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Additional Information

***A combined ANP-delphi approach to evaluate sustainable touristic strategies.***

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**Keywords:** MCDA, Analytic Network Process (ANP), Delphi method, sustainable tourism, sustainability indicators, consensus building

**Abstract**

A certain type of tourism is desirable for the sustainable development of national parks (NP) Tourism development strategies are required for the proper management of NP.

Given that prioritization of these strategies is a key concern for NP managers, in this paper we propose a methodology based on a multicriteria approach such as the Analytic Network Process and on Delphi-type judgment-ensuring procedure. The approach aims at involving different types of stakeholders in a participatory and consensus-building process.

The methodology was applied to the particular case of Los Roques National Park in Venezuela. The goal was to prioritize three possible sustainable tourism strategies defined by the stakeholders.

The experience shows that the procedure not only allows prioritization to be dealt with in an organized and systematic way, but also enables reflective thinking on sustainable development and on the role of participatory management.

**1. Introduction**

Tourism is an activity related to national development and sustainability. The aim of sustainable development is to find a balance between economic, social and environmental factors. The implementation of participatory processes of environmental governance is recognized as useful to address complex sustainable development issues and for planning local strategies of development (Castellani, 2009)

Various research works can be found in the literature that analyze and suggest what sustainable tourism should be i.e. (Tubb 2003) (Grundey 2008), (Kelly et al.,2007). However, contribution of tourism to sustainability remains in a predevelopment phase with small visible changes, yet with much experimentation and discussion among the academic community. For the particular case of coastal national parks, some of the most outstanding reflections and proposals can be found in (Nunes, 2002), (Ehler, 2003) and (Himes, 2007).

According to the management plan of Venezuelan NP and also to the reviewed literature, tourism brings sustainability to a national park if it contributes to its ecological, socio-cultural and economic objectives which means:

–economic improvement for locals in a touristic area;

- preservation of nature and natural resources (such as water, biota, landscape or energy);
- maintenance of the cultural values and liveability of the tourist destination.

Chavez (2007) suggests that environmentally compatible tourism should combine participatory and multidisciplinary planning and sustainability. (Sirikaya, 1997), (Fallon, 2003), (Tubb, 2003), (Hawkins, 2004), (Cottrell and Vaske, 2006) and (Ballantyne et al, 2009) suggest that a good tourism management practice requires that local stakeholders and tour operators work together for the conservation of natural areas within the framework of sustainable development. That all means participatory planning decision-making processes. (Sheppard, 2005), (Videira, 2003). These approaches strongly reinforce the objectives of the European Charter for Sustainable Tourism In Protected Areas process (Europarc federation, 1995) (European Commission, 2001)

Therefore, we can conclude that NP managers must encourage participation of stakeholders towards a certain degree of co-management. The objective is threefold: first the important intrinsic knowledge of stakeholders is included in management, second decisions are made considering all points of view which ensures a wide consensus when putting the actions into practice and finally all stakeholders learn and increase their awareness about the NP management objectives. For all the above reasons, assessment of sustainable tourism strategies can be treated as a multicriteria multi-expert decision problem and therefore MCDA techniques are suitable for solving it (Rozman, 2008).

To help NP managers choose the most beneficial sustainable tourism strategy in line with these objectives in this paper an approach based on a MCDA technique such as the Analytic Network Process (ANP) and the Delphi-type judgment-ensuring procedure is proposed.

A previous work of the authors of this paper in which a simple ANP technique was proposed has been used as the starting point of this work. In that work the results showed that the agreement of the different stakeholders with the procedure was far from satisfactory (Gómez-Navarro, 2010). For that, a new more depurated approach is here proposed in which the judgments of the different stakeholders are ensured through a Delphi procedure, which possibilities the unequal understanding of the problem and eases the following consensus building activity of the NP managers.

The rest of the paper is organized as follows: Sections 2 provides a general overview of the techniques used in the proposed ANP- and Delphi-based methodology. In Section 3 the proposed methodology is described and in Section 4 it is applied to a case study. Section 5 discusses the results and Section 6 gives conclusions on the application of the model

## **2. Overview of the ANP and Delphi procedure and their former applications**

MCDA techniques are suitable for solving this type of problems. More information about MCDA can be found in (Belton and Stewart , 2002). Several authors introduced the use of MCDA techniques for Sustainability Assessment (Ginevicius and Podvezko, 2009). Many of them focused on the use of AHP, Electre or Promethee (Ramzan et al., 2008), (Solnes, 2003), (Beccali et al., 2003). All these MCDA techniques work well under the assumption of independence of criteria. However, this assumption is not always realistic, particularly in

the field of sustainable assessment or planning. Thus, bias can occur when using any of these methods and can lead to non-optimal evaluations. In this paper, the Analytic Network Process (ANP) is chosen as it takes into account interdependences among criteria.

The Analytic Network Process (ANP) is a method proposed by (Saaty, 2001) that provides a framework for decision-making or evaluation problems. It presents its strengths when working in scenarios with scarce information. ANP generalizes the problem modeling process using a network of criteria (sustainability indicators) and alternatives (tourism strategies) all grouped into clusters. The elements in the network can be related in any possible way, i.e. a network can incorporate feedback and interdependence relationships within and between clusters. This provides an accurate modeling of complex settings and allows handling the usual situation of interdependence among elements used for sustainability assessment (Neaupane and Piantanakulchai 2006), (Saaty 2001).

The power of ANP lies in its use of special ratio scales, (ratio from 1 to 9) to capture all kinds of interactions between tangible and intangible criteria. According to (Saaty, 2001), the ANP model comprises the following steps:

- (i) Identifying the components and elements of the network and their relationships.
- (ii) Conducting pairwise comparisons on the elements according to ratio scales
- (iii) Placing the resulting relative importance weights (eigenvectors) in pairwise comparison matrices within the matrix (unweighted matrix).
- (iv) Conducting pairwise comparisons on the clusters.
- (v) Weighting the blocks of the unweighted matrix, by the corresponding priorities of the clusters, so that it can be column-stochastic (weighted matrix).
- (vi) Raising the weighted matrix to limiting powers until the weights converge and remain stable (limit matrix).
- (vii) Obtain the elements prioritizations according to any of the columns of the limit matrix

#### Regarding the Delphi procedure

It is a well-known structured communication technique which relies on a panel of experts to solve complex problems (Landaeta, J., 2006). In the standard version, the experts answer questionnaires in two or more rounds. After each round, a facilitator provides an anonymous summary of the experts' decisions from the previous round as well as the reasons they provided for their judgments (González-Almaguer, 2009). Thus, experts are encouraged to revise their earlier answers in light of the replies of other members of their panel. During this process the range of the answers will decrease and the group will converge towards the "correct" answer through consensus (Astigarra, E., 2009), (Gamarra, E., 2009). A Delphi study does not depend on a statistical sample that attempts to be representative of any population. It is a group decision mechanism requiring qualified experts who have deep understanding of the issues. The selection of experts is a key element of the method (Okoli, C. and Pawlowski, S., 2004).

Some recent applications of ANP to the field of sustainable development are found in strategic policy planning (Erdoğmuş et al. 2006); determination of the appropriate energy policy (Utulas 2005); evaluation of NP websites ((Wen-Hsien, 2010) or environmental

pressure assessment (Gomez-Navarro et al. 2009, 2010). Some of them also use a combination of ANP and Delphi but they use the Delphi process during the generation of the model steps in order to reach a consensus (Onar 2010).

In our case the main problem lies in the understanding of the model (already proposed by experts) and the proper valuation of alternatives. For that, a new more depurated approach is here proposed in which the judgments of the different stakeholders are ensured through a Delphi procedure, which is useful when there is an unequal understanding of the problem such as different levels of knowledge within the group of stakeholders.

So, the methodology proposed aims at helping NP managers by laying the foundations for a fair, rational and efficient debate and to achieve agreements for the touristic development strategies prioritization.

### 3. Proposed methodology

Figure 1 shows the methodology proposed. The first five steps are common to the previous methodology (Gómez-Navarro, 2010)

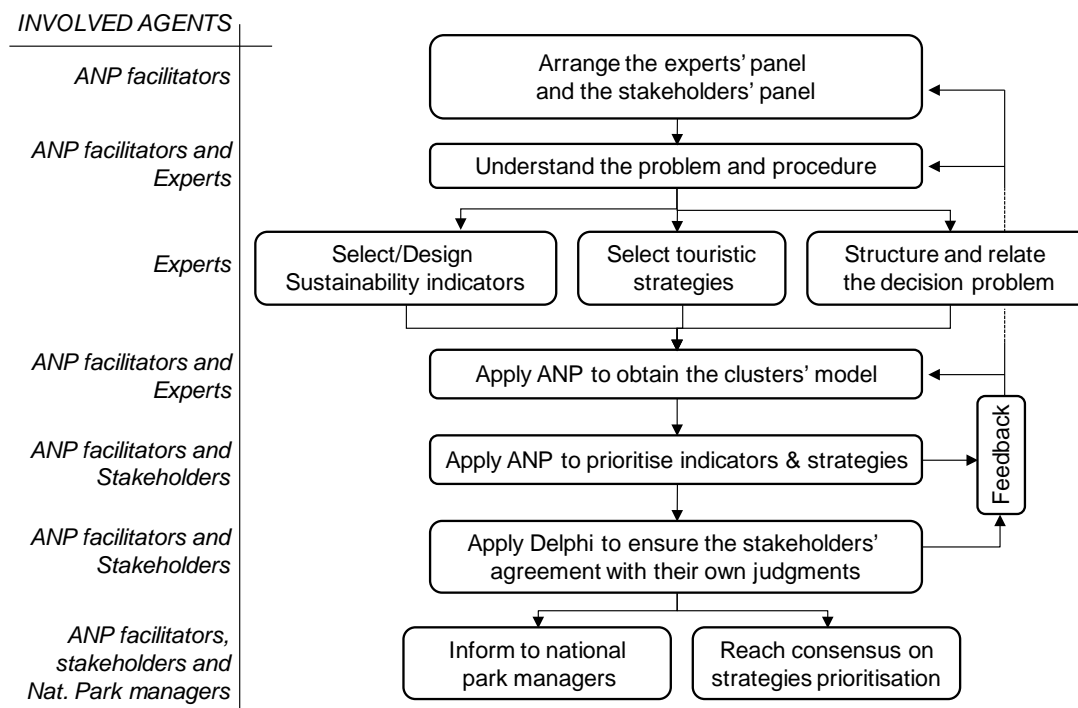


FIGURE 1

The model requires the participation of three types of agents, (i) the facilitators of the prioritization process (authors of this paper), (ii) a panel of sustainable development (SD) experts who will model the problem of evaluation and (iii) the stakeholders related to the National Park who will assess the model and the proposed tourism alternatives.

The SD experts define the sustainability indicators (criteria) that are used in the assessment model. According to other studies on sustainable tourism (San Martín and

Salcedo 2007, Green Globe International and the Network of Sustainable Tourism Certification of the Americas) the criteria should be related to sustainability indicators (pressure, state, response, impact and driving forces) which can be grouped into clusters that are easily understood by the stakeholders. To approach the model to reality, the SD experts also define the influences among criteria

The consultation of the stakeholders and their involvement in the definition of strategies for development followed by a review of the related Literature served to formulate the best tourism strategies for the park (alternatives). It is recommended to count with an active participation of the stakeholders since they will be responsible for the implementation of the most beneficial strategies to the local community.(Sparrevik, 2011)

Next the ANP method was used to allocate weights to the sustainability indicators and prioritization of strategies through questionnaires designed by the facilitators. The stakeholders gave their judgments about the model criteria and alternatives.

In this way the actors involved in the process were asked to rank the priorities of criteria and alternatives that were most important to them. The group results of this first round were obtained by calculating the geometric mean as recommended by Saaty (2001).

In the next stage, each stakeholder was given the answers of the rest of the group, according to transparency sought with Delphi procedure. Then he was encouraged to revise his earlier answers, provide reasons for his judgments or change his opinion in successive rounds. This procedure served to make sure the stakeholders understood the problem and the prioritization procedure.

To demonstrate the goodness of the proposed methodology, the approach was applied to the prioritization of three tourism strategies for Los Roques National Park (Venezuela)

#### 4. Case study: Los Roques Archipelago National Park

Los Roques Archipelago National Park is a group of islands in Venezuela. This protected area is located in the Caribbean Sea, 168 kilometers north of La Guaira (Venezuela's main



FIGURE 2. Los Roques Archipelago National Park

Airport) Until the late nineteenth century, exploitation of salt and guano and fishing were the main activities in the islands of the national park. Both commercial fisheries and tourism, in particular uncontrolled private urban development, negatively affected the natural and landscaping resources of the archipelago. To control the negative effects on the national interests, the Government created the National Park in 1972. For a better

management and sustainable development of the park Los Roques Unique Authority was established in 1991.

Since 1988 the number of visitors to the national park has increased substantially due to the development of tourism programs and plans, which has led to an increase in the number of inns and population in the islands (Blanco et al., 2004). Currently the park has about 1,200 inhabitants and every year about 75,000 tourists enjoy the attractions of the area. Some of the activities permitted under the park rules are recreational sailing, scuba-diving, windsurfing, fishing and bird watching (Inparques, 2010). Among other cultural attractions are the Virgen del Valle celebrations and the Lobster Festival.

In Venezuela, development strategies and plans for NP are designed by the National Executive and approved by the Popular Ministry for the Environment, which is responsible for their dissemination to the interest groups and final users through different entities and organizations. In the case of Los Roques PN the body responsible for implementing and managing these strategies is Los Roques Unique Authority jointly with the National Institute of Parks (Inparques).

Following, a detailed description of the implementation of the methodology is presented

### Application of the methodology

#### *Selecting the experts´ and stakeholders´ panel*

The stakeholder group consists of 8 members who represent various interest groups related to the National Park. Among them is an expert in sustainable development, a representative of an environmental NGO, a staff of Inparques, the Ministry for the Environment, a tour operator, an inn owner, a national tourist and an international tourist. Two of the stakeholders acted as experts, namely the Inparques representative and the representative of the environmental NGO who were selected for their legal status and long experience on the subject and objectives of a national park.

#### *Selection of tourism strategies*

In order to define development strategies stakeholders were consulted during the first meetings and they proposed some strategies that had already been implemented in other Latin American countries with similar geographical and socio-political conditions. These proposals were checked against the related literature, which served to formulate the best tourism strategies for the park (alternatives). The objective was to prioritize three strategies. They all were good proposals but since the economic resources are limited the aim was to prioritize them so that they could be implemented one after the other.

S1. *Eco-efficient Resorts (EER)*. The Ministry representative proposed the development of EER to promote local development of the park by creating interrelated businesses in order to make efficient use of the park's resources. The proposal seeks to benefit from the scenic beauty and biodiversity of the park, while enhancing the development of public services and activities other than tourism. Since *a priori* this strategy can create major environmental pressure on the park, EER should be able to manage their solid waste and wastewater in accordance with rules and regulations governing the use of the Park. According to several authors (Betancort and Fernández, 2002), (Frances, 2003), (Duque,

2005), (Sáez, 2009), EER development can increase local tourism competitiveness while fostering the efficient use of natural resources in the protected area. (Alcantara and Longa, 2003) and (Condo et al, 2001) suggest that the activities related to tourist resorts should be well planned and consistent with the geographical and socio-cultural conditions of the protected area in order to appropriately meet tourist demand.

S2. The stakeholders proposed the development of *environmentally friendly activities* (EFA) such as guided tours, guided diving, fishing, hiking and windsurfing, which allow tourists to enjoy the natural environment of the park while providing education on environmental conservation. Scientists such as (Flachier et al., 1997), (Zubillaga et al 2003), (Courrau and Andracka, 2005) and (Argos, 2009) say that this strategy needs to train tour guides in environmental education and conservation. The development of such activities in a controlled manner can take full advantage of nature's beauties and landscape of the national park without negatively affecting the environment

S3. The third strategy proposed by the stakeholders was the use of *sustainable transportation* (ST) such as animal-powered transport, rowing boats and use of existing trails or roads, since local people living in protected areas with potential for tourism development are highly concerned about issues such as heavy traffic, noise from motor boats and deforestation. (Aguirre, 2007) says that this strategy intends to respect the ecological dynamics of the landscape, water quality and habitat of the species while generating minimal environmental impact. This strategy suggests using more eco-friendly means of transport such as boats with noise control systems, rowing boats for short trips, bicycles and reducing the use of gasoline-powered vehicles

#### *Selection of sustainability indicators*

The two experts in sustainable development and management of National Parks helped to build the ANP-based network model. First the indicators that could be influential in the evaluation of sustainable management of tourism activities were identified. Then the indicators of similar or related criteria were grouped into clusters. The clusters of the present study were: Social aspects, Political-Administrative aspects, Physical and Natural environment and Local Environmental Impacts. The initial criteria were carefully analyzed and only those criteria which represented controllable, measurable elements that could be used as sustainable development indicators were selected. The final list of indicators was:

- I1. Water quality: i.e. the water conditions of the National Park beaches.
- I2. Scenic Beauty: landscape integrity as an attraction for tourists.
- I3. Species Habitat: it assesses the integrity of the local ecosystem.
- I4. Education Level: the years of schooling of the local community.
- I5. Existence of Public Services: whether there are public services such as sewer systems, water, electricity, etc. in the national park
- I6. Economic activities other than tourism: importance in the diversification of economic activities that allow local people to survive.
- I7. Per Capita Income: influence of the average monthly income of the inhabitants of the park
- I8. Solid Waste Generation: management and disposal of solid waste from the various activities developed in the park.
- I9. Wastewater generation: management and disposal of water resulting from the various activities developed in the park.
- I10. Effect of biodiversity: impact of the economic activities developed in the park



I11. Level of Private Investment: interest of third parties to invest in the development of activities in the park.

I12. Tourism Support Institutions, Environmental and / or government: degree of organization and integration of the various actors in the park

I13. Existence of Plans and Regulations for the National Park: legal regulations developed by park managers.

The proposed model is illustrated in the following diagram.

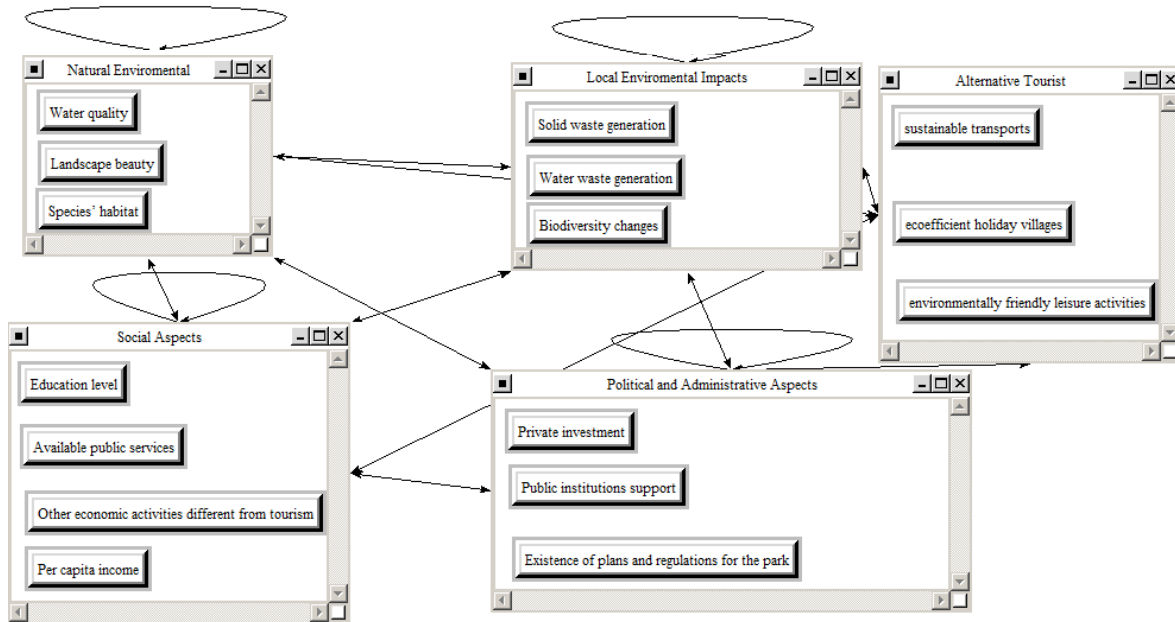


FIGURE 3: Network Model of the case study

### Structure of the decision problem

After the identification of all model elements (indicators and tourism strategies) their influences were determined by means of a relation matrix, whose elements  $a_{ij}$  took values 1 or 0 depending on whether there was any influence of element  $i$  on element  $j$ . The rows and columns of the matrix were formed by all network elements (Table 2).

	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	S1	S2	S3
I1	0	0	1	0	0	0	0	0	0	1	0	0	0	1	1	1
I2	0	0	0	0	0	0	0	0	0	0	1	1	0	1	1	1
I3	1	1	0	0	0	1	1	0	0	1	0	1	1	1	1	1
I4	0	0	0	0	0	1	1	0	0	1	1	0	0	1	1	1
I5	1	1	0	0	0	1	1	0	0	1	1	1	1	1	1	1
I6	1	1	1	0	1	0	1	1	1	1	1	1	0	1	1	1
I7	0	0	1	1	1	1	0	1	1	1	1	0	0	1	1	1
I8	1	1	1	0	0	1	0	0	1	1	0	1	0	1	1	1
I9	1	1	1	0	0	0	0	0	0	1	1	1	0	1	1	1
I10	0	1	1	0	0	1	1	0	0	0	0	1	1	1	1	1
I11	0	1	1	1	1	1	1	0	0	0	0	1	1	1	1	1

I12	0	1	1	1	1	1	1	0	0	1	0	0	1	1	1	1
I13	0	1	1	0	1	1	0	0	0	1	1	1	0	1	1	1
S1	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
S2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0
S3	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0

Table 1: Influence Matrix

### Application of ANP

Once the influences among the elements of the model were determined, a questionnaire was designed to gather information from stakeholders to evaluate the degree of influence. Table 2 shows an example of a question for criteria analysis by pairwise comparison

Social aspects	Degree of influence				
[ <b>X</b> ] Exist of public services	[ ]	[ ]	[ <b>X</b> ]	[ ]	[ ]
[ ] Economic activities other than tourism	Indifferent	Moderate	Strong	Very strong	Extreme

Table 2: Example of a question of the ANP questionnaire

In this example the stakeholder's opinion is: the *existence of public services* is strongly more influential than *other economic activities* concerning the *Social aspects*.

All calculations were performed with the help of Superdecision © software v.2.0.8. After all the calculations a limit supermatrix was obtained for each of the eight interviewed stakeholders. The results of each stakeholder (called first-round results) are presented in the following sections.

### Application of the Delphi method.

After obtaining the results of the stakeholders for the first round (ANP results) a second questionnaire was developed which showed their own answers and the answers given by the other stakeholders. An illustration of the second questionnaire is shown in Table 3.

		With respect to <b>Water Quality</b>		
		Compare the following sustainable tourism strategies indicating your preference		
Comparative figure	Q	Strategies	Intensity of the relationship	
	1	<input checked="" type="checkbox"/> Development of sustainable transport	<input type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
		<input type="checkbox"/> Development of eco-efficient resorts	Equal   Moderate   Strong   Very strong   Extreme	
Please, indicate the reasons why you changed your answer				

Table 3. Delphi questionnaire

Once the ANP results were obtained, Delphi procedure was applied. The first survey was answered during a personal interview with the stakeholders and once the results were processed, a second questionnaire was designed which included the results of the first survey for all the stakeholders and where the stakeholders were asked if they wanted to maintain or modify their earlier responses in light of the individual and overall results obtained on each question.

Questions with very scattered answers in the first round were analyzed on the basis of the comments provided by the SD experts. The second questionnaire was answered by each stakeholder separately via email and the answers processed to obtain the prioritization of strategies by consensus.

In table 3 an example of the Delphi questionnaire handed to the stakeholders is shown. In this particular case, stakeholder nr. 4 said in his first questionnaire that *Sustainable Transport* was preferred to *Eco-efficient* resorts with a strong intensity. However, during the Delphi procedure, after he saw everybody else' s responses he changed his mind and assigned a moderate preference.

## 5. Results

### Results obtained for the criteria

The results obtained after the first ANP round and the two Delphi rounds are:

	Experts																							
	Sustainable			NGO			INPARQUES			Ministry			Tourist Operators			Local Business			National Tourists		International Tourists			
	ANP	1st round	2nd round	ANP	1st round	2nd round	ANP	1st round	2nd round	ANP	1st round	2nd round	ANP	1st round	2nd round	ANP	1st round	2nd round	ANP	1ra ronda	2da ronda	ANP	1st round	2nd round
Public institutions support	0,086	0,074	0,076	0,061	0,061	0,061	0,036	0,050	0,050	0,044	0,052	0,053	0,048	0,049	0,047	0,038	0,035	0,035	0,052	0,061	0,061	0,110	0,096	0,091
Plans and regulations	0,041	0,044	0,048	0,121	0,124	0,124	0,054	0,067	0,067	0,091	0,087	0,087	0,040	0,052	0,052	0,033	0,061	0,058	0,054	0,064	0,064	0,093	0,092	0,094
Private investment	0,106	0,114	0,108	0,103	0,082	0,082	0,063	0,070	0,070	0,113	0,112	0,111	0,072	0,084	0,085	0,160	0,139	0,142	0,065	0,076	0,076	0,061	0,060	0,064
Other economic activities	0,182	0,165	0,163	0,144	0,116	0,116	0,166	0,139	0,139	0,171	0,129	0,130	0,183	0,145	0,145	0,152	0,121	0,122	0,106	0,094	0,095	0,184	0,153	0,147
Available public services	0,065	0,054	0,058	0,111	0,103	0,103	0,061	0,073	0,072	0,062	0,076	0,075	0,055	0,067	0,066	0,059	0,071	0,068	0,064	0,067	0,067	0,055	0,047	0,053
Per capita income	0,184	0,149	0,149	0,088	0,078	0,078	0,216	0,173	0,174	0,077	0,065	0,065	0,092	0,080	0,081	0,205	0,151	0,152	0,117	0,095	0,096	0,135	0,090	0,094
Education level	0,189	0,135	0,134	0,039	0,047	0,047	0,056	0,047	0,048	0,017	0,024	0,024	0,046	0,044	0,045	0,052	0,045	0,046	0,023	0,043	0,043	0,114	0,074	0,073
Biodiversity changes	0,059	0,067	0,068	0,038	0,041	0,041	0,115	0,100	0,100	0,098	0,106	0,105	0,091	0,082	0,082	0,037	0,057	0,056	0,060	0,075	0,074	0,037	0,055	0,050
Water waste generation	0,018	0,033	0,033	0,063	0,076	0,075	0,035	0,051	0,051	0,078	0,082	0,082	0,064	0,072	0,073	0,059	0,064	0,065	0,047	0,055	0,056	0,050	0,075	0,075
Solid waste generation	0,033	0,073	0,073	0,066	0,084	0,085	0,054	0,063	0,063	0,090	0,083	0,084	0,102	0,106	0,106	0,076	0,084	0,084	0,067	0,071	0,071	0,071	0,097	0,099
Landscape beauty	0,007	0,033	0,033	0,026	0,026	0,026	0,009	0,022	0,024	0,045	0,052	0,052	0,036	0,062	0,057	0,052	0,061	0,061	0,015	0,040	0,037	0,011	0,022	0,022
Water quality	0,002	0,013	0,012	0,040	0,062	0,062	0,018	0,034	0,033	0,010	0,025	0,025	0,038	0,041	0,045	0,018	0,034	0,033	0,110	0,085	0,086	0,027	0,054	0,049
Species' habitat	0,029	0,045	0,046	0,099	0,101	0,101	0,116	0,109	0,109	0,104	0,106	0,106	0,133	0,116	0,117	0,060	0,079	0,078	0,220	0,173	0,175	0,052	0,085	0,089

Table 4. ANP results and first and second Delphi rounds

These results show that the experts tend to moderate their results after the Delphi rounds. They all show a more equilibrated profile in the importances given to the different criteria.

A detailed profile of the answers of two different experts is shown here:

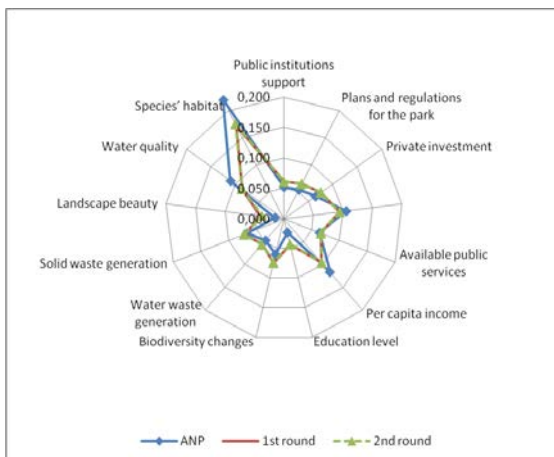


Figure 4. Criteria weights results for the National tourist

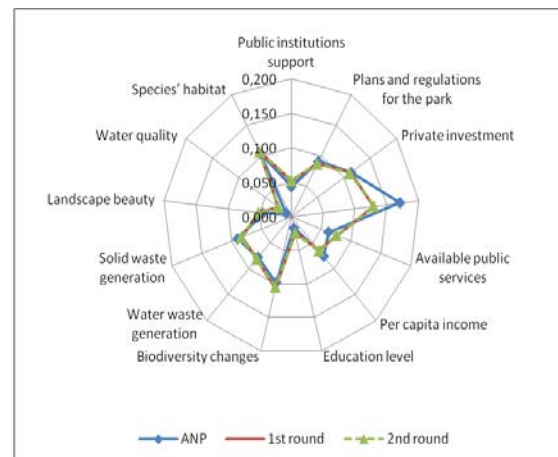


Figure 5. Criteria weights results for the Ministry member

In figure 4 it can be observed that the national tourist first assigned a high importance to criteria related to environmental issues but after knowing the responses of the rest of the experts he reduced this importance and moved it to the economic criteria.

In figure 5 it can be observed that the Ministry member first gave a very high importance to economic activities but in the following Delphi rounds he attenuated this result and assigned more importance to biodiversity changes or landscape beauty.

All the experts behaved in a very similar way. The results after the Delphi rounds show that the profiles of all of them tend to converge. This seems to be good departure point for the following consensus achievement activity.

We also want to stand up that there is almost no difference between results obtained after the first or the second Delphi round, which confirms that in this case one Delphi round would have been enough to be sure of the own judgements.

It is also interesting analyzing the results obtained by the different groups of experts. The following groups have been analyzed:

- (i) All the stakeholders
- (ii) The authorities (Inparques and Ministry representatives)
- (iii) The tourist sector (national and international tourists, tourist operator and hotel owner)
- (iv) The environmentalists (Environmental NGO and SD expert)

To obtain the global priority of each group its individual priorities have been aggregated with the geometric mean (Saaty, 1996)

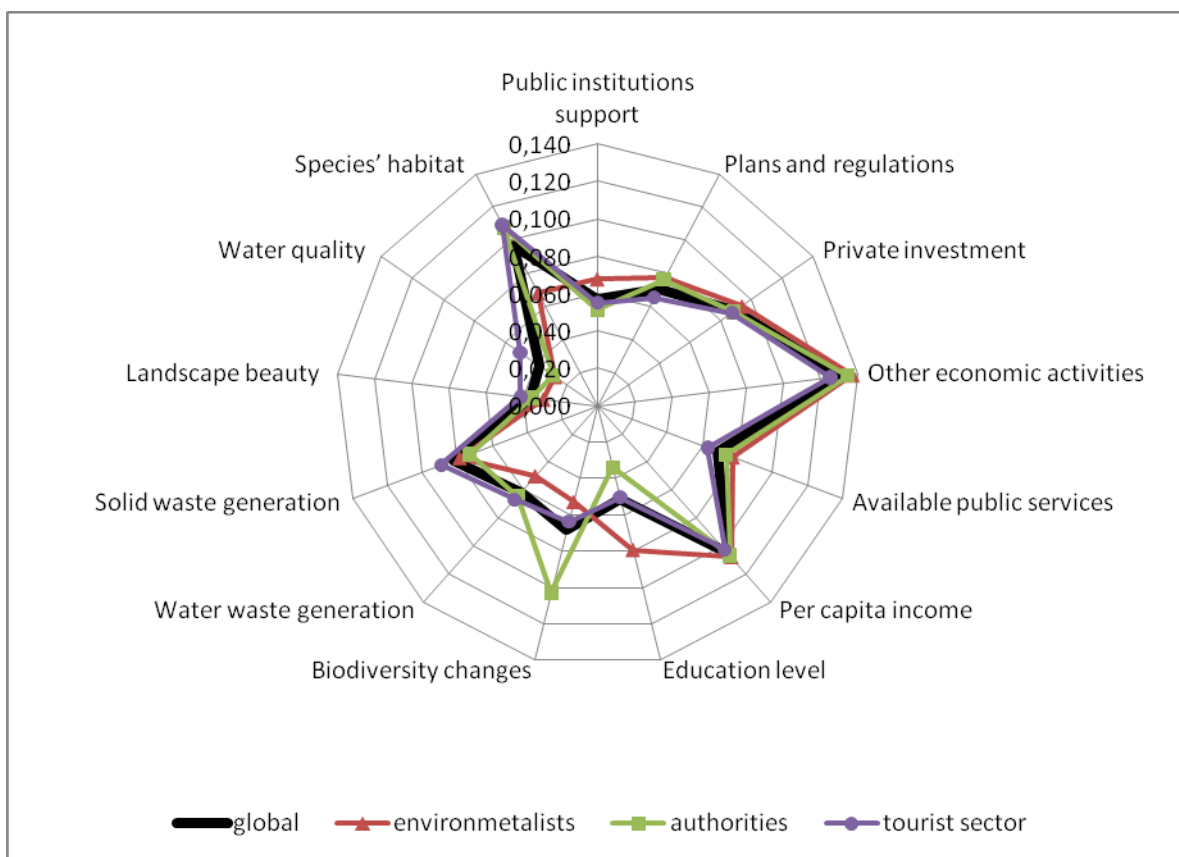


Figure 6. Criteria weight results for the different groups

Here we can compare the different weight profiles obtained by the different groups.

The global results show that according to the whole group of stakeholders the most important criteria are the economic ones: *other economic activities* (13%) and *per capita*

income (10%). On the other hand the least important ones are related to environmental issues such as landscape beauty (3,6%) and water quality (3,8%)

We can also observe that there is strong concordance in the assessment of relative importance of the criteria among the different groups. The four plots in the graph of Figure 6 are quite coincident, especially those obtained by the environmentalists and the tourist sector, these two groups are highly concerned by the solid waste generation (9%). In addition, the results obtained by the authorities show a big concern on biodiversity changes (10%)

The biggest differences in the profiles can be found in criteria such as: *Biodiversity changes*, *Education Level* and *Species habitat*, which have resulted to be the most discrepant ones.

### Results obtained for the alternatives

The final aim was to set a priority (nondimensional ANP value) for each alternative.

The results obtained for the three development strategies analyzed are the following:

	Sustainable Development			NGO Environmentalists			INPARQUES Representatives			Ministry			Tourist Operators			Local Business Representative			National Tourists		International Tourists			
	ANP	1st round	2nd round	ANP	1st round	2nd round	ANP	1st round	2nd round	ANP	1st round	2nd round	ANP	1st round	2nd round	ANP	1st round	2nd round	1ra ronda	2da ronda	ANP	1st round	2nd round	
Eco efficient resorts	0,472	0,447	0,378	0,093	0,120	0,121	0,290	0,185	0,181	0,148	0,127	0,136	0,155	0,213	0,202	0,230	0,280	0,274	0,212	0,232	0,215	0,256	0,183	0,171
Environ friendly activities	0,308	0,348	0,376	0,632	0,546	0,517	0,358	0,421	0,428	0,505	0,595	0,562	0,397	0,444	0,439	0,400	0,306	0,311	0,473	0,428	0,428	0,289	0,332	0,369
Sustainable transportation	0,219	0,205	0,246	0,275	0,334	0,362	0,352	0,394	0,392	0,348	0,278	0,302	0,448	0,343	0,359	0,370	0,414	0,415	0,315	0,340	0,356	0,455	0,484	0,460

Regarding the Delphi rounds of questions the stakeholders who significantly modified their responses with respect to the first questionnaire were the national tourist, the tour operator and the local business representative. When asked about the reasons for their modification, most claimed that they had been very severe with the responses because they did not know how influential some items were on sustainable development

When comparing the final results of the second round with those of the first round no substantial changes were observed in the prioritization of the Sustainable Tourism Development strategies for the national park. Upon completion of the second round 72 % of the questions were stable according to Delphi parameters. When the eight stakeholders were informed that there could be a third round for consensus, 5 of them declared that they were not going to change their answers again whatsoever, which would hardly affect the results of the second round. On the other hand, the SD experts with extensive experience in sustainable development did not substantially change their answers and claimed to be in accordance with their initial answers regardless of the responses of the other members of the panel as they were convinced of their selected criteria.

An example of these is presented in the following plots in figure 7

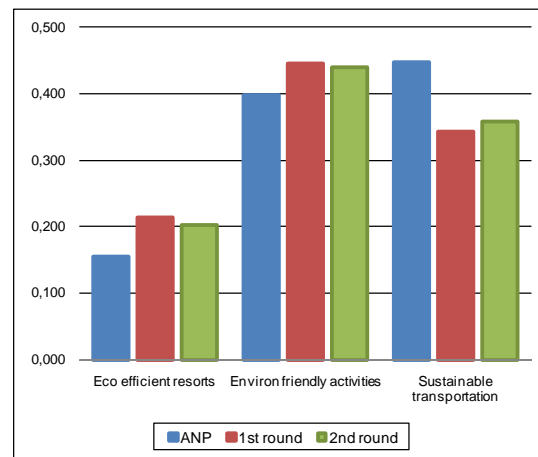


Figure 7. Tourist operator's results for the alternatives after each round.

Regarding the prioritization of alternatives the final results are shown in Figure 8

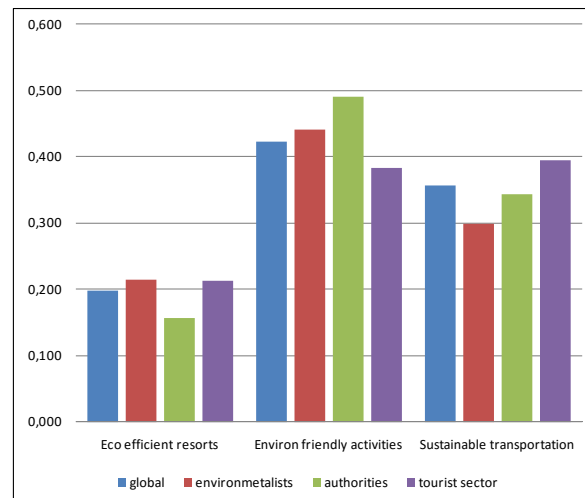


Figure 8. Alternative prioritization results for the different groups

In this case the results show that there is a strong concordance in the assessment of relative importance of the alternatives between the group as a whole and the different specific groups.

The global results show that according to the whole group of stakeholders the best tourist strategy to be implemented are the *Environmental friendly activities* (42,2 %) followed by *Sustainable transports* (35,6%) and the worst ranked by far are the *Ecoefficient resorts* (19,7%).

These results are coherent with the weight assigned to the criteria. The proposal of launching *Environmental friendly activities* has been positively evaluated because it allows diversifying the economic activities which produce income and involves many people in its implementation. It is also an alternative that does not imply much investment.

On the other hand, the proposal of launching *Ecoefficient Resorts* has been poorly evaluated probably for generating too much waste and consequences on the habitat destruction.

## 6. Conclusions

Through the use of a combination of ANP and Delphi for prioritizing actual Touristic development proposals for the los Roques NP some conclusions are reached concerning both the NP participatory procedure and the appropriateness of ANP-Delphi itself as a tool for prioritization.

For the NP participatory procedure, the criteria weighting provides some important insights into the overall philosophy and underlying participants' conception of what co-management means. The results of this paper show that this conception is broadly shared by stakeholders as they coincided in the weights of the criteria, which were assigned individually through the questionnaire. It is particularly important that tourists and environmentalists almost fully match in their assessments.

In this regard, the low weight assigned to the environmental criteria such as water quality or landscape beauty shows that the stakeholders were not environmentally biased. On the contrary economic criteria were considered essential for the promoting the development of the NP and its surrounding areas.

Concerning the prioritization of the development strategies, all the groups fully coincided in their assessment. This suggests that the regular contact among the different stakeholders: authorities with local owners, authorities with environmentalists, has led to a common understanding of problems of the NP.

Concerning the use of a combined ANP-Delphi approach as a tool for prioritization, first the 2 experts stated that the first meeting for defining and agreeing the criteria was fruitful because it allowed them to think about what they were really expecting from the prioritization procedure. All the stakeholders felt that the ANP procedure has allowed them to deal with prioritization in an organized and systematic way. However, they did not considerate really satisfactory or easy to understand until they went to through the Delphi rounds.

They all agreed that the procedure enhances participation and transparency and it is a necessary source of information and support for their decisions. They agreed that this way of proceeding facilitates the consensus building activities, which are the basis of co-management.

Concerning the utility and applicability of this tool and findings to similar cases, the procedure is easily adaptable. Moreover, the literature review and our experience confirm that prioritizing touristic strategies is a necessary task because of the scarcity of resources for NP development implementation.

For this experience to be reproduced elsewhere, NP managers must bear in mind three key rules: first, to arrange a panel of stakeholders' fully representative and motivated; second, to provide an appropriate mean of communication among them and; third, to take ANP-Delphi as a whole procedure and to devote the necessary time to it. In that way, the



ANP process becomes not only interesting in terms of reaching a final prioritization of strategies, but also in terms of enabling debates and reflections.

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