

# Governance Issues in Protected Areas: The Case of Peneda-Gerês National Park

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**Abstract:** The increasing attention that protected areas have received from various players ranging from tourists, firms, and government entities, has highlighted the need to promote appropriate governance mechanisms. These are essential to promote and develop those areas enabling an alignment between various stakeholders with diverse agendas. This research draws attention to this key issue, focusing on the classified Peneda-Gerês National Park (PGNP), considered one of the top 10 in Europe. In order to do so, we employ game theory. This methodology is appropriate for strategic decision-making and enables a deeper understanding of the impacts of different governance mechanisms and their outcomes. This paper will contribute, on a theoretical level, to advancing the use of this methodology to study governance decisions in classified areas. In order to do so, diverse settings are modeled to illustrate different governance solutions employed to manage Peneda-Gerês National Park, highlighting the strategic interplay between the key stakeholders and the outcomes attained. Our results demonstrate that the degree of alignment between the various municipalities will have a direct impact in terms of performance, as well, as show the mechanisms which contribute. Additionally, our findings contribute, in practical terms, to showing how important it is for the public entities involved in the management and care of Peneda-Gerês National Park to cooperate and align their interests to ensure success. Moreover, the study refers to Peneda-Gerês National Park but the results attained are applicable to different contexts in terms of National Park management and promotion.

**Keywords:** National Park, tourism, game theory, place governance, strategy

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## 1. Introduction

Peneda-Gerês National Park (PGNP) is situated in Portugal and part of the top 10 national parks in Europe, given its fauna and flora. National parks are ecosystems that play an important role in terms of the country's tourism but also in terms of employment and wealth creation. The municipalities in which they are located reap benefits with that but also have the responsibility of managing them, leading the efforts of conserving and promoting the national parks. In the case of PGNP, the park overlaps three districts and five municipalities: Melgaço, Terras de Bouro, Arcos de Valdevez, Ponte da Barca and Montalegre.

This article aims to study the impacts of different governance systems in protected areas, applied to the case of PGNP. This managerial process implies strategic decision-making characterized by the interdependence of the various municipalities which harbour the national park. To analyse this process, we will resort to game theory. Game theory studies decision-making by various rational players in which decisions made by one player have repercussions on the outcomes of the other players. Therefore, we will advance the use of this methodology in this domain in tourism where it is still at an embryonic stage (Lalicic & Weber-Sabil, 2020). The rigor, internal consistency and mathematical foundations of game theory enable a formal and systematic analysis of the prevalent strategic interactions. The model we propose is innovative in that it considers the three governance settings of PGNP. In the initial stage, where all the municipalities acted on their own accord; the middle stage which is characterized by the existence of an entity (ADERE) that aims to centralize and aggregate the interests of the various municipalities and the final stage of co-management, where goal alignment and coordination is the key. Our results show that cooperation allows for better outcomes and indicate the mechanisms that aid/hinder that effort.

Other than advancing the theoretical field, our results will contribute to highlighting the key to successful governance measures in managing the PGNP, yet these findings are extendable to national parks in general, and other tourist areas of interest which have various stakeholders making the decisions.

The paper will start by presenting the relevant literature review about tourism and governance issues in natural areas focusing on PGNP. It is then followed by the presentation of the game modelled and the results attained. The paper finalizes with the conclusion and avenues for future research.

## 2. Tourism and governance - case of PGNP

There are 500 classified national parks inside Europe (International Union for Conservation of Nature) and, in Portugal, we have only one national Park: the Peneda-Gerês National Park that is considered one of the 10 best parks in Europe (due to its species of fauna and flora). National parks require protection and preservation (Pulhin et al., 2021) considering their natural environment (fauna and flora) but also because of public recreation and because they represent important tourist attractions for the countries. The issues of protected areas governance bring about the need to find a balance between allowing visitation and enhancing preservation considering that tourism is a strategic sector and key contributor to countries' economy and requires a planning and management strategy so as to generate positive spin-off effects on the local and regional economies.

Planning the management of a national park requires collecting and integrating a lot of information about the physical, biological and social environment (Eadens et al., 2009; Stadolin & Yamchuk, 2017; Pulhin et al., 2021) and there is a call for different stakeholders' conflict management also (Haukeland, 2010, Stanila, 2017), which involves considering their diverse interests (Lalicic & Weber-Sabil, 2020). Some studies have already been developed (Stadolin & Yamchuk, 2017; Stanila, 2017; Pulhin et al., 2021) but there is still a gap in the literature regarding studies on the governance of protected areas.

Considering the specific case of Peneda-Gerês National Park and its governance issues, we can consider three main phases (see Table 1)

**Table 1:** Phases of Peneda-Gerês National Park governance model

<b>1<sup>st</sup> PHASE - From May 1971 to Jan 1993</b>	
<b>Place Governance Model</b>	Place governance based on a technical advisory committee chaired by the director of the park and a scientific committee with no specific cooperation
<b>Cooperation Areas</b>	Long-term scientific planning; Nature preservation/Conservation; Educational and tourist issues
<b>Penalties</b>	No penalty
<b>Main Stakeholders</b>	Technical advisory committee chaired by the director of the park responsible for Policy formulation and Management and Preservation/Conservation
<b>2<sup>nd</sup> PHASE - From Feb. 1993 to March 2021</b>	
<b>Place Governance Model</b>	Based on the Land Use Plan for the Peneda-Gerês National Park (POPNPG) with cooperation between the 5 municipalities mediated by ADERE (association for the development of the park's regions) that was created in Feb. 1993. The 5 municipalities' autonomy is still limited.
<b>Cooperation Areas</b>	Strategic planning; Promotion; Training; Valuing natural resources and nature preservation/ conservation and sustainable tourism
<b>Penalties</b>	Income investment from the 5 municipalities (ADERE financing costs); Reduction in tourists; Less local and regional development and negative impacts on the economy
<b>Main Stakeholders</b>	ICNB - Institute for the Conservation and Biodiversity responsible for policy formulation and Management as well as preservation/conservation
<b>3<sup>rd</sup> PHASE - After March 2021</b>	
<b>Place Governance Model</b>	Based on the co-management model with the active participation of the 5 municipalities that integrate the PGNP within a dynamic of proximity management, being a participative, collaborative and articulated management
<b>Cooperation Areas</b>	Cooperation at a financial, human resources, social and economic, ecological, territorial and cultural level; promotion, awareness and communication (visibility); increase in the number of visitors and strategic planning
<b>Penalties</b>	Fines; Sanctions (cuts or difficulties in accessing financing); Loss of visitors and notoriety; Less local and regional development and negative impacts on the economy
<b>Main Stakeholders</b>	5 municipalities that integrate the PGNP (Melgaço, Arcos de Valdevez, Ponte da Barca, Terras de Bouro and Montalegre); ICNF

During the first phase (from May 1971 to Jan 1993), the place governance of the PGNP was based on a technical advisory committee and chaired by the park director, with the presidents of the Municipal Councils of Melgaço as members and the main cooperation areas were connected with long-term scientific planning, valuing natural resources, nature preservation/conservation, educational, tourist and scientific issues

In the second phase (from February 1993 to March 2021), to help the governance of the Peneda-Gerês National Park– ADERE - association for the development of the park's regions, was established. ADERE, in its constitution, includes the following effective partners: the municipality of Arcos de Valdevez, the municipality of Melgaço, the municipality of Montalegre, the municipality of Ponte da Barca and the municipality of Terras de Bouro. In this stage, cooperation between the various municipalities already takes place, but their autonomy in terms of park management is still limited.

Finally, in the third phase (after March 2021) a new co-management model was implemented for the governance of PGNP that integrates the municipalities of Arcos de Valdevez, Ponte da Barca and Melgaço (in the district of Viana do Castelo), the municipality of Montalegre (district of Vila Real), and the municipality of Terras de Bouro (district of Braga). These stakeholders will begin to participate in a more active way in the governance of the PGNP, together with the ICNF (Institute for Conservation of Nature and Forests). This institute will maintain all its responsibilities in terms of licensing, with the municipalities being responsible for acting more in the field of valuing territories. This new place governance model creates a dynamic of proximity management, putting into practice a participative, collaborative and articulated management. The main areas of cooperation are connected to social, economic, ecological, territorial and cultural development, promotion, awareness and communication (visibility) and the increase in the number of visitors.

### **3. Methodology – game modelled**

Game theory is the study of strategic decision-making. A game is a formal description of a strategic situation. A game is defined by its players, their information set, the possible actions available to them, and their preferences and payoffs. The players are the agents (i.e. individuals, groups, firms) who make the decisions. A game is considered of complete information if its players are aware of all the information relevant to the game: the players; the decisions timings; their possible actions and payoffs. In games considered of incomplete information part of that information is unavailable to the players. Their payoff (or utility), is a numerical value that shows the desirability of a specific outcome for that player. The payoff of each player is influenced both by his actions and also by the other players' actions. The strategic interdependence of the players is the cornerstone of any game. Games can be modelled in various ways. There are cooperative games which study the results attained by each player when making decisions as a group, also studying the conditions which motivate players to diverge from the agreed behavior. Non-cooperative games focus on individual decision-making. In these games, players are called to make their decisions not knowing the other players' decisions (these are called simultaneous games), whereas in non-cooperative sequential games, players make their decisions in a given order. Each of these games has a different technique which enables the game to be solved.

Game theory has been applied to the most diverse areas in various fields ranging from economics, business, politics, war negotiation to biology. Tourism is no exception. Game Theory has been applied to tourism, where the different stakeholders interact and benefit from the destination promotion and development.

Zhao, Zhang & Liu (2019), applied game theory to analyse regional tourism cooperation, showing that game theory can be a powerful tool to show which strategies should be applied by tourism stakeholders in competitive tourism environments. Their results showed the importance of cooperation as well as noting the conditions necessary to sustain it. Sheng (2011) used game theory to study the interactions between competitive and complementary destinations in a given region, and concluded that decision makers should opt to put in place moderate rather than very aggressive strategies. Chen et al., 2021, studied the tourism industry's green supply chain management. Their results showed that most of the hotels do not have an incentive mechanism for green growth but also, that hotels which adopted green behaviours tend to perform better. They put forward some suggestions for governmental measures.

Therefore, some studies that use game theory in the tourism research area, focus on regional tourism cooperation regional competition and sustainable development green supply chain and strategic interdependence between destinations. Nonetheless, the use of this methodology to study governance issues related to the management of national parks, is, to the best of our knowledge, non-existent.

To study the governance systems applied to PGNP, we model a non-cooperative, simultaneous game. In such games, the Nash equilibrium is used as a solution technique. The Nash equilibrium refers to the set of strategies

of best response for each player, where there is no incentive for any of the players to change from that strategy, in other words, the Nash equilibrium is self-enforcing. In our modelled game there are two rational players: Municipality A and Municipality B<sup>1</sup> which decide whether to cooperate or not in the management of PGNP. We start with the initial phase where both players are motivated by their own performance, then the second stage where there is an external agent (ADERE) which acts as a mediating agent and finally phase 3 where there is a co-management system.

#### 4. Discussion

##### 4.1 Phase 1 – initial phase: May 1971 - 1993

In this initial stage, both municipalities aim to maximize their outcomes, focusing solely on their individual interests. The table below shows the outcomes of this game. The payoffs of each player have been transformed into a ranking to facilitate the reading. Each pair of values indicates the ranking for each of the Municipalities for each of the situations, from 1 to 4 (least to best preferred).

**Table 2:** Initial phase outcomes

		Municipality B	
		Not Cooperate	Cooperate
Municipality A	Not Cooperate	2,2	4,1
	Cooperate	1,4	3,3

In this case, the Nash equilibrium will be for both to Not Cooperate.

##### 4.2 Phase 2 – ADERE: 1993- March 201

This stage is characterized by an external agent, ADERE, which mediates the players to push them to develop synergies and therefore increase the benefits for all involved. In this case, although there is no way for ADERE to ‘force’ each municipality to work together, when one doesn’t follow through on what was agreed it suffers, which can be described as reputation costs. On the other hand, following through on the cooperation efforts means that the municipalities which follow through will need to make joint efforts, investments and those which don’t will still reap the benefits which result from those efforts. In this case, the outcomes of the game are shown in the table below:

**Table 3:** Stage with ADERE

		Municipality B	
		Not Cooperate	Cooperate
Municipality A	Not Cooperate	2,2	3,1
	Cooperate	1,3	4,4

In the case where all cooperate and develop the efforts in line with ADERE recommendations, the result will be the most favorable (4,4). However, when one decided not to cooperate, (results in 3,1) it will still reap the benefits of the efforts and investments undertaken by the remaining municipalities, yet having not incurred in those direct costs, but it will suffer, “reputational costs”. Finally, when all players decide not to cooperate, then they will have the costs incurred, but also will not reap any of the benefits, as ADERE’s agenda will not have been followed, resulting in outcome (2,2). In this case, there are two possible Nash equilibriums either both don’t cooperate or both decide to cooperate (4,4). In this scenario, any of the two results are possible (in the presence of more than one equilibrium we cannot determine which one will prevail).

##### 4.3 Phase 3 – co-management: From March 2021

The final stage is the co-management stage. In this stage, the municipalities work as a group. This is different from the second stage where the municipality worked as an individual unit mediated by an external agent (ADERE). In this stage, the municipalities, as a clan, aim to maximize the joint outcomes. Therefore, in this case, when one of the municipalities decides not to cooperate, they will incur not only the reputational costs but also

<sup>1</sup> The game is modelled, as is usual, for two players as the underlining logic and outcomes are more simplified, and therefore easier to grasp, but it can be extended to more players.

heavy penalties for that behavior. This explains the worst outcome (1,1) when the players decide to take that course of action. At the other extreme, the players will have the best outcome (4,4) when they cooperate. When a player decides not to cooperate, the other will also not be able to exploit the benefits of the co-management system and therefore will witness a lower outcome (3) than in the case of cooperation (4).

**Table 4:** Stage with co-management

		Municipality B	
		Not Cooperate	Cooperate
Municipality A	Not Cooperate	1,1	2,3
	Cooperate	3,2	4,4

The Nash equilibrium, in this case, is Cooperate, Cooperate.

Our results clearly show that the higher the alignment, congruence and cooperation between the Municipalities, and the more significant the sanctions imposed for deviating that are applied, the higher the sustainability of the outcome will be.

### 5. Conclusion

Our study, through the use of game theory methodology, studied the key stakeholders involved in the corporate governance of PGNP. The study addressed all three phases of that system. It initiated from the situation where all municipalities worked on their own accord, to the next phase, where there was an external entity mediating the municipalities to direct them towards a certain course of action, and finally the stage of co-management. In the initial phase, the results show that the Nash equilibrium would be for the players involved not to cooperate, in the second stage there were two possible Nash equilibria and finally, in the co-management stage the Nash equilibrium was of cooperation for all involved. Our results clearly show the strategic decision-making is dependent on congruence and cooperation, as well as, the factors which aid/hinder that cooperation (ex. sanctions, etc.). This research adds value, also, in terms of relationship management and governance approaches between various stakeholders and our results show how management authorities can leverage those to maximize the performance. This paper advances the use of game theory in the Tourism arena, but more importantly, aids stakeholders and policymakers on key factors which play a role in the success of governance mechanisms, and which, therefore, should be considered when making such decisions. In terms of avenues for future research, we suggest exporting this methodology to include the management of other vital natural resorts and also extending it to other stakeholders who could be included in the analysis.

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