

REACTIONS OF BENTHIC PREDATORS TO MORTALITY EVENTS: A TIME-LAPSE APPROACH

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Abstract

The Northern Adriatic Sea is a case study for globally increasing coastal hypoxia and anoxia. We documented the course of events after experimentally induced, small-scale (0.25 m²) mortalities here. The time-lapse camera revealed a clear sequence of predators and scavengers – fish, hermit crabs and gastropods – that removed the dead and decaying organisms within several days. Post-anoxia processes should be incorporated into management plans for sensitive areas.

Keywords: *Adriatic Sea, Anoxia, Fishes, Mortality, Behaviour*

Introduction

Hypoxia and anoxia are key, and increasing, threats to shallow coastal ecosystems worldwide [1]. The Northern Adriatic Sea is a recognized area for hypoxia- and anoxia-related community changes and mortalities [2]. Little, however, is known about immediate post-anoxia events and long-term recovery. We employed a new system (EAGU; Fig. 1) which creates and fully documents small-scale anoxia (50 x 50 x 50 cm) *in situ* [3]. The instrument combines photo-documentation with detailed chemo-physical analyses (sensor array) and allows the behaviors and mortalities of benthic organisms to be analyzed during and after oxygen depletion.

Material and Method

The EAGU device was positioned on a soft-bottom in 24 m depth (two deployments: August, September 2009) in the Gulf of Trieste, Northern Adriatic Sea. The system was initially positioned in a closed configuration (plexiglass chamber) over benthic organisms for 60 h to induce mortality. Then, the open configuration (aluminium frame) was used for another 2–3 d. The EAGU yielded ca. 6000 images which can be viewed and analyzed separately or as a film.

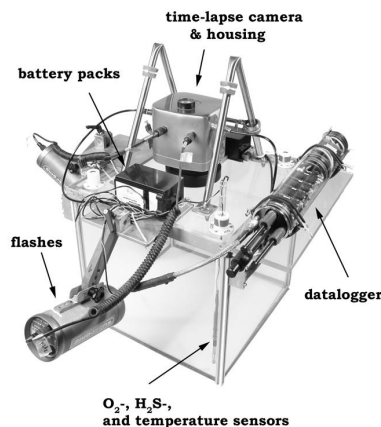


Fig. 1. Experimental Anoxia Generating Unit (EAGU) with instrument lid on plexiglass chamber. ch: camera housing, dl: datalogger, eb: battery, fl: flashes, os: oxygen sensor, sp: sensor port

Results and Discussion

The EAGU successfully created anoxia within three days, and most benthic organisms died. Analogous to dredge damage [4], the moribund/dead organisms attracted predators/scavengers, which removed most of the dead material within days. The analysis showed that fish (*Gobius niger*; *Diplodus vulgaris*, *Serranus hepaticus*) were the first post-anoxia visitors (after 9 min); their numbers gradually decreased during the deployment, suggesting that most of the suitable dead material was consumed early. The second and third group arriving were hermit crabs and gastropods. They mainly fed on remains not used by fishes (e.g. sponges, ascidians) (Fig. 2). After extreme events, measurements need to be taken to protect the remaining living marine resources.

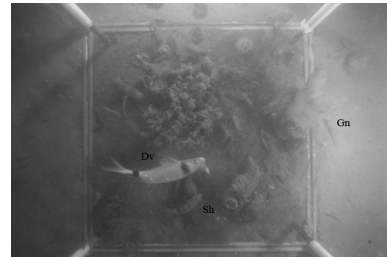


Fig. 2. Three fish species initially attracted by benthic mortality (Gn *Gobius niger*; Dv *Diplodus vulgaris*, Sh *Serranus hepaticus*)

References

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