

# Commons dilemmas in marine protected areas: Environmental Protected Area of Anhatomirim, South Brazil.

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## 1. Introduction

Managing marine protected areas are intrinsically bonded with managing common-pool resources (CPRs), ranging from the access and appropriation of its natural beauty to the fishery resources and the associated traditional knowledge of its users.

Brazil has twelve categories of protected areas, which go from the fully-protected / no-take to the multiple-use. The fully-protected areas are under government property right regime and presume the dominance of strong command-control state intervention on commons. In contrast, sustainable-use areas may establish various property rights and institutional arrangements to manage them.

Group of categories	Category	Property right regime	Main agent in the management
Fully-protected Areas	Biological Reserve	State	Government
	Ecological Station	State	Government
	National Park	State	Government
	Wildlife Refuge	State and private	Government
	Natural Monument	State and private	Government
Sustainable-use protected areas	National Forest	State	Government
	Wildlife Reserves	State	Government
	Private Natural Heritage Reserves	Private	Private
	Extractive Reserve	State	Community
	Sustainable Development Reserve	State	Community
	Area of Relevant Ecological Interest	State, private and community	Co-management
	Environmental Protected Area	State, private and community	Co-management

**Table 01:** Brazilian protected areas categories

Among the sustainable-use protected areas categories in Brazil, the less restrictive and hence more open to innovative management schemes are the Environmental Protected Areas (EPAs). Classified as Category V by International Union for Conservation of Nature (Dudley 2008).

This presentation comprises a description, mostly visual, of the designing and implementation of different property rights of commons through an EPA management plan and its monitoring programs.

We choose to study EPA Anhatomirim (EPAA), in south Brazil, considering the diversity and complexity of economic and leisure activities that occur in its marine portion and due to its planning process, featured by a high number of participatory events. EPAA Management Plan was released in late 2013 (ICMBio 2013).

Focus relies on two participatory monitoring programs which are taking place in EPAA and directly deals with its CPRs: The Dolphin Monitoring Program (DMP) and the Fisheries Monitoring Program (FMP).

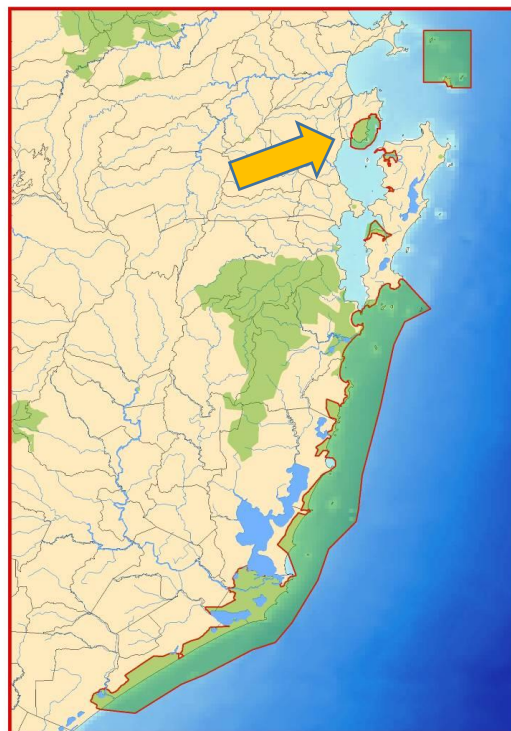
## **2. Environmental Protected Area of Anhatomirim (EPAA)**

The southern coast of Santa Catarina State has five federal marine protected areas. Two of them are no-take (Ecological Station of Carijós and Arvoredo Biological Reserve) and three are multiple-use (Extractive Reserve of Piraubá, EPA Baleia Franca, and EPA Anhatomirim).

EPAA is a 4730 hectares' federal area created in 1992, including 60% of marine ecosystems within its boundaries. The remainder coastal ecosystems are part of Governador Celso Ramos, a municipality with 12,000 inhabitants in which 1/3 live inside EPAA. The MPA was created to ensure the protection of the resident dolphin (*Sotalia guianensis*) population as well as the remnants of Atlantic forest and water sources of relevant interest to the survival of small-scale fishing communities in the region.

Fishing is the main source of income in EPAA, with 75% of its inhabitants involved in the activity. Besides fishing, *schooner* tourism is the fastest-growing marine activity. Mussel (*Perna perna*) marine farming and recreational boating are other fast-growing economic activities in the marine area.

EPAA is thus a small size MPA for the Brazilian standards, but with significant economic activities inside its marine limits. These activities have a potential direct impact on its flagship species, the *S. guianensis* (Daura-Jorge *et al.* 2004), increasing the complexity of environmental management in the area.



**Figure 01-02:** Marine protected areas in Santa Catarina, detaching EPA Anhatomirim.



**Figure 03-07:** Photos of the main activities in the marine portion of EPA Anhatomirim (small-scale fisheries, schooner tourism, mussel farming and recreational craft). In the map, distribution pattern of *Sotalia guianensis* (dark line) and the spatial distribution of each of the economic activities (brown: mussel farming; green: schooners; light green: drift net fisheries; white: small (<45HP) trawling fisheries; purple: medium (>45HP) trawling fisheries) (ICMBio 2013).

### 3. Managing commons in EPAA: fisheries and dolphin-watch

The most important instrument of an EPA to address its management strategies and planning is the Management Plan, which must contain the protected area management guidelines, its spatial zoning and the set of rules of use of the natural resources.

Chico Mendes Institute for Biodiversity Conservation (ICMBio), the authority for managing protected areas under national jurisdiction, released EPAA management plan only in 2013, 21 years after the creation of the protected area.

Territorial and sectoral workshops were the core of the participatory process. The stakeholders involved included resource users, government agencies, and organizations related to each sector.

The management plan was "translated" into legal jargon and officially released by a Federal Decree in 2013.

EPAA has nine different zones, with distinct regulations and management strategies. Four zones were set in its terrestrial portion and five in its marine area: Terrestrial Zone of Restricted Urbanism (TZRU); Terrestrial Zone of Sustainable Use (TZSU); Terrestrial Zone for the Protection of the Atlantic Forest (TZPAF); Terrestrial Zone for the Protection of Small-Scale Fisheries (TZPSSF); Marine Zone for Extensive Use (MZEU); Marine Zone for Special Use (MZSU); Marine Zone for Protection of the Fisheries Stocks (MZPFS); Marine Zone for Regulation of Trawl Fishing (MZRTF); and Marine Zone for the Dolphins Protection (MZDP).

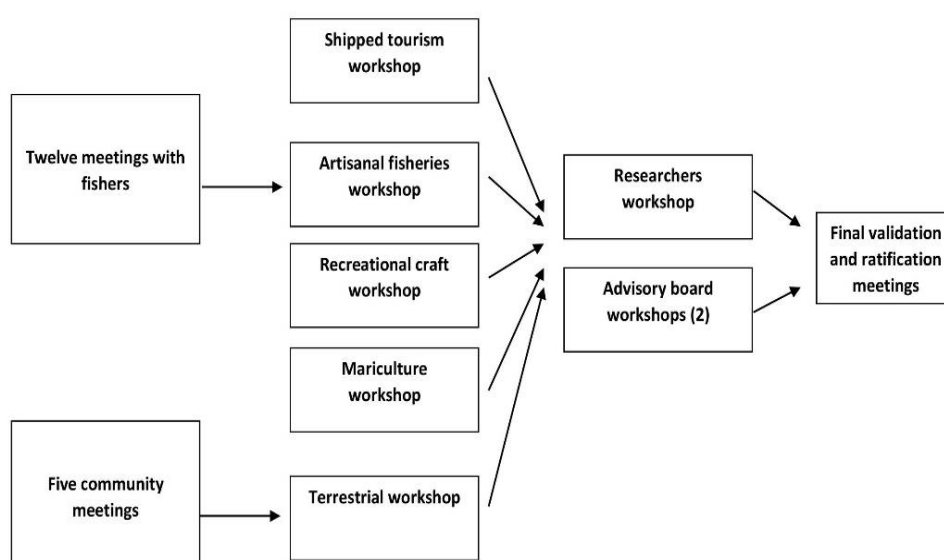


Figure 08: Flowchart of the participatory process.



**Figure 09-14:** Photos of the participatory meetings and workshops during EPAA management plan drafting process.

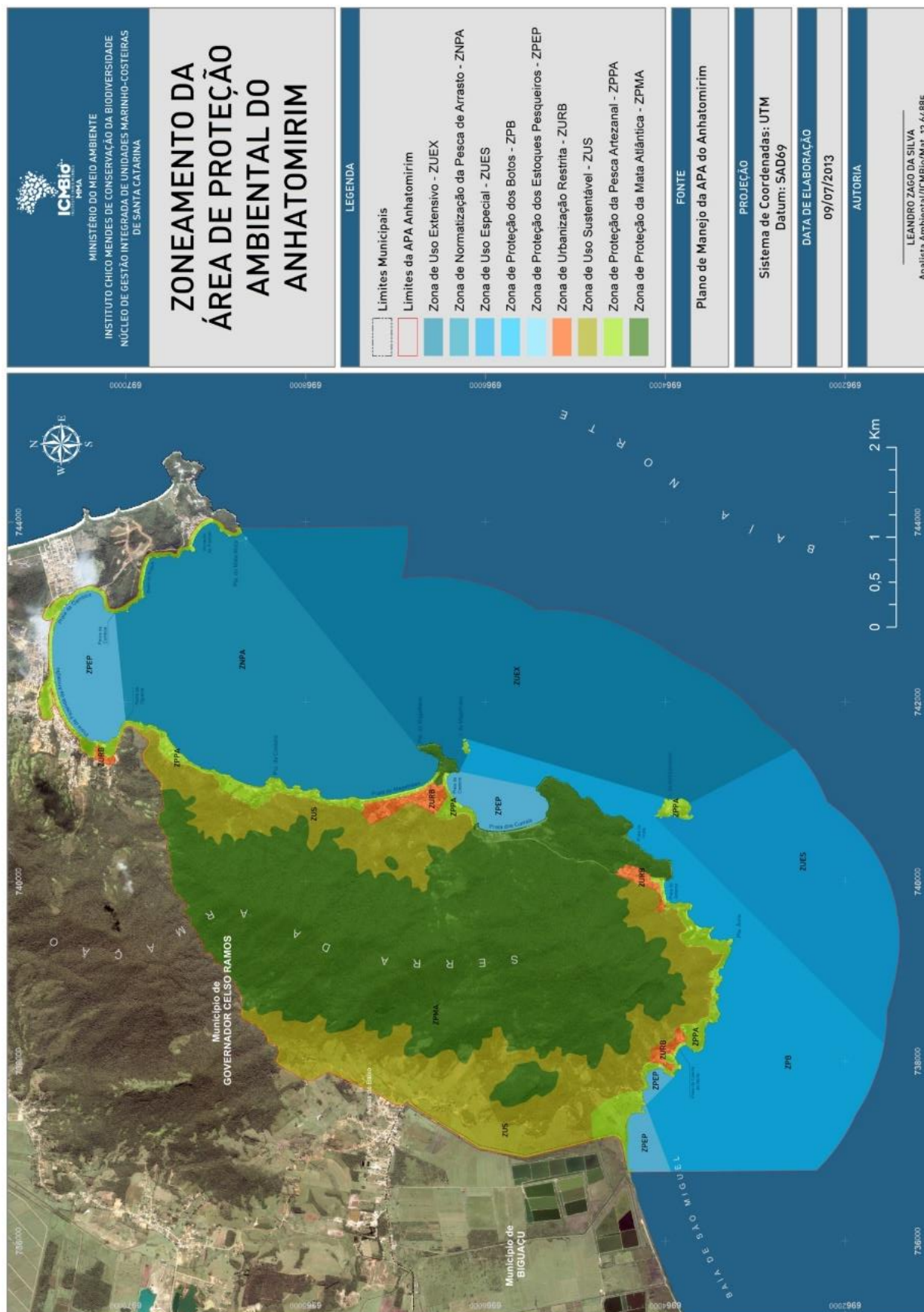


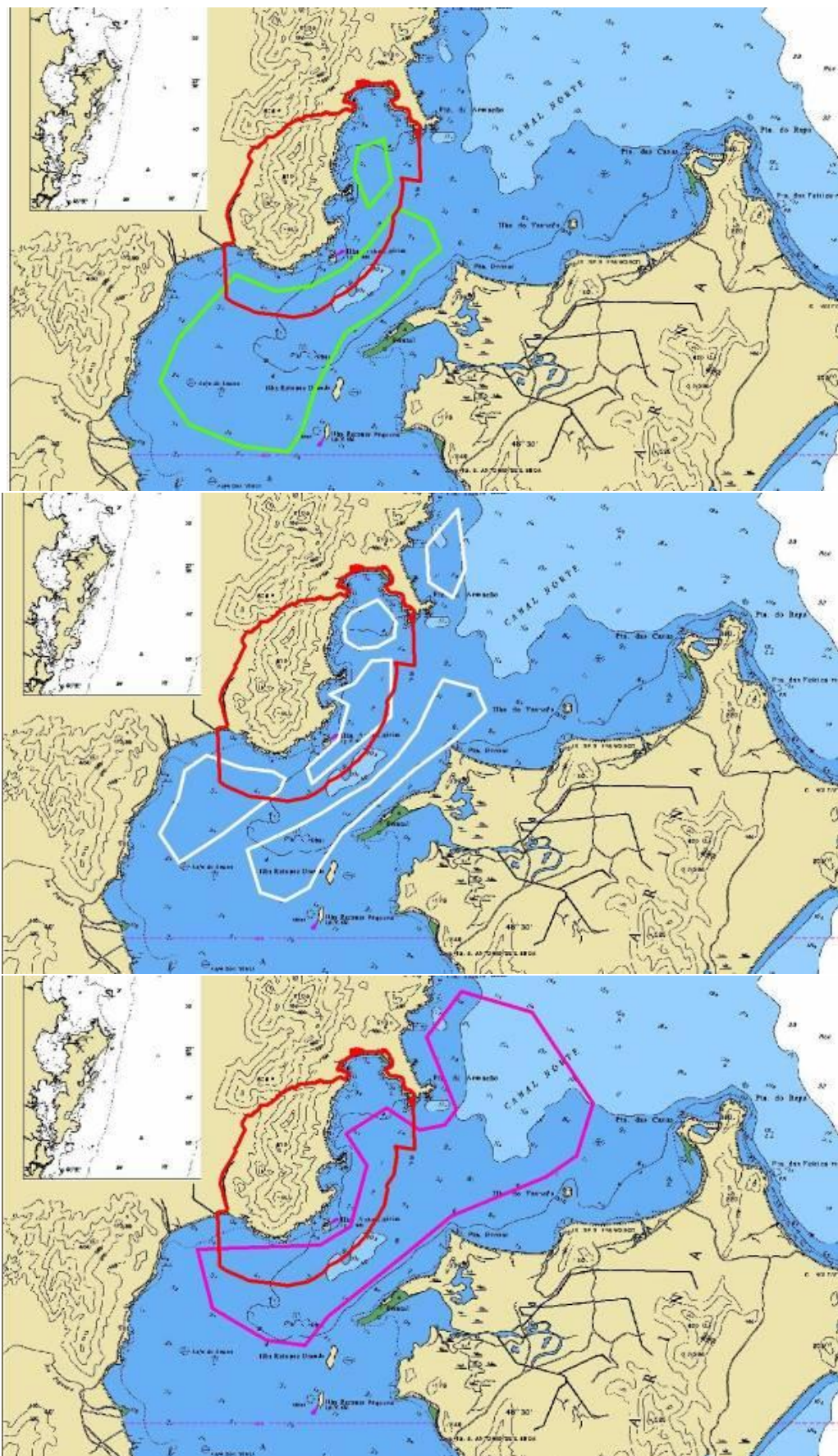
Figure 15: EPAA Management Plan zoning (ICMBio, 2013)

### 3.1 Fisheries management

There are four distinct fishery-related social groups within EPAA boundaries. All fishing groups except gillnetters have both specific and overlapping fishing grounds and are competing for two common targets: white shrimp (*Litopenaeus schimtti*) and pink shrimp (*Farfantepenaeus paulensis* and *F. brasiliensis*).



**Figures 16-19:** Fishers typology in EPAA - From top-left in clockwise: Drift-netters, gillnetters, medium trawlers (over 45HP) and small trawlers (under 45HP).



As small-scale fishers are among EPAA objectives, most of its zoning is related to fisheries management.

In the terrestrial area, due to demographic growth and the real estate speculation, TZPSSF established some preferential areas for fishers. Those areas aim both the guarantee of access to the sea and the construction of community boat houses managed collectively by fishers.



**Figures 23-24:** Examples of areas which are demanded community boat houses.

In the marine portion of EPAA excluding industrial and recreational fishing, and allocating small-scale fishers to specific areas according to its fishing gear was the collectively agreed strategy.

The MZPFS is composed of three small no-take marine zones proposed by fishers.



**Figure 25-27:** Fishers and ICMBio identifying nursery grounds. Nursery grounds according to fishers.

In turn, the MZRTF was established in a traditional trawling area, but with great environmental sensitivity. The management solution to this impasse was the design of this zone, which allows trawling accompanying with the encouragement of technical and technological alternatives to mitigate its impacts, and with the deployment of participatory monitoring, the Fisheries Monitoring Program (FMP).

The focus of EPAA FMP is still only on trawlers. It is expected to expand it to drift-netters and gillnetters.



**Figures 28-32:** Fishers, ICMBio and Federal University of Parana testing and debating BRDs.

### 3.2 Managing and monitoring dolphins

*S. guianensis* is found mostly in estuaries, bays and other protected shallow waters on the Atlantic coast from Nicaragua to southern Brazil, with its southernmost distribution in EPAA. The EPAA population is estimated at 80 individuals. They have a restricted distribution and strong site fidelity (Daura-Jorge *et al* 2004; Flores & Fontoura 2006).



**Figures 33-35:** *Sotalia guianensis* pattern distribution in EPAA and surroundings (ICMBio 2013).

We consider here the dolphins as a non-consumptive CPR (Hennehan *et al* 2015), due to the dispute over the dolphin watch-activity. The dolphin-watch activity started in EPAA in the 1980's and had a constant growth since then. Today a limited number of 22 *schooners* are accredited to work in EPAA. In addition, some EPAA local fishers adapt their boats to carry tourists on summer.

In the *schooners* trip, coupled with the dolphin-watch, the tourists visit a 18<sup>th</sup> century fortress and have a typical lunch in a fishing community.



**Figures 36-40:** Schooners in EPA Anhatomirim, and its routes (ICMBio 2013).

After the creation of EPAA, the first formal institutional change related to dolphins was the establishment of the “Exclusive Dolphins Zone” (EDZ), in 1998 (Ibama Federal Decree 05N/1998). The EDZ prohibited all human activities, even swimming, in a small area, which were the dolphins’ preferential area at that time.



**Figure 41:** Exclusive Dolphins Zone (Ibama Federal Decree 05N-1998)

From 1998 the dolphin’s distribution pattern has changed. It expanded south, even away from EPAA limits, and with less time spent in EDZ (Flores & Bazzalo 2004, see Figure 35).

The 2013 management plan, set the “Marine Zone for the Protection of Dolphins” (MZDP), an extension of the previous EDZ. But MZDP overlaps the main area of the *schooners* activity, and is also a crucial fishing ground, particularly to shrimp drift-netters.

As management solution, MZDP has a bigger surface area than the previous EDZ but establishes fewer legal restrictions. In this new zone, small-scale fishing and *schooner* activity are permitted, while other activities, as recreational craft, are forbidden.

To access this area the *schooners* have to follow a series of procedures, as sewage treatment systems in the vessel’s toilet, obligation to produce and distribute EPAA information leaflets, accredited tour guides on board, and the participation in the Dolphin Monitoring Program (DMP).

The DMP is taking place since 2014, in a partnership with the vessel tour operators. It has among its goals to make an accurate diagnosis of the *schooners* activity and establish its support capacity.



Figures 42-43: 2016 tour guides qualification course

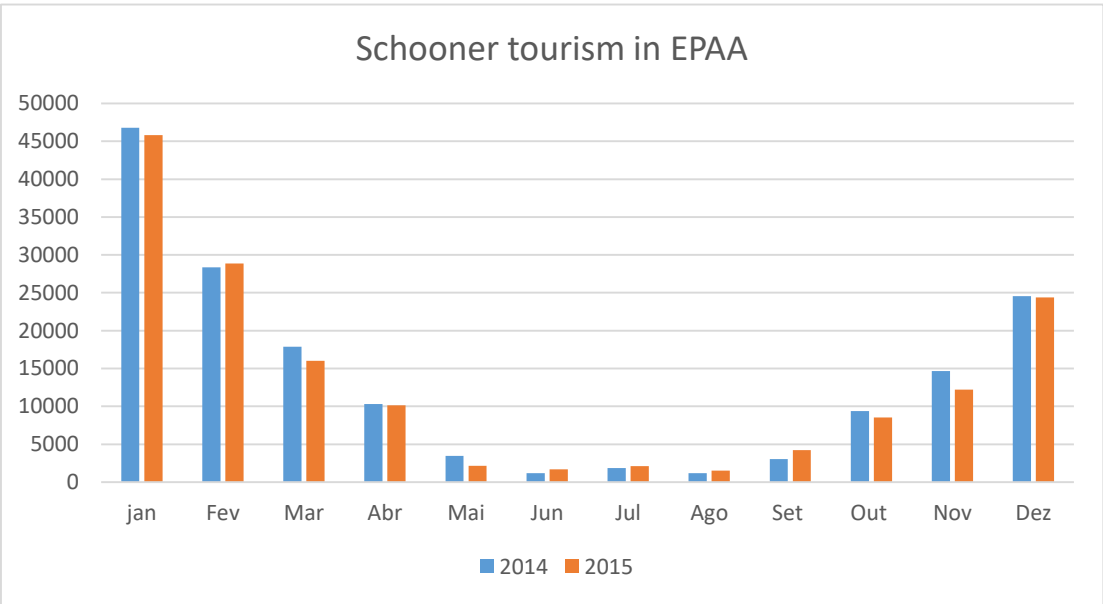
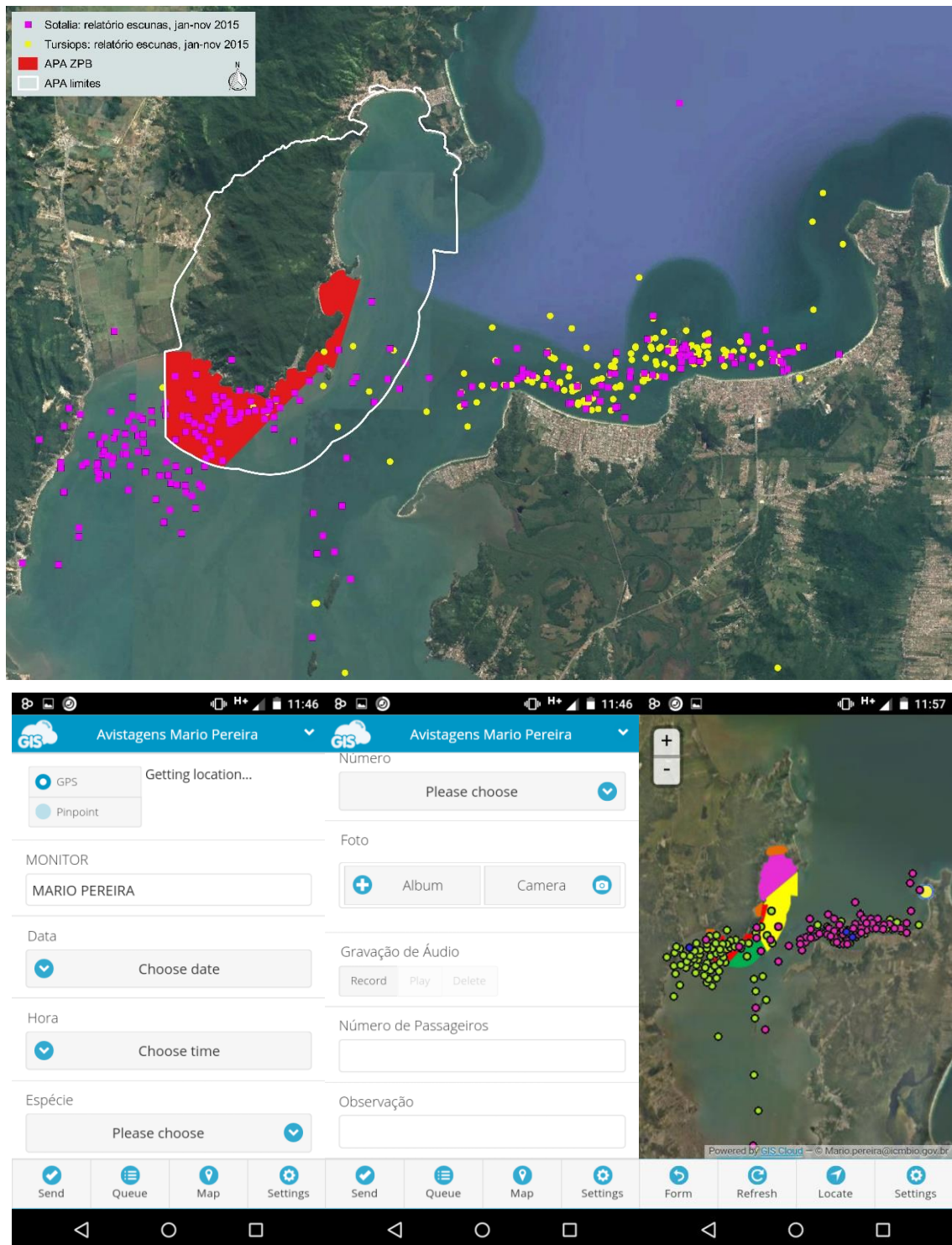


Table 02: Monthly tourists coming by *schooners* in EPAA, according to vessel tour operators (2014-2015).



**Figures 44-45:** Dolphin-watch in EPAA 2015, according to *schooners* data. Screen examples of the dolphin-watch *GisCloud* app

#### **4. Managing commons through multiple-use marine protected areas: potentials and constraints**

Participatory monitoring in EPAA brought new opportunities and some innovative institutional arrangement to CPR's management in the territory. Otherwise, a series of constraints remained. As major potentials and constraints, which need a further detailed analysis, we can quote:

##### Potentials:

- Production and availability of a time-series information, previously non-existent or punctual. As a result of the monitoring of the two activities, there is continuous data since 2013, a rarity for the Brazilian standards of protected areas monitoring programs.
- Closer relationship and greater involvement of the main stakeholders in the management and its monitoring, debating the impacts of the economic activities, proposing mitigation strategies, and thus generating a higher compliance with the MPA objectives and its rules.
- The formation of collective learning-by-doing platforms, one of the key factors for the establishment of an adaptive co-management approach (Armitage *et al* 2009).
- Monitoring programs became the "gateway" for the involvement of other agencies in EPAA management, such as universities (UFPR, UFSC, and IFSC), development agencies (EPAGRI), theme related agencies (MinTUR, MPA), and local administration. Additionally, they provided a better articulation with other national and international experiences, especially in the case of fisheries monitoring, via SocMon and REBYC. These have resulted in the improvement of the cross-scale institutional connections.

##### Constraints and following steps:

- Excessive time spent by ICMBio to process the collected information. In the DMP to transfer the collected data from the spreadsheets that feed the GIS, and in FMP to quantify and analyze the by-catch;
- FMP has not been successful in mediating conflicts between the different fishery-related social groups. Those conflicts even increased, particularly among small and medium scale trawl-fishers.
- Even with training efforts to those responsible for completing the DMP spreadsheets, difficulties in establishing standardized data collection to input the GIS remains, due the multiple sources that bring the information (the 22 *schooners*);
- It is fundamental to combine the DMP data, originated from dolphin-watch *schooners* trips, therefore from a "platform of opportunity" approach (Hupman, K. *et al* 2014; New *et al* 2015; Moura *et al* 2012), with data from scientific survey cruises;
- Employ the collected information in management actions and formal institutional changes, i.e. new rules and procedures. This next step will require greater

involvement of the stakeholders and the subsequent enforcement, which is always deficient in Brazil:

- Define if a BRD should be mandatory inside EPAA and, if so, with which of the devices.
- Establish the support capacity for the dolphin-watch activity, and the obligations arising, e.g. criteria to select *schooners* able to work in EPAA.
- Expand both Monitoring Programs to other CPR users:
  - The platform of opportunity derived from DMP to the recreational fleet
  - The FMP to the other fisheries, primarily to drift-netters, which compete for the same resource (shrimps).

## ACKNOWLEDGEMENTS:

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