# Monitoring Walkers and Hikers of Madeira Island through web-share services

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## Introduction

The popularity of nature-based tourism, recreation activities and natural parks visitation is increasing exponentially worldwide. In Europe, this trend is clearly visible and research on this matter is urgent and of the utmost importance.

The extensive use of recreational and protected areas coupled with the current global tourism trends, demands for rapid and high-quality information on users and visitors, preferably on a low budget. New methods have been developed to fulfil this need, using Web 2.0 and web-share services platforms (PPGIS/GIS) that are frequently connected to APPs and social media. Seeing as these platforms are easily available and both geographic data and social media data are produced voluntarily by its users, it can be used to collect valuable content in an inexpensive way (Pickering *et al*., 2018).

The island of Madeira (Portugal) is one of Europe's main insular touristic destinations, holds a Natural Park which occupies 2/3 of its area. Hiking is the most popular way to visit the park, where the visitors can choose from 28 official paths recommend by the local government and many more recommended by local municipalities. Despite the evidence that nature-based tourism is increasing in Madeira, especially in its main attractions e.g. *Levadas* and *Veredas* (Madeira´s hiking trails), the characterization and monitorization of this touristic product has never been done properly. Sadly, unlike other countries where nature tourism/ecotourism is a well-established touristic product with proper monitoring and developing strategies, little is being done concerning this phenomenon in Portugal (Nogueira Mendes *et al*., 2012) as well in Madeira.

The establishment of a reference situation is therefore the next logical step to take to solve this information gap. To achieve such goal several actions would be required, namely counting and profiling users and monitoring paths impacts and accessibility. Also, it would be significant to identify users' preferences and major incoming markets of Levadas and Veredas hikers. The aim of this study is to explore whether web shared data can be used with the purpose of identifying users' country of residence and compare it with the official touristic data regarding incoming markets of Madeira.

## Methods

Following the approach of Nogueira Mendes *et al*. (2014), systematic queries were done on GPSies.com to collect all the GPS tracks available for pedestrian activities on Madeira Island. On a second stage, dedicated searches were done on all GPSies users identified in the first dataset to gather all their GPS tracks. Country of residence, favourite activity, total number of tracks uploaded and date of registration for each user was register. All tracks were later converted into shapefiles into different two datasets and analysed within GIS. Track

information for both datasets included track and user name, length, suitable activity, date of upload and others in a total of 15 different characteristics

## Results and Analysis

Overall, 32787 tracks were collected, from 385 users of 20 different countries with a mean of 85 users per country, 16 tracks per user and maximum of 1774 tracks from a single German user. In total, users have upload 29911,94 km of tracks on Madeira island with a mean per hike of 17,16 km. Concerning the rest of the world, together these 385 users have upload 2.221.718,73 km of tracks.



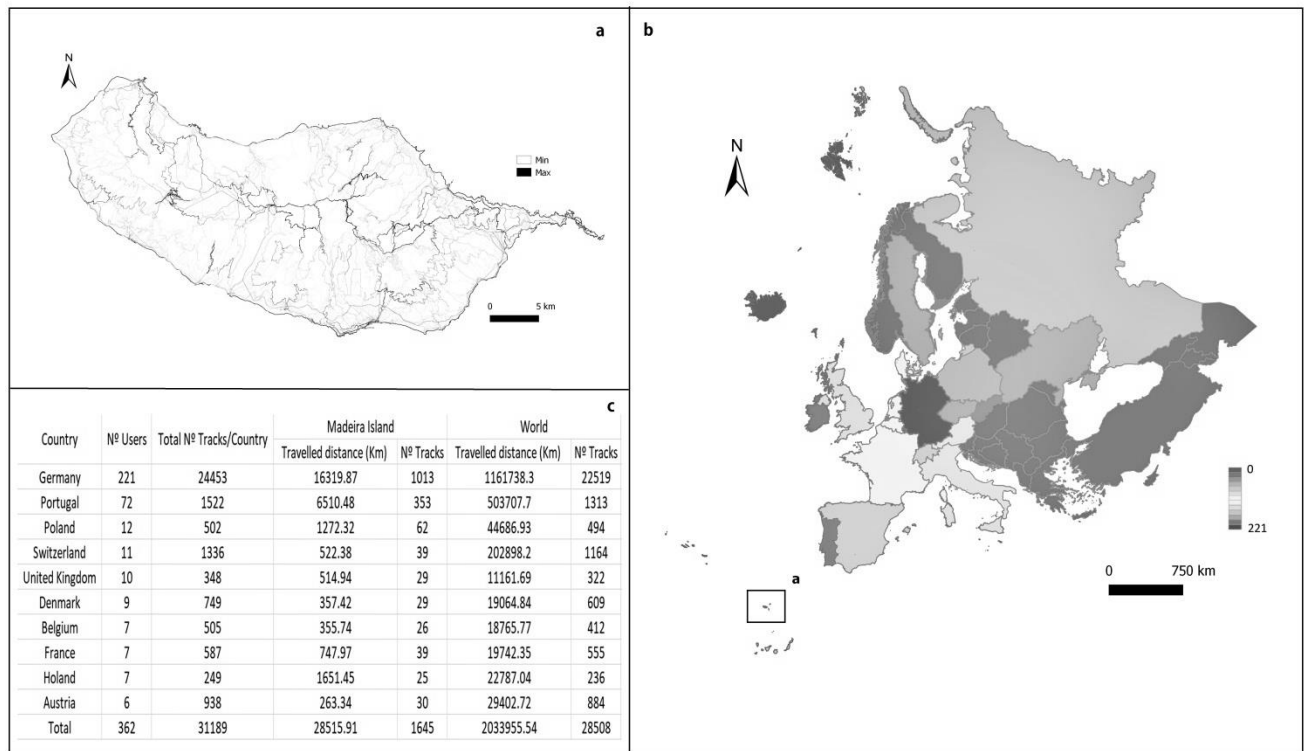| Country | Nº Users | Total Nº Tracks/Country | Madeira Island | | World | |
|---|---|---|---|---|---|---|
| | | | Travelled distance (Km) | Nº Tracks | Travelled distance (Km) | Nº Tracks |
| Germany | 221 | 24453 | 16319.87 | 1013 | 1161738.3 | 22519 |
| Portugal | 72 | 1522 | 6510.48 | 353 | 503707.7 | 1313 |
| Poland | 12 | 502 | 1272.32 | 62 | 44686.93 | 494 |
| Switzerland | 11 | 1336 | 522.38 | 39 | 202898.2 | 1164 |
| United Kingdom | 10 | 348 | 514.94 | 29 | 11161.69 | 322 |
| Denmark | 9 | 749 | 357.42 | 29 | 19064.84 | 609 |
| Belgium | 7 | 505 | 355.74 | 26 | 18765.77 | 412 |
| France | 7 | 587 | 747.97 | 39 | 19742.35 | 555 |
| Holand | 7 | 249 | 1651.45 | 25 | 22787.04 | 236 |
| Austria | 6 | 938 | 263.34 | 30 | 29402.72 | 884 |
| Total | 362 | 31189 | 28515.91 | 1645 | 2033955.54 | 28508 |

Figure 1 a) Intensity of the tracks on Madeira's Island; b) Number of users per country; c) Summary table of the top 10 countries on our search

On Figure 1 a), we can clearly recognize many of the emblematic paths of Madeira as is PR1. *Vereda do Areeiro* and PR6. *Levada das 25 Fontes*. Besides the Levadas and Veredas trails, some noise is also detected. There are tracks that are either too long or that cross non-walking areas, others follow the main roads of the island, which is acceptable since submitted information is 100% voluntary.

When comparing the top 10 Countries from GPSies users of Madeira Island with the local statistics from Regional Directorate of Statistics significant differences are found. Our data suggests that Germany and Portugal are the main contributors of hikers, with the United Kingdom placing in fifth place. The same pattern is not observed from the data provided by the regional statistics directorate, where the UK places first as the foreign country which contributes most to the tourism and stays in Madeira Island, followed by Germany and France (Direção Regional de Estatística da Madeira, 2017a, b), suggesting that hiking is not the main activity/motivation for UK visitors of Madeira. This activity seems to be more important for the new incoming markets, such as Denmark and Poland that appear on our top 10 of users' country of origin suggesting that these are not the typical tourists of Madeira,

matching to the growing of nature-based tourism in the island providing new and relevant data.

## Conclusion

Further work must be done, to understand if the objective can be fulfilled. Since it is not possible to verify whether the users correspond in fact to the niche of hikers and walkers of the island, fieldwork is the only tool which will allow more conclusions to be obtained. For that reason, to be able to corroborate the data gathered are surveys are being conducted to the users/visitors of the most emblematic and used paths of the natural park of Madeira.

Nevertheless, despite the noise on the information and GPSies.com being a platform with more potential for investigation in Europe, we believe that the results obtained with this work can be very interesting.

To conclude, we trust that this work can contribute to the beginning of a serious monitorization of all the paths of Madeira. It provides the regional government, the park authorities and other stakeholders the first insight into what is really happening on the *Levadas* and *Veredas* of the natural park of Madeira.

## Acknowledgments

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