

Assessment of factors affecting juvenile penaeid shrimp distribution in nearshore nursery areas in Maputo Bay reveals substantial variation in habitat use

Daniela Carvalho de Abreu ^a, Alvaro Albino Vetina ^b, Júlia Matsombe ^a, Kelvin da Conceição ^c, Carlos Verão ^a, Adriano Macia ^a and Per-Olav Moksnes ^d

^a Department of Biological Sciences, Eduardo Mondlane University, C.P. 257, Maputo, Mozambique ; ^b Natural History Museum, Eduardo Mondlane University, C.P. 257, Maputo, Mozambique; ^c Laboratory of Shallow Sea Aquaculture, Faculty of Bioresources, Mie University, Mie, Japan ; ^d Department of Marine Sciences, Faculty of Science, University of Gothenburg, Box 461, SE-405 30, Göteborg, Sweden.

Email addresses: danielac.deabreu@gmail.com (presenting author); aavetina@gmail.com, komar.conceicao@gmail.com, carlosverao19@gmail.com, julialourenco3@gmail.com, adriano@zebra.uem.mz, per.moksnes@marine.gu.se

Extended Abstract for ORAL PRESENTATION (to be performed by the first author)

Background

Due to complex interactions of biotic, abiotic and landscape factors, the nursery value of nearshore habitats shows large geographical variation, even for the same habitats within systems. It is therefore important to assess the factors affecting juvenile distribution within nurseries for an efficient conservation of coastal ecosystems and management of commercial fishery resources. Some penaeid shrimp species are reported to have a preference for mangroves as nursery habitat, whereas other are more widespread, occurring in seagrass beds, mud flats, mangrove channels, etc. Although temporal and spatial variations of juvenile penaeid shrimp in different shallow water habitats are relatively well described the factors controlling juvenile shrimp abundance and distribution within and between coastal areas are still poorly understood, including the importance of mangroves for juvenile recruitment. The aim of this study is to expand the investigation on spatial and temporal pattern of three commercially important penaeid shrimp species in Maputo Bay, southern Mozambique (*Penaeus indicus*, *Metapenaeus monoceros* and *Metapenaeus stebbingi*), and to identify factors that influence their distribution and abundance within four estuarine and coastal nursery areas. Quantitative data on juvenile shrimp densities, abiotic, biotic environmental variables and landscape factors were obtained and analysed for two different seasons.

Methods

To assess how the distribution of juvenile shrimp in shallow habitats varies in relation to physical and biological variables, sampling of penaeid shrimp, potential shrimp predators, distance to mangrove habitats and other biological and physical variables were carried out based on standard sample collection and measurement methods, in four potential nursery areas in Maputo Bay: Incomati, Espírito Santo, and Maputo River estuaries, and the Bembe area during two different seasons (dry and wet).

Results

The results showed that the nursery areas were distinctly different in e.g. salinity, sediment composition, and predator abundance, and suggest that different factors were affecting the distribution of shrimp in each area. In the most exploited estuary, Espírito Santo, which

showed the overall highest number of shrimp, the density of all species appeared to be driven by turbidity. However, in Maputo River estuary the distribution of all shrimp species was best explained by the amount of benthic microalgae and the extent of mud and sandflats, whereas different factors appeared to affect each species in the Incomati River estuary. In the coastal area Bembe, the content of clay in the sediment (or the hydrodynamic environment) appeared to drive shrimp densities, resulting in a species-specific distribution.

Conclusions

The results suggest that the distribution of juvenile penaeid shrimp is driven by complex interactions of abiotic, biotic and landscape factors that may differ between apparent similar areas, making it difficult to generalize and define what constitute a good nursery area for these species. Instead the result suggests that the juvenile shrimp can make use of many different types of coastal environments as nursery areas, including both estuarine and marine areas. Overall, the results suggest productive mud- and sandflats, with or without fringing mangroves, constitute key nursery areas for penaeid shrimp in the study area. Maputo Bay is the second largest commercial shrimp fishing ground in Mozambique and this study may contribute with valuable scientific information to support a nursery area oriented sustainable management of the penaeid shrimp fishery.