

Combining Stated Preference techniques and GPS tracking to model the effect of access policies in the Dolomites, Italy

Francesco Orsi, University of Trento, Italy, francesco.orsi@ing.unitn.it;

Davide Geneletti, University of Trento, Italy

Introduction

The visitation of protected areas generally involves two main travel components: a trip to the point where the actual excursion starts (e.g. parking, trailhead, etc.) and the excursion itself. The implementation of different access policies (e.g. toll road, restricted access on paths) on one of these two components may affect the other and vice versa. Understanding these reciprocal effects before the actual implementation of a policy would help park managers define strategies that better preserve the environment while ensuring higher standards of recreational quality. Stated Preference (SP) techniques have been widely used to estimate the sensitivity of visitors to different management options in protected areas (Lawson and Manning, 2002; Kelly et al., 2007) and assess the likely acceptance of various transportation alternatives (Pettebone et al., 2011). GPS devices have been applied recently to track people's movements and eventually identify areas that may experience problems of overcrowding (Hallo et al., 2005; D'Antonio, 2010). This study introduces an innovative methodology that combines stated preference techniques and GPS-based tracking to estimate the likely effects of an access policy in natural and protected areas. The methodology was tested in an area of the recently established Dolomites Unesco Heritage site (Italy). This is one of the most popular excursion areas of the Dolomites and can be reached quite easily via road and cable cars.

Method

The proposed approach relies on three main actions: visitor counting, preference elicitation and GPS tracking. Counting of both vehicles reaching the area and individual hikers is performed at the main entrance points of the excursion area by means of mechanical and manual counters. The preference of visitors with respect to different access policy options is elicited through an SP questionnaire. The questionnaire includes a preliminary section where the respondent is asked to provide some basic information (e.g. age, origin, expected destination of the day) and the actual stated preference section. The latter proposes a number of choice sets from which to pick one of three labeled alternatives reflecting possible ways of reaching the area (i.e. car, bus, cable car). Each alternative is described by five attributes referring to both the alternative's characteristics and environmental conditions at the destination: cost, convenience (e.g. availability of parking lots), accessibility constraints (e.g. hours of service), traffic, crowding on the path. After completing the questionnaire, the respondent is given a GPS logger that will be returned at the end of the excursion. The logger is a cheap device that records the

geographic coordinate of the user at fixed intervals of time and has a capacity of several thousands records. As the reference number of the GPS device provided to a respondent is written on the questionnaire, information supplied by these two tools can be linked. Given the characteristics of the study area, the various actions were performed at different locations, as depicted in Figure 1.

Results and discussion

Our approach enabled the collection of a vast amount of inter-connected data regarding people's movements and preferences in a protected area. Counters let the correlation between the number of cars reaching the area and the number of people starting an excursion to emerge. The SP survey informed about the likely response of visitors to access policies that modify the cost and degree of freedom associated with different transportation options. Moreover, it highlighted visitors' willingness to tradeoff the convenience of a transportation option against the environmental quality of the site. Finally, GPS devices provided a very detailed description of each respondent's itinerary (e.g. length, average speed, stops) and, when joined with responses to the questionnaire, a thorough understanding of a visitor's current and expected behavior. The main advantage of the proposed approach is the cost-benefit ratio. When considering that mechanical counters require limited human assistance and that many visitors can be contacted by simply choosing the right locations across the study area, few people can collect large amounts of data in just few days of work. The ability to link preferences as elicited through questionnaires and GPS tracks provides valuable insights into the relationship between modes of access and chosen itineraries, thus offering a thorough understanding on the potential global effects of a given management policy. This is exactly the kind of information that can adequately feed agent-based simulation models used to describe in detail such effects and therefore the method seems promising in the field of protected area management. These elements are presented and discussed in the light of the preliminary results obtained during the first summer campaign.

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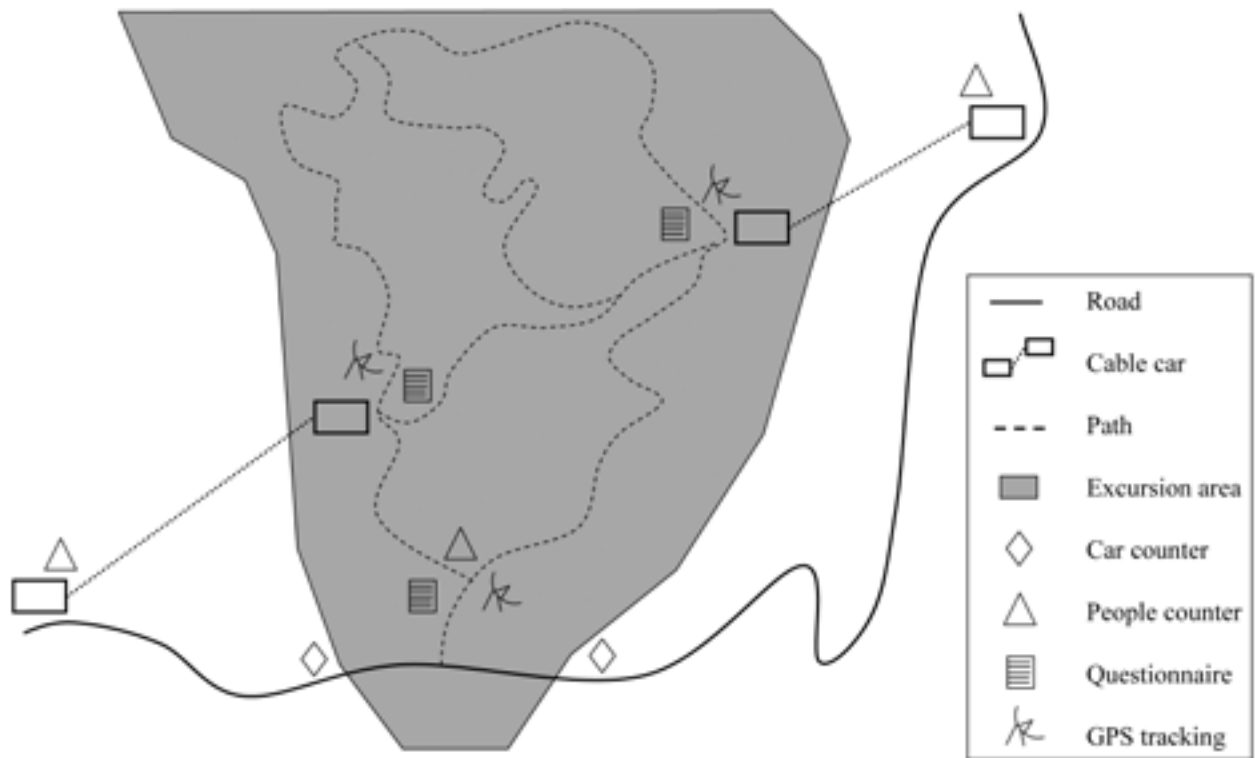


Figure 1. The proposed method involves different actions (visitor counting, preference elicitation through questionnaires, GPS tracking) being performed at different locations across the study area.

D'Antonio, A., Monz, C., Lawson, S., Newman, P., Pettebone, D., Courtemanch, A. (2010). GPS-based measurements of back-country visitors in parks and protected areas: examples of methods and applications from three case studies. *Journal of Park and Recreation Administration* 3

Hallo, J.C., Manning, R.E., Valliere, W., Budruk, M., (2005). A case study comparison of visitor self-reported and GPS recorded travel routes. *Proceedings of the Northeastern Recreation Research Symposium GTR-NE-326, USA*, pp. 172–177.

Kelly, J., Haider, W., Williams, P.W., Englund, K., (2007). Stated preferences for eco-efficient destination planning options. *Tourism Management* 28, 377–390.

Lawson, S.R., Manning, R.E., (2002). Tradeoffs among social, resource, and management attributes of the Denali Wilderness experience: a contextual approach to normative research. *Leisure Sciences* 24, 297–312.

Pettebone, D., Newman, P., Lawson, S.R., Hunt, L., Monz, C., Zwiefka, J., (2011). Estimating visitors' travel mode choices along the Bear Lake Road in Rocky Mountain National Park. *Journal of Transport Geography* 19, 1210–1221.