

Optimizing the use of the Eco-counters tool. A case of study

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Introduction

Identifying the number, distribution, and behaviour of visitors to protected natural areas is an essential component of effective and efficient visitor management (Newsome, More & Dowling, 2002; Leung et al., 2015). Reliable data on visitor numbers, and particularly how they are distributed in time and space across these areas are key aspects to balancing conservational and recreational use (sporting and tourist use) of protected areas (Cessford & Muhar, 2003). In this sense, the increasingly popular eco-counters are a good management tool. However, the evidence has shown that the correct analysis of the output data is more difficult than is commonly expected. The purpose of this presentation is to address the problems arising from the use of these eco-counters and to discuss a possible methodology to optimize the use of this tool.

Methodology

The methodology proposed in this presentation is based on the experience of more than ten related applied research projects and, especially, on the last project carried out by the authors regarding the review of the monitoring system of the number, distribution, and characteristics of the visitors to the Alt Pirineu Natural Park 2011-2017, Spain (Fariás & Morera, 2017a,b).

The methodology developed includes the consideration of five main steps:

Step 1. Identify the main access points. Classify them by priority instead of the number of visits expected.

Step 2. List their main characteristics in terms of access: by car, walking, others mixed.

Step 3. Contrasting information. Fieldwork assessing the situation of the current eco-counters (if applicable) and/or thinking about best possible location of the new eco-counters.

Step 4. Accurate data are processed to determine the distribution and type of use in the area.

Step 5. Put the results into practice and track the design of the system.

Details of the basic equation apply to calculate visits using eco-counter data in the case of vehicle entrances, where VC is: vehicles detected by eco-counters; VT: vehicles that have crossed through the eco-counter; VNC: vehicles that have not crossed through the eco-counter; VUL: local population, and; VPB: visitors who have access to the Park on foot or mountain bike who, in the case of the vehicle eco-counter, are not registered by the eco-counters.

$$\left(\frac{(VC - \% \frac{VT}{VC} x VC)}{2} + \% \frac{VT}{VC} x VC \right) x \frac{\text{average of people}}{\text{vehicle}} + \% \frac{VNC}{VC} x VC x \frac{\text{average of people}}{\text{vehicle}} - \% \frac{VUL}{VC} x VC + \% \frac{VPB}{VC} x VC$$

Different vehicles that have crossed the eco-counter
 Total visitors that have crossed the eco-counter with vehicle
 Visitors with vehicle that have not crossed the eco-counter
 People that have accessed to the Park, but to do other activities as could be to work or to collect firewood, they have not accessed to visit the Park
 Visitors that accessed to the Park, but they could not be detected by the eco-counter

Eq. 1: Equation used to calculate the number of visitors to the park from the information collected by the eco-counters.

In total six entrances were considered in this study, all of which had a vehicle eco-counter. More details about each entrance can be seen in Figure 1 and Table 1.

Table 1. Main characteristics of the entrances controlled

	Name of the entrance	Location	Eco-counters
1	Fornet	Valls d'Àneu (TM Alt Àneu)	Magnetic Eco-Twin*
2	Tavascan	Vall de Cardós (TM Lladorre)	Magnetic Eco-Twin
3	La Farga	Vall Ferrera (TM Alins)	Magnetic Eco-Twin
4	Tor	Vall de Tor (TM Alins)	Magnetic Eco-Twin
5	Sant Joan	Vall Sta Magdalena (TM Montferrer)	Magnetic Eco-Twin
6	Os de Civís	Alt Urgell (TM Valls de Valira)	Magnetic Eco-Combo**

* These counters collect data in infrared format and then couple them to a Bluetooth infrared data transformer.

** these counters work in the same way as the ones above but collect data directly in Bluetooth format

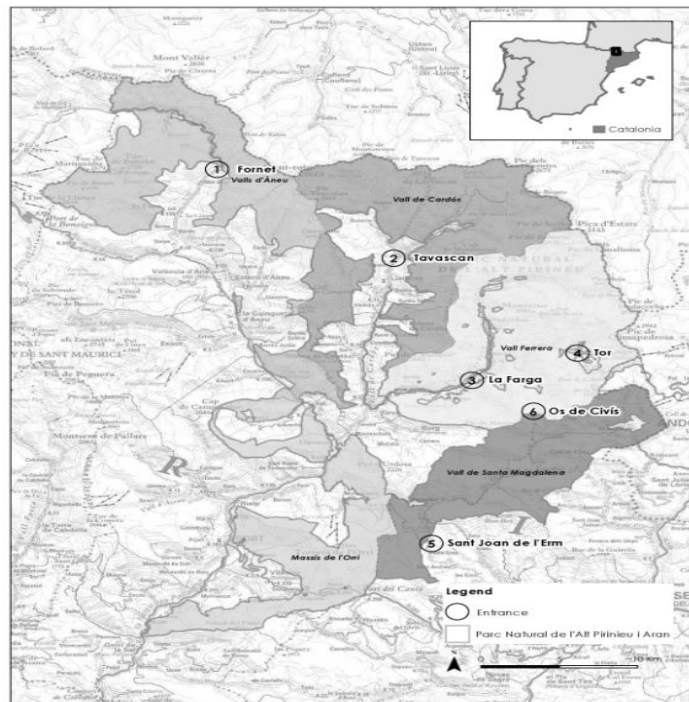


Figure 1. Alt Pirineu Natural Park - Spain

Results

The results obtained in the application of this methodology (year 2011) and the revised results in the year 2017 showed important changes in terms of the use and distribution of visits at two of the six entrances controlled, indicating a significant variation in the equation originally applied, not only in terms of number, but also in distribution (Figure 2). The range of variation between a simple or a complex equation can range from 8% to 25% depending on the entrances.

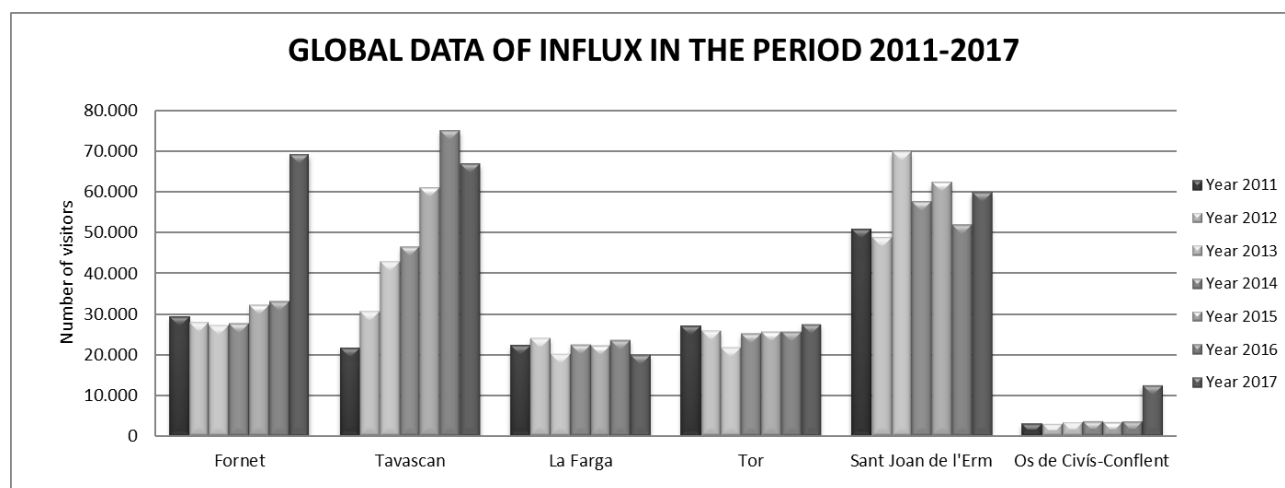


Figure 2. Evolution in the number of visits

Discussion

Although eco-counters are becoming a more common system for monitoring the number of visits to protected natural areas by applying simple filters, the results obtained in this study demonstrate that it is necessary to create a specific equation for each entrance where the eco-counters are located, and that it has to be checked periodically in order to identify the main changes and re-adjust the corresponding equations. Recommendations about how better to use the eco-counters will be discussed further in the presentation of the results.

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