

Incentives for good governance: getting the balance right for Port-Cros National Park (Mediterranean Sea, France)

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Abstract. This paper provides preliminary findings from an examination of the nature of the management effectiveness and governance structure underpinning the Port-Cros National Park (PCNP), created in 1963, then restricted to the Port-Cros Archipelago, and the newly created Port-Cros National Park (N-PCNP), (whose implementation process extended from 2012-2016) the surface area of which will be multiplied 64-fold to 75-fold. The analysis that follows was restricted to the marine parts of PCNP and N-PCNP. The MPAG governance analysis framework was applied through semi-structured interviews with park managers, staff and relevant experts. Through this systematic analysis the role and interaction between incentives are better understood. The PCNP, created primarily from the top-down with elements of a bottom-up approach, resulted, in the course of its more than 50-year history, in a successful positive balance between natural heritage preservation and sustainable development, such as the artisanal fishery. Public acceptance has been addressed through increased use of participative incentives, brought about by a reform of French National Parks in 2006 and the creation of the N-PNPC in 2012-2016. Although the current governance approach and management is effective, and not all cross cutting issues and challenges are sufficiently addressed, the French 2006 approach of national parks and the 2012-2016 bottom-up process of negotiating the N-PCNP charter is unique and is considered by those involved as a model for Mediterranean Marine Protected Areas (MPAs). It is recommended that increased participative and interpretative incentives be utilised to generate greater community stewardship.

Keywords: Marine Protected Area (MPA), Incentives, Governance, Mediterranean Sea, National Park, Management effectiveness.

Résumé. Bonne gouvernance : le bon équilibre pour le Parc national de Port-Cros (Méditerranée, France). Le présent travail constitue une analyse préliminaire de l'efficacité de la gestion et de la gouvernance au sein du Parc national de Port-Cros (PNPC), créé en 1963 et alors circonscrit à l'archipel de Port-Cros, et du nouveau Parc national de Port-Cros (ici désigné sous le nom de N-PNPC), dont le processus de création s'étend de 2012 à 2016 et dont la surface sera multipliée par 64 à 75 par rapport au PNPC initial. L'analyse qui suit ne concerne que la partie marine du PNPC et du N-PNPC (Aire Marine Protégée, AMP). L'analyse de gouvernance MPAG (*Marine Protected Area Governance*) a été mise en œuvre au moyen d'interviews semi-structurées avec des gestionnaires et des experts de l'AMP. Cette analyse permet de mieux comprendre le rôle des motivations, des incitations et

de leurs interactions. Le PNPC, créé selon un processus *top-down* (de haut en bas, i.e. par l'Etat), mais avec également une composante *bottom-up* (de bas en haut, i.e. à l'initiative de la population locale), a débouché, au cours de ses 50 ans d'histoire, sur un équilibre positif entre protection du patrimoine naturel et développement durable (en particulier, celui de la pêche artisanale). La Loi française de 2006 sur la réforme des parcs nationaux, qui débouche sur la création du N-PNPC entre 2012 et 2016, a accru l'implication du public dans la gouvernance. Bien que la gouvernance actuelle et la gestion soient efficaces, tous les problèmes et enjeux ne sont pas suffisamment abordés. L'approche des parcs nationaux résultant, en France, de la Loi de 2006, et le processus *bottom-up* de négociation d'une charte, telle que celle du N-PNPC, sont considérés par leurs acteurs comme un modèle pour les AMPs de Méditerranée. Il est recommandé de continuer à développer ces pratiques participatives, afin d'accroître l'implication du public.

Mots-clés : Aires Marines Protégées (AMP), efficacité de la gestion, gouvernance, incitations, Méditerranée, Parc national.

Introduction

With the growing recognition for the need to move beyond ideological arguments as to which management approach is best, and rather develop governance approaches that combine the steering roles of the state, the market and the people, attention must be given to identifying good practice and its transferability to other Marine Protected Areas (MPAs) (De Santo, 2013; Jones, 2014; Qiu, 2013). The Marine Protected Area Governance (MPAG) analysis framework (Jones, 2014) permits a systematic analysis and comparison of governance effectiveness between case studies (Jones *et al.*, 2011a; Jones, 2014). With many MPAs in the Mediterranean which were established without consideration of the human dimension, or which are just 'paper parks' (i.e. MPAs devoid of implementation, enforcement and management), e.g. Natura 2000 areas (in the framework of the EU 1992 Habitat Directive) (Sala *et al.*, 2012; Meinesz and Blanfuné, 2015; but see Barcelo *et al.*, 2010), this analysis provides an opportunity to highlight present and future challenges faced, for example the task of expanding or implementing MPAs in areas with high levels of human use/impact. The aim of this paper is to examine and compare the nature of the management and governance structures underpinning Port-Cros National Park (PCNP), a national park created in 1963 which was then restricted to the small Port-Cros Archipelago (Provence, France, Mediterranean Sea), and the much broader new Port-Cros National Park (hereafter N-PCNP), created in June 2012, but whose implementation process spreads between 2012 and 2016 (see below). Through the systematic analysis of PCNP and N-PCNP, we identify good practice, lessons learned and provide recommendations for possible interventions to improve governance effectiveness.

Materials and Methods

The work conducted forms part of a larger European Union (EU) funded project – MMMPA (www.mmmmpa.eu; Monitoring Mediterranean Marine Protected Areas). The project includes seven well-established MPAs in the Mediterranean that provide a suitable context for an intensive examination of their management and governance systems. In this paper we present the preliminary findings for PCNP and N-PCNP. It is worth noting that these findings only concern the marine area of the National Park, not its terrestrial area.

The research presented in this paper was conducted between October 2012 and June 2014, i.e. in the very beginning of the creation of N-PCNP. Initially a literature review of secondary data (published data and grey literature) was conducted to support findings and provide greater context and understanding of the MPAs history and situation. The MPAG governance framework was applied through 5 semi-structured interviews with park staff and experts all of whom had a deep understanding of the governance issues within PCNP and N-PCNP. In addition, the principal author attended three committee meetings held between the 6th-19th October 2013 in which the development of the park Charter was discussed, allowing for more understanding of stakeholders participation, attitudes and position in the park. Still, it must be noted that this analysis is based primarily on the expert views of the respondents to this study, rather than on wider socio-economic studies and their views may not represent the views of other experts or of people who are affected by the park (Jones *et al.*, 2011b). Post fieldwork, a feedback report was created and sent to all participants. Respondents were asked to make suggestions/ amendments, for example providing fact checks for dates, figures and legislation, further validating the analysis and reliability of the findings.

Results

Context and Governance Approach

PCNP is a state designated and managed protected area. Created in 1963, it represents the second European terrestrial and marine national park, after the Mljet National Park (Croatia). The PCNP was then restricted to the Port-Cros Archipelago: the islands of Port-Cros and Bagaud and the islets of Le Rascas and La Gabinière; the terrestrial and marine surface areas were ~700 ha and ~1 300 ha, respectively (Boudouresque, 1976; Olivier, 1987; Barcelo and Boudouresque, 2012). Although the PCNP was state-designated, in the framework of a more top-down than bottom-up process, as were most national parks at that time, the bottom-up component of the

PCNP creation process was reported as being higher than the average (Sorlin, 1963; Bougeant, 1990).

The 2006 reform of French national parks has defined a new and innovative approach towards governance and targets of national parks (Martin, 2013; Thurel, 2015). This governance approach is based upon a National Park Charter, which is a joint project for the territory of the park; it is aimed at strengthening the appropriation of the National Park by stakeholders, users, local leaders and representatives, bringing consistency to the policy implemented within the core (central region) of the park and the surrounding area. The charter is also a project of sustainable development for the territory. The free adhesion of each *commune* (the smallest administrative district in France) to the charter enables the National Park to define its boundaries through aggregation of the territories situated around the core area, hence forming the 'area of adhesion'.

Since May 4th 2012, the core of the N-PCNP includes not only the Port-Cros Archipelago, but also the Porquerolles Archipelago (1 000 ha and 1 600 ha of terrestrial and marine surface area, respectively). A vast 'adjacent marine area' (AMA), extending seawards to the edge of the continental shelf (123 000 ha), also belongs to the N-PCNP. During the last 4 years (2012 through 2015), the Charter of the National Park was drafted, discussed, modified and improved, in the context of dozens of meetings, organized in a dozen places; meetings which residents, users, stakeholders and elected representatives could attend freely. The drafting process of the Charter has therefore been largely bottom-up. The Charter was then approved by the French *Ministère de l'Environnement, de l'Energie et de la Mer* (decree of December 30, 2015). Finally, in June 2016, 11 coastal communes ('area of adherence'; 23 000 ha), from La Garde to Ramatuelle, will decide to ratify (or not) the Charter of the Park, and therefore to join (or not) N-PCNP (Fig. 1). Overall, the surface area of the N-PCNP, compared to the PCNP, will be multiplied 64-fold to 75-fold, depending upon the adherence (or not) of the coastal *communes*. The management of the N-PCNP is supported by a Board of Managers, which includes representatives of the central government, the regional government, mayors of the *communes* of the adherence area, other elected representatives and members chosen for their national or local relevance (landowners, residents, users, and representatives of environmental NGOs or sector trade organizations) (Martin, 2013). The Scientific Council, created in 1964, ensures that decisions are evidence based and further advises the staff, the Director and the Board of managers (Olivier, 1987; Boudouresque *et al.*, 2013).

Drivers and possible conflicts

The main drivers and possible conflicts in PCNP and N-PCNP are created by the need to balance the tourism industry to ensure that it is economically beneficial whilst minimising environmental impact.

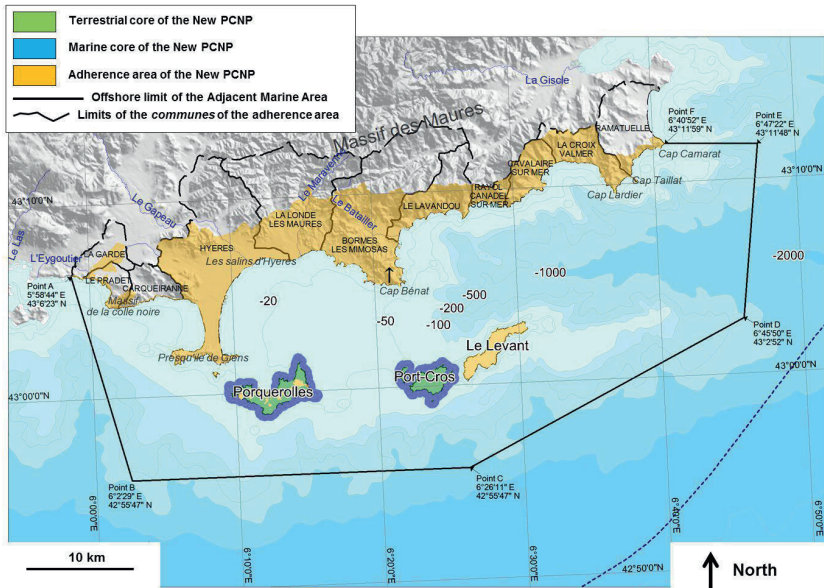


Figure 1. Location and zoning of the new Port-Cros National Park (N-PCNP). In black block capitals: name of the *commune*. In black lower-case letters: other names. In blue: rivers. -20 through -2000: depth contours (m). Drawing: courtesy of Charles-François Boudouresque and Port-Cros National Park.

As far as the Port-Cros Archipelago is concerned (PCNP), trawling, which is harmful for benthic habitats, such as the *Posidonia oceanica* seagrass meadows and coastal detrital, and therefore harmful for both the habitat and the resource, was banned by the creation of the PCNP, in 1963 (Boudouresque, 1976; Bougeant, 1990; Cadiou *et al.*, 2009). A fishing charter introduced in 1999 aids management of the artisanal fishery. The fishing charter represents an agreement between the fishers and the PCNP managers. It includes additional restrictions compared with outside fishing grounds, e.g. a shorter soak time, a larger mesh size, a lower number of pieces of net per boat, etc., resulting in a lower fishing pressure. At the same time, recreational fishing (spear fishing and angling) has been almost completely banned. Three main factors have motivated the regulation of the recreational fishing: (i) scientists have become aware of the very large catches taken by recreational fishing, sometimes similar or higher than artisanal

fishing catches (Moreteau, 1981; Chavoïn and Boudouresque, 2004; Boudouresque *et al.*, 2004, 2005; Morales-Nin *et al.*, 2005; Cadiou *et al.*, 2009); (ii) recreational fishing was felt to be incompatible with the image of a national park (Cadiou *et al.*, 2009); (iii) regulation of recreational fishing is seen as a management and governance tool to help make an increase in restrictions on artisanal fishing acceptable (Boudouresque *et al.*, 2005; Cadiou *et al.*, 2009). To be authorised to fish inside the area, each fisher has to sign the charter each year and to abide by its rules. In addition, fishers have to communicate details of their catches to the park managers *via* a fishing logbook (Cadiou *et al.*, 2009; Robert, 2013). The charter is updated annually, based on scientific monitoring and in consultation with the fishers (Boudouresque *et al.*, 2004; Cadiou *et al.*, 2009; Astruch *et al.*, 2012). At the moment, a comparable fishing charter does not extend to Porquerolles, where both artisanal and recreational fishing continue to present a serious management challenge. However, a No-Take-Zone (NTZ), aiming to enhance the reserve effect, increasing fish populations and stocks in adjacent areas and therefore of potential benefit to all users (Boudouresque *et al.*, 2005), was designed on the southern coast of Porquerolles. The Porquerolles stakeholders and users, in particular artisanal fishers and diving clubs, together with the PNPC and N-PCNP authority, reportedly worked since 2005 on the creation of this NTZ (Barcelo *et al.*, 2010; Rincé, 2013; Rincé *et al.*, 2015).

A diving charter has been negotiated in the PCNP, according to a governance process similar to that of the fishing charter (Robert, 2013). This charter is of critical importance as the Port-Cros Archipelago, due to the success of its protection, its impressive seascapes and the fish richness and diversity, represents a famous diving spot. The charter is intended to minimize the impact of divers on the benthos (Harmelin and Marinopoulos, 1994; Francour, 1998; Mauris *et al.*, 1999; Coma *et al.*, 2004; Dalias *et al.*, 2012). It establishes rules of good practice, such as the ban of fish feeding by divers. Diving activity in Porquerolles presents a further challenge for the N-PCNP, as the island could receive in the coming years, an increasing number of divers, thanks to its better protection and the potential improvement of the ecological status of its habitats.

The management of the anchoring of pleasure boats and large cruise vessels also constitutes a challenge for the PCNP and the N-PCNP. Anchoring threatens benthic habitats, such as the *Posidonia oceanica* seagrass meadow and the coralligenous bioconstructions (Robert, 1983; Ganteaume *et al.*, 2005a, 2005b; Boudouresque *et al.*, 2012; Rouanet *et al.*, 2013). Around the northern coast of Port-Cros Archipelago (PCNP) anchoring has been banned. Mooring based

upon ‘ecological mooring’, i.e. harmless mooring systems that do not impact the benthic habitats (Boudouresque *et al.*, 2012), have been established in the Bay of Port-Cros. In the same way, in the framework of the Natura 2000 zone of ‘Rade d’Hyères’ and in close consultation with users, ecological mooring and mooring banned areas have been established at Porquerolles Island (Barcelo *et al.*, 2010). However, these moorings are expensive to install and maintain creating an additional financial challenge and burden for the park.

Invasive species are an increasing threat, particularly the presence of *Caulerpa cylindracea*, *Caulerpa taxifolia* and *Womersleyella setacea* that threaten the community structure and function of vulnerable coralligenous, reef and *Posidonia oceanica* habitats (Boudouresque and Verlaque, 2002; Boudouresque *et al.*, 2009; Ruitton *et al.*, 2009; Astruch *et al.*, 2012;). *Caulerpa taxifolia* was first discovered in the Bay of Port-Man (PCNP) in 1994 and is managed actively by park staff mainly through manual uprooting (Cottalorda *et al.*, 2010, 2011; Barcelo *et al.*, 2013; Jaubert *et al.*, 2015a). It is also present around Porquerolles Island and in a number of continental localities; attempts are made to localize and, once discovered, to control the colonies (Cottalorda *et al.*, 2010; Jaubert *et al.*, 2015b; Pironneau and Ringwald, 2015).

Effectiveness

Effectiveness is estimated for how well the MPA is doing in terms of biodiversity conservation objectives. In general, the biological evidence indicates that the Port Cros Archipelago (PCNP) has benefited well from protection (GEM, 2005; Harmelin *et al.*, 2007; Harmelin, 2013; Harmelin and Ruitton, 2007; Harmelin *et al.*, 2010; Ruitton and Harmelin, 2010, 2012; Astruch *et al.*, 2012). The ecological status, both at the species and ecosystem levels, were reported to be among the best at the Mediterranean scale (Personnic *et al.*, 2014; Boudouresque *et al.*, 2015; Thibaut *et al.*, 2016).

Effectiveness is also estimated for how well the MPA is doing in terms of sustainable development, e.g. a sustainable artisanal fishery. The data indicate that, around the Port-Cros Archipelago (PCNP), the CPUEs (Captures Per Unit Effort) of artisanal fishers are not lower than outside the PCNP, despite the fishing charter restrictions, or because of these restrictions, the latter contributing to an increase of the available resource, hence the CPUEs (Boudouresque *et al.*, 2004, 2005; Cadiou *et al.*, 2009). Overall, the almost complete prohibition of recreational fishing (spear fishing and angling) around the Port-Cros Archipelago (PCNP) has widely compensated for the impact of restrictions to the artisanal fishing, in the framework of the fishing

charter; as a result, the artisanal fishing does not jeopardize the natural heritage (Boudouresque *et al.*, 2004; Cadiou *et al.*, 2009).

As the park was recently extended (N-PCNP), in May 2012, it is too soon to judge the effectiveness for biodiversity recovery of this area. However, managers had doubts regarding the future effectiveness of the whole park. It was reported that there is often disparity between the official regulations and on the ground enforcement, although the enforcement of PCNP regulations (and probably of future N-PCNP regulations) was reported to be far better than in most Mediterranean MPAs (Sala *et al.*, 2012). For Porquerolles Island, the lack of a fishing charter created (at the time of the study, October 2012 through June 2014) poses a challenge for managers to manage the fishing sector (artisanal and recreational). Management of the tourism industry is currently considered to be ineffective. The high number of tourists and lack of control regarding numbers were reported to putatively exceed the carrying capacity for the Port-Cros and Porquerolles Islands (Bergère and Le Berre, 2009, 2011; Le Berre *et al.*, 2013), creating further challenges for the N-PCNP and limiting its ability to meet its long-term conservation objectives. Finding a balance between the conservation objectives and economic demands for the park's population in Porquerolles, following the 2006 reform of the French national parks and the 2012 creation of the N-PCNP was considered to raise concerns regarding the ability to achieve the same level of biodiversity conservation and/or recovery seen on Port Cros Archipelago. However, the greater involvement of the community since the reform has substantially increased public acceptance of the N-PCNP, which has been an issue previously, following the relatively top down implementation of the park in the Port Cros Archipelago (PCNP) (but see, for a bottom-up interpretation of the PCNP creation, Sorlin, 1963; Bougeant, 1990). The increased public acceptance is expected to have positive outcomes for the park, through increased stewardship and compliance. Increased participation is therefore seen as a beneficial step for the park governance.

Incentives

Incentives are the means to encourage actors to choose to behave in a manner that provides for certain strategic policy outcomes, particularly biodiversity conservation objectives, to be fulfilled (Jones *et al.*, 2011a). The MPAG analysis framework explores 36 incentives divided between five categories: legal, participative, economic, interpretative and knowledge. In PCNP, legal and knowledge incentives predominated at the time of its creation, in 1963, then in the 1960s through the 1970s, for example: hierarchical obligations, rules for participation, independent advice and arbitration. However, since the

1980s, management has been increasingly based upon consultation with users (e.g. inhabitants, fishers, divers, policy-makers), leading some to view the PCNP as a model of efficiency and governance in the Mediterranean, at a time when more collaborative forms of governance were neither popular nor in vogue (Boudouresque, 2002; Cadiou *et al.*, 2009; Martin, 2013; Robert, 2013). Since the 2006 reform, the 2012 creation of the N-PNPC and the necessity to create a new charter, the use of participative incentives has increased substantially, for example the establishment of collaborative platforms and neutral facilitation (Barcelo *et al.*, 2010). Incentives needed are mainly with the economic and interpretative categories, for example, increased provision of funding from the private sector or NGOs, promotion of green marketing and awareness-raising.

Crosscutting issues

Leadership of PCNP was mainly driven by the national government and park staff. In the bottom-up context of the N-PNPC, however, within the local community, a leader is lacking that could help drive community stewardship. Furthermore, the lack of local level or national level NGOs is a missed opportunity, especially given the current economic climate, which is hindering management efficiency of the park. One issue that must be addressed is the inconsistency in applying regulations with reports of islanders expecting privileges and rule breaking to be overlooked (see also Barcelo *et al.*, 2010).

Conclusion

The challenges faced by N-PCNP (tourism, impacts from fishing both artisanal and recreational, and invasive species) are similar to the other MPAs investigated in this larger project (Hogg *et al.*, unpublished data). The top-down and bottom-up implementation of the PCNP has led to recovery of biodiversity but also caused initial low public support for the MPA. Subsequently (1980s through 2000s), governance has gradually improved in the PCNP. The use of legal incentives can be considered necessary, but has been insufficient to address all the conservation challenges faced. Participative incentives have increased since the 2006 reform of French national parks and the 2012-2016 creation of the N-PNPC, which puts great emphasis on sustainable development of the communities, and this has helped to generate overall public acceptance of the N-PNPC. Additional programs could be introduced to further improve community stewardship and foster a shared understanding, such as 'education' or 'training' sessions for local administrations, tourist agencies and community members, and a community warden scheme. This article has provided a brief overview of the preliminary findings. Although specific to PCNP and to the early

process of the N-PNPC setting up (2012-2014), the lessons learned can be transferred to other contextually similar MPAs. The French 2006 approach of national parks and the 2012-2016 bottom-up process of negotiating the N-PCNP charter is unique and was reported to be deserving of being considered as a model for Mediterranean MPAs.

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References

- ASTRUCH P., BOUDOURESQUE C.F., BONHOMME D., GOJJARD A., 2012. - Mapping and state of conservation of benthic marine habitats and assemblages of Port-Cros national Park (Provence, France, northwestern Mediterranean Sea). *Sci. Rep. Port-Cros Natl. Park.*, 26: 45–90.
- BARCELO A., BOUDOURESQUE C.F., 2012. - Rôle de la recherche dans un parc national: 50 ans de recherche dans le parc national de Port-Cros. *Bull. Soc. zool. Fr.* 137, 11–24.
- BARCELO A., CANALE J., CRESP G., CREUSEFOND M., CROSSETTI G., DESPINOY P., HILY G., MAZELLA C., MILLIER L., RIDOLFI J., SELLIER G., 2010. - Concertation et mode de gouvernance lors de la mise en place de l'aire marine protégée de Porquerolles (Hyères, France) dans le cadre de Natura 2000 en mer. *Sci. Rep. Port-Cros Natl. Park*, 24: 21-38.
- BARCELO A., COTTALORDA J.M., PEIRACHE M., JAUBERT R., BERGERE H., ESPOSITO G., FORMENTIN J.Y., GILLET P., HOUARD T., JULLIAN E., LEFEBVRE C., MOREAU S., PIRONNEAU E., ROBERT P., VIVIANI R.A., BOUDOURESQUE C.F., 2013. - Deux décennies d'amélioration des techniques de recherche et de contrôle du Chlorobionte invasif *Caulerpa taxifolia* (Vahl) C. Agardh dans les eaux du Parc national de Port-Cros (Méditerranée, France). *Sci. Rep. Port-Cros natl. Park*, 27: 437-450.
- BERGERE H., LE BERRE S., 2011. - Définition et étalonnage d'un système d'évaluation de la capacité de charge de l'île de Port-Cros (Hyères, France). *Sci. Rep. Port-Cros Natl. Park*, 25: 81-104.
- BOUDOURESQUE C.F., 1976. - Dix ans de protection de la mer à Port-Cros (Parc National). *Atti della Tavola Rotonda internazionale «La Biologia Marina per la Difesa e per la Produttività del Mare»*, Livorno: 163-179.
- BOUDOURESQUE C.F., 2002. - Concilier protection et usages du milieu marin: l'expérience du Parc national de Port-Cros. *Rev. Soc. anciens Élèves École polytechnique, Jaune Rouge*, 575: 31-35.
- BOUDOURESQUE C.F., BARCELO A., HARMELIN J.G., MARTIN G.J., MAURER C., MÉDAIL F., SELLIER G., VIVIANI R.A., 2013. - The Scientific Council of a national park, the Port-Cros National Park: 50 years of conservation culture. *Sci. Rep. Port-Cros Natl. Park*, 27: 297–317.

- BOUDOURESQUE C.F., BERNARD G., BONHOMME P., CHARBONNEL E., DIVIACCO G., MEINESZ A., PERGENT G., PERGENT-MARTINI C., RUITTON S., TUNESI L., 2012. - *Protection and conservation of Posidonia oceanica meadows*. RAMOGE, GIS Posidonie and RAC/SPA publ., Tunis: 1-202.
- BOUDOURESQUE C.F., BERNARD G., PERGENT G., SHILI A., VERLAQUE M., 2009. - Regression of Mediterranean seagrasses caused by natural processes and anthropogenic disturbances and stress: a critical review. *Botanica Marina*, 52: 395-418.
- BOUDOURESQUE C.F., CADIOU G., GUERIN B., LE DIRÉACH L., ROBERT P., 2004. - Is there a negative interaction between biodiversity conservation and artisanal fishing in a Marine Protected Area, the Port-Cros National Park (France, Mediterranean Sea). *Sci. Rep. Port-Cros natl. Park*, 20: 147-160.
- BOUDOURESQUE C.F., CADIOU G., LE DIRÉACH H. L., 2005. - Marine protected areas: a tool for coastal areas management. *In: Strategic management of marine ecosystems*, LEVNER E., LINKOV I., PROTH J.M. (eds.), Springer publ., Dordrecht: 29-52.
- BOUDOURESQUE C.F., PERSONNIC S., ASTRUCH P., BALLESTEROS E., BELLAN-SANTINI D., BONHOMME P., BOTHA D., FEUNTEUN E., HARMELIN-VIVIE M., PERGENT G., PASTOR J., POGGIALE J.C., RENAUD F., THIBAUT T., RUITTON S., 2015. - Ecosystem-based versus species-based approach for assessment of the human impact on the Mediterranean seagrass *Posidonia oceanica*. *Marine productivity: perturbations and resilience of socio-ecosystems*. CECCALDI H., HÉNOCQUE Y., KOIKE Y., KOMATSU T., STORA G., TUSSEAU-VUILLEMIN M.H. (eds), Springer International Publishing Switzerland: 235-241.
- BOUDOURESQUE C.F., VERLAQUE M., 2002. - Biological pollution in the Mediterranean Sea: invasive versus introduced macrophytes. *Mar. Poll. Bull.*, 44: 32-38.
- BOUGEANT P., 1990. - Un parc en forme d'île : bilan des vingt cinq premières années de fonctionnement du Parc national de Port-Cros. *Parchi marini del Mediterraneo. Aspetti naturalistici e gestionali. Atti del 1° Convegno internazionale*, San Teodoro, 28/29/30 Aprile 1989. Istituto delle Civiltà del Mare publ., San Reodoro: 75-92.
- CADIOU G., BOUDOURESQUE C.F., BONHOMME P., LE DIRÉACH, L., 2009. - The management of artisanal fishing within the Marine Protected Area of the Port-Cros National Park (northwest Mediterranean Sea): a success story? *ICES J. Mar. Sci.*, 66: 41-49.
- CHAVOIN O., BOUDOURESQUE C.F., 2004. - An attempt to quantify spear fishing catches in a French Riviera Mediterranean area. *Sci. Rep. Port-Cros Natl. Park*, 20: 161-171.
- COMA R., POLA E., RIBES M., ZABALA M., 2004. - Long-term assessment of temperate octocoral mortality patterns, protected vs. unprotected areas. *Ecological Applications*, 14: 1466-1478.
- COTTALORDA J.M., BARCELO A., BARRAL M., BERGERE H., FROMENTIN J.Y., PIRONNEAU E., HOUARD T., 2011. - Résultats de la campagne d'octobre 2010 de recherche et d'éradication de la Chlorobionte envahissante *Caulerpa taxifolia* (Vahl) C. Agardh. *Sci. Rep. Port-Cros Natl. Park*, 25: 199-202.
- COTTALORDA J.M., BARCELO A., BERGÈRE H., HOUARD T., LEFEBVRE C., ROBERT P., 2010. Le Parc national de Port-Cros: une structure de référence dans la mise en œuvre de stratégies de contrôle de la chlorobionte envahissante *Caulerpa taxifolia* (Vahl) C. Agardh. *Sci. Rep. Port-Cros natl. Park*, 24: 105-126.

- DALIAS N., ASTRUCH P., FOULQUIÉ M., ROUANET E., 2012. - *Suivi à long terme de l'impact potentiel de la plongée sous-marine sur les peuplements d'invertébrés benthiques au sein de la Réserve Naturelle Marine de Cerbère-Banyuls (2007-2011) – Rapport final*. SEANO et GIS Posidonie publ., Marseille: 1-136.
- DE SANTO E.M., 2013. - The Darwin Mounds special area of conservation: Implications for offshore marine governance. *Mar. Pol.*, 41: 25–32.
- FRANCOUR P., 1998. - *Mise au point d'une méthode rapide de suivi des peuplements de gorgones au Parc national de Port-Cros (Méditerranée nord-occidentale)*. GIS Posidonie publ., Marseille : 1-26.
- GANTEAUME A., BONHOMME P., BERNARD G., POULAIN M., BOUDOURESQUE C.F., 2005a. - Impact de l'ancrage des bateaux de plaisance sur la prairie à *Posidonia oceanica* dans le Parc national de Port-Cros (Méditerranée nord-occidentale). *Sci. Rep. Port-Cros Natl. Park*, 21: 147-162.
- GANTEAUME A., BONHOMME P., EMERY E., HERVÉ G., BOUDOURESQUE C.F., 2005b. - Impact sur la prairie à *Posidonia oceanica* de l'amarrage des bateaux de croisière, au large du port de Porquerolles (Provence, France, Méditerranée). *Sci. Rep. Port-Cros Natl. Park*, 21: 163-173.
- GEM, 2005. - Recensement de la population de mérrou brun (*Epinephelus marginatus* : Pisces) du Parc national de Port-Cros (France, Méditerranée). *Sci. Rep. Port-Cros Natl. Park*, 22: 39–49.
- HARME LIN, J.G., 2013. - Le mérrou brun et le corb: deux Grands Témoins de 50 ans de protection du milieu marin dans le Parc national de Port-Cros (France, Méditerranée). *Sci. Rep. Port-Cros Natl. Park*, 27: 263-277.
- HARME LIN J.G., MARINOPOULOS J., 1994. - Population structure and partial mortality of the gorgonian *Paramuricea clavata* (Risso) in the North-Western Mediterranean (France, Port-Cros Island). *Marine Life*, 4(1): 5-13.
- HARME LIN J.G., ROBERT P., CANTOU M., 2007. - *Long term changes in the dusky grouper (Epinephelus marginatus) population from a NW Mediterranean marine protected area, the national park of Port-Cros (France)*. Nice University Publishers, Nice.
- HARME LIN J.G., RUITTON S., 2007. - La population de corb (*Sciaena umbra* : Pisces) du Parc national de Port-Cros (France), état en 2005 et évolution depuis 1990 : un indicateur halieutique et biogéographique pertinent. *Sci. Rep. Port-Cros Natl. Park*, 22: 49–65.
- HARME LIN J.G., RUITTON S., GEM, 2010. - Statut du mérrou brun (*Epinephelus marginatus*) dans le Parc national de Port-Cros (France, Méditerranée): état 2008 et évolution en 15 ans. *Sci. Rep. Port-Cros Natl. Park* 24: 147–159.
- JAUBERT R., COTTALORDA J.M., BARCELO A., PEIRACHE M., BERGERE H., JULLIAN E., FORMENTIN J.Y., PASQUALINI B., BADAIRE C., PIRONNEAU É., MOUSSAY C., CLOU J.Y., 2015a. - Résultats de la campagne 2014 de recherche et d'éradication du chlorobionte invasif *Caulerpa taxifolia* (Vahl) C. Agardh dans les eaux de l'île de Port-Cros, cœur du Parc national de Port-Cros (Var, France). *Sci. Rep. Port-Cros Natl. Park*, 29: 255-258.
- JAUBERT R., ESPOSITO G., MOREAU S., FORMENTIN J.Y., PEIRACHE M., BARCELO A., MOUSSAY C., CLOU J.Y., COTTALORDA J.M., 2015b. - Résultats de la campagne 2014 de recherche et d'éradication du chlorobionte invasif *Caulerpa taxifolia* (Vahl) C. Agardh dans les eaux de l'île de Porquerolles, cœur du Parc national de Port-Cros (Var, France). *Sci. Rep. Port-Cros Natl. Park*, 29: 259-262.

- JONES P., QIU W., DE SANTO E.M., 2011a. - *Governing Marine Protected Areas—Getting the Balance Right*. Tech. Rep., United Nations Environment Programme: 1-126.
- JONES P., QIU W., DE SANTO E.M., 2011b. - *Governing Marine Protected Areas: Getting the balance right. Volume 2*. Tech. Rep., United Nations Environment Programme: 1-227.
- JONES P.J.S., 2014. - *Governing Marine Protected Areas: Resilience Through Diversity*, 1st ed. Routledge, Oxon. 24 pp.
- LE BERRE S., BRIGAND L., LAFON X., 2009. - Mettre en place un observatoire de la fréquentation: l'observatoire Bountîles prône le sur-mesure. *Espaces naturels*, 27: 28-29.
- LE BERRE S., BRIGAND L., LE CORRE N., PEUZIAT I., 2013. - L'apport du Parc national de Port-Cros à la réflexion sur les usages récréatifs et leurs suivis dans les aires protégées : les observatoires Bountîles Port-Cros et Porquerolles. *Sci. Rep. Port-Cros Natl. Park*, 27: 325-353.
- MARTIN G., 2013. - Le Parc national de Port-Cros, un exemple de gouvernance de la complexité - Aspects juridiques. *Sci. Rep. Port-Cros Natl. Park*, 27: 355-367.
- MAURIS E., HARMELIN J.G., DESMIER X., 1999. - Gorgones rouges : bas les palmes. *Océans*, Nov-Décembre : 32-36.
- MEINESZ A., BLANFUNÉ A., 2015. - 1983-2013: Development of marine protected areas along the French Mediterranean coasts and perspectives for achievement of the Aichi target. *Marine Policy*, 54: 10-16.
- MORALES-NIN B., MORANTA J., GARCÍA C., TUGORES M.P., GRAU A.M., RIERA F., CERDÀ M., 2005. - The recreational fishery off Majorca Island (western Mediterranean): some implications for coastal resource management. *ICES J. Mar. Sci.*, 62: 727-739.
- MORETEAU J.C., 1981. - La navigation de plaisance dans le Parc National de Port-Cros. *Trav. sci. Parc nation. Port-Cros*, 7: 11-24.
- OLIVIER J., 1987. - *La gestion d'un espace protégé en Méditerranée. L'exemple du Parc national de Port-Cros* (Var, France). Plan d'Action pour la Méditerranée, PNUE publ., Athènes : 1-27
- PERSONNIC S., BOUDOURESQUE C.F., ASTRUCH P., BALLESTEROS E., BLOUET S., BELLAN-SANTINI D., BONHOMME P., THIBAUT-BOTHA D., FEUNTEUN E., HARMELIN-VIVIEN M., PERGENT G., PERGENT-MARTINI C., PASTOR J., POGGIALE J.C., RENAUD F., THIBAUT T., RUITTON S., 2014. - An ecosystem-based approach to assess the status of a Mediterranean ecosystem, the *Posidonia oceanica* seagrass meadow. *PlosOne*, 9 (6): 1-17 (e98994).
- PIRONNEAU E., RINGWALD C., 2015. Résultats de la campagne d'octobre 2014 de recherche et d'éradication du chlorobionte invasif *Caulerpa taxifolia* (Vahl) C. Agardh dans la baie de la Garonne (Le Pradet, Var, France). *Sci. Rep. Port-Cros Natl. Park*, 29: 273-275.
- QIU W., 2013. - The Sanya Coral Reef National Marine Nature Reserve, China: A governance analysis. *Mar. Pol.*, 41 : 50-56.
- RINCÉ M., 2013. - *Etude préalable à la création d'une zone ressource. Secteurs Natura 2000 FR 9311613 'rade d'Hyères' et FR 9310020 'îles d'Hyères'. Ile de Porquerolles. Analyse des secteurs potentiels à la mise en place du dispositif de zone ressource. Orientations possibles en fonction des objectifs énoncés. Mémoire de Master 2 'Gestion des écosystèmes anthropisés', Université de La Rochelle: 1-36 (+ annexes).*

- RINCÉ M., JAUBERT R., MOUSSAY C., BOUDOURESQUE C.F., 2015. - Etude pour le choix de la localisation d'une 'zone ressource', zone marine destinée à favoriser l'effet réserve' à Porquerolles (Parc national de Port-Cros, France, Méditerranée). *Sci. Rep. Port-Cros natl. Park*, 29: 195-208.
- ROBERT P., 1983. Dégradation de l'herbier de posidonies dans la zone de mouillage organisé de la baie de Port-Cros. *Trav. Sci. Parc nation. Port-Cros*, 9: 195-197.
- ROBERT P., 2013. - Evolution de la gouvernance : l'exemple de la pêche dans les eaux du Parc national de Port-Cros. *Sci. Rep. Port-Cros Natl. Park*, 27: 319-324.
- ROUANET E., ASTRUCH P., BONHOMME D., BONHOMME P., ROGEAU E., de SAINT MARTIN T., BOUDOURESQUE C.F., 2013. - Evidence of anchor effect in a *Posidonia oceanica* seagrass meadow under low anchoring pressure via a multi-criteria grid. *Rapp. Comm. int. Mer Médit.*, 40: 676.
- RUITTON S., HARMELIN J.G., 2010. - Recensement et structure démographique de la population de corbs (*Sciaena umbra*) du Parc national de Port-Cros en 2009-2010. Parc national de Port-Cros et GIS Posidonie publ., Marseille: 1-46.
- RUITTON S., HARMELIN J.G., 2012. - Le compte est très bon. Port-Cros 2011 : quand le joyau devient parure. *Marginatus*, 12: 2.
- RUITTON S., THIBAUT T., COTTALORDA J.M., VERLAQUE M., BONHOMME P., LASSAUQUE J., 2009. - Evaluation de l'impact de *Caulerpa racemosa* sur les communautés benthiques coralligènes du Parc national de Port-Cros : les peuplements patrimoniaux de *Cystoseira* spp. et de *Corallinacea*. *Rapp. Sci.*, 1-56.
- SALA E., BALLESTEROS E., DENDRINOS P., DI FRANCO A., FERRETTI F., FOLEY D., FRASCHETTI S., FRIEDLANDER A., GARRABOU J., GÜÇLÜSOY H., GUIDETTI P., HALPERN B.J., HEREU B., KARAMANLIDIS A.A., KIZILKAYA Z., MACPHERSON E., MANGIALAJO L., MARIANI S., MICHELI F., PAIS A., RISER K., ROSENBERG A.A., SALES M., SELKOE K.A., STARR R., TOMAS F., ZABALA M., 2012. - The structure of Mediterranean reef ecosystems across environmental and human gradients, and conservation implications. *Plos One*, 7 (2): 1-13 (e32742).
- SORLIN M., 1963. - Histoire de Port-Cros. Protection et aspects culturels. *Terre Vie, Rev. Ecol. Appl.*, 110 (4): 494-498.
- THIBAUT T., BLANFUNÉ A., BOUDOURESQUE C.F., COTTALORDA J.M., HEREU B., SUSINI M.L., VERLAQUE M., 2016. - Unexpected temporal stability of *Cystoseira* and *Sargassum* forests in Port-Cros, one of the oldest Mediterranean marine National Parks. *Cryptogamie, Algologie* 37(1): 1-30.
- THUREL F., 2015. - Port-Cros et son héritage culturel. *Sci. Rep. Port-Cros Natl. Park*, 29: 237-246.