

The scientific strategy of the Port-Cros National Park for the 2013 2022 period

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Introduction

Le fonctionnement de la Méditerranée

Port-Cros National Park (PCNP) was created in 1963. It is located in Provence (France, northwestern Mediterranean). At the time of its inception, PCNP corresponded only to the island of Port-Cros and its neighboring islands and islets (Bagaud, La Gabinière and Le Rascas), an area spanning 700 ha for the terrestrial part and 1 300 ha for the marine part. Over time, PCNP has been entrusted with the management of land outside the original territory: Porquerolles Island, land belonging to the *Conservatoire de l'Espace Littoral et des Rivages Lacustres* (Conservatoire of coastal areas and lake shores), Natura 2000¹ zones and finally the coordination of the French party to the PELAGOS Sanctuary for marine mammals, an international agreement signed in 1999 between Italy,

¹ Natura 2000 is the centrepiece of EU nature and biodiversity policy. It is an EU wide network of nature protection areas established under the 1992 Habitats Directive. The aim of the network is to assure the long-term survival of Europe's most valuable and threatened species and habitats.

Monaco and France for the conservation of these animals (Barcelo and Boudouresque, 2011, 2012).

Since 2012, PCNP has embarked on a project to amend its territory including Port-Cros, Porquerolles and Le Levant islands, ten or so coastal municipalities ('accessible membership area') and a vast 'adjacent marine area' (Fig. 1).

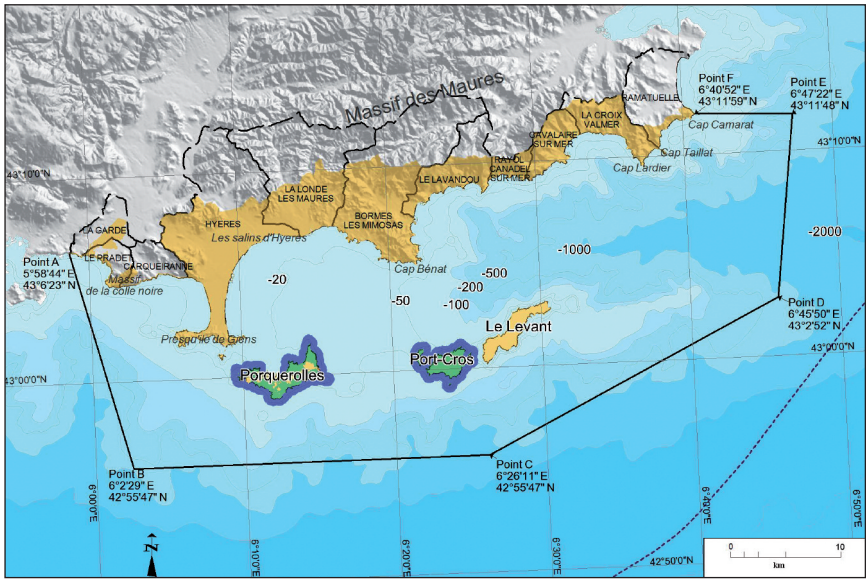


Figure 1. The proposed area of the new Port-Cros National Park, approved by the Decree of 25 April 2012. Green: terrestrial core areas. Blue: marine core areas. Yellow: accessible membership area. The black delimiting line joining points A, B, C, D, E and F shows the adjacent marine area. Numbers from -20 to -2000 show depth contours/(in metres below sea level).

The Port-Cros National Park scientific strategy (Parc national de Port-Cros, 2013) is a framework document which defines, in a long term vision, requirements in the scientific field and retains the priority focus areas for the 2013-2022 period. It looks at the entire knowledge production process, from its genesis to its dissemination. This document was developed, between 2011 and 2013, by the Scientific Department, the Institution's Management and the Scientific Council (CS) of PCNP. It was formally approved by the CS in December 2012 and by the Board of Directors in March 2013.

The document is structured around the following four questions: **(i)** Why a scientific strategy? **(ii)** Where do we start? **(iii)** Where do we want to go in 10 years time? And **(iv)** How to get there? The following article constitutes an abstract of this document. It outlines the strategy and avoids technicalities, whenever possible.

Why a scientific strategy?

Never before had the Port-Cros National Park made a plan on this scale and in this form in the scientific field. The scientific strategy aims primarily at making means match with scientific objectives in order to optimize and better allocate budgets, re-assign missions more accurately, target knowledge to be acquired as a priority and develop internal skills.

This scientific strategy also aims at foreseeing and anticipating some questions or future issues related to the evolution of territories (including the proposed area of the new Port-Cros National Park) and societies, and consequently at planning which management measures will be appropriate.

The strategy should bring forth how to best use previous works, as well as past or future efforts and highlight their efficiency. Additionally, it aims at having the National Park area recognised as a home to high-level research.

Where do we start?

An in-house knowledge inventory has made it possible to determine the quantity of work already done and the strengths of the Institution. The inventory has also revealed some gaps and brought forward how to better target further efforts. Since 1963, when the National Park was created, scientific activity has grown and structured itself, thus reflecting a positive interaction with the Park management.

The scientific strategy registers inventories conducted within the National Park and grants them a level of comprehensiveness. Nevertheless, the fact is that many taxonomic groups are absolutely not inventoried. Two of the three domains of the tree of Life have never been investigated. As for the third one, surveys remain very partial and focused on macro-organisms. A list of 103 monitoring programs currently under way on the territory has been drawn up. They relate to habitats, species or socio-economy. This list specifies priority level, frequency, history and, in some cases, the prescribed timeframe for carrying out the programs. The strategy quotes all studies and research works historically conducted on the territory. It also looks at the Institution: how its territory and its missions have developed in 2012; how it is structured and staffed; what its material and financial resources are; and, its existing partnerships.

Finally, the paper reviews the strengths and the weaknesses and underlines where progress has already begun.

Where do we want to go in 10 years time?

This chapter takes a look at the ambition and the expected key results. Clearly, a geographical ambition emerges. On one hand, the strategy will be targeted at the local level in view of the National Park's new perimeter and all the ensuing needs. On the other hand, it is highly relevant at the Mediterranean level and thus remains consistent with the history of the Institution.

Expected key results are described in 9 priority areas (subject to completion in the upcoming months when the National Park's Charter will be finalized):

(1) Heritage inventory. The objective is to have inventories of biological, cultural and architectural assets within the core areas and to make significant progress in the Areas of Special Interest.

(2) 'Quality policy' for data, scientific capitalization and optimization. Management measures will be based on validated scientific knowledge: scientific data will result from a standard procedure; these will be available in-house, shared and promoted outside.

(3) Strict nature reserve, reference sites. The National Park will have reference sites to observe biodiversity and human activity trends, including reference sites undisturbed by human activities. Bagaud Island has the vocation to become an international scientific reference site for monitoring indirect impacts of human activity.

(4) Management and conservation. Throughout its territory, the core areas, the accessible membership area and the adjacent marine area, the Institution will support and promote research aiming at better understanding the main principles of management and conservation ecology; the non-intervention principle (no action is taken unless it is justified in advance) will remain essential in the daily management of the National Park's core areas. It should be explained and justified so as to foster support from the partners.

(5) Environmental services. The National Park will be able to provide qualitative and quantitative input to environmental services; that is to say, the benefits raised by natural and agricultural areas situated in the core areas or in a few special sites chosen together with voluntary municipalities in the accessible membership area.

(6) Ecological connectivity. Concepts such as wildlife corridors, ecological solidarity or the Green and Blue Network² will be studied to be better identified and taken into account in the new territory.

(7) Introduced species. The National Park will maintain its leading position as an experimental area on the issue of introduced species.

(8) Innovation, experimentation, anticipation. The National Park displays its willingness to support initiatives relating to the evolution of biological capital, territories and societies, notably through the development of modelling tools.

(9) Carrying capacity. The goal is to identify the territory as a pilot area for the study of the carrying capacity in the coastal zone.

How to get there?

Measures to be implemented by 2022 in order to achieve the expected results are detailed in the strategy.

As far as the acquisition of knowledge is concerned, the Institution should feature as part of existing networks, mainly Mediterranean, and integrate major research programs alongside universities and national research centres. Terrestrial flora and fauna, marine environment, social science inventories being a priority are specified while taking into account main territories. Monitoring guidelines have led to prioritization, focusing on a list of outstanding (natural heritage, indicators of climate change, invasive or undesirable, of economic interest, etc.) species (and habitats).

Priority is given to long series, including physico-chemical data for which the National Park has invested little so far. Hence the relevance of data collected by the Port-Cros thermographs and the Grand Langoustier weather station. Other current biological monitoring is pursued on the ground: shearwaters, Tyrrhenian painted frog (*Discoglossus sardus*) and European leaf-toed gecko (*Euleptes europaea*); and in the sea: dusky groupers and the lower limit of the *Posidonia oceanica* meadow. In the same vein, special attention will be paid to the foreshore habitat monitoring and thought will be given to a new network of plots dedicated to the study of climate change and the identification of ancient forests cores. Focus will also be given to acoustic monitoring and monitoring of artisanal fisheries.

²The 'Green and blue network' is a flagship measure of the French Environment Ministry. It was launched in 2007 and aims at halting biodiversity decline by maintaining and restoring ecological continuity. The Green and blue network is a spatial planning tool aiming at (re)constituting a coherent ecological network nationwide, so that animal and plant species can circulate and reproduce (maintaining their genetic diversity), find food and rest.

As regards observatories, priority is given to perpetuate and expand the 'Observatory of biodiversity and coastal marine uses', whereas some changes are planned for Bountiles (a database for measurement and monitoring of visitor attendance and use in Port-Cros and Porquerolles islands and surrounding sea strip). It is also put forward that a dedicated computer tool is to be set up for protocol-governed monitoring.

The National Park is already recognised as a laboratory, home and reference site for studies and research. Alongside scientists, the Institution has to facilitate research deployment particularly in such fields as ecosystems, habitats and species conservation, and genetic diversity. Priorities also emerge for a better knowledge of life cycles for marine species relevant to fisheries science; for the study of global change and its impact; and for the study of recreational use focusing on the definition of carrying capacity.

The island of Bagaud, because it is a strict nature reserve, protected from direct human impact, is the pilot site for studying global change. Research horizons are outlined for this area, as well as appropriate steps and equipment to set up.

Since room for research teams is limited on the islands, especially during the high season, thought will be given to set up a multidisciplinary venue on the mainland coastline now part of the National Park's new expanded territory.

The strategy then defines operational guidelines necessary to meet targets. A clear picture of equipment will be drawn in order to make up for shortcomings. As a rule, mobile tools will be available for rangers needing to keyboard data on small dedicated scientific equipment adapted to the sea. The data acquisition method is made clear and the foundation for a quality approach detailed. Before any data is entered in the field, the structuring of database (governed by protocols whose contents have been perfectly organized) is a prerequisite.

The organization of the PCNP Institution, and in particular that of the Scientific Department, is explained as well as the need for training and prior approval before any scientific activity is conducted.

Some of the missions entrusted to the Scientific Committee and its members are set internally but also externally.

Guidelines are adopted for knowledge restitution, currently a weak point of scientific activity. The importance of the scientific Journal 'Scientific Reports of Port-Cros National Park' is strongly asserted as well as the need to rely on bridging organizations established on the territory.

The last paragraphs deal with the implementation of the strategy over the next 10 years, its management, coordination and assessment.

Discussion and conclusions

In protected areas, especially in National Parks, scientific research is a necessary and vital tool for the manager. Research is also a duty of general interest, a kind of 'public service mission' whose objectives reach well beyond the boundaries of the protected area. This multiplicity of objectives (research in the Park, by the Park and for the Park) has often been emphasized, by both scientists and managers (e.g. Pillet, 1981; Letourneux, 1986; Barcelo and Boudouresque, 2011, 2012).

During the 50 years of the PCNP's existence, there is no doubt that scientific research has been effective, has responded to these objectives and has evolved according to the evolution of science in general, and to the objectives of French National Parks in particular (Bougeant, 1989; Gérardin, 2012; Boudouresque *et al.*, 2013; Farsac *et al.*, 2013). This evolution has taken place on an empirical basis, without a long-term project, in the context of an atypical (a core area without a peripheral zone) and small (the smallest National Park in France) National Park.

Since 2012, under the Law No. 2006-436 of 14 April 2006 relating to National Parks, marine parks and regional parks, PCNP is engaged in a kind of re-founding. Its total area is likely to increase more than 100 times. It will not only consist of a core area, but also an 'accessible membership area' and an 'adjacent marine area'. In this context, a forward-looking approach has become a necessity: need for a long term strategy, need to make choices and then need to prioritize these choices. Indeed, given the financial and human resources that can be reasonably expected, it is not possible to achieve everything that we wish.

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