

DATA REPORT

The status of stakeholder views on salt marsh ecosystem services at a coastal lagoon (Ria Formosa Lagoon)

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Abstract

The present study is a short provocative looking at stakeholders' views in the dimensions of ecosystem services in a global environmental change context. The work is based on a regional survey and intends to examine the perceptions of stakeholders of the Ria Formosa lagoon about salt marshes value. Results are part of an ongoing study about wetlands valuation. Though the collected data is only a minor component of a much larger, interdisciplinary research effort, it is an important piece for understanding the conservation status, target audience and communication assets.

Key-words: stakeholders, regional survey, wetlands valuation, communication assets

1. Background

Although the concept of ecosystem services (ESs) has been extensively discussed in scientific circles since the 1970s (e.g. Carpenter et al., 2006; Costanza et al., 1997, 2014; De Groot et al., 2002; Fisher, et al., 2009), ESs assessment and application is still a growing research field. The ES awareness has significantly influenced international conservation research and policy in recent decades, but the related design of appropriate tools to implement it effectively in practical applications remains challenging (Armsworth et al., 2007; Tusznió et al., 2020). Scientists are already convinced of the value of ESs, but what about local decision-makers? The ESs concept and fundamentals remains to be seen to what extent this concept can be easily embraced by managers.

Local governance of ESs become a focal point, important for addressing global biodiversity loss due to climate effects and attaining sustainable human development (Shih et al., 2020). At the local level, the lack of instruments to explore the complexity of landscape planning and diagnosis may be a barrier to local-level decision-makers utilization of ecosystem service science (Sitas et al., 2014). Ongoing scientific challenges in ESs require the regional baseline surveying of stakeholder's perceptions about coastal ESs, for different coastal assets, for different habitats, given diverse economic and cultural frames. The exercise helps local managers identify conflicts

between human use and the provision of ecosystem services (Leggett and Finlay, 2001; Hicks et al., 2013; de Juan et al., 2017). It also provides information on potential conflicts between distinct groups of users, a critical aspect to be addressed by decision-makers to guarantee adequate ESs management (Bennett et al., 2015).

In this work, a survey was conducted with representative stakeholders of a marsh habitat in a coastal lagoon in south Portugal. The goal was to collect their views and understanding of salt marsh ESs. Stakeholders were defined as individuals capable of directly or indirectly influencing the long-term development of local policy (e.g., involved in governance, participating in discussions and with specific technical knowledge), following Ruckelshaus et al., (2015) and Willcock et al. (2016).

By presenting insights into stakeholders' perceptions of salt marshes value, this study also seeks to highlight the engagement of local decision-makers on this matter. How much do they care about salt marsh conservation and ES values? Apart from their ecological importance, marshes offer nature-based solutions to buffer climate change impacts and ecosystem services that contribute to human well-being (Newton et al., 2018; Carrasco, 2019; Geijzendorffer et al., 2019). This way, investing in the conservation and sustainable use of marsh ecosystems contributes to meet the Paris Agreement climate change goals. (Geijzendorffer et al., 2019). Assessing the level of stakeholders' perceptions of ESs can be useful in many respects, ranging from management strategies and participative forms of management to the implantation of policy making.

Although the collected data is only a small component of a much larger, interdisciplinary research effort, it is an important piece for understanding the local stakeholders and regional target audience. Data presented herein represent the first glance at the assessment of stakeholders' perceptions about salt marsh ESs value in a natural park in Portugal. The following summary focuses on four main results of a nonrandom survey taken in 2019. The first part sets out the regional identity of marshes along the Ria Formosa lagoon and understanding of the ESs concept with the regional aspect. The second part establishes an ESs value and methods of data sharing between scientists, authorities, private companies or other public parties relevant for management issues.

2. Methodology

The survey was designed based on the questionnaire approach shown in McKinley et al., (2019). The collected data provide insight into coastal stakeholder perceptions and attitudes towards a specific ecosystem's conservation in a given region, which can be different from the coastal stakeholder's perception and attitudes taken at other regions. The participants were informed of the study objectives and data analysis, and voluntary consented for the data to be used for scientific purposes.

These particular salt marshes belong to the Ria Formosa, a shallow mesotidal lagoon (Figure 1), presenting approximately 105 km² of wetlands area including a large intertidal zone (Dias and Sousa, 2009). The lagoon is composed of large salt marshes, sand flats and a complex network of natural and partially dredged tidal channels. The

Ria Formosa Lagoon was designated Natural Reserve in 1978, a Natural Park in 1987, and is listed as a European Union Natura 2000 site, aiming at achieving a balanced and sustainable exploitation of its resources. The wetland area is protected by the RAMSAR and BERNA. The local population and tourism industry benefit significantly from the lagoon's ESs, especially the regulating and cultural services. There is frequent conflict between nature conservation and economic gain (e.g., recreation, small-scale fishers, dredging) and a need for an ecosystem approach to economic activity as a result (e.g. Pacheco et al., 2006; Ceia et al., 2010).



View to the salt marshes



Figure 1. Inset to the Ria Formosa Lagoon (showing the location of the main islands, tidal inlets, tidal channels and cities) and view to salt marsh patches bordering the main channels (obtained from Google Earth, downloaded in Dec 2019; image ©2015 Copernicus)

In a first instance, individuals representing target stakeholder groups with local importance for coastal management were selected. Stakeholder selection was based on previous knowledge of the system and supported by the prior work of Costas et al. (2015) and Domingues et al. (2017). A group of marine and coastal practitioners and user groups including private companies (e.g. Regional Airport, mining industries, touristic companies), academics (e.g. researches in the field), policymakers (e.g. Portuguese Environmental Agency, Natural Park), NGOs (e.g. NGOss for coastal conservation), and public institutions (e.g. economic Regional Coordination Commission), among others, were contacted via email and asked to complete an online questionnaire (see supplementary material). Following a short introduction to the theme, respondents completed a mix of questions focusing on: (i) their understanding of the concept of ESs, (ii) their use of the term within coastal management, (iii) their evaluation of ESs, and (iv) personal information (see supplementary material).

3. Description of the collected dataset

The number of people (or institutions) with stake in this area is limited, and very few studies have been dedicated to understanding stakeholder participation in regional coastal management. Stakeholders were repeatedly asked to complete the survey, although only few replies were recovered. The survey respondents (n = 35) ranged in age from 25 to 64; 80% were female. Other studies with limited participation of stakeholders can be found in Lamarque et al., (2011); Costas et al., (2015); Cebrián-Piqueras et al., (2017); Stosch et al., (2019), amongst others.

There was more than one response by stakeholders' group. Approximately 49% of the respondents belong to private companies; 40% of the respondents belong to public institutions; 9% of the respondents belong to local associations or NGOs, and 3% of the respondents belong to an educational entity. Approximately 65% of the responding private companies offer direct recreational services including private tourism (e.g., boat tours, birdwatching, hotels and private real estate). Approximately 29% of the responding private companies are small-scale fisheries and salt exploitation companies. Approximately 50% of the public institutions have a direct stake in local management and conservation (public coastal managers).

Although all respondents believed that there is a direct threat to the Ria Formosa salt marshes, only 54% acknowledged that deterioration has occurred (Figure 2A). This means that there was no consensus about this habitat's ecological status. The main recognized threats were water pollution (~ 70%) and plastic pollution (~ 40%). Other minor threats mentioned were the conversion of salt marsh areas for other economic purposes, erosion processes, effects of sea-level rise and the existence of invasive species. For private local businesses (such as tourism, fisheries, and aquaculture

exploitation), degrading ecosystems present a number of significant risks including reduced touristic capacity, reduced touristic visits, and reduced fisheries production capacity.

When asked about the definition of ESs, more than half (66%) recognized the concept, but only 36% work professionally in this scientific area or in related areas. The results indicated that the majority of survey respondents believe that ESs management is very important. Approximately 82% of respondents thought that current existing regional information/tools on ecosystem services were inadequate.

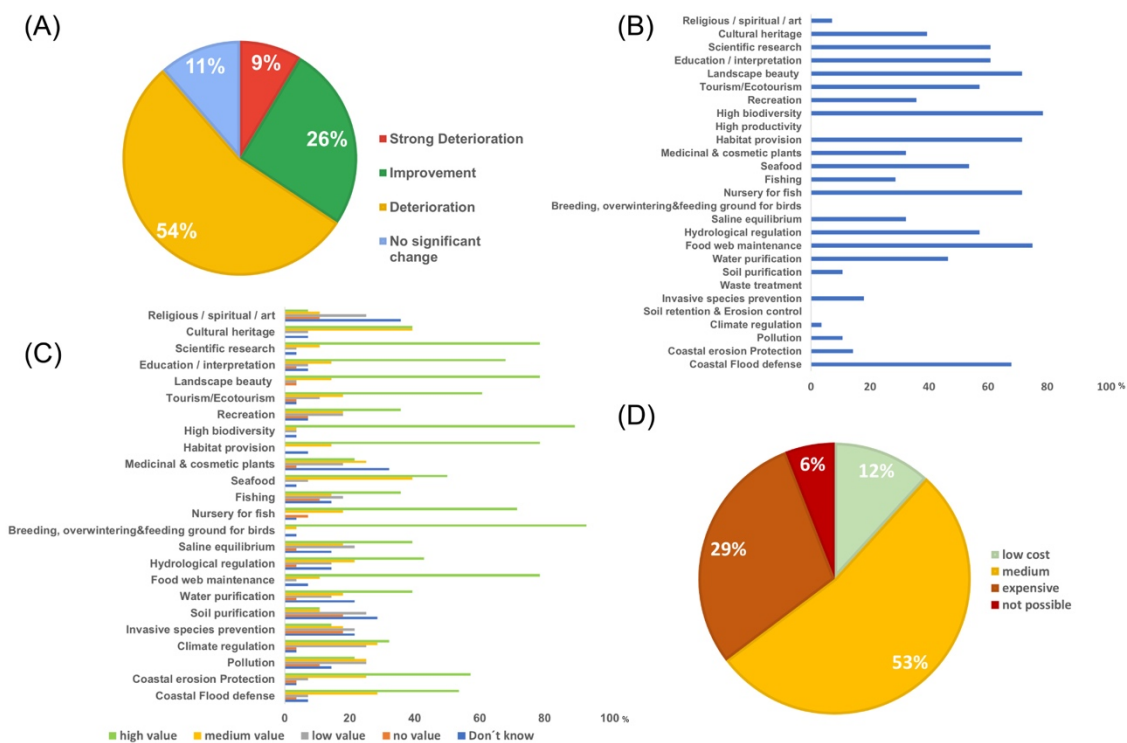


Figure 2. Collected responses on the questions: (A) Identification of the main pressures to salt marsh ES: problem recognition; (B) what are the major ES provided by the Ria Formosa salt marshes? (C) What is the ecological value of the ecosystem functions provided by the Ria Formosa salt marshes? (D) What is the overall cost of protection of the Ria Formosa salt marshes ecosystem services?

The most common salt marsh advantages (>60%) are coastal flood defense, food web maintenance nursery for fish, habitat provision, high biodiversity, landscape beauty, education/interpretation, and scientific research (Figure 2B). Among those benefits, the most valuable are food web maintenance, fish nurseries, habitat provision, high biodiversity, landscape beauty, sites for education/interpretation, and locations for scientific research; however, their function as a bird breeding, overwintering & feeding ground is also important (Figure 2C). Participants recognized the value in many of the common benefits that a healthy ecosystem can provide to a community (mostly related with biological functions), whether they knew they were talking about ESs or just the habitat.

Although most respondents could estimate the ecological value of marsh ESs, this task became difficult when discussing the economic value of these systems. High economic values were prescribed to coastal erosion protection, food web maintenance, breeding, overwintering and feeding ground for birds, tourism/ecotourism, landscape beauty. In 2019, the majority of the stakeholders believed the cost of protection for the Ria Formosa salt marshes ESs was medium (Figure 2D).

Approximately 47% of the respondents recognized the existence of a coastal management strategy applied to Ria Formosa salt marshes ESs, but 43% disagreed with the actual regional management objectives. Approximately 83% of the respondents strongly agreed that the community also has responsibility for protecting the salt marsh ESs, but only 30% agreed that the community has the right to use the salt marsh ESs for their benefit. Indeed, only 23% of the respondents believed that their opinions were considered when decisions about the management of the salt marsh ESs were made. The high degree of involvement may fill knowledge gaps and provide stimuli for cooperation and private engagement (Ruiz-Frau et al., 2017).

4. Do perceptions differ depending on the stakeholder?

Most of the respondents (approximately 45%) thought that the best way of communicating the importance of ESs is through the combination of mapping and other assessment methods and tools but also by improving communication and awareness-raising methods (approximately 35% of the respondents). Respondents agreed that for stakeholders to participate in ESs management we need to improve communication and awareness-raising methods (41%) but also produce guidance/documents and best practices (41%).

The majority of respondents who did not recognize the concept of ESs came from the private (business) sector, but there were also a few from public institutions with no idea about the ES concept. This can be explained by public stakeholders' preferences about different habitats or ecosystem services (de Juan et al., 2017). Diverse stakeholder profiles may express varying preferences for ecosystem services planning and management, depending on their knowledge, values and connections (e.g. place attachment) to the landscape (Lamarque et al., 2011; Stosch et al., 2019).

The results suggest that stakeholders from public institutions are better informed than private companies. Only 31% of the private companies operating in this area, the core 'habitat users' (as touristic operators), are familiar with the ESs concept and its application. In addition, only 25% of the total respondents make use of ESs maps in their work. This means that although 66% recognized the ESs concept, not everyone was familiar with ES methodologies or even knew what ESs are. The recognition of salt marsh threats means that, although the majority of the respondents recognized the salt marshes' ecological importance, they could not connect salt marshes and ESs. There might be a barrier in the way that the importance of ES is communicated to private individuals (McKinley et al., 2019; Stosch et al., 2019). Social, cultural and economic contexts such as education level, type of employment, interests and traditions influence

stakeholder perception of ecosystem services (Cebrián-Piqueras et al., 2017). Notwithstanding the highlighted challenges, the survey showed a clear opportunity for successful management of marshes, as the majority of respondents recognized the high ecological and economic benefits of marshes ESs.

5. Conclusions

If ecosystem service science is to be operationalized and used by decision-makers, an in-depth understanding of its local implementation, management, opportunities and challenges is needed (Sitas et al., 2014). The present study presents an initial assessment of stakeholders' perceptions about salt marsh ecosystem services value and conservation in a natural park in Portugal. Deterioration of the salt marshes was perceived as relevant by only 54% of the respondents.

Analysis of the collected dataset shows how stakeholders' perceptions may differ according to stakeholder type. Although most respondents were able to estimate the ecological value of the marsh ecosystem services, this task became difficult when discussing the economic value of these systems. The results suggest that private companies are interested in information about the environment but most of them do not fully understand what ecosystem services mean. Although they expressed some familiarity with the subject, its concept (and monitoring techniques) was less understood. Moreover, not all decision-makers were familiar with the ecosystem services concept. Providing more information to all audiences on the specific strengths of local ecosystem services will strengthen the conservation strategy for these environments.

Despite study limitations, the outcome challenges can inspire more efficient communication approaches for empowering ecosystem services management and to make it more participative. The conducted survey should be repeated in the coming years to monitor the evolution of stakeholders' perceptions on marsh services values and conservation in the Ria Formosa lagoon.

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