

## Sustainable tourism The environmental dimension

### SUMMARY

Tourism is the third largest economic sector in the European Union (EU). It is estimated to employ a total of 17 million people, and its overall contribution to the economy is close to 10 % of EU gross domestic product. Tourism has a special, two-way relationship with the environment. On the one hand, the quality of the environment is essential to tourism's success, as this is very often what attracts people to visit a place, and persuades them to go back. On the other hand, tourism can become the vector of significant pressures and impacts on the environment. Potential adverse effects of tourism development relate to three main areas: strain on natural resources; pollution; and physical impacts, typically involving the degradation of ecosystems.

Climate change and tourism are closely interlinked. While the tourism sector contributes to greenhouse gas emissions, for the most part derived from the transport of tourists, it also faces profound impacts from global warming. The beach-, winter- and nature-based tourism segments are likely to be most affected.

Research points to a lack of relevant, EU-wide, recent and detailed data about the impacts of tourism on the environment. The European Environment Agency is working on the elaboration of a reporting mechanism on the tourism and environment relationship, based on several indicators, many of which are consistent with the European tourism indicators system for sustainable destination management (ETIS), developed as part of EU action to promote tourism sustainability.



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*This briefing has been produced at the request of a Member of the Committee of the Regions, in the framework of the Cooperation Agreement between the Parliament and the Committee.*

## Background

Sustainable tourism has been defined by various authors and institutions, from different perspectives (see box for examples). In essence, the concept refers to the balancing of the environmental, economic, and socio-cultural aspects of tourism development, i.e. the three pillars of sustainability. The environmental sustainability pillar, as defined by the [United Nations](#), entails conserving and managing resources, especially those that are not renewable or are precious in terms of life support, which requires action to minimise air, land and water pollution, and to conserve biological diversity and natural heritage.

Tourism has a special, two-way relationship with the environment. On the one hand, it is an industry bound to [territory](#), dependent on the national, regional and local resources of a country. The quality of the environment is essential, as this is very often what attracts people to visit a place, and persuades them to return. Evidence of this can be found in the 2016 edition of the EU Eurobarometer [survey](#) on Europeans' preferences on tourism, confirming that nature and landscape remain predominant factors in choosing holiday destinations, while the quality of natural features continues to be the main reason for wanting to return to the same place.

On the other hand, tourism has major impacts on the environment, not least due to the sheer size of the industry. It is one of the world's largest and fastest-growing economic sectors. [Data](#) from the UNWTO indicate that the number of international tourist arrivals (overnight visitors) increased from 25 million globally in 1950 to 278 million in 1980, 674 million in 2000, 1 186 million in 2015, and is expected to reach 1 800 million by 2030.

Europe is the world leading tourist destination, largely because of its combined natural and cultural attractiveness (with 453 [inscribed sites](#), it accounts, for instance, for nearly half of the Unesco [World Heritage List](#)). International tourist arrivals in Europe (in both EU and other European countries) grew by 5 % in 2015, to reach a total of 608 million (51 % of the world's total). Of these, over 478 million arrivals were to EU-28 countries.<sup>1</sup> Five of the top 10 countries for holiday-makers in the world were EU Member States – France, Spain, Italy, Germany and the United Kingdom.

## Importance of tourism for the European Union

Tourism is the third largest economic sector in the EU, employing a total of 17 million people.<sup>2</sup> Its overall contribution to the economy is close to 10 % of EU gross domestic product (GDP), taking into account what tourism brings to other related sectors, such as culture, transport and food.

Tourism in the EU is often concentrated in coastal regions (mainly in the Mediterranean), Alpine regions and some of the Union's major cities, as illustrated by Map 1, showing the regional distribution of the total number of overnight stays of both domestic tourists

### What is sustainable tourism?

'Tourism that takes full account of its current and future economic, social and environmental impacts, addressing the needs of visitors, the industry, the environment and host communities.'

([World Tourism Organization](#), 2005)

'Tourism that is economically and socially viable without detracting from the environment and local culture.'

([European Commission](#), 2003)

'Tourism that respects both local people and the traveller, cultural heritage and the environment.'

([UNESCO](#), 2010)

'With sustainable tourism, sociocultural and environmental impacts are neither permanent nor irreversible.'

(Beech & Chadwick, *The Business of Tourism Management*, 2006, p. 560).

(residents of the country) and international tourists (non-residents). In absolute terms, the highest number of nights spent was recorded in the Canary Islands (94.3 million nights). Two other Spanish regions were among the top five EU tourist regions, Catalonia (72.7 million nights) and the Balearic Islands (63 million nights), along with the French capital city region of Île de France (77.7 million nights), and the coastal region of Croatia (63.3 million nights).

#### Coastal and maritime tourism

is an important tourism sector in the EU. It employs over 3.2 million people; generates a total of €183 billion in gross value added; and represents over one third of the maritime economy. In 2012, cruise tourism alone accounted for 330 000 jobs, and a direct turnover of €15.5 billion. A 2013 [EU study](#) indicates that coastal and maritime tourism could grow by 2-3 % by 2020.

Initial figures indicate that 2016 marked the seventh consecutive year of growth for European tourism. In its latest [report](#) on 'European Tourism – Trends & Prospects', published in early February 2017, the European Travel Commission underlined that 29 of the 33 European destinations which submitted data recorded growth in either arrivals or overnights, or both. On the same note, [Eurostat](#) estimated that nights spent at tourist accommodation across the European Union grew by 2 % in 2016, reaching more than 2.8 billion, in January 2017. In relation to tourism's environmental sustainability, the [European Environment Agency](#) (EEA) recalls that any increase in the number of tourists undoubtedly also has an impact on environmental variables, such as waste generation and energy consumption, as well as air pollution and water consumption.

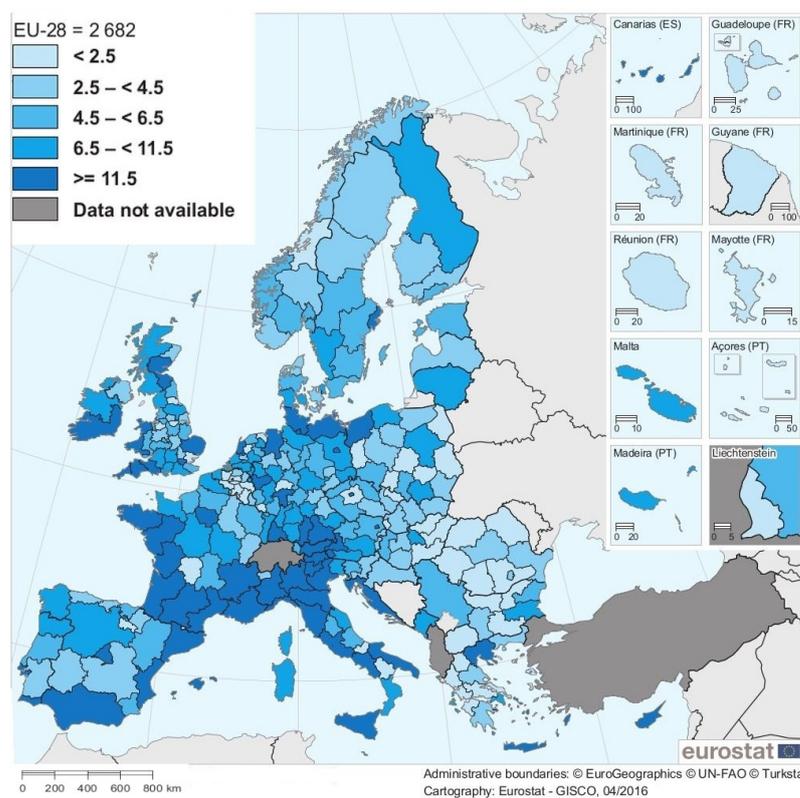
### **Impact of tourism on the environment**

Tourism is associated with a variety of [environmental impacts](#) caused by all its elements: accommodation, activities, transport to and from the destination, and in and around the destination. Potential adverse effects of tourism development can be subsumed under three main areas: pressure on natural resources; pollution; and physical impacts.<sup>3</sup>

#### **Strain on natural resources: the case of water use**

Tourism needs and consumes fresh water for a variety of purposes, including, for instance, toilets and showers, kitchens and laundry; swimming pools, spas and saunas; cooling; and the irrigation of gardens. Some tourist activities, most prominently golf and skiing (where snowmaking is involved), also substantially add to water use.<sup>4</sup> The

**Map 1 – Nights spent in tourist accommodation establishments, by NUTS 2 regions, 2014 (in million)**



Data source: Eurostat, [Tourism statistics at regional level](#), March 2016.

International Commission for the Protection of the Alps (CIPRA) [estimated](#), for instance, that approximately 1 million litres of water are needed to cover a 1-hectare ski slope area with artificial snow. Likewise, [golf courses](#), which have a long association with coastal areas (see box below), require huge amounts of water for irrigation. Some assess the average water consumption on a standard 18-hole golf course (with an irrigated surface of 54 ha) at around 300 000 m<sup>3</sup> per year.<sup>5</sup> [Others](#) suggest that golf courses could consume up to 1 million m<sup>3</sup> of water per year. In Spain, measures have been taken to promote the use of [recycled water](#) to supply golf facilities.

The [EEA](#) estimated that a tourist consumes three or four times more water per day than a permanent resident, with non-tourist water use ranging between 100 and 200 litres per person per day across Europe. Although the overall water consumption for tourism is small, it often occurs in water-scarce seasons and areas, adding to the pressure on local resources. This is a matter of particular concern in the Mediterranean region. For example, eastern Spain, particularly the provinces of Alicante, Murcia and Almeria, is estimated to be in deficit by at least [400 million m<sup>3</sup>](#) of water per year. The drought-prone area is also one of the main tourist destinations in Spain. It welcomes approximately 1 million tourists during the summer, which has a significant impact on water supply.

#### **Golf courses in coastal areas**

According to a 2015 KPMG [study](#), there are around 1 400 golf facilities in European Mediterranean countries, of which 30 % are located within 20 km of the coast. The majority of integrated golf resorts near coasts (comprising one or more golf courses, hospitality facilities and/or residential properties for sale) are located in Spain and Portugal, which both have a long history of coastal golf resort development. Some developments can exceed 1 000 residential units. According to a [survey](#) by the global golf tourism organisation (IAGTO), Spain and Portugal rank respectively first and second in the top 10 golf tourism destinations globally.

Observers warn that golf resorts tend to be increasingly situated in or near protected areas. Examples of controversial development projects involving [Natura 2000](#) designated areas in coastal regions can be found in Crete ([Greece](#)); [Cyprus](#); and the Algarve region (southern [Portugal](#)). In the latter two cases, the European Commission has opened [infringement](#) cases against the countries concerned.<sup>6</sup>

#### **Pollution**

##### *Solid and liquid waste*

Production of **solid waste** by tourists largely exceeds that of residents. Estimates show that in [Malta](#), a resident generates a daily average of 0.68 kg of municipal solid waste (MSW) compared to a daily average of 1.25 kg by a tourist in a hotel; in Cabras ([Sardinia](#)), residents produce 0.5 kg per inhabitant per day, while for tourists, the mean annual production of solid waste was evaluated at 7 kg per overnight stay. Waste disposal is particularly an issue for small touristic islands. Common waste management problems can include a small number of facilities for waste treatment or disposal; significant seasonal variations in waste quantity and composition; high population density; limited land mass to locate landfills and other waste treatment infrastructure; and difficulties in achieving economies of scale.<sup>7</sup> [Small islands](#) are considered to be environmentally more vulnerable to MSW growth. Negative effects on health may also spread more quickly.

**Sewage** can be a major source of water pollution, damaging fauna and flora and representing a threat to human health. According to Oceana, an organisation advocating for the protection of oceans, [cruise ships](#) release 95 000 m<sup>3</sup> of sewage from toilets and 5 420 000 m<sup>3</sup> of sewage from sinks, galleys and showers into oceans and seas every day.

Human activities, including tourism-related ones, along coasts also have an impact. In [2011](#), the United Nations Environment Agency (UNEP) estimated that in the European Mediterranean, only 30 % of municipal wastewater from coastal towns received any treatment before discharge. However, there are indications that since then, significant progress has been made. [Malta](#), for example, which once dumped its sewage at sea, has built three sewage treatment plants along the coast, with a positive impact on the marine environment. According to the latest EEA [report](#) on European bathing water quality, the country had, in 2015, the second cleanest coastal bathing water in Europe (97.7 % of its reported bathing water sites were of excellent quality), after Cyprus (99.1 %).

Other tourism-related waste includes **litter** dumped by tourists on [mountain trails](#) and beaches, requiring extensive clean-up action. The [potential cost](#) across the EU for cleaning coasts and beaches from marine litter resulting from land-based and marine-based activities was assessed at nearly €630 million per year.

#### *Air pollution and noise*

Data from the [UNWTO](#) show that in 2015, 54 % of international tourists travelled to their destinations by air, 39 % by road, 2 % by rail, and 5 % by water. The share of air transport is gradually increasing. In the EU, motor vehicles were, according to [Eurostat](#), the main means of transport for 64.4 % of all trips undertaken by EU residents in 2014. Air pollution from tourist transport has impacts at global level, particularly from carbon dioxide (CO<sub>2</sub>) emissions related to transport energy use (see next section), but can also be severe at local level. This is a particular issue in the Alps, which attract 120 million visitors every year. Cars are used for 84 % of holiday [travel to the Alps](#). Valleys suffer greatly from air and noise pollution caused by motorised road transport, which are significantly [aggravated](#) by the topography of the Alps. Models for more sustainable tourist mobility are therefore being explored (see box).

#### **Best practice: The Alpine Pearls**

Launched in 2006 with the aim to create innovative tourist packages that protect the environment, the '[Alpine Pearls](#)' initiative currently involves 24 villages (or Pearls) from the six Alpine countries (Germany, France, Austria, Italy, Slovenia and Switzerland). The core idea is to propose car-free experiences while ensuring full mobility at the holiday destination, with the help of shuttle services, hikers' and ski buses, taxicab services, e-cars, bicycles or e-bikes.

#### **Physical impacts**

Physical impacts<sup>8</sup> stem not only from tourism-related land clearing and construction, but also from continuing tourist activities. They typically include the degradation of [ecosystems](#). The development of tourism facilities (such as accommodation or leisure facilities) can involve sand mining, beach and sand dune erosion, soil erosion and extensive paving. Construction of transport infrastructure (airports, roads) can result in land degradation and loss of wildlife habitats, while altering landscapes. Tourism development can also lead to deforestation and intensified or unsustainable use of land (clearing of forested land for ski areas; draining and filling of coastal wetlands for tourism infrastructure and facilities, resulting in disturbance, erosion and, in the long term, destruction of local ecosystems). Recreational activities in marine areas (snorkelling, sport fishing, scuba diving, yachting, cruising) can represent a direct threat to fragile ecosystems. In mountains, wildlife species are [easily affected](#) by human activities and presence. Concentrated numbers of tourists in close proximity to breeding grounds, nests, and food sources can disturb them significantly. Local plant and animal species are also vulnerable to the introduction of exotic and invasive species and diseases.

### Tourism and environmental protection

Tourism can play a part in fostering environmental protection and conservation. Direct financial [contribution to conservation](#) is derived from entrance fees for protected areas and parks; grants with which tour operators and other tourism providers support conservation measures; and taxes which the government partly uses for financing environmental protection. Recent examples in this regard include, besides the sustainable tourism tax introduced by the [Balearic Islands](#), the environmental contribution tax levied by [Malta](#) since June 2016. Tourism also has the potential to raise awareness of the value of nature, as well as of environmental problems, thereby encouraging environmentally conscious behaviour and activities to preserve the environment. This is, for instance, one of the aims of the '[Wildsea Europe](#)' project, focusing on the protection of marine biodiversity and supported by the EU's [COSME](#) programme.

A [European charter for sustainable tourism in protected areas](#) was set out in 1995 by the Europarc federation, the network for Europe's natural and cultural heritage. The [organisation](#) is currently involved in the Impact Interreg Europe [project](#), funded by the European Regional Development Fund (ERDF). This four-year cooperation project, which will run until 2020 and gathers different regional administrations around Europe, aims at changing management policies in order to promote productive activities (such as [eco-tourism](#), outdoor sports and recreational fishing) in protected areas, without compromising biodiversity conservation.

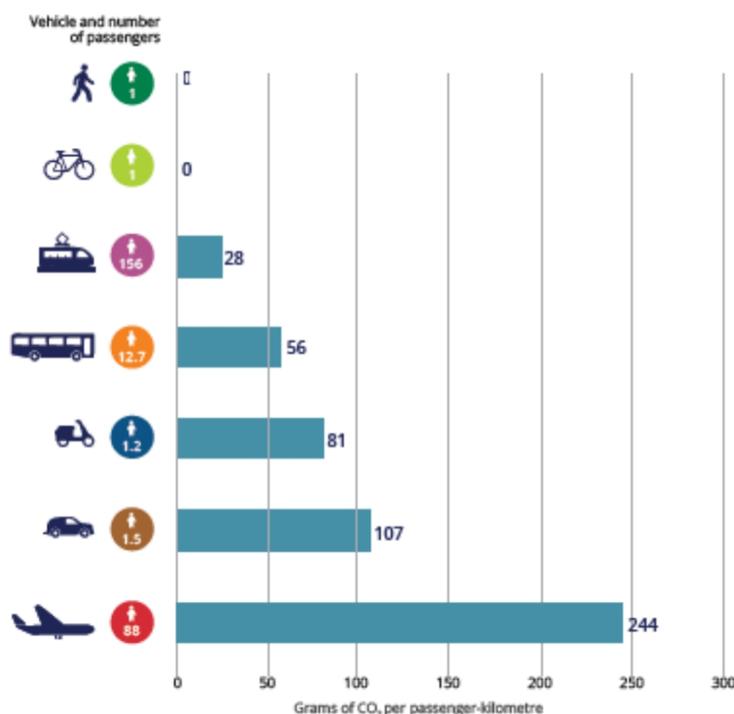
### Tourism and climate change

Climate is a critical resource for tourism, particularly for the beach-, nature- and winter-sport tourism segments. [Changing climate](#) and weather patterns can considerably affect tourists' comfort and travel decisions, with potential effects on demand patterns and tourist flows. At the same time, the tourism sector contributes to greenhouse gas (GHG) emissions, mainly through the transport of tourists.

#### Contribution of tourism to climate change

[GHG emissions](#) related to tourism currently represent about 4.9 % of global emissions (but are predicted to more than [double](#) within 25 years). While the [accommodation](#) sector generates about 20 % of all emissions (through heating, air conditioning, maintenance of bars, restaurants, pools, etc.), transport accounts for the largest proportion (75 %). Tourism-related transport therefore contributes about 3.7 % of global GHG emissions. As shown in Figure 1, modal choice strongly influences the carbon footprint, the CO<sub>2</sub> emissions from air transport being significantly higher than those from other transport modes.

**Figure 1 – Specific CO<sub>2</sub> emissions at average occupancy for various transport modes, 2014**



Source: EEA, [Transitions towards a more sustainable mobility system](#), 2016, p. 52.

### Impact of climate change on tourism

[Climate](#) defines the length and quality of tourism seasons, and plays a key role in destination choice and tourist spending. In many destinations, tourism is closely linked with a natural environment that can be affected by climate, such as snow conditions, water levels and quality, and biodiversity. Climate also has a significant influence on environmental conditions that can deter tourists, including infectious disease, insect or water-borne pests (e.g. jellyfish, algae blooms), wildfires and extreme weather events.

Global warming will therefore have [profound impacts](#) on the tourism industry. Rising sea levels and extreme weather will threaten coastal tourist infrastructure, while eroding and submerging beaches. Higher temperatures will make winter sports less viable in some locations; lead to more forest fires; and harm biodiversity. The tourism sector can also expect impacts of a more general nature, including more expensive insurance (due to more common extreme weather events, damaging infrastructure and disrupting travel), as well as reduced water availability and food security.

#### *Summer beach tourism*

In its latest [report](#) on 'Climate change, impacts and vulnerability in Europe 2016', the European Environment Agency stresses that rising temperatures could result in better conditions for beach tourism, on average, across Europe. The beach season will be prolonged, into spring and autumn, in southern regions. Competition between beach destinations will increase, as climate conditions at the Atlantic and northern European coasts improve, whereas summer temperatures at some Mediterranean destinations may become too hot for tourists in the key summer months.<sup>9</sup> A 2015 EU study<sup>10</sup> suggests that under current economic conditions, the 2100 climate could lower tourism revenues by up to 0.45 % of GDP per year in the southern EU Mediterranean regions, while northern European regions would gain up to 0.32 % of GDP. There is, however, great uncertainty as to how tourists will adapt to the effects of changing climate (by changing travel period/destination/holiday type). The [various scenarios](#) and their potential impact were assessed as part of the EU-funded TOPDad research project.

#### *Alpine skiing tourism*

Climate models forecast that climate change will cause a decrease in snow cover in Europe. Deterioration of Alpine skiing conditions during winter is expected in most regions, particularly in low-lying ski areas. At the same time, rising temperatures will increase the cost of artificial snow-making, which is currently the most common strategy to cope with variations in snow conditions and preserve the winter tourism industry.

#### **World Heritage, tourism and climate change**

Historic monuments and buildings are also at risk. [Unesco](#) has identified numerous World Heritage sites that are critical tourist destinations and vulnerable to climate-driven environmental change. One of the European sites most at threat from sea-level rise is Venice, where waters have risen by some 30 centimetres since the end of the 19th century. Rising sea levels in the Adriatic have already damaged hundreds of buildings in the city.

Climate change also endangers the Neolithic monuments of the Orkney Islands off the north coast of Scotland and at Stonehenge and Avebury (southern England). Whilst the latter may be sensitive to increasingly extreme weather, including storms and flooding, in Orkney, sea-level rise, the increasing frequency of storms and accelerated coastal erosion represent serious threats. The Unesco report stresses that some 17 % of the UK's coast is eroding and storm damage is expected to increase. 12 % of Scotland's coastline, the longest of northern Europe (aside from Norway's), is eroding, according to conservative estimates.

## EU action to promote sustainable tourism

The EU's [role in tourism](#) is one of coordination and support. It seeks to encourage the creation of a favourable environment for the development of undertakings in the sector, and to promote cooperation between Member States, notably through the exchange of good practice. EU initiatives supporting tourism sustainability take various forms.

### EDEN – European Destinations of Excellence

Launched in 2006, the [EDEN initiative](#) is based on national competitions taking place every other year, which lead to the selection of a tourist 'destination of excellence' for each participating country. The award goes to emerging, non-traditional European destinations, committed to social, cultural and environmental sustainability. The competition is organised around an [annual theme](#), chosen by the European Commission together with national tourism authorities. So far, 140 destinations have been rewarded across Europe. The [EDEN network](#), consisting of award winners and runners-up, works as a platform for exchanging good practice in sustainable tourism, and seeks to encourage other destinations to adopt sustainable tourism development models. It currently has over 350 members from 27 European countries.

### Project funding

Under the COSME programme,<sup>11</sup> support has been granted to [sustainable transnational tourist products](#) (such as transnational itineraries, routes, trails) related to natural heritage and environmentally friendly tourism. Examples include, besides the above-mentioned Wildsea project, an outdoor tourism [project](#) linked to European [greenways](#), exclusively dedicated to non-motorised journeys. The EU also supported, through various grants, the development of cycling routes across Europe, notably the [EuroVelo](#) network.

### Development of a Europe-wide tourism indicators system for destinations

Launched in 2013, the European tourism indicators system for sustainable destination management ([ETIS](#)) is a tool designed to support destinations in monitoring and in measuring their sustainable tourism performances. ETIS is a voluntary management instrument, and its monitoring results are based on self-assessment, observations, data collection and analysis by the destinations themselves. The system does not set minimum values to be achieved nor does it provide any certification (see box) but sets 43 core indicators and an indicative set of supplementary indicators. Those related to environmental impact cover the reduction of transport impact, climate change, solid-waste management, sewage treatment, water management, energy usage, as well as landscape and biodiversity management.

#### Existing EU certification schemes

Tourist accommodation and campsite services can apply for the [EU Ecolabel](#) (a voluntary environmental performance certificate awarded to products and services meeting specific, identified criteria, which reduce overall environmental impact). Current criteria for awarding the EU Ecolabel to tourist accommodation are outlined in a [Commission decision](#) from January 2017. Actors in the tourism industry can also join the EU Eco-Management and Audit Scheme ([EMAS](#)), open to organisations operating in all economic sectors.

## European Parliament's contribution

The issue of sustainable, responsible and social tourism is extensively addressed in the European Parliament's [resolution](#) from October 2015 on 'New challenges and concepts for the promotion of tourism in Europe'. Increased (co-)financing for sustainable tourism projects under the COSME programme, and continued financial support to initiatives and

networks such as EDEN featured among Parliament's proposals on funding. Specific requests to the Commission included, in particular, a study on sustainability certificates for soft tourism services (with an analysis of voluntary instruments indicating which instruments have been successful) as well as an impact assessment of how climate change affects tourism in sensitive regions such as islands, coasts and mountains, and in particular remote and outermost regions. The European Parliament also called for the development of networks of green routes incorporating rural and wooded areas and minor natural sites, the integration of natural heritage initiatives into national and regional tourism strategies, and a stronger integration of climate protection into European, national and regional tourism and transport policies.

#### Input from the advisory committees

In its [opinion](#) on 'Tourism as a driving force for regional cooperation across the EU', adopted in December 2016, the Committee of the Regions (CoR) called on the regions to consider sustainability in their tourism strategies, including innovative tools (ETIS). In the light of climate change, it encouraged tourist regions to diversify their economic focus, while inviting them to invest together with the tourism sector in climate-friendly projects using tools such as hotel energy solutions ([HES](#)) and nearly zero-energy hotels ([neZEH](#)).

The European Economic and Social Committee (EESC) is working on an exploratory [opinion](#) on nautical and maritime tourism diversification strategies, with a particular focus on the Mediterranean region and a strong emphasis on [sustainability](#). The text, requested by the Maltese Presidency of the EU Council, is scheduled for a vote in plenary at the end of March.

#### Outlook

As pointed out in a European Parliament [study](#) from November 2015, there is a lack of relevant, EU-wide, recent and detailed data about the impacts of tourism on the environment. As part of its mission of monitoring and informing on pressures and impacts, as well as sustainability trends of European industry sectors, the European Environment Agency works on the development of a reporting mechanism on the tourism and environment relationship, based on 25 indicators, many of which have a connection with ETIS ([TOUERM](#)). These indicators address, for example, the issues of tourism and leisure pressure on protected areas, water abstraction by tourism, spatial impact of tourism facilities such as golf courses, and marina ports and ski resorts. One indicator will also relate to tourism enterprises using environmental certification or labelling.

The issue of environmental sustainability in tourism will remain in the spotlight in the coming months, since the United Nations has designated [2017](#) as the international year of sustainable tourism for development, to promote tourism's role in five areas, namely inclusive and sustainable economic growth; social inclusiveness, employment and poverty reduction; resource efficiency, environmental protection and climate change; cultural values, diversity and heritage; and mutual understanding, peace and security.

#### Further reading

European Environment Agency, [Climate change, impacts and vulnerability in Europe 2016](#), 2017.

Policy Department B: Structural and Cohesion Policies, Research for TRAN Committee, [From responsible best practices to sustainable tourism development](#), European Parliament, 2015.

Plan Bleu, [Tourism and sustainability in the Mediterranean: key facts and trends](#), June 2016.

## Endnotes

- <sup>1</sup> The EU total includes arrivals in EU Member States of tourists from other EU Member States. The EU is an attractive destination for its residents. According to [Eurostat](#), in 2014, three in four outbound trips (i.e. outside the country of residence) of EU residents were spent inside the EU, with Spain being the top foreign EU destination (20.7 % of trips).
- <sup>2</sup> Data from the [European Commission](#) (April 2016). Exact quantification of tourism's contribution to gross domestic product (GDP) and employment is no easy exercise. [Eurostat](#) estimated that tourism industries (economic activities related to tourism, but not necessarily relying on tourism only) employed just over 12 million persons (9 % of total employment in the EU non-financial business economy) in 2013. The [World Travel and Tourism Council](#) indicated that the total contribution of travel and tourism to EU GDP amounted to 9.7 % in 2014, and was forecast to reach 10.4 % in 2025, while the sector accounted for 11.1 % of total employment (almost 25 million jobs). Recent data for European Union countries which are members of the OECD can be found in the [OECD tourism trends and policies 2016](#).
- <sup>3</sup> Based on Sunlu, U., [Environmental impacts of tourism](#), in 'Local Resources and Global Trades: Environments and Agriculture in the Mediterranean Region', Camarda, D. & Grassini, L. (eds.), 2003, pp. 263-270.
- <sup>4</sup> Gössling, S., Peeters, P., Hall, C.M., Dubois, G., Ceron, J.P., Lehmann, L., and Scott, D. (2012), [Tourism and water use: supply, demand, and security – An international review](#), *Tourism Management*, 33(1), pp. 1-15.
- <sup>5</sup> Salgot, M.; Priestley, G.K.; Folch, M., Golf course irrigation with reclaimed water in the Mediterranean: a risk management matter, *Water* 2012, 4, pp. 389-429.
- <sup>6</sup> For more details, see the corresponding press releases for [Cyprus](#) and [Portugal](#).
- <sup>7</sup> Ezeah, C., Fazakerley, J. and Byrne, T., [Tourism waste management in the European Union: lessons learned from four popular EU tourist destinations](#), *American Journal of Climate Change*, 2015, 4, pp. 431-445.
- <sup>8</sup> Romagosa, F., et al., [Report on feasibility for regular assessment of environmental impacts and sustainable tourism in Europe](#), European Environment Agency, December 2014, p.14.
- <sup>9</sup> Some assess the situation differently. A 2016 study highlights tourists' high tolerance to high temperature and their absence of concern over heat waves, contrasting with a deep aversion to rain. Authors therefore suggest that in the Mediterranean, rising temperatures associated to climate change in spring might not boost tourism if they are accompanied by rising precipitations. (Dubois, G., Ceron, JP., Gössling, S. et al., [Weather preferences of French tourists: lessons for climate change impact assessment](#), *Climatic Change*, Vol. 136, Issue 2, May 2016, pp. 339–351).
- <sup>10</sup> Barrios, S. & Ibañez, J.N., [Time is of the essence: adaptation of tourism demand to climate change in Europe](#), *Climatic Change*, Volume 132, Issue 4, October 2015, pp. 645–660.
- <sup>11</sup> For an overview of EU funding possibilities for tourism-related projects and activities, see the [Guide on EU funding for the tourism sector 2014-2020](#).

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