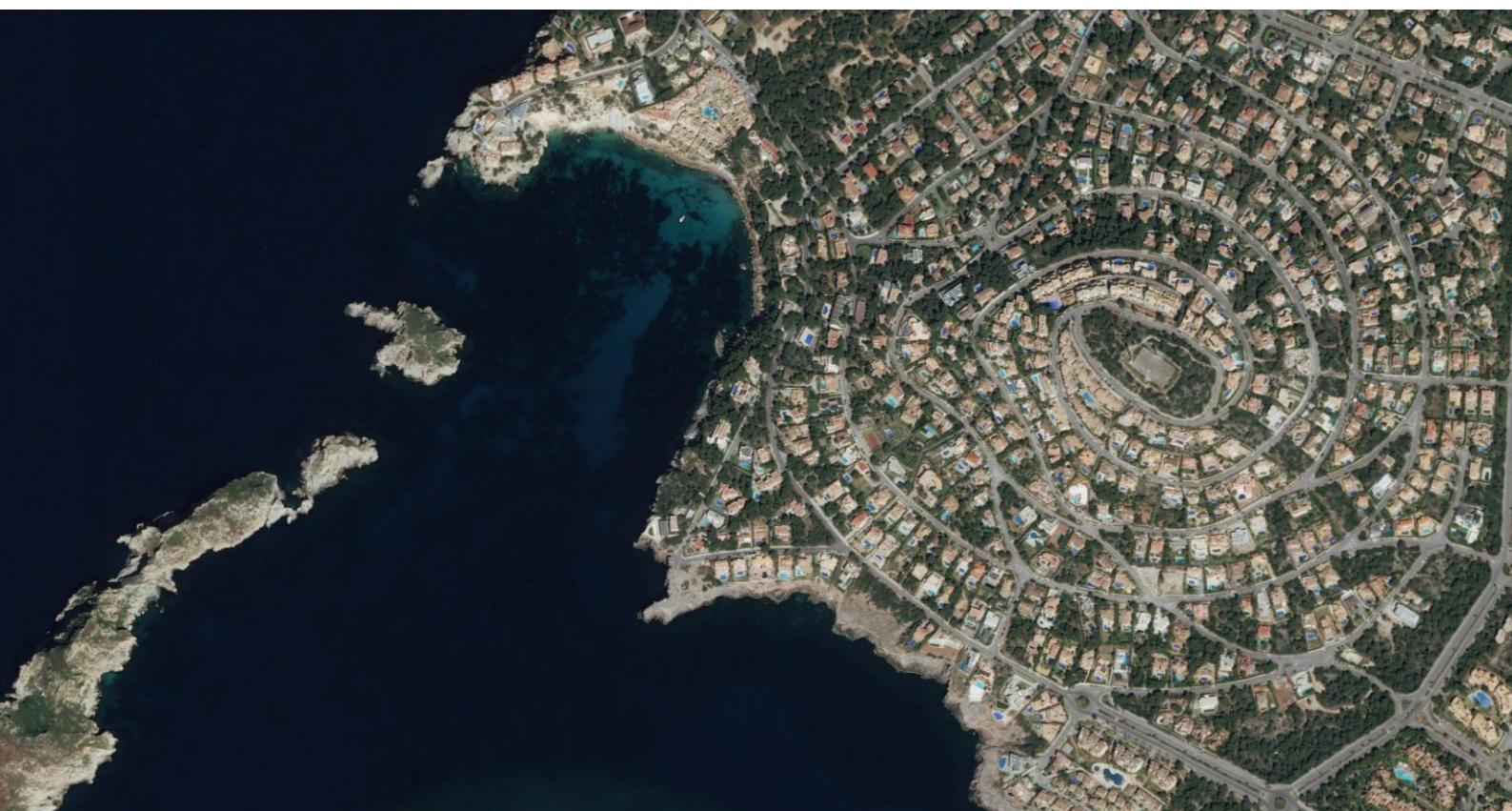


# Tourism and the environment

## Towards a reporting mechanism in Europe



### ANNEX 11. Indicator assessment TOUR007 Spatial impact of tourism facilities (1). Golf courses

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)

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## Indicator name: TOUR007 – Spatial impact of tourism facilities (1). Golf courses

### Assessment

#### Indicator name

TOUR007a - Spatial impact of tourism facilities (I): Golf courses

#### Key policy question

Are we reducing the spatial impact from tourism infrastructures?

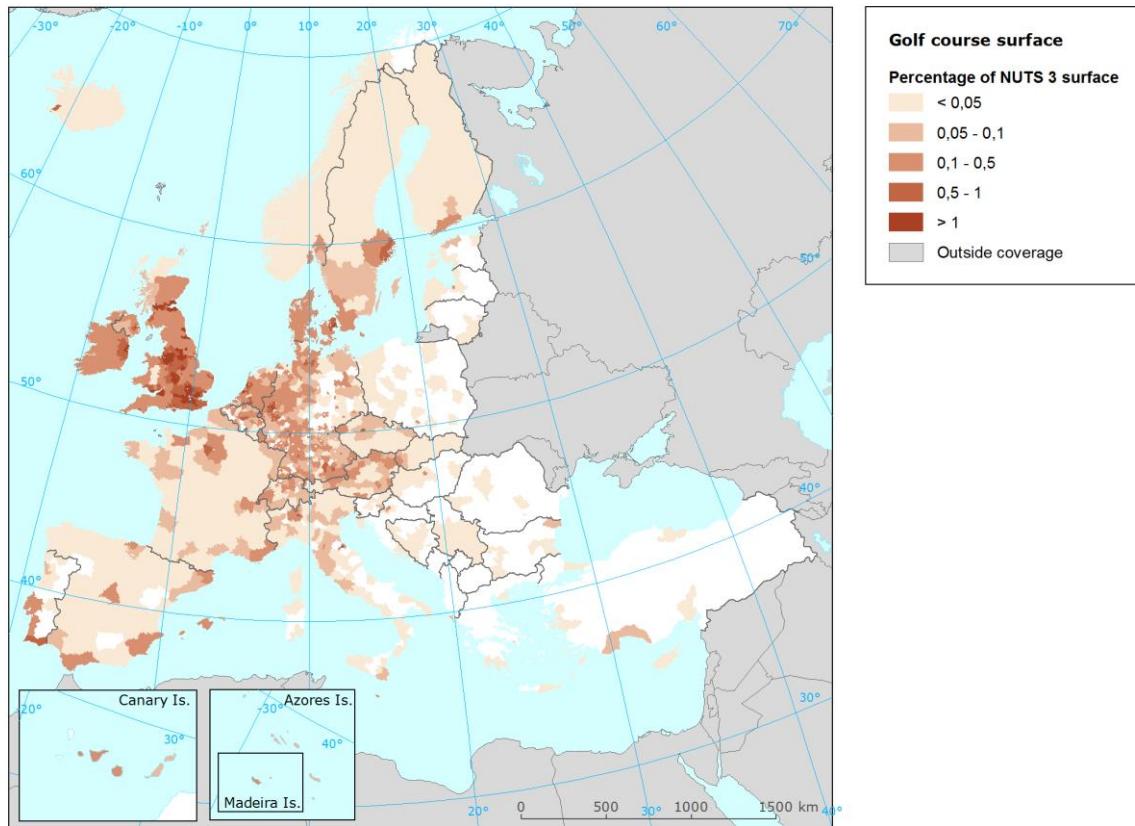
#### Key message

Infrastructures for tourism activities, in particular golf courses, have a major impact on the surrounding environment. The resource consumption (e.g. water abstraction, land occupation) and pollution generation (e.g. use of pesticides) are major concerns. Golf course maintenance can also deplete fresh water resources. In recent years, golf tourism has increased in popularity and the number of golf courses has grown rapidly. Moreover, there is a requirement for additional infrastructure to support the golf courses (e.g. roads to access or additional buildings). Golf courses have also attracted the development of holiday resorts as a supporting business with a mutual retrofit.

#### Key assessment

The spatial representation of the indicator is expressed as the ratio between the area covered by golf courses and the area covered by the corresponding NUTS 3 region. 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.

### Distribution of golf courses in Europe



The indicator also analyses the land take (development of new infrastructures in previously undeveloped land) in areas near the golf courses (up to 1000 m from their border). During the period 2000-2006 about 3,600 ha within the 1 km buffer around golf courses were taken for new developments in Europe (including sport infrastructures). This corresponds to an increase of 3.6 % compared to already developed land in 2000, which is above the overall land take rate in Europe for the same period (2.8 %). Land take around the golf courses has decreased by 55% in 2006-2012 compared to previous period. It could be observed that the process is more intense on the first 200 m and, similarly, on the 500-1000 m buffer.

It should be highlighted that land take near golf courses was well above European average in few countries (2000-2006): Cyprus (45%), Greece (24%), Spain (22%), Iceland (21%), Estonia (12%) and Portugal (11%). On the other side UK (0.8 %) stands as the country with the lowest land take within the 1000 m area next to golf courses. The decrease of land take for the period 2006-2012 is also observed in all countries. However, Spain remains as the country with the highest land take (10%).

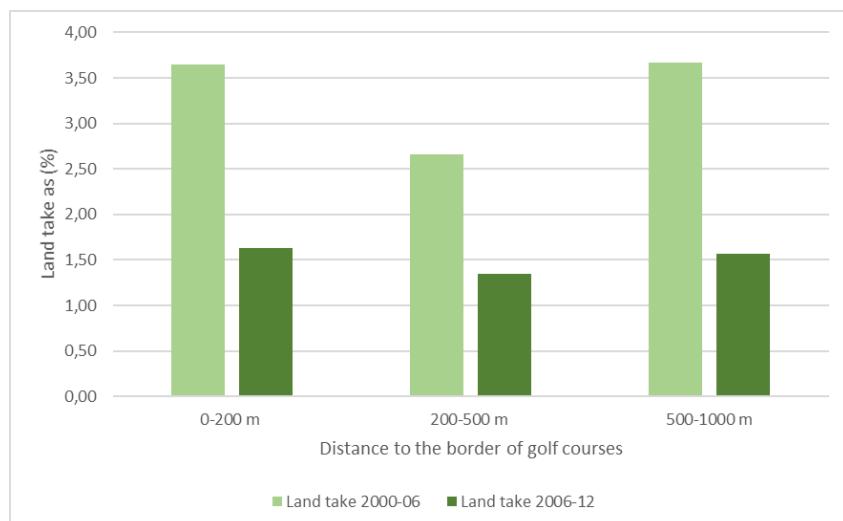
About 40% of the land taken in the period 2000-2006 was driven by new developments or new construction sites (i.e. at the end of the period these areas were still under construction). Sports and related facilities were the second driver in the first 200 m (38%), next to the golf courses. However, as we move farther, low density housing is becoming more relevant (up to 30% of new developments in the 500-1000 m zone). A similar pattern could be observed for the land taken in the period 2006-2012. However, industrial and commercial sites become more predominant.

Most of the new developments have been at expenses of arable land (40% of total land taken) and pasture and mosaics (30%). In this case the pattern is very similar in the three buffers around the golf courses, being relatively independent of the distance. Also, it is very similar in the two periods. Although this pattern reflects an aggregate at European level, changes on land use can be paired with changes on

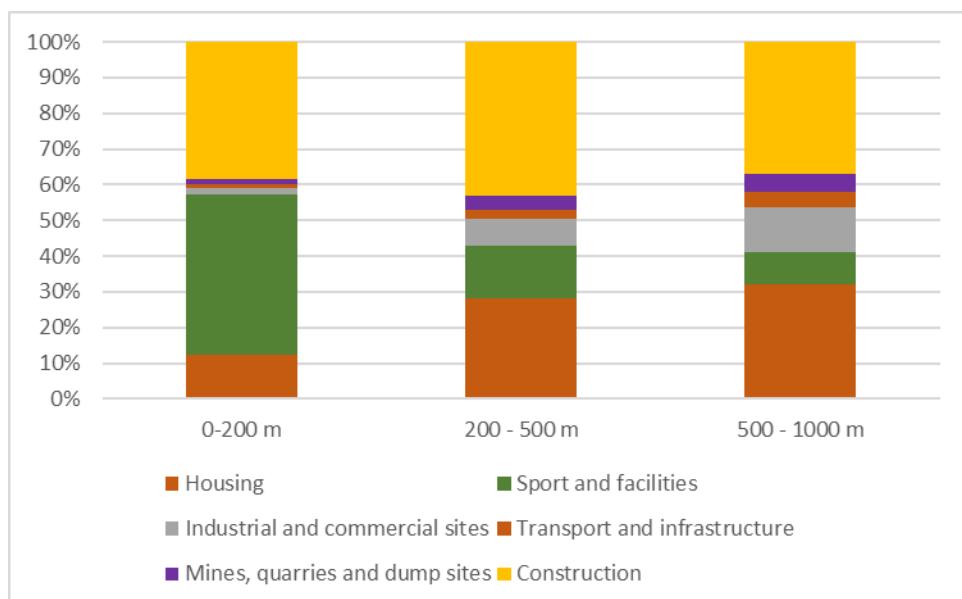
economic activity: agricultural areas are converted to new infrastructures to support the tourist activity, probably more profitable.

It could be concluded that land take around golf courses was very intensive in the period 2000-2006, above the overall land take rate in Europe. However, the process slowed down in the period (2006-2012). Most of the land taken could directly be related to the golf courses: expansion of sport and related infrastructure, and diffuse housing (resorts). It should be noted that there are substantial difference between countries that could reflect different process around golf courses. Spain is one of the countries with highest land take and it has already been documented how golf courses have facilitated or been developed together with new resorts. On the other side UK presents a different pattern: being the country with the highest density of golf courses, land take remains very low.

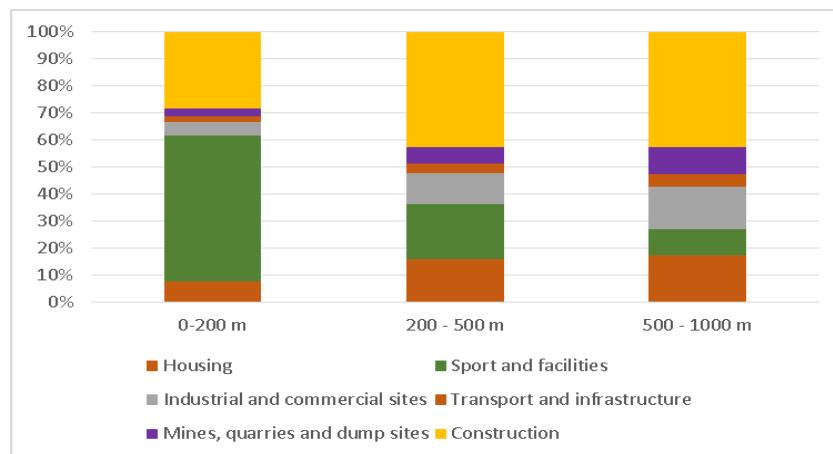
**Land take as percentage of artificial land at the beginning of each period. EU-39**



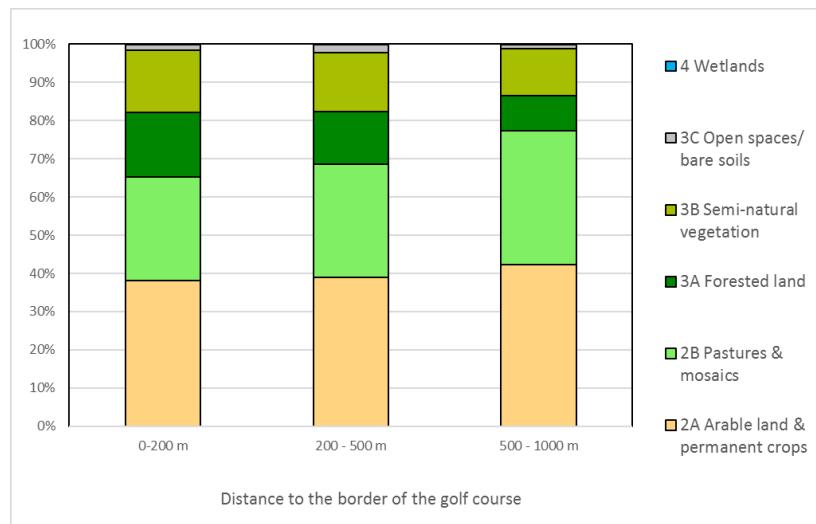
**Drivers of land take (2000-2006) in the three buffers delineated around the golf courses. The figure shows the distribution of new uses of the land taken during the period 2000-2006. EU-39**



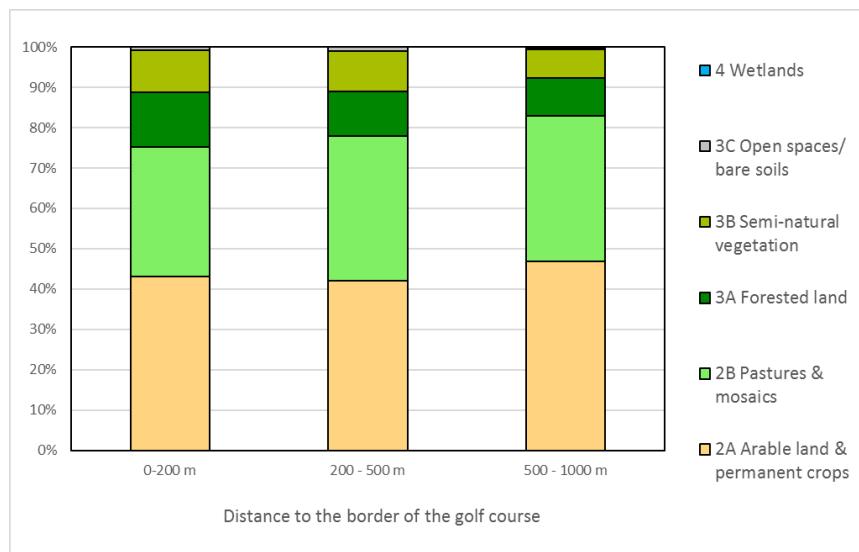
**Drivers of land take (2006-2012) in the three buffers delineated around the golf courses. The figure shows the distribution of new uses of the land taken during the period 2000-2006. EU-39**



**Relative contribution of land-cover categories to the land taken in the period 2000-2006**



**Relative contribution of land-cover categories to the land taken in the period 2006-2012. EU-39**



## Specifications

### Indicator definition

Area of golf courses per NUTS3 area.

Land take in the 1 km buffer around of golf courses in Europe.

### DPSIR

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### Rationale

Golf courses are important tourist attractions over all Europe. The golf resorts not only include the greens, but also - and most importantly in Mediterranean countries – they are the central part of touristic urbanisations and second home developments. Patterns of land take (how much and at what expenses) could help to identify hot spots.

### Policy context

National and sub-national spatial planning regulations.

EC and national policies on tourism and sustainable tourism.

Water Framework Directive.

### Methodology for indicator calculation

Due to the lack of consistent official data sources on golf courses, the spatial data for golf courses in Europe have been extracted from OpenStreetMap (OSM), using the descriptor “golf\_course”. The resulting file of polygons for golf courses was cleaned from polygons not closely related to the extent of the golf course (buildings, access roads). Three buffers have been delineated around each golf: 0-200 m, 200-500m, and 500-1000 m. These buffers include the area with potential higher influence for existing and new developments associated to golf courses. CLC has been used to analyse initial state of land cover (2000) and successive changes: 2000-2006 and 2006-2012.

### Data specifications

Data sources:

- OpenStreetMap contributors The source data is available under the Open Database Licence.
- Eurostat.
- Corine Land Cover (CLC) 2000, 2006, 2012.

### Data sets uncertainties

Being OpenStreetMap a voluntary mapping effort, the completeness and correctness of the dataset cannot be ensured completely. Nevertheless, visual test have shown a very detailed delineation and a good coverage of golf courses around Europe.

### Ownership and contacts

ETC/ULS.

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