

Molluscs as bioindicators of the regression of a *Zostera marina* bed in southern Spain

Javier Urra¹, Jessica Narros¹, Ángel Mateo-Ramírez¹, Pablo Marina¹, Mouna Antit², José Luis Rueda³ and Carmen Salas^{1*}

¹ University of Málaga, Biología Animal, Spain

² Université de Tunis El Manar, UR11ES12 Biologie de la Reproduction et du Développement animal, Tunisia

³ Instituto Español de Oceanografía, Centro Oceanográfico de Fuengirola, Spain

Seagrass beds are experiencing a sharp decline worldwide and, unfortunately, a continued decrease is expected, mainly due to anthropogenic influence, with negative repercussions for coastal biodiversity. One of these declining seagrasses is *Zostera marina* L. which is the most widespread in the northern hemisphere (North America, Europe and Asia). One of the most recent observed cases of eelgrass decline occurred in the Special Area of Conservation “Acantilados de Maro - Cerro Gordo” (southern Spain) between 2005 and 2007. These eelgrass beds were probably the deepest ones (5–18 m depth) in Europe and supported a highly diverse associated fauna (Rueda et al., 2009).

Different methods have been designed for evaluating ecological integrity or condition status of coastal waters. In general, there is an increasing interest in developing assessment tools for different physicochemical or biological elements of the ecosystems. Taking this into account, what might be the characteristics of a good ecological indicator? In Europe, and within the Water Framework Directive (Directive 2008/56/EC), biological elements are limited to composition, abundance (and biomass) of phytoplankton, other aquatic flora, benthic invertebrate fauna, and fishes. The data used to quantify these biological elements describe distributions/gradients, ratios, biodiversity indices and classification schemes. Environmental science must complement the structural ecosystem properties through an approach towards the ecosystem function and dynamics. In this way, trophic webs constitute probably an appropriate type of measurement of the ecosystem function.

Molluscs constitute ca. 25% of the benthos and their dynamics have been shown to reflect the dynamics of the whole community. Therefore, we analyzed the changes in the molluscan taxocoenosis associated with the regression of a *Zostera marina* bed from the SAC of Acantilados de Maro - Cerro Gordo from 2005 to 2009. We analyzed changes in biotic variables: species richness, abundance, diversity index, biotic indexes and trophic diversity of the molluscan assemblage, and abiotic variables: grain size and percentage of organic matter in sediment.

The aim was to check which of these indicators expressed better the environmental changes caused by the regression of the eelgrass bed. Species richness was the best indicator for showing loss of species and the Trophic Index (Danovaro et al., 2004) was the indicator that better expressed the drastic change of the assemblage, with a strong reduction of the trophic groups. Regarding biotic indexes, AMBI, MAMBI and MEDOCC, the absence of eutrophication makes these indicators less accurate to reflect the environmental change caused by the loss of the eelgrass bed. In fact, the best descriptor for this event would be the integrity of seafloor, because the regression of the eelgrass bed changes completely the bottom landscape.

The loss of seagrasses and its effects are going to be one of the important topics in future scientific studies due to this continuous declining trend, so tools allowing us to anticipate this threat are becoming essential. In southern Spain, protection of seagrasses is urgently needed for preserving not only the beds but also the diverse communities associated with them.

References

- Danovaro, R., Dell'Anno, A., Pusceddu, A. (2004). Biodiversity response to climate change in a warm deep sea. *Ecol. Lett.*, 7(9): 821-828.
- Rueda, J.L., Gofas, S., Urra, J., Salas, C. (2009). A highly diverse molluscan assemblage associated with eelgrass beds (*Zostera marina* L.) in Europe: Micro-habitat preference, feeding guilds and biogeographical distribution. *Sci. Mar.*, 73 (4): 679-700.

Keywords: Seagrass beds, Alboran sea, Eelgrass loss, Trophic index, Bioindicators

Conference: XIX Iberian Symposium on Marine Biology Studies, Porto, Portugal, 5 Sep - 9 Sep, 2016. **Presentation Type:** Oral Presentation

Topic: 2. GLOBAL CHANGES, INVASIVE SPECIES AND CONSERVATION

Citation: Urra J, Narros J, Mateo-Ramírez Á, Marina P, Antit M, Rueda J and Salas C (2016). Molluscs as bioindicators of the regression of a *Zostera marina* bed in southern Spain. *Front. Mar. Sci. Conference Abstract: XIX Iberian Symposium on Marine Biology Studies*. doi: 10.3389/conf.FMARS.2016.05.00053

Received: 29 Apr 2016; **Published Online:** 02 Sep 2016.

* **Correspondence:** Ms. Carmen Salas, University of Málaga, Biología Animal, Málaga, Málaga, 29071, Spain, casanova@uma.es

