

Recreational boating and visitors observations in MPAs: methodological approach and challenges

Ingrid Peuziat¹, Iwan Le Berre¹, Annalisa Minelli², Nicolas Le Corre¹

¹*Université de Bretagne Occidentale, LETG-Brest (UMR 6554 CNRS), France. ingrid.peuziat@univ-brest.fr*

²*CNR-ISMAR, Istituto di Scienze Marine / Arsenale – Tesa 104, Castello 2737/F, 30122, 10 Venezia, Italy*

Introduction

Traditionally the management of marine protected areas has given priority to the acquisition of biophysical data, whereas the social dimension was often dealt with as an afterthought. But recently it has become essential to understand the characteristics of human activities. However, there is still little structured information available describing recreational activities at sea in detail and allowing a global vision of their development.

The presentation aims (i) to present the main methods implemented for the spatial and dynamic analysis of water-based frequentation in marine protected areas in France, (ii) to share this experience in a critical way in order to improve the methods that allow for a more comprehensive assessment of nautical activities.

Method

The following analysis and assessment of methods allowing for the monitoring of recreational activities is based on the approaches used by the research programs of the LETG laboratory in Brest. Their respective projects rely on different areas of expertise and techniques in order to collect data on recreational activities. The programs focus on protected areas in the Atlantic Ocean, the Channel and the Mediterranean Sea. Several of these methods have been tested for visitor monitoring observatories.

Results and discussion

The comprehensive study of boating and water-based activities requires various data: quantifying boats and flows (number of boats, type, size, age), monitoring their temporal course (periods of high frequentation), spatializing frequentation (boat lanes and preferential destinations) and characterizing practices (categories of users, motivations, perception of the activity and its environment).

We will distinguish the methods according to the type of data they allow to collect (quantitative, spatio-temporal or qualitative data).

How many? Quantitative methods

The quantitative approaches are essential for understanding the intensity of the different activities in marine protected areas. However, the methodological difficulties of implementing the counts are numerous at sea. Two types of counts can be distinguished: (i) direct counts, to evaluate the instantaneous or dynamic frequentation of well delimited sites; (ii) analysis of administrative data (registrations, licences) for an overall evaluation of fleets (Sidman and Fik, 2005). The latter does not answer the following questions: where are these boats? how many sail? where are they going and when?

Where? Remote sensing methods

The sea constitutes an open environment, on which satellite or airborne remote sensing methods provide snapshots of frequentation. Aerial overflights photography is used for beach frequentation analysis, mooring or boat counts (Le Berre et al., 2013; Smallwood and Beckley, 2012). These methods are limited when they must be carried out over large marine areas (time) or repeated frequently (cost and analysis time). Satellite remote sensing can provide snapshots of frequentation over large areas. The use of very high resolution images (e.g. Ikonos), and pattern recognition methods, is also being developed. But the spatial resolution of satellite images may prove too low to characterize small boats and these methods still experimental requires specific skills.

When? Instrumentation monitoring methods

At sea different activities can coexist in the same area at the same time, or share it at different times. Taking into account the time dimension is therefore important, particularly for the management of uses. Passive acoustics allow continuous recording of the sound environment (marine traffic and 'noisy' activities) through the deployment of hydrophones. However, underwater acoustics has two major disadvantages: firstly, this method only works for motorized boats.. Secondly, the accurate localization relies on the use of several sensors placed in a study area.

Spatio-temporal methods

To describe maritime activities and traffic intensity, the most widespread data source is now Automatic Identification System (AIS). This method is of particular interest when trying to understand the behavior of ships by locating, characterizing and quantifying maritime flows and by allowing a fine temporal reconstruction of traffic (Le Guyader et al., 2011). However, not all boats are equipped with this device. In our field of study of recreational boating, AIS data mainly concern large pleasure crafts and passenger ships.

Who and why? Contribution of social sciences

To improve knowledge about users (age, gender, socio-professional category) and their practices (frequency of navigation, areas frequented, motivations, etc.), the use of methods from the human and social sciences is frequent. Most often these are "face-to-face" interviews or remote surveys (by mail, telephone, Internet). The objective is to define behaviors on the sites, which can eventually be extended and generalized.

The survey can be coupled with GPS or mobile phone technologies to record tracks. The main limitations of these methods concern deployment difficulties or low efficiency at sea. The contribution of participatory methods can help to intensify data collection, but it remains limited in France.

Conclusion

The various methods presented provide useful and complementary data for mapping maritime activities (tab. 1). However, they also have disadvantages which are related to costs as well as their intrusive or low operational nature.

Tab. 1. Methods of marine activities observations: Interest and limits

Type of data collected	Methods	Exemples	Interests/limits				
			How Many	Who	How	Where	When
Quantitative	Count	Direct counts	strong	poor	moderate	moderate	moderate
		Aerial survey	strong	moderate	poor	moderate	moderate
		Automatic registration methods (video, counters...)	strong	poor	poor	poor	strong
		Licences (boats registration ...), statistics...	strong	moderate	poor	poor	poor
Qualitative	Boats and users characterization	Survey, interview	poor	strong	strong	moderate	moderate
		Focus group	poor	strong	strong	moderate	moderate
		Log book	poor	strong	strong	moderate	moderate
		Direct observations (terrestrial ou by air)	poor	strong	strong	moderate	moderate
Behavioural	Uses description	Observations	poor	strong	strong	moderate	moderate
		Reconstruction of itineraries	moderate	moderate	strong	moderate	moderate
		Observation notebook	poor	strong	strong	moderate	poor
		Participative cartography	moderate	moderate	strong	moderate	moderate
		GPS tracking	moderate	moderate	moderate	strong	moderate
		Phone data	strong	moderate	moderate	strong	strong
Spatial	Spatial distribution	Regulatory information	moderate	moderate	moderate	strong	moderate
		Spatialization by aerial photographie or satellite image (remote sensing)	strong	moderate	poor	strong	moderate
		Radar, sonar	moderate	moderate	poor	strong	strong
Temporal	Temporal distribution	Hydrophone	strong	moderate	poor	poor	strong
Spatiotemporal	Spatiotemporal evolution	AIS	strong	strong	moderate	strong	strong
		Observations by personnal from semaphore	strong	strong	poor	moderate	strong

Methods operational efficiency

	poor		moderate		strong
--	------	--	----------	--	--------

In the end, to set up long-term observation series of maritime activities and their interactions with the environment, various issues need to be addressed/taken into account/considered. They are (i) scientific and technical (development of marine sensors, control of treatment

protocols and dissemination of results), (ii) political and societal, particularly with regard to the social acceptability of the observation of maritime activities.

References

Le Berre I., Peuziat I., Minelli A. 2016, Habiter le littoral... pour naviguer. Comment décrire les activités humaines en mer côtière ? in Robert S., Melin H. (dir), *Habiter le littoral. contemporains*. éd. Quae.

Le Berre S., Peuziat I., Le Corre N., Brigand L. (2013), *Visitor Use observation and monitoring in Mediterranean marine protected areas: A handbook for managers*. WWF France. MedPAN, Parc National de Port-Cros.

Le Guyader, D., Brosset, D., Gourmelon, F., (2011). «Exploitation de données AIS (Automatic Identification System) pour la cartographie du transport maritime». *Mappemonde* 104.

Sidman, C., Fik, T., (2005). “Modeling spatial patterns of recreational boaters: vessel, behavioral, and geographic considerations”. *Leisure Sciences* 27.

Smallwood, C.B., Beckley, L.E., 2012. “Spatial distribution and zoning compliance of recreational fishing in Ningaloo Marine Park, north-western Australia”. *Fisheries Research* 125-126.