# Ecological characteritics of zooplankton in the northern waters of Nan'ao Island

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## Introduction

Zooplankton are small aquatic animals drifting in the water column with limited movement [1].Zooplankton suit to address hypotheses about ecological boundaries in ecological transition areas , for the transition of zooplankton assemblages relies on the the change of the physical and chemical conditions[2-5] . Consequently, assessing zooplankton community changes along season with relation to various environmental parameters could provide important information about the water masses seasonal transition.

The north waters of Nao'ao Island(NWNI) located on the southwest Taiwan Strait. The NWNI hydrodynamics is controlled by some water masses, such as the Han River freshwater, the Dongshan-Shantou open sea upwelling water, the strait warm water and the Zhe-Min coastal water [7] . And, there is an important aquaculture zone with the shellfish, algea and fish culture in the South China Coastal. The hydrodynamic changes is effect to the aquaculture production [8-10]. So this paper discussed the water masses effect on zooplankton on analyzed the relationship between the spatial-temporal changes of zooplanktonic ecological characteristics and some environmental parameters to provide some knowneladge for the aquaculture optimizing.

## Methods

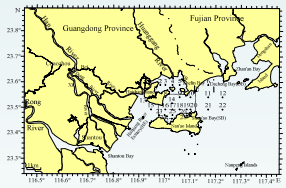


*Fig.1 Sampling area and location of the sampling stations*

Zooplankton samples were collected using a 0.2m$^2$ opening net, having 0.500μm mesh during four cruises form April 2011 to February 2012 (Fig. 1).

Data analysis were performed with R software.

## Result

### *Zooplankton species composition*

A total of 158 zooplankton species were identified, including 17 groups. In addition, Copepod species was most in every cruises, larva species was next; hydrozoan species rose in Aug and disappeared in Feb (Fig. 2). Zooplankton species were 46, 104, 96 and 44 from Apr to Feb.

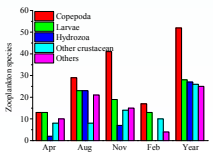


*Fig.2 Zooplankton species composition (Other crustacean included Cladocera, Ostrcoda, Amphipoda, Mysidacea, Decapoda, Isopoda and Euphausiacea, and others inclouded Protidta, Ctenophara, Siphonophorae, Cheatognaths, Annelida, Appendiculata and Thaliacea)*

### *Zooplankton dominant species*

The dominant species whose abundance contribution was greater than 2% by Simper analysis in Feb was simpler than others. *Centropages tenuiremis* was only one as dominant species in all the cruises. The spatial distribution of the major dominant species was different, especially in IB (Fig.3).

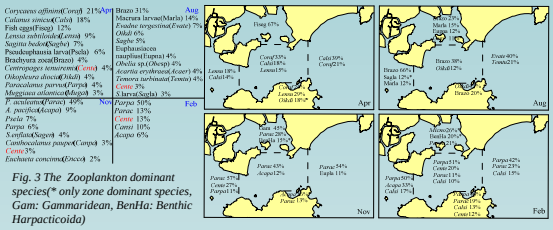


*Fig. 3 The Zooplankton dominant species(* only zone dominant species, Gam: Gammaridean, BenHa: Benthic Harpacticoida)*

### *Zooplankton biomass, abundance and diversity*

The mean values of zooplankton biomass and abundance were 98.68 mg/ m$^{-3}$ and 144.67ind/m$^{-3}$ . They in Apr were lower than other cruises. Zooplankton biomass in HE was more than other zones, and abundance in DB was most(Fig.4).

The *D* and *H'* mean values were 2.42 and 2.78.The *H'* spatial-temporal divergences were small expert IB in Apr. *D* in Feb was smallest, and D in IB was not better than other zones.

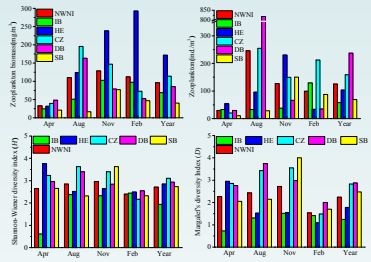


*Fig. 4 The spatial-temporal distribution of Zooplankton biomass, abundance and diversity*

### *Environmental influence on the zooplankton community*

The species-environment relationships, as indicated by db-RDA analysis, revealed that the spatial-temporal divergence of the zooplankton community(ZC) was obvious. The environmental variables explained 30% of the temporal variation and 14~47% of the spatial variation form Apr to Feb (Fig. 5).

The spatial-temporal structure of zooplankton species composition was decided by the distribution of the dominant species.

### *The water mass effect on zooplankton*

The water masses changes effect on ZC could be implied by the salinity/temperature and zone/season explained the part of the ZC variation.

The different of the dominant species between IB and others revealed that the freshwater mass was dominant effect on ZC in IB , the downstream of Huanggang River Estuary, although the effect declined in Nov and Feb. Except DB, Brachyura zoea being dominant in NWNI implied that the freshwater was

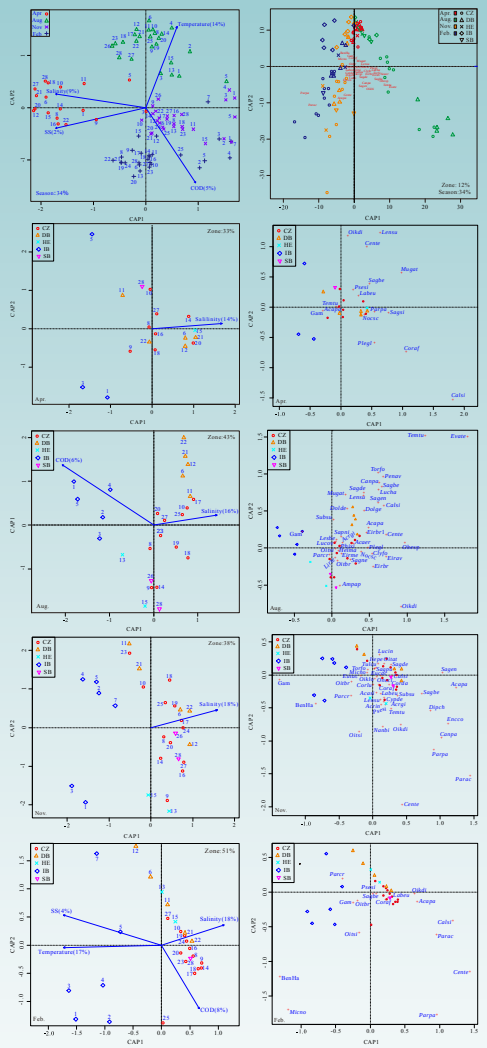


*Fig. 5 The species-environment relationships by bd-RDA (non-including larvae)*

dominant effect on CZ in the zone in Aug. The upwelling indicspecies, *Temora turbinate*[11-12], was the dominant species in DB, which implied that the upwelling mass invaded DB in Aug. The Min-Zhe coastal mass dominant effect on the zone was implied by that *Paracalanus parvus*, a Min-Zhe coastal mass indicspecies [13], was a dominant species in NWI in Feb.

## Conclusion

The ZC ecological characteritics in NWNI accorded with the other bays at Taiwan Strait. The spatial-temporal variation of the ZC structure was dominated by the changes of the waters masses.

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