



Combining multivariate analysis and cost analysis in outdoor recreation planning



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ABSTRACT

In this paper we examine the usefulness of combining multivariate analysis and costs analysis in recreation planning. Although these approaches have sometimes been developed in previous recreation studies, they have never been combined in this way. We apply this approach to a regional beach planning policy called the “Beach Plan”, in Aquitaine, south-western France. A multivariate procedure is used to assess the current environmental and social conditions of the 91 beaches included in the Plan. It reveals some connections between the variables we selected at the inventory step and leads to the definition of four homogeneous clusters of sites. We also identify possible social inequities. We find that the partition obtained by the cluster analysis does not coincide with the classification defined in the Plan. This confirms the necessity of an iterative process between inventory and implementation steps. We then examine the cost consequences of the implementation of the Plan. To do so, we define “total incremental cost functions” which enable us to evaluate the cost impacts of introducing sites in the Plan. We show that the application of the strict efficiency criterion may lead to several socially undesirable effects. We therefore propose an alternative integration path, called the “no social cost” path, after combining results provided by the multivariate analysis and the cost analysis.

MANAGEMENT IMPLICATIONS

- At the inventory stage of recreation planning, multivariate analyses provide a synoptic description of recreational activities, out of a large quantity of data. Multiple correspondence analysis is a factorial method designed to deal with categorical variables
- The combination of physical and socioeconomic data is of great help to decision makers in defining new social objectives in recreational planning.
- By identifying possible correlations between the variables, multivariate analyses provide a better understanding of the functioning of sites. In the French case for instance, the level of use and the management effort are much more discriminating than the environmental characteristics of the beaches.
- Cost analysis aims at giving full account of the variability of management costs at the site level. Several drivers are identified accordingly.
- Cost analysis is also a means to compare several strategies for implementing the plan. In the present case, ranking the sites according to a “pure efficiency” criterion may be appealing because it allows for the introduction of 66 sites (out of the 91) into the planning process at a zero overall cost.
- The selection rule based on the efficiency criterion tends to increase social and economic inequalities between the municipalities. Another selection rule (hereafter called the “no social costs”) may reduce such undesirable effects.

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1. Introduction

Recreation planning is a process for ensuring the sustainable use and conservation of open spaces (Hammit & Cole, 1998; Stein,

2013). In this respect, planning generally involves the task of defining specific areas where recreation is a key function (Stein, 2013). Depending on the anticipated activities and the environmental conditions, various uses can be assigned to these recreation sites, ranging from sports areas equipped with many facilities, to more natural land designed to meet very specific needs of nature-based tourists. As Pröbstl, Wirth, Elands, and Bell (2010) pointed out, approaches to recreation planning may be diverse. Compared to the North American countries, European managers seem to use more tailor-made solutions which are adapted to local conditions. Nevertheless, any planning process should include key steps such as an inventory of current (social and environmental) conditions, the definition of goals and objectives, and the preparation of an implementation stage (Hammit & Cole, 1998; Pröbstl et al., 2010). Although a planning process usually starts with an inventory step, objectives are sometimes determined first before investigating the various ways of achieving them (as in Roig, Comas, Rodriguez-Perea, and Martin-Prieto (2005)). In any event, recreation planning clearly remains an integrated process that requires interdisciplinary research approaches. In this paper we would like to demonstrate the insights to be gained when combining multivariate analysis and cost analysis in recreation planning. More specifically, we use factor and cluster analysis. Both are data reduction techniques designed to provide a synoptic view of a large amount of data. Factor analysis is a method that reduces the number of variables (Lebart, Piron, & Morineau, 2006) while cluster analysis reduces the number of statistical units by a grouping of observations into homogeneous “groups” (Mirkin, 2005). These methods have sometimes been used for the classification of recreational users (Fyhri, Jacobsen, & Tommervik, 2009; Roca, Villares, & Ortego, 2009) or of the natural environment (Kaplanovsky, 2005). More recently, some authors have applied them in studies of recreational sites management, such as camping zones (Leung & Marion, 1999; Monz & Twardock, 2010) or beaches (Roig et al., 2005). As such cluster analyses are very promising for informing the “inventory step” of planning processes. Furthermore, they are complementary to the planning process of recreational zoning (as in Roig et al. (2005)) and the implementation phase would benefit from appropriate analytical tools that evaluate options. In biodiversity conservation, close attention has recently been paid to cost considerations, in order to optimize the use of existing resources and achieve more ambitious goals (Armsworth, Cantu-Salazar, Parnell, & Stoneman, 2011; Naidoo et al., 2006). In recreation planning, we found little if any scientific articles dedicated to this issue. Compared to conservation planning, economic research in recreation planning or land use planning seems to be much more interested in the evaluation of welfare impacts and non-monetary benefits, rather than costs (Cheshire & Sheppard, 2002; Hanley, Shaw, & Wright, 2003; Loomis & Walsh, 1997). Nevertheless, we think that cost analysis may also be of assistance, although the benefits are expressed in non-monetary terms.

In this paper we combine multivariate and costs analyses to study the effects of a French recreational planning policy, the “Beach Plan” on the Aquitaine coastline in south-western France. To improve the recreational quality of the various beaches of Aquitaine, the Plan defines a typology of sites with new management objectives. However, until now no clear objectives have been formulated to support the typology, or the implementation of the Plan.

The paper is structured as follows. First, we describe the study area. We then detail the data collection and the methodology for multivariate analysis and cost assessment. In Section 3 we present the results produced by both approaches as well as the implications for the implementation of the Plan. We discuss our results and conclude our arguments in Section 4.

2. Materials and models

2.1. Presentation of the study area and the “Beach Plan”

The Aquitaine coastline is characterized by relatively limited urbanization (approximately 10% of the total shoreline) and the presence of large areas of natural land. The prevailing landscape consists of sandy beaches along its 230 km of shoreline, with rocks and cliffs in the southern part (approx. 30 km). A few kilometres inland, numerous freshwater lakes offer another type of beaches. Unsurprisingly, this coastline is highly attractive to tourists: in 2010, the coastal zones accounted for 40 million overnight stays, e.g. 42% of the total for Aquitaine (Conseil Régional du Tourisme d'Aquitaine, 2011). Tourism is however concentrated during a very limited period of the year (i.e. summer). The region experiences continuous population growth, concentrated around the biggest cities.² As a consequence, human densities vary widely along the coastline (from 23 inhabitants/km² in the least developed areas to 570 inhabitants/km² in the biggest coastal cities). This permanent population actually represents another major source of recreational demand. The current use pattern of the Aquitaine coastline is defined mostly by a long history of spatial planning, which started during the late 1960s when the inter-ministerial committee to develop Aquitaine's coast (*Mission Interministérielle pour l'Aménagement de la Côte Aquitaine* – MIACA) managed the recreational activities along the coast. Following its first “Beach Plan”, that committee funded most recreational facilities (parking lots, access, etc.). Since then, several public policies have followed (Daubet, Dehez, & Figura, 2010), dedicated to various aspects of beach management (organization of beach cleaning, monitoring erosion, installation of new facilities, etc.). In 2010 a new Beach Plan was launched by the local public authorities (*Schéma Plan Plage Littoral Aquitain – Stratégie régionale*, 2010). It was designed to (i) assess actual conditions of the coastline, (ii) devise new management standards to improve outdoor recreational facilities, and (iii) set objectives for the distribution of such standards along the coastline. Of the 170 beaches identified in Aquitaine (including oceanside and lakeside beaches), 91 were included in the Plan (Fig. 1).

These 91 beaches were selected for their natural features (i.e. urban beaches were excluded) and the guarantee of public access (thus excluding private camps). The definition of management standards led to a classification of four types of beaches:

- “Extended recreation” (ER) beaches (31 sites) offer a variety a facilities and services. They are located in the immediate vicinity of urban areas and management practices are determined accordingly. As far as possible, coordination is sought with services provided by urban centres (e.g. transport). Recreation is the main objective. A high use rate is therefore expected.
- “Recreation and nature” (RN) beaches (11 sites) may not be situated in the vicinity of urban areas but rather in a natural environment. Fewer services are therefore available, compared to “Extended recreation” beaches. High use is still expected, requiring a high standard of facilities and services.
- “Natural” (N) beaches (27 sites), situated in a natural environment, are supposed to meet the demand for nature-based tourism. Few facilities are offered and particular attention is paid to environmental quality. Similar to others beaches, the safety of individuals must be ensured. A lower level of recreational use is expected.
- “Lakeside” (L) beaches (22 sites) are situated inland. The environmental characteristics of lakes and the types of

² Source: French National Census.

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