A decade worth of progress in the participatory monitoring and management of visitors in recreational and protected areas

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Introduction

Visitor monitoring in Recreational and Protected Areas (R&PA) has seen a rapid advancement in the implementation of new techniques and technologies over the past decade. This has dramatically increased our capacity to gain insights on the numbers, profiles, perceptions, motivations and expectations of visitors, and other critical measurements for R&PA management. This progress has however also raised questions about the niches which these new techniques and technologies fill, their benefits and the opportunities that arise, along with the concerns about employing them. Importantly, how well do these new techniques compare to traditional, more established forms of visitor monitoring? This presentation aims to answer some of these questions while providing an introduction and overview of the progress in participatory visitor monitoring techniques and technologies over the past decade with a focus on volunteered geographic information (VGI), public participation geographic information systems (PPGIS) mapping and tracking (GPS tracking). The authors present and evaluate these methodologies in the context of a literature review, empirical studies and by drawing from their combined knowledge of over 20 years in people monitoring to identify advantages and disadvantages compared to traditional techniques.

Volunteered geographic information (VGI)

R&PA visitor monitoring that relies on VGI capitalises on the data wealth contained in web 2.0, and mines on-line content in multiple formats of tracked movements, text, image, sound or video. Varied VGI platforms and services which have emerged during the last decade and a half can be accessed. The commonality among these multi-facetted systems are the geo- and time-stamped data, and the wide dissemination of data through web-forums, blogs and social media like Facebook, Youtube and Flickr or services focussed on sports and exercise such as GPSies or STRAVA. Whether free of cost, "freemium" or paid, these systems attract worldwide communities of engaged users. VGI have provided new information regarding use and users of R&PA, most recently to extract spatial locations and intensity of recreational activities such as mountain biking (Campelo & Nogueira Mendes, 2016) (Fig. 1 Top left) and running (Santos et al., 2016). Other activities such as geocaching (Fig 1 Top right) showed value to determine preferences and motivations of R&PA visitors (Santos et al., 2012).

Public participation GIS (PPGIS) mapping

Much of the information that R&PA require is location specific, such as which facilities visitors use or what values they associate with specific areas. The most effective way to collect, visualise and manage location-specific information is through GIS. If such data were collected with surveys or interviews, they would need to be manually assigned to map locations which is time-consuming and error-prone. In contrast, online PPGIS, capitalizes on web-GIS where people explore and comment on customised online maps, for example, to

mark specific locations for undertaking a specific activity in R&PA or for suggesting management actions (Fig.1 Bottom left). That way the information is assigned directly to its location (geocoded) and can be exported for analysis and visualisation with GIS software (see Wolf, 2015). Sampling undertaken for PPGIS research is typically more purposive and the data collection more structured compared to VGI systems. The past decade has witnessed significant progress in the application of PPGIS mapping as evidenced in more than 80 publications, presenting new solutions and challenges.

MTB in Sintra-Cascais NT Portugal (GPSies.com @ Oct 2013)

Geocaches in Portugal (GeoPT.org @ Nov 2012)

Northern Sydney National Parks Australia
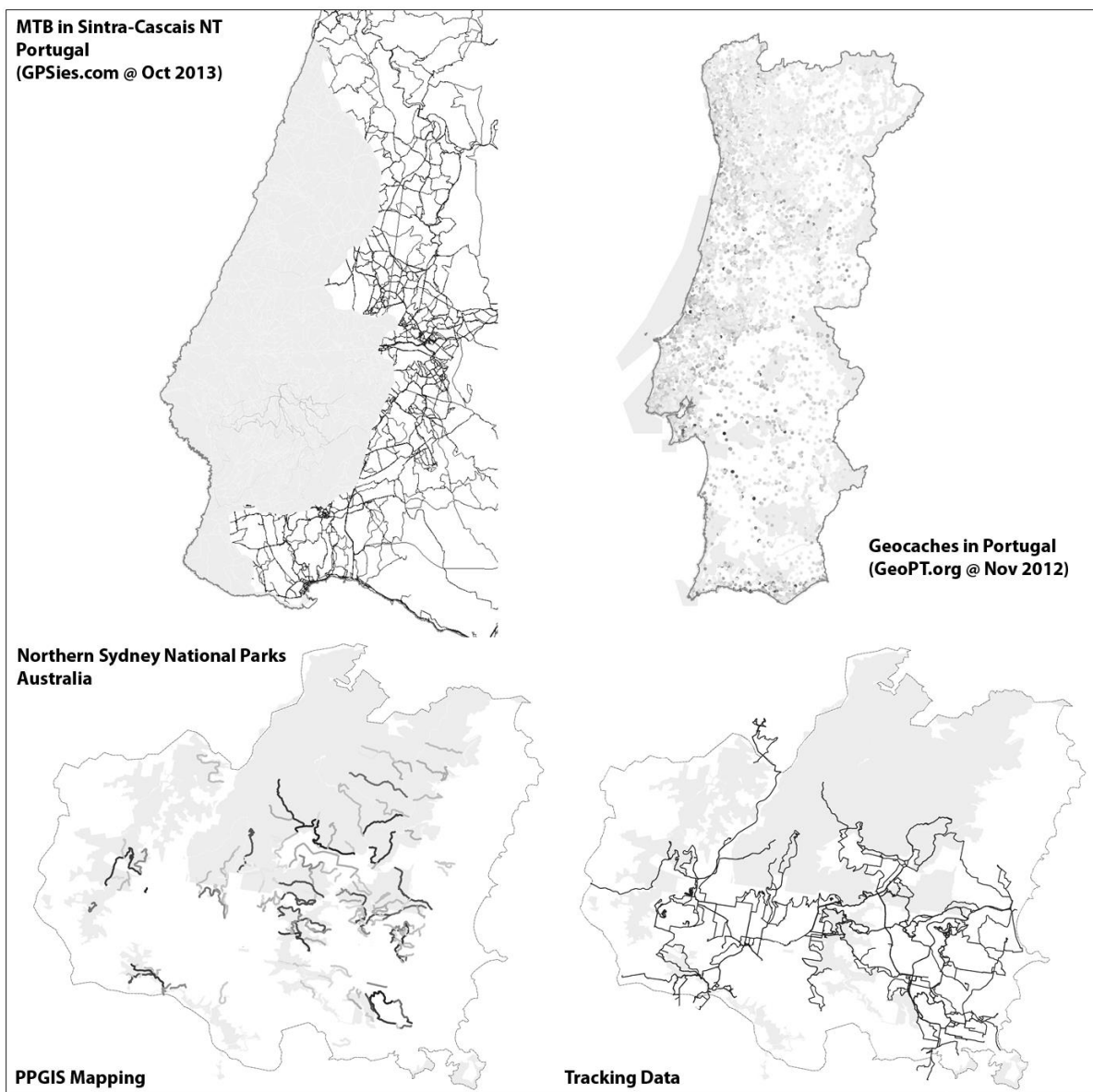
PPGIS Mapping

Tracking Data

Figure 1. Top: examples of VGI for use intensity of mountain bike in Sintra-Cascais Natural Park (left) and Geocaching in Portugal (right) (adapted from Campelo & Nogueira Mendes, 2016; Santos et al., 2012). Bottom: examples of PPGIS mapping (left) and tracking data (right) inside and outside of Northern Sydney national parks in Australia showing favourite networks of rides (Wolf et al., 2018; Wolf & Wohlfart, 2014; Wolf et al., 2014). More intensely coloured tracks/points indicate more popular mountain bike rides or geocaches.

GPS tracking

GPS tracking is another form of PPGIS which has evolved rapidly over the past decade as evidenced by the rate of papers published annually, including more than 50 GPS tracking papers in the tourism and recreation discipline alone. Typically, participants are equipped with a GPS data logger that tracks their travels (e.g., Fig.1 bottom right) but alternative modes of tracking have emerged including mobile phone and Bluetooth tracking, photo repositories and geocoded social media. GPS tracking studies can be scaled from local to global which evidences the versatility of this technique.

Pros & Cons

Studies to date highlight the clear advantages of these new methods: (1) they can generate massive amount of data (some VGI services have over millions of registered users, tracks, photos, etc.); (2) they can generate detailed information on visitor profiles, distributions and preferences, which perhaps is not required for routine R&PA monitoring but highly useful to address specific management questions; (3) both VGI and GPS tracking produce whole networks of travels (vs. singular location points) enabling sophisticated analysis with great visualisation options; (4) require no manual data entry if administered online; (5) data are independent of the sampling period (some VGI data can cover over a decade worth of data); (6) can achieve high response rates and increase attention span (for PPGIS), possibly higher than traditional surveys, which has been the authors' experience but varied opinions exist.

New challenges for all these data sources may include (1) the considerable expertise required in GIS or Web-GIS design, data management and analysis, which is typically time consuming; (2) spatial accuracy; (3) privacy concerns; (4) issues of representation (especially regarding VGI) i.e. – not all users upload their tracks, photos, comments resulting in data bias; (5) if administered online (for PPGIS), participants need internet access and some computer/mapping skills; (6) differences in results may occur between online and field PPGIS applications (see discussion in Wolf et al., 2015).

Conclusions

The past decade has shown promising developments in various participatory visitor monitoring techniques. We discussed limitations and future potential for the application of these participatory techniques which are integral to our way forward in addressing the major questions in visitor monitoring such as understanding visitor motivations, preferences and behaviours. These innovative techniques open up opportunities for capitalising on local spatial knowledge to enhance decision-making quality and capacity, especially in stakeholder-sensitive contexts. Findings can also be used to better manage R&PA and their visitor experiences to make them accessible and attractive to the public.

Acknowledgments

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