Geocaching and protected areas

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Introduction

Created in the USA after the discontinued use of "Selective Availability" within the Global

Positioning System (GPS), geocaching can be explained as a modern treasure hunting that mixes handled GPS, tablets or smartphones, WEB2.0 wiki features and a community of over 6.000.000 geocachers worldwide. At the present time there are over 2.350.000 active caches, hidden within all environments from the hydrothermal vents to the highest mountains around the world. Taking advantage of internet features and web-GIS technology this activity is organized by an official website (www.geocaching.com), several national web-forums and discussion groups. Each cache is registered as well as each individual log or comment, being used to decide which cache should be done next time, or if there's a cache nearby that deserves a visit.

Previous work based on geographical analysis of this activity (Santos *et al* (2012) and Nogueira Mendes *et al* (2013)), have found positive correlations between "natural" land use environments (forest and agriculture) and geocaching activity in Portugal, and that in Lisbon this activity tends to happen with more intensity on touristic and iconic areas of the city.

These findings also suggest that protected or other recreational areas might be of special interest for geoacaching (mainly recognized as an open air activity), even if top expression of this activity (caches/area, founds/cache/week and total founds) happens within urban areas. In order to fully understand this activity, it is important to know what makes a good cache. The place where it is hidden might be an important factor, but other aspects should be closely related with the number of visits that each cache gets. The caches description and the feedback provided after each found should also provide some clues regarding general perceptions and motivations related with this activity. Other aspects that deserve a special attention due to the massive expression of geoacaching in some countries, include insights if this activity can provide clues regarding the public perception of the territory. Is there a different expression between urban and non-urban geocaching? What are the negative or positive impacts of this activity? Is there a carrying capacity for geocaches and geocachers visits within recreational and protected areas? Are management measures needed to be taken, or geoacaching guidelines and the community self-control is enough to keep this activity compatible with other uses, especially within recreational and protected areas?

Therefore the main objective of this study was to understand and characterize geoacaching within protected areas in Portugal, proposing a quick method that could help to monitor this activity in similar areas in terms of his spatial and temporal patterns.

Study Area

The Arrábida Natural Park (PNArr), located within the Lisbon Metropolitan Area (that holds nearly 2.5 million inhabitants), is situated 40 Kms south from the Portuguese capital. Like many recreational and protected areas it faces growing pressure and demands for recreational activities. Lacking a formal and structured offer of paths, trails and visiting centres, visitation and recreational use is mainly informal leading to some conflicts and impacts.

Material and Methods

A first dataset for this study was collected from www.geopt.org (one of the Portuguese geocaching forums) in October 2012 that includes all existent geocaches ever placed in Portugal since 2001 (24402 geocaches of which 5451 were archived – *i.e.* not available to be found and logged at that time). Caches exact location was updated and corrected from the geocaching official webpage and converted into a shape-file on ArcGis that was also used to select all caches within PNArr (278, of which 55 were archived) that all together where responsible for 29448 logs of which 26086 were founds, *i.e.* expressed visits to this protected area). A second dataset was created from each geocache webpage that was saved in an *.html* file for a latter content analysis regarding to each geocache description performed by a small questionnaire built in order to understand the overall image that this activity provides regarding the PNArr heritage and conservation values. Does the cache webpage refer that this is within PNArr? Does it mention that this is a protected area? Does it mention or is it dedicated to any of the natural or patrimonial values that the PNArr should preserve? Results were later used to perform spatial autocorrelation tests using Anselin-Moran's global index on ArcGis.

The third and final dataset was built from each log (including founds, not founds and comments) ever made to each PNArr geocache that include the log date and user that made it. This dataset was used to perform a temporal analysis to this activity.
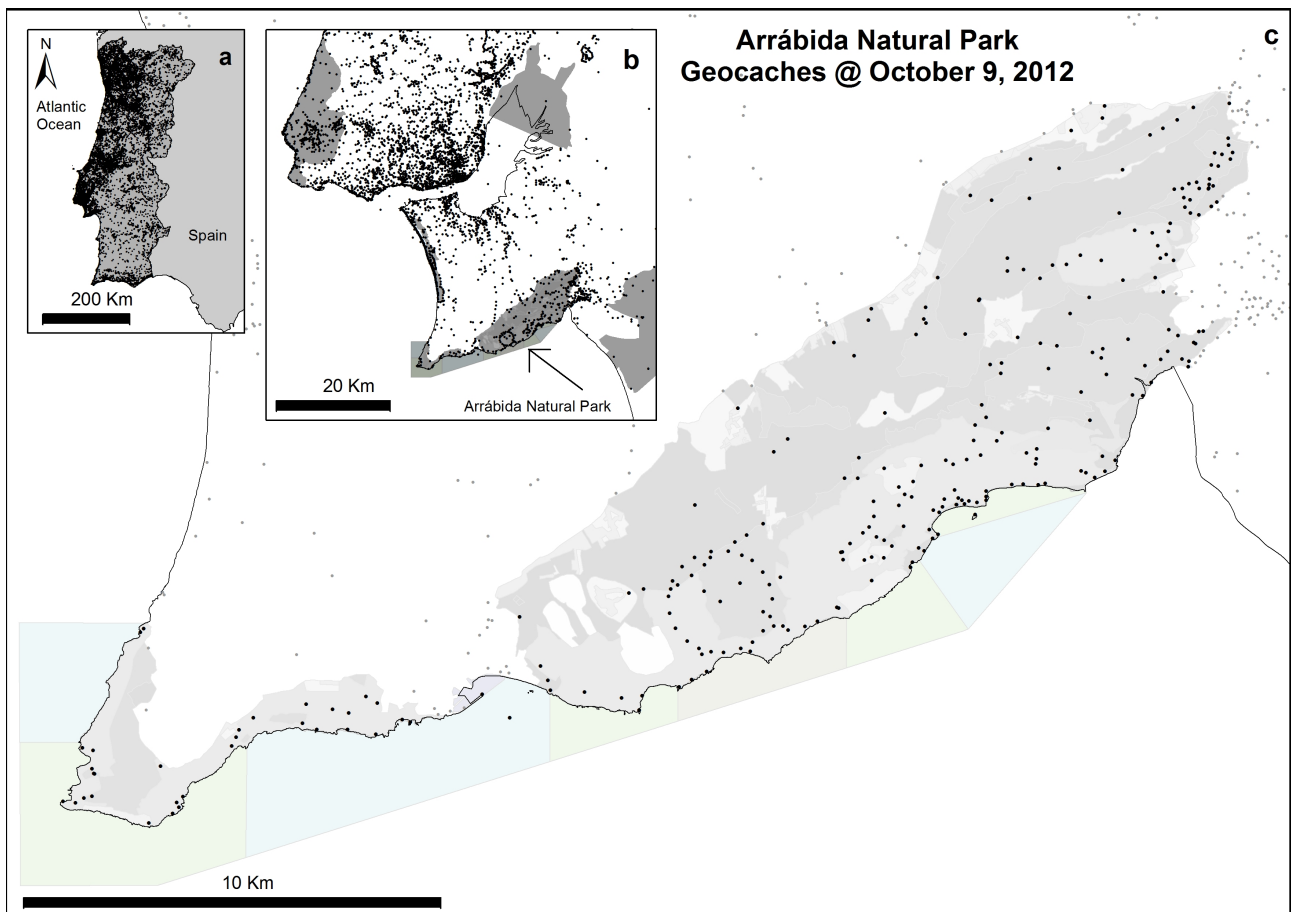
Figure 1 Geocaches of Portugal Mainland (a), Lisbon Metropolitan Area (b) and Arrábida Natural Park (c), from the original dataset collected at October 9, 2012.

Results and Analysis

From the total 278 analysed geocaches, 65 mentioned PNArr and 6 also include the zoning plan of the place where they were hidden. 219 of the geocaches directly expressed some value associated to this protected area (remarkable architecture – 96; cultural heritage – 119; local history – 62; fauna – 51; flora – 80; geology – 75; landscape – 111). 58 of the webpage descriptions included other language besides Portuguese, 211 included pictures of the area and 90 geocaches were promoted through small suggestions of local touristic activities. Finally, 35 geocaches webpages promoted positive behaviours (respect for private property and nature), but 4 directly promoted negative behaviours (trespassing, and invasion of totally protected zones, which is forbidden by the PNArr zoning plan). This also shows a major concern, which is the fact that 8 of the total analysed caches were inside the total protection area.

Anselin-Moran's global index tests have shown that there are spatial patterns regarding geocaches hidden places and the geocaches description, with main emphasis on the emblematic places of PNArr (best sightseeing spots close to the coast, national monuments, and best geological and botanical scenes).

Temporal analysis on all geocaches logs shows that this activity follows the normal pattern for recreational activities. Spring, summer and fall have by far more founds and logs than winter and weekends have up to 5 times more activity than working days (with significant p values measured by a Kruskal-Wallis ANOVA).

Conclusions

Final results of this study provide a new approach regarding geocaching activity within protected areas. Further evaluation should be done in other recreational and protected areas to confirm the main findings of this study, but important clues are presented and could be used in order to understand this activity. The overall picture of geocaching in PNArr resembles to the park itself, taking advantage of this protected area characteristics. Lacking interpretational centres, it is fair to say that geocaching provides visitor or resident geocachers with important information regarding Arrábida, mainly related to its geology, flora, landscape and typical uses. From the collection date up to 2014, the caches of Arrábida have almost doubled and the actual logs and founds have more than doubled in one and a half year which proves the viral grow of geocaching in Portugal. The findings of this study also allowed solving the 8 geocaches that were hidden inside total protection areas, that were voluntarily archived by the cache owners, which proves that geocachers are a conscientious community that can work together with the parks authorities for mutual benefits of all involved actors.

Acknowledgements

References:

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