Spatio-temporal distribution of nekton community structure and diversity change in Hangzhou Bay, CHINA

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PART

Subject background
(1) Estuarine bay (complexity salinity, high turbidity and well-mixed) is closely related to human life and productive activities as a unique ecosystem (Barbier et al., 2011);

(2) Population dynamics and influence mechanism of nekton in the estuarine bay was seriously disturbed by human activities;

(3) Estuarine bay waters serve as spawning, feeding and nursery grounds for fish larvae, juvenile and adult nekton (Nyitrai et al., 2012).
PART 02
Research object
Research object

Estuarine nekton

High abundance and biomass of nekton
Complex spatial patterns of nekton

Rich sources of nutrients
Diverse habitats

Bait

Food organism
PART 03
Research results
### Research results-1
**Nekton assemblages and composition**

<table>
<thead>
<tr>
<th>Eco-group</th>
<th>Species number</th>
<th>Mean Biomass</th>
<th>Mean Abundance</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spring</td>
<td>Summer</td>
<td>Autumn</td>
</tr>
<tr>
<td>Fish</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>20</td>
<td>15</td>
<td>21</td>
</tr>
<tr>
<td>Shrimp</td>
<td>8</td>
<td>11</td>
<td>7</td>
</tr>
<tr>
<td>Crab</td>
<td>3</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>Total</td>
<td>31</td>
<td>31</td>
<td>33</td>
</tr>
</tbody>
</table>

1. 57 taxa distributed among 23 families
2. Mean nekton biomass: Winter(fish) > Summer(shrimp)
3. Mean nekton abundance: Warm seasons(summer, autumn) > cold seasons (winter, spring)
4. Nekton of HZB were mainly composed of small near-shore species
Research results-2
Spatial distribution of nekton community

Spatial distribution of nekton biomass (kg/km$^2$) in HZB

Spatial distribution of nekton abundance ($\times 10^3$ind./km$^2$) in HZB
Research results-3
Dominant species of nekton

Dominant species (IRI>1000):

**Fish:** *Miichthys miiuy*, *Collichthys lucidus*;

**Shrimp:** *Exopalaemon annandalei*, *Palaemon gravieri*;

**Crab:** *Portunus trituberculatus*. 

![Graph showing seasonal distribution of nekton species](image)
Research results - 4
Nekton species diversity

Diversity index ($H$), evenness index ($J$) and richness index ($d$):
(i) Warm seasons > cold seasons (biomass);
(ii) Opposite result (abundance in $H'$ and $J'$)

$AI$: 94 to 218
$MI$: -73 to 35
Large variation and unstable
Research results - 5
Seasonal differences of nekton community structure

(a) Hierarchical cluster analysis of nekton biomass in spring
(b) Hierarchical cluster analysis of nekton biomass in summer
(c) Hierarchical cluster analysis of nekton biomass in autumn
(d) Hierarchical cluster analysis of nekton biomass in winter

(a) Spring: 3 groups(60%);
(b) Summer: 4 groups(65%);
(c) Autumn: 3 groups(65%);
(d) Winter: 3 groups(55%).

ANOSIM analysis results: difference between seasons reached the significance level (Global $R=0.616$, $P=0.0001$)
Research results-6
Relationship between nekton and environmental variables

Redundancy analysis (RDA):
(a) negative correlated with salinity;
(b) DO and surface salinity positive correlated; negative correlated with DIP;
(c) Depth showed a significant positive correlation;
(d) Chla and surface temperature were highly positive correlated.
PART 04
Summary
The community of nekton in Hangzhou Bay showed significant spatio-temporal variation. With the index of $H'$, $J'$, $d$, $AI$, and $MI$, the community was not stable comfortably. The community of nekton could be divided into 3~4 groups in the 55%~65% similarity levels in four seasons. Physico-chemical factors were highly correlated with the nekton biomass.
Thank you for your attention!