2.16 Tourism sectors included in certification systems in Germany



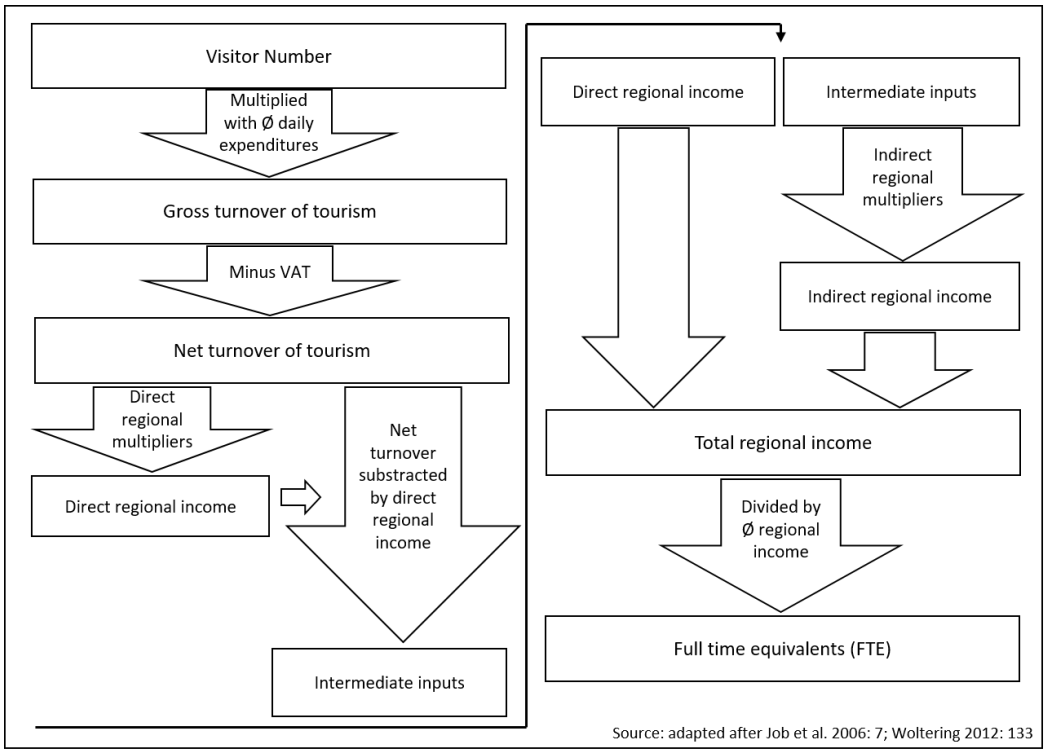
Source: Stradas et al., 2016.

Socio-economic impacts of tourism in protected areas – Finland and Germany

Protected areas are among the most attractive tourism destinations. Motivations for people to visit protected areas are manifold and include, e.g. the wish to experience pristine nature, clean air and silence, as well as opportunities for nature sports or adventure sports. At the same time, protected areas provide tourism infrastructure such as trail networks and visitor centres. Tourism in protected areas generates regional economic revenues and creates local jobs. Adequate evaluation and monitoring of these positive impacts is essential both for managing the protected area, as well as for enhancing recognition of the protected area at the local, regional or national political level. Finland and Germany have started implementing a pioneering activity in surveying visitors to the protected areas and especially making the economic benefits of tourism in the protected area visible.

Even though the national monitoring systems of Finland and Germany show some differences in terms of the details of their methodological approach, they do share some basic principles. In general, the monitoring methodology consists of three basic requirements: visitor counting, visitor survey and the computation of economic impacts. Visitor counting can make use of different data sources and methodologies, depending on regional circumstances, but must meet a certain level of quality. Visitor surveys usually cover a broad range of issues on protected area tourism to improve management and to avoid negative consequences. However, for the mere monitoring of economic effects they must at least include questions on visitation (i.e. length of stay, etc.), visitor spending, the importance of the protected area for the trip (travel motivation) and, finally, on statistics and demographics. By using this information, it is possible to calculate the turnover of tourism. However, in order to compute the economic benefits within the respective region, regional multipliers are needed to define the amount of money that stays within the region and that contributes to the regional economy via direct and indirect (induced) spending effects (see Figure 2.24). The availability of such (up-to-date) multipliers is limited and their development, just as effective and continuous monitoring itself, would require initial and continuous funding.

Figure 2.24 Computing of economic impacts of tourism in protected areas



Source: Adapted after Job et al., 2006; Woltering, 2012.

Since 2007, comparable studies have been conducted in German National Parks; these were finalised in 2016. Similar studies in UNESCO biosphere reserves are still ongoing and expected to be completed in 2019. These studies show that protected areas in Germany are already important destinations for (nature-based) tourism. Visitor numbers range from 206,000 visitors to the Unteres Odertal national park, to about 20.6 million visitors in the Wadden Sea National Park of Lower Saxony. All in all, German national parks account for more than 50 million visitor days per year. In monetary terms, the yearly visitor's spending is about €2.78 billion in gross turnover. Through direct and indirect effects, the respective park regions can also profit from this in the form of an increase in total regional income equal to an amount close to €1.5 billion. This means the theoretical number of people that could earn their living from tourism (Full-Time Equivalents or FTEs) is as high as 85,000 people, for national parks alone (Job et al., 2016).

In the case of Finland, Metsähallitus Parks & Wildlife Finland calculates, on a yearly basis, the local income and job benefits of visitor spending for all the national parks, hiking areas and other key protected areas in the country (Metsähallitus, 2016). Data is collected by continuous visitor counting and visitor surveys implemented every five years. Finland's national parks received more than 2.6 million visits in 2015. The input–output ratio of national parks is good: when Metsähallitus Parks & Wildlife Finland invests one euro of taxpayers' money in the hiking services of national parks, the local economy benefits by €10, on average. The total visitor spending effects of all the 39 national parks in 2015 were €141.5 million and about 1,400 jobs (FTE). The biggest visitor spending total effects were reported for Pallas–Yllästunturi NP with €36.5 million. The spending effects of visitors for whom Pallas–Yllästunturi NP was the main motive for the visitation, were €22.4 million and 225 jobs (FTE) (Metsähallitus, 2016). The biggest local economic impacts can be seen in tourism centres where visitors stay for a longer period and the supply of tourism services is larger. Close to big cities the visitation impacts are primarily recreation and health benefits.

Case study - Geoparks for sustainable tourism in the Czech Republic

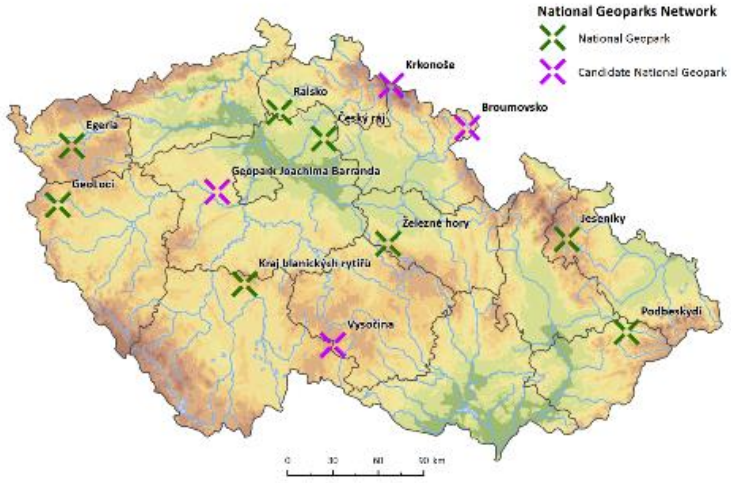
The term Geopark is used for a territory that includes the geological phenomena of particular interest, related to the landscape and its history. It also includes historical and cultural phenomena. The main purpose of a geopark is to promote its territory as a tourism destination, to encourage sustainable development (geotourism) of the region, and support research and education on the area. Geoparks also allow for the strengthening of economic and social development and, furthermore, often allow for the development of a local identity, and thus create a relationship between the landscape and its inhabitants. Finally, Geoparks increase the international status of a given area.

The National Geoparks Network of the Czech Republic was established by Regulation no. 6/2007 of the Ministry of the Environment of the Czech Republic in 2007. Based on this regulation, seven geoparks have already been designated in 2016: Geopark Český ráj (Bohemian Paradise, 750 km^2, established in 2005 as a Geopark within the European Geoparks Network as well as a UNESCO Global Geopark), Geopark Egeria (2,500 km^2, established in 2010), Geopark GeoLoci (1,400 km^2, established in 2012), Geopark Železné hory (777.5 km^2, established in 2012), Geopark Kraj blanických rytířů (628 km^2, established in 2014), Geopark Podbeskydí (530 km^2, established in 2014), Geopark Ralsko (294 km^2, established in 2016). In total, there are currently four localities that are candidates for the title of National geopark; these are: Joachim Barrande Geopark, Geopark Jeseníky, Geopark Broumovsko and Geopark Vysočina (Geopark Highlands) (see Map 2.26). Moreover, the location of Krkonoše Mts. is also currently interested in applying for candidacy.

The territories designated as Czech Geoparks are very different areas in terms of landscape characteristics, as well as tourism characteristics; moreover, most of them are also protected areas (in particular Protected Landscape Areas). Well-known localities (e.g. Geopark Český ráj, Krkonoše Mts.) are

areas of international importance with a high number of tourists; on the other hand, other Czech Geoparks (e.g. Geopark GeoLoci, Egeria) attract a lower number of tourists, and thus their development depends on promotion. The future development of each Czech Geopark is dependent on management activities, which have to be able to create and promote activities for tourists and visitors that encourage them towards "soft" forms of tourism.

Map 2.26 Geoparks Network of the Czech Republic



Source: http://www.geology.cz/narodnigeoparky/

Case study - Developing ecotourism destinations in Romania

Following the National Ecotourism Strategy, launched in 2009, a system for evaluating eco- destinations was also elaborated, and Romania was the first country in Europe to develop such a system. The system is based on the European Ecotourism Labelling Standard, recognised internationally in September 2012 by the Global Sustainable Tourism Council.

Following the development of the system, between 2014 and 2016, the project “The national network of ecotourist destinations – sustainable development instrument”, co-financed by the NGO Fund in Romania, was implemented by the Association of Ecotourism in Romania and the National Authority for Tourism (NTA), to help destinations fulfil the eco-destinations criteria and develop adequate destination management systems.

The general objective of the project was to increase the operating capacity of the national ecotourism destination network, which contributes to: a) local sustainable development through the implementation of development measures at the destinations level and increasing their visibility on the Romanian and European market, and b) nature conservation by integrating protected areas in the regional development. The specific objectives of the project were:

1. The creation of a national ecotourism destination network that meets the specific requirements of the NTA and contributes to promoting ecotourism as a strategic tool in the development of sustainable tourism in Romania.

2. The existence of an optimal capacity in each destination, to stimulate concrete measures in order to achieve sustainable development through ecotourism.

The project aimed to solve the problems of rural/local communities from micro-regions with protected areas that have the possibility to develop their ecotourism product and services offer in order to reduce

the non-sustainable use of natural resources in the community. The problems arising were related to the restrictions of land use because of the protected area status. In most cases, local communities are not aware of the potential benefits of being in or in the proximity of a protected area. A total of 10 micro-regions were included in the project in order to help increase their local capacity as ecotourism destinations. The main results of the project were:

• a guide in electronic format that presents the stages of the development process of an ecotourism destination;
• 50,000 maps printed (5,000 copies for each of the 10 areas), as well as 9,000 brochures presenting the 10 destinations, which were printed in Romanian and English;
• criteria for ecotourism destinations in Romania were assessed according to the standard elaborated by the Global Sustainable Tourism Council (GSTC), in order to obtain international recognition;
• The National Ecotourism Conference took place at the end of March 2016 in Bucharest;
• 20 people trained in the management of the destination, as well as 10 participants in a study trip to a foreign destination that helped them gain practical knowledge about the functioning of an ecotourism destination abroad;
• 15 independent evaluators were trained according to Eco-Romania Certification System for the improvement of ecotourism services at the local level;
• 35 touristic services (guesthouses and tours) were evaluated according to the Eco-Romania certification system;
• The ecotourism destination network has been promoted in various events both in Romania and abroad, such as Fespo Zurich, Destinations London, Romanian Travel Fain, Bicycle Saloon in Bucharest;
• A web platform has been created in order to promote the destinations (www.eco-romania.ro);
• In Țara Dornelor Region workshops were held and direct meetings with local craftsmen were conducted in order to assist them in adapting the handicrafts they produce to the market requirements and the local identity. As a result of this activity, a shop with local souvenirs was created in the Visitor Centre of Călimani National Park.

Photo: UNESCO Church in Budesti, region Mara – Cosău – Creasta Cocoșului. ©Emil Pop.

Sustainably redirecting tourism development on the Island of Lanzarote, Canary Islands, Spain

Located in the Atlantic Ocean, 1,000 km to the southwest of the Iberian Peninsula and 100 km to the West of Morocco, the island of Lanzarote forms part of the Canary Islands autonomous community of Spain. The island is relatively flat (maximum altitude 670 m), of volcanic origin, with vast lava fields and a profusion of craters. It also contains shallow sea beds that harbour a great wealth of biodiversity. The

climate is dry sub-tropical, with trade winds and a mean annual rainfall of 115 mm, and no permanent water courses. The vegetation is xerophilous, adapted to storing and retaining humidity. There is a high number of endemic species.

Due to its special natural heritage characteristics, the southwest of the island (51 km^2) was declared a National Park in 1974 by the Spanish Government, while the whole island was declared a Biosphere Reserve by UNESCO in 1993, and a Geopark in 2014. There are more protected areas on the island, such as the Volcanoes Natural Park, the Protected Landscape of La Geria, etc.

From a demographic point of view, the island is increasing in population, with a growth of nearly 40% between 2001 (103,044 inhabitants) and 2016 (143,738 inhabitants), which now means a population density of 170 inhabitants per km^2. Islanders have developed a series of adaptations to trap and use the scanty and unpredictable rainfall, which are now embedded in the local culture. This is the case of agriculture techniques for sowing under ash and volcanic sheet flows under inverted cones, forming unique landscapes. The primary sector has gradually decreased in importance in favour of the tourist sector. This blends perfectly with the natural environment.

The island receives almost three million tourist arrivals yearly (international and domestic visitors). Foreign tourists are distributed in quite a homogeneous way throughout the year, and tourism visits are not prone to particular seasonal fluctuations. This is a positive factor for the local economy and tourism planning. The tourist model implemented in the 1960s, 1970s and 1980s was considered inappropriate by the island's local authorities (*Cabildo de Lanzarote*), which soon became aware of the need to manage and regulate tourist activity, in terms of sustainable development (Prats, 2007).

Currently, the sustainable tourism development of Lanzarote Island is based on the following pillars:

- Regulation: taking into account international, European, national and regional rules.
- Planning: both general and tourism planning.
- Cooperation: among public bodies, and between public bodies and the private sector.
- Permanent assessment: by authorities and researchers. There are a great number of references to the island in scientific publications.
- Participation of the local population, as a principle of governance and democracy.

This has been the philosophy of the work method since 1991, when the first "Plan Insular de Lanzarote (PIOL)" was approved, until now. The main objectives are:

- to contain unchecked urban expansion;
- to boost the quality of their tourist areas and facilities;
- to preserve the fragile identity of the territory;
- to involve the local society in the debate about the development model, etc.

More planning tools have been implemented in the same way. The "Sustainable Lanzarote Strategy 2020 – Towards a 100% Sustainable Lanzarote", adopted in 2014, includes:

- a new energy model, based on renewable energies;
- a new water management system, in order to achieve self-sufficiency and avoid emergency water situations;
- improvements in waste treatment, with the new environmental centre;
- shifting the public transport network towards a more sustainable mobility; and
- a number of social and economic measures to achieve the well-being of the local population.

In addition, Lanzarote was the headquarters of the Sustainable Tourist World Conference in 1995, sponsored by UNESCO, from which the Charter for Sustainable Tourism, a global reference worldwide, emanated.

"Project Egadi Islands" for tourism related waste management in Italy

A few kilometres from the western coast of Sicily, Favignana is the main island of the Archipelago of the Egadi Islands (Favignana, Marettimo and Levanzo), with an area of almost 20 km^2 and about 4,500 inhabitants; 85% of the population and tourism activities are concentrated here. The archipelago hosts the "Protected Marine Area of Aegadian Islands", the largest marine reserve in Europe (approximately 53,992 hectares); thanks to its rich environmental and natural heritage, the archipelago attracts over 400,000 visitors each year, mainly during the summer season.

Photo: Favignana island in the Egadi archipelago. Author: Roberto (Flickr).

The Italian National Agency for New Technologies, Energy and Sustainable Economic Development (ENEA), together with the City Council of Favignana and the Marine Protected Area of Egadi Islands, conducted a pilot project with the objective of enhancing and increasing the quality of tourism activities, reducing their impact on the natural heritage and resources of the territory. The initiative is particularly significant because the delicate ecosystem of the archipelago is annually subjected to the pressure of the large summer influx of visitors. In both 2013 and 2014, during the peak season (June–September), Favignana alone welcomed an estimated 70,000 tourists, roughly fifteen times the resident population.

Specifically, the project allowed for the development, in Favignana, of a composting plant that converts organic waste into soil fertiliser, the treatment and reuse of wastewater, and the installation of a "water house", powered by photovoltaic panels, to reduce the large volume of plastic bottles to be disposed of. In 14 months, more than 200,000 litres of water were generated and plastic waste decreased by over 5 tons, equivalent to nearly 140,000 bottles of 1.5 litres.

Finally, it succeeded in preventing the residues of an endemic aquatic plant of the Mediterranean Sea (*Posidonia oceanica*) from remaining on the island's shore, annoying tourists. The ENEA developed and patented a procedure that allows them to be replanted on the seabed. The environmental benefit is significant: this procedure in fact increases the sea beds of *Posidonia oceanica*, important for the marine ecosystem because it can absorb large amounts of CO_2, and because it constitutes an ideal habitat for the reproduction of many fish species.

An environmental quality label was also created, managed by the Marine Protected Area of the Egadi Islands, for local companies that have embarked on a path of improvement and reduction of the environmental impact of their activities, including the promotion of tourism. There are already 60 companies that have achieved certification for meeting the sustainability criteria set out for each tourist

category (restaurants, bars, swimming facilities, hotels, rental business, mooring, fishing, diving centres and passenger transport).

Through the measures it implemented, the "Egadi Project", realised in the period 2012–2014 as part of the broader *"Eco - innovation Sicily"* project, managed to contribute to the protection of environmental assets, reduce the consumption of local resources by land-based activities and enhance the tourism offer. Since the beginning of the project, there has been an estimated increase in the number of visitors of + 7% between 2013 and 2014. Moreover, an extension of the tourist season (April to October) compared with the summer peak, with positive economic effects, was also detected. This initiative, awarded with the Smart Communities Award SMAU Milano 2015 and the Green Coast Award 2013, is particularly significant because it is a model that can be replicated on other smaller islands of the Mediterranean that are subjected to the same kind of pressures, and because it may provide guidelines for interventions, even in limited areas that present different types of problems.

3 Towards an integrated European information system on tourism

Projections for population growth, increasing worldwide mobility and long-haul travel, as well as increasing international tourism arrivals, suggest that sustainability in tourism needs to be placed within the current context of the scientific debate on planetary boundaries[13] (Rockström et al., 2009; Gössling, 2002).

Despite the lack of available continuous temporal and geographical data coverage, some global estimates are available, based on a tourism and environment literature review. In addition, there are models that assess the resource use intensity of the tourism sector according to three different scenarios (economic slowdown, business as usual, global growth) for the 2010–2050 period (Gössling and Peeters, 2015). Although the data will be further refined, the business-as-usual scenario showed that resource use by the tourism sector will double over the next 20–40 years. These findings are similar to those in the current Anthropocene[14] debate and are very much in conflict with the limits of growth set by planetary boundaries (see Table 3.1).

Table 3.1 Estimated global environmental impact of tourism, 2010 and 2050

Aspect	Global total in 2010	Global total demand and impacts in 2050, BAU scenario	Estimated Increment in 2010–2050
Energy	16697 PJ	44110 PJ	164%
Emissions	1119 Mt CO_2	2957 Mt CO_2	164%
Fresh water	138 km^3	265 km^3	92%
Land use	61826 km^2	178731 km^2	189%
Food consumption	39.4 Mt	82 Mt	108%

Source: Gössling and Peeters, 2015.

It has been argued that, even if relevant efficiency gains were to be achieved, such as energy efficiency in accommodation and transport, biofuels for aviation, or electric cars, these gains would be outpaced by the higher number of international tourism arrivals, the increase in the kilometres per passenger travelled and the growing rate of resource use by a limited but consistent share of up-market tourism. Such an increase would mean that the sustainability of the sector on a global scale would only being possible if absolute resource use was decoupled from the increasing number of tourists, possibly through a shift towards a "steady-state" tourism resource use in terms of "right-sizing an economy in environmental terms" (Gössling and Peeters, 2015; Hall, 2010). This might imply an overturning of the current travel trends and patterns of covering ever longer distances, more frequently and by air, for shorter stays (Peeters et al., 2007).

Thus, a question arises as to whether the natural systems and changing climate conditions will be able to sustain tourism as an intense-resource-use economic sector. In this regard, the 7th EU Environmental Action Programme (7th EAP) is rooted in a vision of the same time span and addresses planetary boundaries through the motto "living well within the limits of our planet". The 7th EAP addresses tourism in terms of its contribution to the greening of the economy, via the integration of environmental issues

[13] "Planetary boundaries define […] the boundaries of the planetary playing field for humanity […] to be sure of avoiding major human-induced environmental change on a global scale" (Rockström et al., 2009). Such environmental changes could include climate change, ocean acidification, stratospheric ozone depletion, atmospheric aerosol loading, biogeochemical flows (interference with P and N cycles), global freshwater use, land system change, rate of biodiversity loss, chemical pollution.

[14] The term 'Anthropocene' is assigned to the present, in many ways human-dominated, geological epoch (Crutzen, 2002).

into specific policies, while acknowledging that the deterioration of bathing water quality, changes to the hydrological cycle and land use, as well as floods and droughts are detrimental both to human health and to the economic prosperity of industries such as tourism.

Recent international policy agreements that reaffirm and foster sustainable development worldwide, such as the 2030 Agenda for Sustainable Development of the United Nations (United Nations, 2015), shed light on the necessity for the tourism sector to align its efforts to other key economic sectors for the achievement of such goals in the long run. The Sustainable Development Goals (SDGs) and targets 8.9, 12b, 14.7 of the 2030 Agenda address tourism, focusing equally on the sustainable creation of jobs and growth, and the sustainable use of natural resources, in particular marine resources. It also emphasises the importance of monitoring the environmental impact of tourism. Meanwhile, the 10-Year Framework of Programmes[15] (10YFP) of the Sustainable Tourism Programme, as an implementation tool for SDG 12, aims at accelerating the shift towards sustainable consumption and production (SCP) in tourism. The success of all these policy processes depends on the efficacy of the monitoring and evaluation of the actions undertaken.

On a global scale, the United Nations World Tourism Organization, in cooperation with the United Nations Statistics Division (UNSD), has launched an initiative to move progressively towards a statistical framework to measure sustainable tourism (MST) that will bridge two UN standards: the Tourism Satellite Account (TSA) and the System of Environmental Economic Accounting (SEEA). The MST is meant to collect information on the environmental pressure and impacts of tourism, the dependency of tourism on the environment and ecosystems, environmental protection expenditure and environmental taxes, and some of the socio-economic impacts and dependencies of tourism (employment, etc.).

Due to the strong local characterisation of most pressures and impacts by tourism, UNWTO is also the promoter of an initiative that addresses the measurement of tourism at sub-national levels, also from a statistical perspective, for setting up the Regional Tourism Information System, led by the International Network on Regional Economics, Mobility and Tourism (INRouTe) (INRouTe, 2016) (see Box 3.1).

The 7th EAP also emphasises the need for a "clear overview of GHG measurement, monitoring and data collection, which is currently incomplete for key sectors", tourism among them. Moreover, it identifies the European Environment Agency and the European Environment Information and Observation Network (EIONET) as specialised bodies that are expert at adapting scientific knowledge for public policy so as to further strengthen and improve the science–policy interface.

As a response, the proposal for a reporting mechanism on tourism and environment by the European Environment Agency, is meant to contribute to filling the knowledge gap in monitoring progress towards "a resource-efficient, green and competitive low-carbon economy". This mechanism has to position itself within an emerging context of monitoring and reporting initiatives worldwide on tourism environmental impacts and sustainability – such those by UNWTO and INRouTe – and needs to strive for interoperability at different scales, from the global to the regional and local ones.

[15] The 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns (10YFP) is a global framework of action designed to enhance international cooperation to accelerate the shift towards SCP in both developed and developing countries.

Box 3.1 The INRouTe initiative

Setting up of a Regional Tourism Information System (R-TIS) by the International Network on Regional Economics, Mobility and Tourism

INRouTe is a private initiative promoted by UNWTO, aimed at measuring tourism and sustainable development at subnational levels, providing information for policy and analytical purposes, within the framework of the UN 2030 Agenda. This initiative has also aided the adaptation of tourism statistics international standards to subnational levels by proposing a statistical robust Regional Tourism Information System (R-TIS) conceptual framework.

In this context, it is advisable for the basic core of such a system to refer to basic statistical data and indicators. For those regions where tourism is economically significant, such as a good number of European ones, it is recommended that they focus on an incremental approach that involves, as a first step, the development of a limited set of statistical data and indicators at the national/regional levels, for a limited number of items, covering three areas of particular interest: tourism as an economic sector, the consequences of tourism on the sustainable development of the respective territory and the territorial cohesion that tourism should preserve or promote. In a second step, an articulation of regional/sub-regional levels should be foreseen, including geo-referenced data. In terms of environmental sustainability, a specific emphasis is put on water consumption and the tourist pressure. INRouTe particularly emphasises the need to strengthen the coordination and cooperation between territorial and tourism planning to ensure a sustainable development approach in the territories where tourism is a relevant socio-economic factor (INRouTe, 2016).

3.1 Developing the environmental dimension: TOUERM, a reporting mechanism on tourism and environment

In 2013, the EEA kicked off activities to test the feasibility of and develop an indicator-based reporting mechanism linking tourism and the environment (TOUERM or Tourism and Environment Reporting Mechanism). Its main objective is to provide a more comprehensive picture of tourism, within the general monitoring processes carried out by the EEA regarding other European economic sectors' (transport, energy, agriculture and industry) environmental performance.

Since then the EEA has been working in cooperation with an Eionet Expert Group representing all EEA members and cooperating countries and the "European Topic Centre on Urban, Land and Soil systems – ETC/ULS" to:

- explore the feasibility of TOUERM as a coherent framework for monitoring;
- assess the connection between tourism and the environment in Europe;
- identify main topics and indicators in order to address them (and develop those indicators).

The framework followed a tiered approach, starting by identifying key policy questions, linked to a set of indicators:

1. What characterises and drives the demand for tourism?
2. What are the environmental impacts of tourism?
3. Are we getting better at managing tourism demand to preserve natural resources?

4. Are we moving towards a better internalisation of the external costs of the tourism sector?
5. How effective are environmental management and monitoring tools towards a more integrated tourism strategy?

Indicators

In the next phase, 25 priority indicators were identified and prioritised according to the following criteria: 1) Data availability, 2) Consolidated methodology, 3) Processing requirements that are feasible within the framework of the project, 4) Policy relevance, 5) Clarity of the message.

Indicators also address the driver–pressure–state–impact–response (DPSIR) analytical framework, which uses the cause–effect relationship to organise information about interactions between society and the environment. As applicable to the sustainability analysis of the tourism sector, the assessment of state (S) component in the DPSIR model is not the key focus. This is because the main scope is the identification, monitoring and reduction of the environmental pressures (P) and impacts (I) caused by the sector, while state analysis is more relevant to environmental aspects, such as water or biodiversity, that are affected by tourism activities (e.g. in the form of ecosystem services). As a result, state indicators are omitted from the proposed indicator set for reporting mechanism.

Of the 25 priority data sets identified, 19 have been developed to produce 9 indicators, which are presented in Table 3.2. The majority of those indicator data sets are in line with the European Tourism Indicator System (ETIS), developed by the European Commission as a reference system to help monitor and manage tourism destinations from a sustainable development perspective (European Commission, 2016).

The indicators developed so far as proxies aim at covering a wide range of topics related to the environmental dimension of tourism sustainability. These include, among others, the attractiveness of places, water consumption, biodiversity disturbance, spread of sustainability practices through the adoption of environmental certification schemes and labelling, and potentials for ecotourism. To some extent, initially, land take is also addressed through the development of specific tourism and recreational related facilities (ski areas, marinas and golf courses).

However, other policy relevant indicators – identified as priority ones by the EEA member and cooperating countries – have yet to be fully developed because of several methodological challenges. It is very common in fact in tourism- and environment-related analysis – also because of the complexity of the sector – to encounter difficulties in developing appropriate monitoring tools that allow regular and consistent assessments at a Pan-European level, especially because of the lack of statistical data from official sources.

This is very much the case with many environmental aspects – such as waste and wastewater generation, air pollution by transport, energy and water consumption, and land take – for which it is difficult to extract, from all available quantitative data, the precise share that corresponds to tourism. This requires investments in additional resources (time and expertise), which have so far led to the production of ad hoc basis and specific case research analyses, presented in this report.

Another challenge addressed is the integration of socio-economic information, usually aggregated at the administrative level, with environmental data that has a spatial dimension beyond administrative boundaries and is scale dependent. The adoption of a grid of 1x1 km as a reference unit at the European level is a common approach to integrate data from different nature and sources.

Table 3.2 Proposal for TOUERM indicators

DPSIR scheme components	TOUERM Indicators	Indicator data sets
Drivers	Tourism flows	Tourism arrivals Overnights spent at tourism accommodation establishments Seasonality of tourism
	Tourism-related modes of transport	Tourism-related modes of transport: number of trips Tourism-related modes of transport (I): Airplane Tourism-related modes of transport (II): Cruises
	Most attractive places	Most attractive places
Pressures	Tourism density and intensity	Tourism density Tourism intensity Occupancy rate in tourist accommodation establishments
	Tourism pressure on protected areas	Tourism pressure on protected areas
	Water abstraction by tourism	Water abstraction by tourism
State	Bathing water quality	Bathing water quality reporting
Impacts	Spatial impacts of tourism facilities	Spatial impact of tourism facilities (I): Golf courses Spatial impact of tourism facilities (II): Marinas Spatial impact of tourism facilities (III): Ski resorts
Responses	Percentage of destination that is designated for protection	Percentage of destination that is designated for protection
	Tourism certification tools	Tourism enterprises using environmental certification/labelling (EMAS, EU Ecolabel, European charter for sustainable tourism) Blue Flags for beaches and marinas

Source: Own elaboration.

3.2 Data for potential reporting on tourism and the environment within existing reporting mechanisms

Data needed

In July 2016 a Report submitted by the EC to the European Parliament and the Council on the implementation of Regulation (EU) No 692/2011 concerning European statistics on tourism stressed that it is important to make sure that European statistics can, in the future, assess the macroeconomic

importance of tourism and its impact on the environment. Article 5 of that Regulation refers specifically to the necessity of conducting pilot studies on the development, production and dissemination of harmonised tables for tourism satellite accounts, and of collecting additional data on the effects of tourism on the environment.

The Report also highlighted the attention paid by Eurostat to the work carried out by the European Environment Agency, the OECD and the UN World Tourism Organization, among others, and the data input provided by these to indicator systems on sustainable tourism. However, given the pressure, in terms of resources, to implement the Regulation's requirements for regular data production, putting in place a broader programme of pilot studies has proved impossible in recent years.

This need for official statistics that may better reflect the environmental dimension of tourism-related sectors such as transport is also stressed in a study of the European Parliament, commissioned by the Committee, on Transport and Tourism (European Parliament, 2016). This study explores the sustainable development of EU tourism and concludes that there is a lack of up-to-date data for both the environmental and social effects of tourism. Additionally, the study highlights that "tourism, environmental and transport policies in the EU need to integrate better to create sustainable development", while acknowledging the "weak" relationship between transport and tourism research. The study also provides general recommendations for improving tourism monitoring, statistics and research:

- To update the studies and research that address tourism and transport models in conjunction with each other, in order to determine the overall impacts of tourism and transport on a range of environmental and social aspects, as a prerequisite for assessing the integration of tourism and transport sectors' policies;

- To develop strongly improved statistics on tourism impact, including more detailed data on number of arrivals, nights, travel purpose (leisure, business, etc.) and expenditures, transport modes, source markets and distances travelled. Regarding the latter, in particular, distance travelled and travel speed are drivers of CO_2 emissions and the current statistics about the number of trips at the national level alone are not that useful, since European countries vary greatly in size;

- To perform more critical analyses on the impact of new airport capacity on specific regions.

To enable the evaluation of trends and track progress towards sustainability other data gaps concerning environmental pressures would also need to be filled:

- Environmental data by accommodation sector (on water and energy consumption, waste generation and wastewater generation);

- Environmental data by tourism facilities (such as beach and mountain resorts, and marinas) on water consumption, energy consumption, waste generation, wastewater generation and land occupation.

Land, in particular, is the main physical element that sustains the development of tourism and its infrastructures. However, there are uncertainties and gaps in the data regarding land use by tourism that need to be addressed. From a land use perspective, the area that is required by tourism activities is significantly larger than the actual built-up area, which is thus not suitable for such activities. This can be explained considering the difference between the percentages of direct land use (accommodation establishments, second homes, resorts, airports, roads, parking areas, campsites, marinas, railways, recreational facilities,) and indirect land use (land for food supply, quarries for construction materials, landfill for waste disposal areas for tourism related industrial production, etc.) by tourism.

Current existing monitoring frameworks are still underestimating the actual impact of tourism on land use and require further improving existing tools for analysis. This is also the case for monitoring tools assessing the impact of the tourism sector on the supply, distribution and consumption of food, including its relevance to climate and air quality.

Current European tourism statistics do not yet fully reflect the environmental dimension of the impacts by the sector, despite the fact that some indicators based on the EUROSTAT database (for example, tourism intensity, density, occupancy rates, related modes of transport) and their combinations helped to develop some proxies on potential environmental pressures.

National and sub-national experiences with tourism within the EEA member countries

The existence of national reporting or information systems on tourism and the environment have been assessed by the EEA via a first-hand review, a dedicated questionnaire and during the several TOUERM workshops of the Eionet Working Group on tourism and environment.

In most countries, nevertheless, national data collection for tourism data relies above all on statistical information gathered by national statistic agencies. Most of the indicators and variables available at the national level are the same as reported to and published by Eurostat. In this context, for example, Spain and Italy prepare more specific data collections, while Germany focusses on the effects and outlook of national tourism policies. In several other countries, tourism is part of the national reporting activities on the state of the environment (Croatia, Italy, Germany, Serbia).

Spain and Italy evidence the high importance of the tourism sector within their economies by submitting additional tourism information through national and regional data collecting. The Spanish National Institute for Tourism Studies (Instituto de Estudios Turísticos) provides in-depth information about tourism-specific issues such as low-cost airlines, tourism mobility across Spain's borders, as well as the results of regular targeted surveys (labour market, visitor surveys, etc.). Italy's ISTAT, as well as its National Tourism Research Institute (ISNART), conduct specific surveys on tourism, though these have a socio-economic focus only.

Additionally, several countries are monitoring tourism in protected areas (Hungary, Iceland, Germany) or have developed studies on tourism and climate change (Portugal, Italy). Other countries, such as Hungary and Latvia, are working on dedicated actions for ecotourism or have developed action plans dedicated to tourism and the environment. In Ireland, for instance, the National Tourism Development Authority (Fáilte Ireland, 2007) published its Environmental Action Plan 2007–2009, calling for research and management activities to bring about the harmonisation of tourism and environmental issues. Slovakia is the only country that provides a dedicated report on tourism and its impact on the environment. It is published by the Slovak Environmental Agency and follows the DPSIR model. It provides a regular (every two years) review of indicators, describing tourism's impact on the environment, as well as the level of environmental efficiency of tourism.

At the sub-national level, the Catalonian Tourism Observatory, the Basque Tourism Observatory and the Andalusian Territorial Information System on Tourism are different examples of further initiatives in Spain that aim to monitor tourism-related data sets on different scales. Furthermore, several European regions, such as the Baltic Sea region, have developed their own indicator and information systems (e.g. BASTIS Baltic Sea Heritage Tourism Information System), which have a strong market orientation and are based, to a great extent, on the same national statistical data.

Other portals related to destination development, such as DestiNet (https://destinet.eu), work as platforms for the exchange of knowledge and, to some degree, of data. Italy prepares an Environmental

Data Yearbook that provides an overview of tourism data and evaluates the impact of the sector on the environment, presented at the NUTS2 level.

Tourism data reporting flows at European level

Despite and beside the diverse and uneven national approaches with regard to monitoring and reporting on the tourism-and-environment nexus, all EU member states take part in the existing information flow on tourism national statistics currently feeding the European Virtual Tourism Observatory (VTO) managed by the European Commission – DG GROWTH.

In fact, all EU Member States provide the Tourism Advisory Committee (TAC) of the European Commission with annual reports on tourism – mostly containing socio-economic data – and country profiles are available too. The existence of this information flow represents an additional element for reflection in the development of better reporting mechanisms on tourism-related performances at the European level, by potentially integrating the questionnaires for the countries with requests for environmental data.

Other tourism data owners

Potential owners of data relevant to tourism- and environment-related analysis include both private subjects and public institutions. These could be consulted in order to further refine available data. As far as the transport sector is concerned, potential data owners that may help determine the share of touristic use are air companies, tourist bus companies, car rentals companies and waterways companies. As regards the accommodation sector, additional data is collected by hotel managers, camping sites, and resorts with the potential to inform about water consumption, energy consumption and waste generation. Managers of protected areas are also to be consulted as far as, for example, number of visitors and amount of waste collected are concerned.

National case studies: Italy and Slovakia

Italian reporting experience on tourism and the environment

At the national level, as far as Italian experiences on indicator-based reporting on the tourism-and-environment nexus are concerned, a specific analysis is carried out at the national level by the National Environment Agency (ISPRA) and its findings are regularly presented in the chapter on tourism in the Environmental Data Yearbook based on the DPSIR framework. Nine indicators, in the "Tourism" chapter of the 2016 edition of the Environmental Data Yearbook (ISPRA, 2016), consistent with the ongoing work of the EEA on tourism and the environment, are used to inform on the different relations between tourism and the environment at the national level:

- tourism infrastructure,
- tourism intensity,
- flow of tourists by transport mode,
- impact of tourism on the generation of municipal waste,
- energy consumption by the sector,
- environmental pressures by specific tourism infrastructure such as golf courses and marinas,
- “Blue flags" for beaches and marinas,
- receptivity and tourist flows in Italian parks.

In addition to these 9 indicators, several other chapters of the Environmental Data Yearbook include other environmental indicators that are still very significant for tourism, such as: land use in coastal areas, the EMAS and Ecolabel certifications, the quality of bathing water, the compliance of sewage systems, as well as all indicators related to transport.

At the regional level, also following ISPRA's activities and achievements on the subject, a specific indicator-based reporting mechanism and a thematic report on "Tourism and Environment" is prepared by the Regional Environmental Protection Agency (ARPA) of the Emilia Romagna Region, with a special focus on the intensively and historically touristic province of Rimini.

Photo: Rimini waterfront (Emilia Romagna, Italy). Author: trolvag (Wikimedia commons).

Awareness of the complexity of the relation between tourism and the environment at the local level led ARPA to the development of this thematic report, acknowledging, on the one hand, that tourism is a harbinger of economic well-being for the community and, on the other, that it represents an environmental pressure not to be underestimated for the healthy future of the sector and its sustainable management. Several core indicators are used in the report:

- Land use and land take (based on Corine Land Cover and Copernicus Imperviousness layer);
- Tourist flows;
- Water withdrawals and consumption;
- Waste water and treatment plants;
- Bathing water;
- Air quality and tourism;
- Nature and biodiversity;
- Tourism and waste;
- Tourism and acoustic pollution;
- Tourism and mobility, consumption and production of energy in the tourism sector;
- Environmental certificates.

These indicators try to illustrate the state of the tourism sector in the Rimini Province, showing, sometimes in a quantitative way, the pressures that tourism, defined as infrastructure and tourist flows, exerts on the territory, but also the territorial heritage. The aim of the thematic report is for tourism to be managed in a responsible way with a view to its sustainable development.

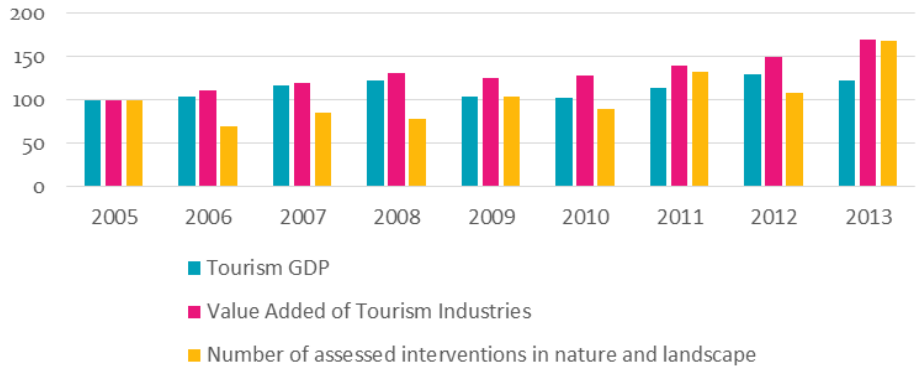
Comparison of single indicators related to tourism and the environment, as part of the assessment of tourism impact on the environment within regular reporting in Slovakia

The report "Tourism and its Environmental Impact in the Slovak Republic as of 2014" is one of the task outcomes listed in the main Programme of the Slovak Environmental Agency and Ministry of Environment of the Slovak Republic. This programme is entitled "Assessment of Effects of Selected Sectors of the Economic Activities on Environment and Implementation of Environmental Aspects into Sectorial Policies". This report is already the fifth one of its kind; the first report was completed in 2005. Besides a relatively high number of simple indicators that provide quantitative information about the impact of tourism activities on some components of the environment – or reversely about the environmental load of tourism performances (number of visitors, number of overnights, etc.) – it seems it would be useful and interesting to make a comparison of indicators on "tourism and environment" from both sides of the issue.

This approach was also applied in the above-mentioned report. In this case, the time series enabled an assessment of the mutual relationship between single indicators. It was also possible to evaluate whether the "price" paid by the environment for the benefit of tourism development (i.e. its impact) is increasing, stagnating or decreasing. There are two illustrations of this approach as follows.

In order to evaluate the environmental efficiency of tourism, a comparison was made between the number of assessed interventions in nature and landscape, on the one hand, and economic indicators that synthetically express economic aspects of tourism benefits, on the other. Among the economic indicators included were the GDP generated by tourism and the value added to tourism industries (including the performance of other industries within the tourism sector) (see Figure 3.1). The TSA methodology includes, among tourism industries, 10 internationally comparable industries (accommodation services; food services; rail transport; road transport; water transport; air transport; renting of vehicles for personal transport; TAs, TOs, reservations and related services; cultural activities; sports and recreational activities) and 2 optional industries depending on the country (retail of driving fuel, retail of typical specific goods for a country; specific activities typical for country such as spa services, well-being services, insurance services).

Figure 3.1 Environmental efficiency of tourism in Slovakia – Synthetic indicators with respect to a number of interventions in nature and landscape, 2005-2013 (year 2005 = 100%)



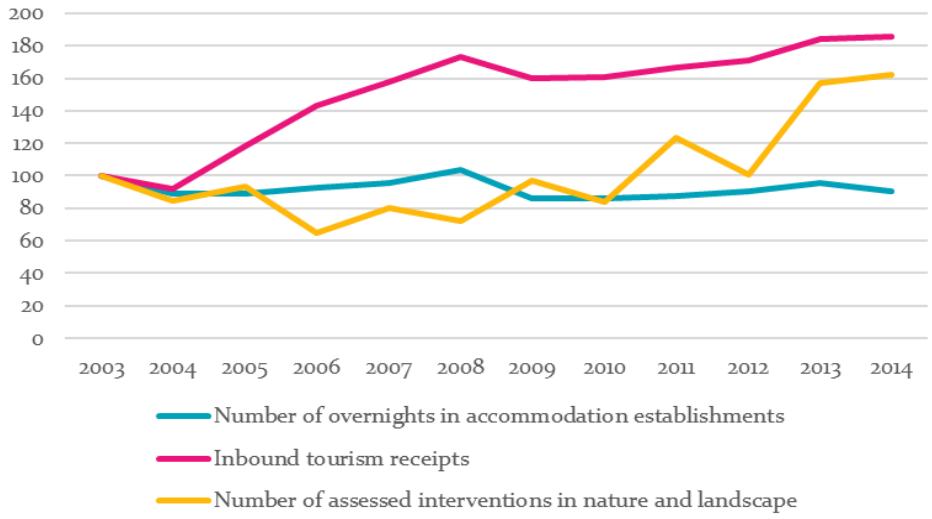
Source: Statistical Office of the Slovak Republic; State Agency for Nature Conservation.

In this case, the time period prior to 2010 can be seen as favourable from the point of view of environment efficiency measurements, because the growth of economic performance indicators was higher in comparison with the growth (or stagnation in some years) of the number of assessed interventions. It means that to reach higher tourism benefits there were relatively less interventions in nature and landscape needed. The present structure of available data does not allow for the specification

of particular categories of interventions; therefore, the data express all investment interventions in nature and landscape that require assessment. The growth in the number of interventions in 2011 overtook the pace of tourism GDP growth and in 2013 nearly aligned with the growth of the value added to tourism industries.

Figure 3.2 shows a comparison of quantitative development of interventions in nature and landscape, where the evolution of inbound tourism receipts and the evolution of number of nights in accommodation establishments can be seen. This graph provides evidence for several conclusions. The first one is that receipts grow faster than the number of overnights. This has two is a positive development in both economic and environmental terms, because a higher volume of receipts was achieved through a lower number of overnights spent (lower impact). A little less favourable is fact that, after 2010, the pace of growth of interventions was significantly higher in comparison with the quantitative growth of overnights. Finally, there is also a negative development: during last years of the reference period the interventions recorded the highest growth and considerably eliminated the positive development of environmental efficiency that was noticed during the first part of the reference period. Especially, the decoupling effect is reduced in terms of inbound receipts and this effect is totally lost when it comes to the number of overnights. This significant reduction of environmental efficiency at the end of the analysed time series is common for this graph, as well as the previous one.

Figure 3.2 Environmental efficiency of tourism in Slovakia with respect to a number of interventions in nature and landscape, 2003-2014 (year 2003 = 100%)



Source: Statistical Office of the Slovak Republic; State Agency for Nature Conservation.

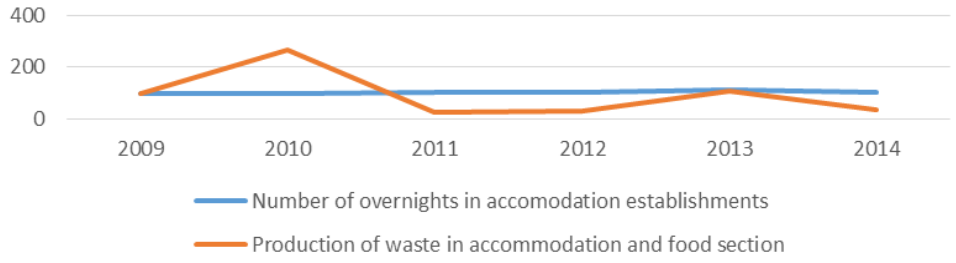
The number of nights is an indicator expressed in physical units and includes overnights of both domestic and foreign tourists, covering both parts of internal tourism. Although these overnights don't represent all tourist nights in Slovakia, they represent a significant proportion of all overnights – and the most economically significant – because they are the greatest factor influencing the environmental performance of all types of accommodation establishments and their higher qualitative standard. Receipts of inbound tourism as a monetary indicator shows the economic benefit of inbound tourism, which is considered – alongside job creation – as being of crucial importance for national economies.

The efficiency of tourism in Slovakia with respect to waste production has also been assessed (see Figure 3.3). In this case, the environmental efficiency of tourism, and specifically the efficiency of accommodation and food services, is evaluated by comparing the waste produced by these services and their performance indicator (number of nights), both expressed in physical units. With the exception of the extreme fluctuation of waste generated in 2010, the relation between the number of nights and

generated waste is positive, because a reduction or stagnation in the number of nights is accompanied with a decrease of the waste volumes generated by these services.

By taking into account the indicators presented above, it can be concluded that there has been a favourable development of environmental efficiency within this segment of services in Slovakia during the last years.

Figure 3.3 Environmental efficiency of tourism in Slovakia with respect to waste production in accommodation and food section, 2009-2014 (year 2009 = 100%)



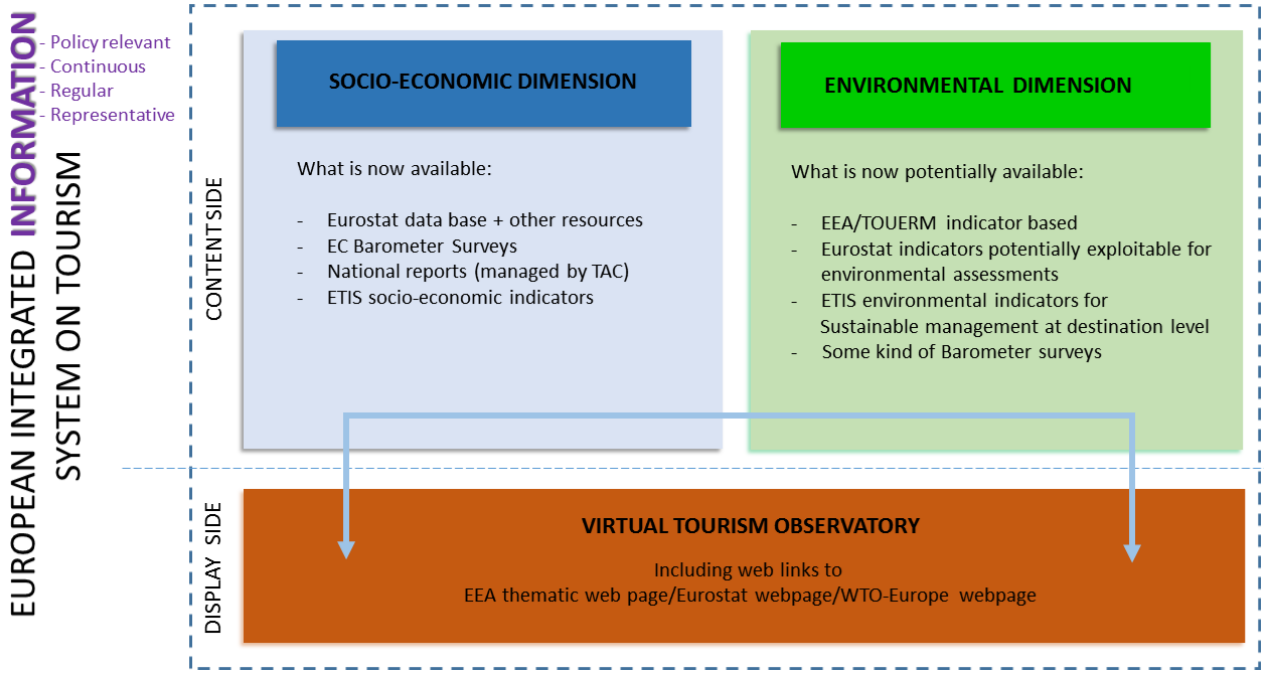
Source: Statistical Office of the Slovak Republic, Slovak Environment Agency.

3.3 The required integrated tourism information system

Following up on the recommendations by the European Commission in their Communication on the "Agenda for a sustainable and competitive European tourism" to undertake continuous monitoring and increase understanding of impacts, regular reporting on the overall sustainability of the tourism sector will require the setting up of an integrated tourism information system at the European level, with TOUERM representing its major environmental component (see Figure 3.4). Within this context, the information should be policy-relevant, continuous, regular and representative. Such an integrated tourism information system should build and capitalise on existing data sources and mechanisms, as well as improve them, and may include:

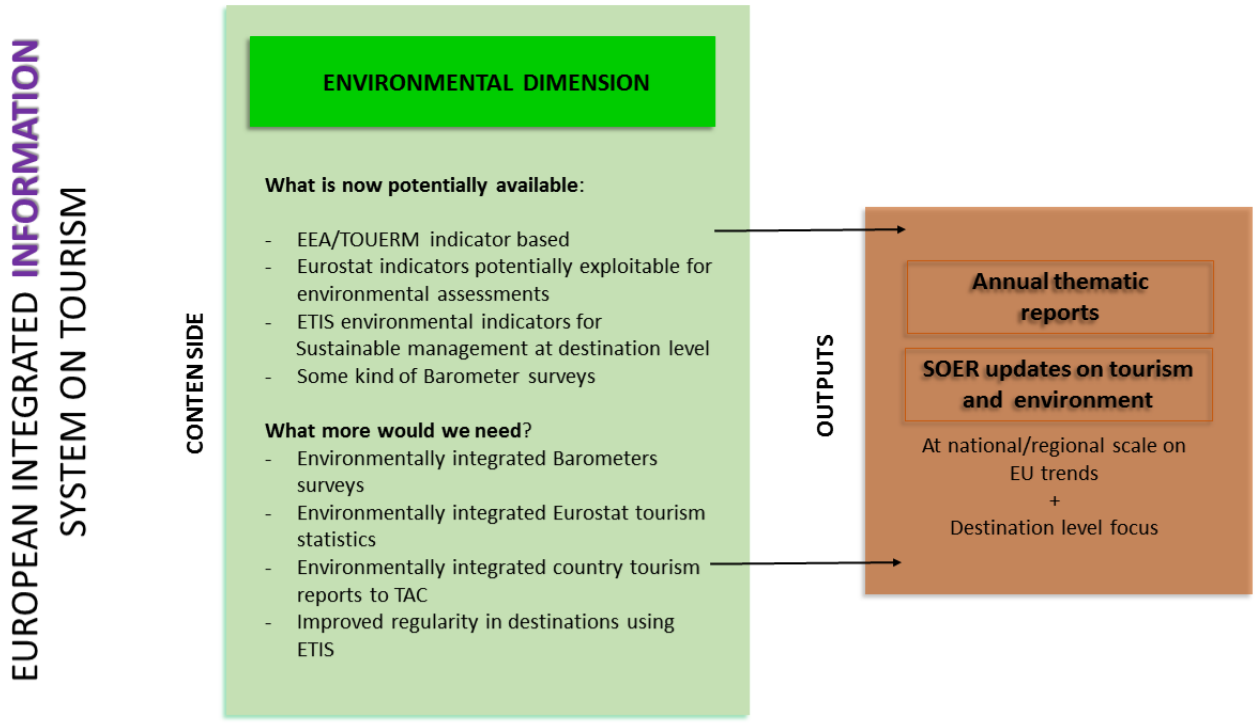
- The Eurostat data base, to provide "context" and socioeconomic information on the sector, also in light of the most recent developments in terms of the exploitation of big data sources;
- Information from DG GROW reporting flows by the MS to the Tourism Advisory Committee, to improve information on environmental data;
- Eurobarometer surveys, to provide information on the consumption and behaviour patterns of European tourists;
- The Virtual Tourism Observatory as an entry point, as well as a source of socioeconomic and environmental information on the sector;
- Information with relevant time and geographical coverage through use of the ETIS indicators at the destination management level, and EEA Tourism and environment reporting mechanism (TOUERM) indicators to provide information on the environmental impacts and sustainability trends of the sector, according to the DPSIR scheme (see Figure 3.5);
- Possibly Copernicus programme products, to complement the tourism- and environment-related information provided by the TOUERM indicators (see Box 3.2);
- Appropriately selected Eionet data flows. All 33 EEA member countries and the six cooperating West Balkan countries contribute to the priority data flows exercise, as a subset of the EEA's data collection activities. Some of these data flows have the potential to be exploited also for tourism- and environment-related analysis.

Figure 3.4 Main components of the European integrated information system on tourism, showing TOUERM as its environmental dimension



Source: Own elaboration.

Figure 3.5 Main components of TOUERM – an environmental dimension of the European integrated information system on tourism



Source: Own elaboration.

Box 3.2 Copernicus potentials for tourism-related analysis

Copernicus is a European Union programme aimed at developing European information services based on satellite Earth Observation and in situ (non-space) data. Vast amounts of global data from satellites and from ground-based, airborne and seaborne measurement systems are being used to provide information to help service providers, public authorities and other international organisations improve the quality of life for the citizens of Europe. The information services provided are freely and openly accessible to its users. Datasets go back many years, allowing for the ability to search across and compare between decades, thus ensuring the monitoring of changes.

The programme serves different domains with timely collected data, including tourism. Currently, tourism is only regarded as a sector that may benefit from an application concerning the assessment of bathing conditions: the Copernicus marine environment monitoring service can be used to implement coastal water quality services that can in turn help public authorities to enhance the protection of bathing waters. The service can also help to detect jelly fish populations and predict algal blooms. Moreover, Copernicus could also support additional applications in this domain that could aid tourism-related environmental impacts analysis, based on existing and up-coming products.

Corine Land Cover (CLC). The relevance of this data set is the long time series (1990-2000-2006-2012), although one of the major difficulties is to directly identify which land use changes could be the result of tourism flows. Land uses change over time and such changes – in particular those related to new developments – are often mixed up with other drivers (e.g. industrial development, demand for new housing independent from tourism). However, CLC still provides a valuable context for identifying where certain processes occur. In addition, analysis of specific tourism infrastructures obtained by other approaches (e.g. golf courses, ski resorts) can be complemented with the analysis of land cover changes for a given period to understand the dynamics within a particular region. Moreover, the dynamics of natural and semi-natural areas are also relevant to identify potential changes to attractiveness.

Figure 3.6 Example of Copernicus CLC image

Source: Copernicus.

High resolution layers (HRL), such as imperviousness, forests, grassland, wetlands, and permanent water bodies, provide complementary information that can help to define certain landscape characteristics and, therefore, to certain degree, attractiveness characteristics. HRLs should be further explored, potentially combining this information with CLC to define potential delivery of scenic and natural values (services). In the future it would be desirable to compare service provision with demand.

Urban Atlas (UA). The UA also shows classes of interest related to tourism potentials (although it presents the same thematic issues as CLC), at a higher resolution: ports, airports, and sport and leisure facilities. This class includes golf courses or ski resorts, which are very much linked to tourism. Riparian zones (RZ). This layer is mainly focused on green and blue infrastructure. It could be used to identify attractive places, as mentioned before, at the Pan-European level. Natura 2000. This layer is very much focused on the assessment of effective preservation of certain grassland habitat types. It should be checked to what extent these habitats are particularly attractive in rural areas. Costal layer (up-coming). It is one of the most promising products for tourism, in particular for the following reasons: a) higher resolution for coastal areas, which undergo intense use by tourism; b) differentiation of types of ports; c) identification of linear coastal defences; and d) specific thematic classification of coastal systems (e.g. dunes, bare rock, type of waters, etc.).

4 Conclusions

Tourism is an important sector for the European economies but also a major driving force influencing pressures and impacts on the environment. Europe is the first tourism destination for international arrivals and the main source of tourists worldwide. This should call for a joint action at the EU level to improve monitoring and reporting on those pressures and impacts, with the goal of informing policy implementation and decision-making.

Despite the fact that many environment-related policies acknowledge these pressures and impacts and call for the sector to become more and more environmentally sustainable, it is still quite difficult to define a baseline and to measure to what extent and where in Europe this sustainability goal is being progressively achieved. This difficulty lies partially in the complex and cross-cutting nature of the sector.

Another limitation is posed by the remarkable volume of socio-economic data on tourism, with current European policy placing an emphasis on the competitiveness and growth of the sector. However, this information is not particularly suitable for analysing the environmental dimension of tourism, although it is useful for painting a picture of the socio-economic drivers and prevailing consumption patterns. Such analyses still require dedicated efforts, as well as organising data into environmentally relevant reporting units. The lack of environmental policy targets related to tourism is thus reflected in the fragmented environmental data available for the analysis of the tourism sector.

Several of the indicators rely on EUROSTAT databases, and are consistent with the European Commission's European Tourism Indicator System (ETIS). Moreover, work carried out by the European Commission's Directorate-General for Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) and Directorate-General for Eurostat – European statistics (DG ESTAT) suggests that it could be possible to improve environment-related tourism data in the medium–long term, as recently recommended by the European Commission in its report on the implementation of Regulation (EU) No 692/2011 of the European Parliament and of the Council concerning European statistics on tourism. Equally, enhanced cooperation with the UNWTO within the framework of the recently launched initiatives for measuring sustainable tourism provides opportunities for synergies with and mutual contributions to the proposed Regional Tourism Information System (R-TIS).

There is an opportunity to downscale existing information and develop first assessments by using both methodologies currently developed for proxies, as well as ancillary data from emerging sources (e.g. big data or open source geographic data). As a consequence, a first indicator-based framework has been provided by the EEA. Cooperation with EEA member countries, through the National Focal Points and experts in the Eionet Working group on tourism and environment, has the potential to provide solutions to overcome the above-mentioned methodological challenges to completing a core set of robust indicators for TOUERM, while building on national experience and initiatives, as well as on the existing data flows within the network. In this same manner, TOUERM has the potential to become the environmental component of a broader and integrated information system on Tourism at the European level, in connection with existing platforms such as the European Commission's Virtual Tourism Observatory.

However, this is a first stage of an ongoing process that should be continued and that should consolidate an increasing number of indicators and data that will allow regular and consistent reporting on the tourism-and-environment relationship in Europe. At the same time the process is awaiting the availability of European statistics that will better represent the environmental dimension of tourism impacts in the future, as recently recommended by the European Commission.

How to improve the information gap in the analysis? There is a number of actions recommended at different levels. On the one hand, at the statistical level, an improvement of the environmental dimension – which is an important variable also in respect of the socio-economic health of the sector in the future – is required. On the other hand, at the policy level, it is necessary to overcome the distinction between sustainable tourism and competitive tourism and improve the statistical environmental dimension, recognising the dependency of the sector on healthy natural systems, while supporting environment-related data collection for monitoring and reporting as an essential element to tourism planning, promotion and management.

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European Topic Centre on Urban Land and Soil Systems (ETC/ULS)
Departament de Geografia
Universitat Autònoma de Barcelona (UAB)
08193 – Bellaterra
Spain

Tel.: +34 935813520
Web: uls.eionet.europa.eu

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