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# Participatory approach to identify governance indicators for integrated coastal zone management, the case of marine protected areas

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Abstract
Marine protected areas are a laboratory of integrated coastal management. Driving the MPA system requires the implementation of a battery of indicators of governance. This governance must take into account both the internal dynamics of the system and the threats coming from the system environment. As part of a research project funded by the French Ministry of Ecology, (Liteau program), 4 coral reef MPAs were selected as pilote studies (St Martin in the Caribbean, Reunion and Mayotte in the Indian Ocean, the South Lagoon of New Caledonia in Oceania) to develop jointly between scientists and managers of MPAs governance indicators. The approach is definitely bottom up. It is based on the co-construction of indicators. In that way, the views of the scientists who bring their knowledge of governance and ICZM were crossed with the views of MPA managers who bring their field knowledge and specific requests relating to the management of their MPAs. The process was conducted in 5 steps which will be described. The main indicators will be presented and then discussed.

Keywords: MPA, ICZM, participatory approach, indicator, governance

## Introduction

Marine protected areas are a laboratory of integrated coastal management

In general terms, management "is the application of a set of decisions in the service of a strategy to achieve the objectives defined in relation to issues" (Corlay, 1998). The coastal areas management aims either to avoid or reduce conflicts of use, either to limit human pressures on natural resources or areas considered at risk of overexploitation. It proceeds by the establishment of a zoning and a management plan which regulates the uses of each type of zone. The application of these principles is subject to various drivers. Thus coastal management usually vary from a prescriptive approach to a negotiated approach. The prescriptive approach is the oldest. It inspired the bulk of public policy development and management of the French coastline for years 1970 to 2000 and remains active in the French administrative culture. In that perspective ICZM should be "the disposition of each coastal segment to the most appropriate business, according to decisions taken by the public authorities in light of scientific knowledge, thanks to which we can ensure consistency in the

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use (avoiding the adverse effects that would result in sterilization of the rich shores), and harnessing the energy of nature to serve our needs rather than abruptly counter the natural system" (Pinot, 1988). This prescriptive approach put the space at the center of the management process: it proceeds by rules, and takes little account of the views of local people, which we expect strict compliance.
On the opposite, the negotiated approach aims to involve stakeholders in the management process, particularly in defining management objectives and regulations associated with them. Ideally, this participation of the population to coastal management is endorsed and institutionalized in the form of co-management agreements. Between the prescriptive approach and the negotiated approach, most ICZM strategies which are currently in force could be called hybrids approaches because they involve practices from the both sides.

Marine protected areas have experienced a similar trend. Introduced to preserve marine biodiversity or ensure its recovery, they initially operated under a unique model in which the local population was excluded. In this conservation/ exclusion model, the local people were considered a set of poachers or potential spoilers of habitats to preserve. This conservation/ exclusion model tends to be replaced today at the international level by a conservation / participation model. According to its logics, the preservation of biodiversity can not be done without the support of the local population. Given the strong interactions between the marine protected area and its adjacent land parts, where human being live and work, MPAs are a laboratory of integrated coastal management.

The contribution of scientists in the study of MPAs

This trend from exclusion to participation in the operating model of MPAS leads to a major change in the input of scientists in MPAs management. Under the model preservation / exclusion their role was essential. The zoning and its associated management rules were directly driven by the scientific knowledge, including the monitoring of MPAs habitats and biodiversity. Thus, the management of the MPA was limited to the regulation of the relationship between a predator and a prey. Predators are the MPAs users and local population and the prey is the ecosystem to preserve.

With the transition to the model conservation / participation model, the task of MPAs is quite more complex. They must continue to act directly on the predator / prey relationship, but they also must work with the predators in order to achieve the self-limitation of their predation. Yet because of their initial training focused on the ecology and biology of marine populations, MPAs managers are powerless to address these new facets of their business. Scientific knowledge of habitats and their biodiversity is of no help in this area. In this framework, the contribution of scientific knowledge in the the MPAs is doomed to decrease unless it provides managers with a new field of knowledge dealing with the MPAs users (the predators), their uses of the ecosystem, their perceptions about this ecosystem, their impact on it and the rules established by the MPAs managers to protect it. This type of knowledge deals with governance and owns to the field of social sciences. Usually the involvement of these sciences in the acquisition of knowledge on MPAs and their management is low but the demand is dramatically increasing as more generally about the coast and its management. Thus this communication deals with the governance of MPAs. It is part of an applied research project called PAMPA and funded by the French Ministry of Ecology (LITEAU Programme).

The PAMPA project

This project aims to develop and validate indicators of the performance of MPAs for management of coastal ecosystems, resources and their uses. These indicators should be presented in the form of a dashboard. It enables managers to drive their MPA in a sustainable way. Three types of indicators are included in this dashboard. The first deals with the status and dynamics of the ecosystem and related resources in and around MPAs. The second deals with a) the impact of uses on the ecosystem and resources and b) the role of MPAs in the nature and extent of this impact. The third deals with the state of governance and the role of AMPs on the coastal space uses dynamics, including the use conflicts. Eight study sites were selected. Four are located on the French coast of the Mediterranean. Four are located in the French overseas. It is this last group where the process of developing governance indicators is the most advanced. Thus, this communication will only deal with these four tropical MPAs: St Martin in the Caribbean, Reunion and Mayotte in the Indian Ocean, the South Lagoon of New Caledonia in Oceania. All of which have the feature to include large extents of coral reefs. The approach used to build the governance indicators will now be presented. It will be followed by a presentation of indicators and a discussion on the prospects of applying this type of approach in the context of ICZM.

**Methodology: The process of building MPAs governance indicators**

The approach is definitely bottom up. It is based on the co-building of indicators. In that way, the views of the scientists who bring their knowledge of governance and ICZM were crossed with the views of MPA managers who bring their field knowledge and specific requests relating to the management of their MPA. The process was conducted in 5 steps.

The first step was a critical review of the governance indicators proposed by Pomeroy *et al*. (2004) in their guide published by IUCN to assess the effectiveness of MPAs. Presented at the first Overseas PAMPA project workshop, held in Noumea in June 2008, this critical review was supplemented by discussions with participants: all MPAs managers of New Caledonia, representatives of the public authorities involved into coastal management in New Caledonia, the MPAs managers of Reunion and Mayotte. These discussions led to the development of an initial set of 40 indicators focusing on three themes: a) establishing and maintaining the structures and management strategies, b) participation and representation of actors, c) acceptance of the AMP and conflict reduction (Pelletier *et al*., 2008, David, 2009).

In a second step, these indicators were presented to the first national PAMPA seminar, held in Brest in November 2008. A critical review of these indicators begun at this time. It was fully conducted for the second overseas PAMPA project workshop, held in Reunion. Finally 43 indicators were proposed (David *et al*., 2009a).

In a third step, these 43 metrics were discussed by managers and scientists involved in the project during the second national PAMPA seminar, held in Marseille in December 2009. This resulted in a list of 66 indicators of governance (David *et al*., 2009a). This total is too high to be operational within a dashboard of indicators to drive a MPA. Concluding the seminar, he has been asked to all PAMPA stakeholders (managers and scientists) to select among these metrics of governance:
- a set of ten indicators prioritized for inclusion in the final dash,
- a set of ten indicators considered as secondary but still important to drive a MPA,

- some specific indicators poorly shared by other MPAs but which seem compulsory to local governance (David *et al*., 2010).

As results, a total of 13 indicators were selected without a rating can be established between key indicators and secondary indicators. This was the fourth stage of this process of co-building of indicators of MPAs governance. It took place during the first five months of 2010.

As final and fifth step of the process, this selection was validated during a workshop held in Banyuls in june 2010.

**Results**

The 13 selected indicators deal with four major topics: a) the control of the regulation, b) the sustainability of the management, c) the participation of local stakeholders in the MPA management and its activities, the acceptance of the MPA and reducing conflicts (Table 1).

**Table 1 – The major topics of the 13 indicators of MPAs governance**

| **Topics** | Number of indicators dealing with |
|---|---|
| sustainability of the MPA management | **2** |
| Implementation and enforcement of the MPAs rules | **2** |
| participation of local stakeholders in the MPA management and its activities | **4** |
| acceptance of the MPA and reducing conflicts | **5** |

To properly fulfill its role of protecting and restoring biodiversity, any MPA must be sustainable. Securing financial resources is therefore a central element of its strategy. In the French context, the financing of MPAs is insured by the government: state, regions, departments, municipalities. We can therefore consider that these funds are secured but the total amount of these budgetary allocations may vary according the economical or political situations at these different institutional levels. Ideally, this amount should increase as inflation. In an environment characterized by greater volatility in budgets, as is the case in many countries of the tropics, secure budgets for the MPA requires the loyalty of the largest donors, who each provide at least 25% of the budget of the MPA. Plus the role taken by these loyal donors in the budget of the MPA is important, the greater the risk of crisis in the finances of the MPA is reduced.

Besides the financial security, to be sustainable, any MPA must complete properly for a long time its main objective which is the preservation of remarkable marine ecosystems and their restoration when they are damaged. This goal requires two things: a) monitoring the protected maritime area in order to arrest offenders and deter poaching and other offences by the mere presence of the MPA's staff, b) regular monitoring of the state of ecosystem health in order to measure the impact of the MPA management in terms of conservation or restoration. To be sustainable, any MPA therefore requires a large portion of its work time to be mobilized on both tasks (table 2). All other actions are secondary, including environmental awareness and education. This last task tends to take a growing importance in MPAs because it is hoped that it will change the stakeholders' behaviour in the direction of a better marine ecosystem conservation. But it is difficult to assess its effectiveness. So the risk is there that some AMP spend more than half of its work time to environmental awareness and education at the expense of a) implementation and enforcement of the MPA rules, including maritime surveillance, and b) monitoring the state of health of the ecosystem. If these two last tasks

mobilize less than 25% of the MPA's work time, this AMP can be considered to lose its effectiveness and on the way to become a paper MPA.

**Table 2 – indicators dealing with the sustainability of the MPA**

| Indicators | comments |
|---|---|
| working time of the MPA staff dedicated a) to the implementation and enforcement of the rules and b) the monitoring of the ecosystem health /<br>working time of the MPA staff dedicated to education and environmental awareness | Directly provided by the MPA staff |
| % of aid donors providing 25 % of the budget since 5 years | Directly provided by the MPA staff |

The implementation and enforcement of the MPAs' rules remains the key to the success of a large number of MPAs. If habitats and biodiversity are damaged by illegal use, this is the heart of the conservation project that is threatened. The presence of the MPAs' staff on the water is the main deterrent to potential offenders. Where are carried out jointly with the police, the monitoring effort is increased and the verbalization of offenders is provided. It is therefore logical that this indicator has been considered a priority. Poaching is done preferably at night, we can therefore consider that the proportion of trips made at night with the police is a good estimator of the effectiveness of the monitoring effort (Table 3).

**Table 3 – indicators dealing with the implementation and enforcement of the MPA rules**

| Indicators | comments |
|---|---|
| % of the poachers survey trips carried out jointly by the MPAs guards and gendarmerie at night | Directly provided by the MPA staff |
| % of the poachers survey trip carried out at night | Directly provided by the MPA staff |

The participation of local stakeholders is central to the negotiated approach regarding MPAs as IZCM. This participation has two dimensions. The first is the willingness of MPAs' managers to involve local stakeholders in the management process. It results in the representation of each category of local stakeholders in the management committee. The second is the willingness of local stakeholders to participate in the management committee or activities driven by the managers of the MPA. Three of the four indicators in Table 4 fall into this category. Fishing is the main use which suffers from the creation of any MPA. That is why the participation of professional and recreational fishers in the management of fish stocks present in or around MPAs is a good indicator of the support of fishermen with the objectives of the GPA. Without this membership, participation can only be very limited. So can we consider that the last two indicators in Table 4 also reflect the social acceptance of the MPA by fishers.

Reduce conflict and generate public support for the MPA is one of the high priority put forward by managers. It determines the future of their MPA (table 5). Without a minimum acceptance of the work done by the MPA from the local population and users, it runs the risk of not really be effective unless substantial resources are put in the detection and apprehension of offenders. The local press plays an important role in educating the public about the goals of biodiversity conservation highlighted by the MPA. The corresponding indicator implies that managers do a regular press review to select all the papers dealing with the MPA. The willingness of the MPA users and local population to punish offenders is a very interesting indicator but it requires many questionnaires to be built as shown by the example of Reunion (Thomassin *et al*., 2010).

**Table 4 – Indicators dealing with the participation of local stakeholders in the MPA management and its activities**

| Indicator | Meaning of the indicator |
|---|---|
| number of users representatives reported to the total number of committee members | Representativeness of local stakeholders in the management committee |
| % of the Management Committee meetings where a) 75 % and more, b) between 50 and 75 %, c) less than 50 % of users representatives are involved | Involvement of local stakeholders in the management committee |
| % of recreational fishers who inform managers of MPAs on their catch and effort | Willingness of recreational fishers to collaborate with the MPA staff |
| Ratio of reported catches / catches recorded by the MPA managers or the fisheries authority | Willingness of professional fishers to fill properly their logbooks about their catch and effort and to provide these data to the MPA managers |

**Table 5 – Indicators dealing with the social acceptance of the MPA and the conflicts reduction**

| Indicator | Meaning of the indicator |
|---|---|
| % of investigated people able to explain 3 management objectives of the MPA | Knowledge of the MPA's management objectives |
| % of investigated people able to citer 3 management rules of the MPA | Knowledge of the MPA's rules |
| % of each type of local stakeholders having a) good relations with the other types of stakeholders, b) no relations, conflicts | Identification of potential conflicts between users |
| % of articles a) showing a) a positive perception towards the MPA, b) showing a negative perception, c) relating uses conflicts | Perception of the local news papers towards the MPA |
| Willingness of local stakeholders to punish offenders | Balance between the uses value and the heritage value of the MPA |

## Discussion and conclusion

The PAMPA project showed that if the word "governance" is known to MPA managers, most of them have a very vague idea of what it is. In this context, it had been possible to construct a set of indicators according to experts. But this type of approach is often ineffective if the experts do not sufficiently take into account the ground realities. The proposed indicators for MPA managers respond only very imperfectly to their needs. The participatory approach seems more relevant, if MPA managers can include their demand. The use of a questionnaire seems the easiest way to collect such a demand. But when it is unclear, the results of the questionnaire can only be irrelevant. We are here in a classic situation of an unclear demand by the MPA managers that requires to be specified with a clear offer of services by experts. Such a situation has already been tried out at Reunion as part of a proposed use of satellite imagery for integrated management of reef areas in association with the upper watersheds (David *et al*, 2009b). The choice fell on the co-construction of the demand with the potential users of remote sensing who manage the coastal watersheds (Antona *et al*. 2007). A similar approach is used in the PAMPA project. Its main drawback is the lengthy process which requires multiple round trips between the MPA managers involved in the project and the experts who offer a range of indicators. But this iteration is the key to the success of the operation. A second drawback is the heterogeneity of the studied MPAs and the specificity of local contexts. Develop a dashboard generic enough to apply to all cases while being relevant enough to help each MPA to be driven with sufficient precision is a challenge. But the challenge worth addressing. We will know with time if the governance indicators co-

constructed as part of PAMPA project will provide complete satisfaction to MPA managers, or if only a small number of them will stand the test of time, unless that over the years each dashboard evolves in the direction of new indicators better suited to local problems of governance. This development would mean that the search for a generic dashboard and locally relevant is utopia. One thing, however acquired. Given the difficulty of establishing such a dashboard, it is important not to freeze it and to be adaptable in order to include new indicators or to withdraw old ones at the request of local managers. In this perspective, the example of the PAMPA project seems relevant and applicable to a large number of ICZM cases.

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