Introduction

The coastal zone is an extremely complex social-ecological system that changes in relation to its environmental, socio-economic, cultural and governance factors (Diedrich et al., 2010). Integrated coastal zone management (ICZM) is a process that seeks to develop an integrated model for sustainable development, that is based on finding points of convergence among these factors (IOC, 2006; cited Diedrich et al. 2010). Indicators are presented as efficient and descriptive tools of anthropogenic and natural phenomena, which are optional for ICZM (Diedrich et al., 2010). Indicators are defined as quantitative/qualitative statements or measured/observed parameters that can be used to describe existing situations and measure changes or trends over time (IOC, 2006), also in evaluating an isolated phenomenon (diagnosis) or in a monitoring system to evaluate processes and detect changes (Diedrich & Domíneque-Quesada and Sanz-Larruga, 2010). In ICZM, sustainability scenarios and indicators are never generic, they are specifically to sites and restricted by political and local realities (Diedrich et al., 2010). In the context of these realities, the analytical framework used for an assessment helps to determine the variety of indicators that are chosen to communicate the outcomes of that assessment (Gabrielsen & Bosch, 2003). For its assessments of the relations between human activities and the environment, the Environmental European Agency (EEA) uses the Driving forces-Pressures-State-Impact-Responses (DPSIR) framework (Figure 1; Gabrielsen & Bosch, 2003) and it has been used in this work. The main goal of this work has been to show a proposal of sustainable indicators for the agriculture and livestock sectors (driving forces) in Gran Canaria. Since both are two important and influential driving forces the Canary Islands coast (Gesplan, 2012) and therefore they should be taken into account in a local ICZM system.

Methods

First, a shortlist of indicators was obtained according to the references, based on the established framework (DPSIR model) and the following four criteria: relevance, data availability, regular updating and ease of interpretation (criteria used by the public bank of environmental indicators of Ministry of Agriculture, Food and the Environment, MAGRAMA). Second, a DELPHI analysis was performed with two specialists in these driving forces, in order to decrease the number of preselected indicators. Third, the final weight of indicators was estimated by an Analytic Hierarchy Process (AHP; Saaty 1980). It was conducted by the two experts considered according to three criteria: relevance, data availability and ease of interpretation.

Results and discussion

The AHP set 45 indicators initially, divided into DPSIR categories (Table 1). The experts observed the importance granted in parentheses to the criteria of suitability (72.4%), data availability (19.3%) and ease of interpretation (8.3%). In driving force category, it was given a 7% to “agriculture and livestock” indicators, a 64% to “agriculture” and a 28% to “livestock”. In response category, it was given a 25% to “surveillance and control” and a 75% to “accompanying measures and technical assistance to the sector”. The information described above was combined with the comparative indicators that are part of the AHP, and the resulting normalized weights (to 0) are observed in the following Table 2. The most relevant indicators are highlighted in Figure 2 and their names appear in bold in the Table 1. This outcome has been delivered from the work agreed among the expert team of OMARCOST project (OMARCOST, 2014). Notwithstanding DPSIR possess some drawbacks, the fact that the method is still in use more than three decades after its creation also attests to its robustness, and it has been concluded that the DPSIR framework is a useful tool that can still be refined (Gari et al., 2015). It links cause-effect relationships among the five categories of the framework (Figure 1) and has been used for analyzing and assessing the social and ecological problems of aquatic systems subject to anthropogenic influence. It has been used to develop ICZM (Gari et al., 2015). We believe that DPSIR has successfully guided the selection of indicators for the drivers evaluated.

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Table 1. Names of the 45 indicators used in the Analytic Hierarchy Process (AHP).

<table>
<thead>
<tr>
<th>PRESSURES</th>
<th>STATE</th>
<th>IMPACTS</th>
<th>RESPONSES</th>
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<tbody>
<tr>
<td>P1: Agriculture</td>
<td>F1: Annual area of agricultural production</td>
<td>F2: Area of agricultural production</td>
<td>F3: Agriculture related activities</td>
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