

Temporal and spatial variation of fish community and their nursery in a tropical seagrass meadow

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Abstract

Fish species composition and spatio-temporal variability of the community were studied in a tropical seagrass meadow located in a lagoon in the eastern part of North Sulawesi. The diversity of fish community in the seagrass meadows was relatively high, with the Shannon-Wiener index ranging from 1.57 to 3.69. The family Apogonidae was the most dominant in abundance (8.27 ind./100 m²) and biomass (28.49 g/100 m²). At the species level, *Apogon lateralis* and *Sphaeramia orbicularis* were the most dominant species in abundance and biomass, respectively. For spatial distribution on species, the end, middle and mouth of the lagoon clustered together as a whole, which may be due to the substrate types found in those zones. The fish species, fish abundance and fish biomass were greater in the dry and wet seasons than in the transition season, which is explained by the strong monsoon, which provides a more suitable environment and food for the fish. The maximum length of 93.10% of the captured species was less than their length at maturity, indicating that seagrass meadows are nursery habitats for many fishes. Therefore, protection of the seagrass meadows is essential for fisheries and sustainable resource utilization.

Key words: seagrass meadows, fish assemblages, nursery function, North Sulawesi

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1 Introduction

Seagrass meadows are the key ecosystems that constitute important fishing grounds and critical nursery habitats for commercial species (Hemminga and Duarte, 2000; Nagelkerken et al., 2000). However, seagrass meadows are under constant threat worldwide. The changes in seagrass coverage may affect fish community structure, as many species utilize these habitats during their vulnerable early life history stages (Sobocinski et al., 2013; Unsworth et al., 2014). In some areas of the Coral Triangle, fauna associated with seagrass contributes at least 50% of fish-based food, in which juvenile fishes can comprise up to 26% of the catch (Unsworth et al., 2007a, 2014). Seagrass meadows support the fishery occurs in three ways: (1) seagrass meadows function as a nursery area for fisheries species, (2) they provide foraging and refuge habitat for the fauna species, and (3) they provide trophic subsidy to fisheries in adjacent and deep-water habitats (Gillanders, 2007; Heck et al., 2008; Lilley and Unsworth, 2014; Nordlund et al., 2018). Thus, it is in both environmental and economic interests to protect and manage seagrass mead-

ows effectively (de la Torre-Castro et al., 2014).

Southeast Asia is a hotspot of biodiversity, with enormous species richness (Sodhi et al., 2004), and the Indonesian coasts in particular harbor exceptionally high seagrass and fish diversity (Vonk et al., 2008, 2010; Pogoreutz et al., 2012). A great number of studies on the community structure of fishes that inhabit in seagrass meadows have been carried out in Indonesia, where living more than 300 species of fish live (Hutomo and Peristiwady, 1996; Manik, 2007; Du et al., 2016). However, these studies have focused only on fish communities in few areas, while the nursery function of seagrass meadows for fishes in North Sulawesi remains poorly described. Although a few studies have been carried out in Tanjung Merah and Tasikoki, near Kema, there is no information on the temporal and spatial variation of seagrass fish in this area. Understanding the nursery function of seagrass meadows is fundamental for interpreting the fluctuations of local stock and community structure (Silvano et al., 2000), which has implications for human food security (Davis et al., 2005; Hsieh et al., 2006). Therefore, considering the ecological and eco-

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