Community Ecology of Polychaeta (Annelida) in Soft Bottom Macrobenthos of Southern South China Sea

Noor Shahida Rosli
Zainudin Bachok

Institute of Oceanography and Environment (INOS),
Universiti Malaysia Terengganu, MALAYSIA.
Polychaete

● Presence in various marine habitats (Frid, 2011).

● Constitutes more to the total macrobenthic animals:
  - abundance
  - biomass
  - number of species
  - number of individuals
- Semi-enclosed body of water.
- Large Marine Ecosystem (LME) - high biodiversity (Liu, 2013).
- Critical world trade routes (Morton and Blackmore, 2001).
Problem Statement and Justification

Species richness and species number -

Majority species are belong to the Indo-Malayan subregion (Al-Hakim and Glasby, 2004)

(Huang et al., 2010; Liu, 2013).

661 species
54 families
(Paxton and Chou, 2000)
Problem Statement and Justification

- Offshore polychaete study:
  
  SEAFDEC Expedition (1997-2000)

- Previous studies:
  
  - estuary
    (Nakao et al., 1989)
  
  - reef
    (Ibrahim et al., 2006)
  
  - coastal
    (Gholizadeh et al., 2012)
Objectives

Determination of the relationship between polychaetes community structures with sediment parameters in southern South China Sea
<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>No. of station</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 – 59</td>
<td>13</td>
</tr>
<tr>
<td>60 - 79</td>
<td>30</td>
</tr>
</tbody>
</table>
Field sampling
Results

12,477 individuals

47 families, 217 genera
Number of species: \((p<0.05)\) among areas

Lowest: Kuala Terengganu
Abundance of polychaetes

- **Total density**: \( p < 0.05 \) among areas

- **Lowest**: Kuala Terengganu \( (420 \pm 167 \text{ individuals/m}^2) \)
Diversity: $(p<0.05)$ among areas (3.88 to 5.65)
Evenness: $(p>0.05)$ among areas

Lowest: Kudat-Balambangan Island
Sediment characteristics

- Sediment types (%): sand, silt and clay
- Sand < silt & clay ($p<0.05$)
- Offshore sediments → **compounded** and **complicated**.

- **Compounded** → **mixture of various sediments** (silty-clay, silty-clay-loam, silt-loam and sandy-loam).

- **Complicated** → **patchy distribution**.

<table>
<thead>
<tr>
<th>Sediment texture</th>
<th>No. of stations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silty-clay</td>
<td>11</td>
</tr>
<tr>
<td>Silty-clay-loam</td>
<td>14</td>
</tr>
<tr>
<td>Silt-loam</td>
<td>10</td>
</tr>
<tr>
<td>Silt</td>
<td>1</td>
</tr>
<tr>
<td>Clay</td>
<td>3</td>
</tr>
<tr>
<td>Clay-loam</td>
<td>1</td>
</tr>
<tr>
<td>Loam</td>
<td>1</td>
</tr>
<tr>
<td>Sandy-loam</td>
<td>1</td>
</tr>
</tbody>
</table>
Sediment organic carbon (OC)

- **Highest**: Kuala Terengganu $(p<0.05)$
## Variation in abundance in sediment

<table>
<thead>
<tr>
<th>Group of sediment</th>
<th>Pekan-Dungun</th>
<th>Kuala Terengganu</th>
<th>Kudat-Balambangan Island</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silty-clay</td>
<td>523</td>
<td>308</td>
<td>534</td>
<td>1364.5</td>
</tr>
<tr>
<td>Silty-clay-loam</td>
<td>654</td>
<td>569</td>
<td>382</td>
<td>1604.8</td>
</tr>
<tr>
<td>Silt-loam</td>
<td>616</td>
<td>397</td>
<td>676</td>
<td>1688.9</td>
</tr>
<tr>
<td>Silt</td>
<td>-</td>
<td>398</td>
<td>-</td>
<td>398</td>
</tr>
<tr>
<td>Clay</td>
<td>-</td>
<td>-</td>
<td>861</td>
<td>861.3</td>
</tr>
<tr>
<td>Clay-loam</td>
<td>-</td>
<td>-</td>
<td>528</td>
<td>528</td>
</tr>
<tr>
<td>Loam</td>
<td>-</td>
<td>-</td>
<td>574</td>
<td>574</td>
</tr>
<tr>
<td>Sandy-loam</td>
<td>-</td>
<td>-</td>
<td>638</td>
<td>638</td>
</tr>
</tbody>
</table>
## Discussions

<table>
<thead>
<tr>
<th>No.</th>
<th>Location</th>
<th>Density (No. of ind/m²)</th>
<th>References</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Offshore Malaysia</td>
<td>567</td>
<td>Present study</td>
</tr>
<tr>
<td>2</td>
<td>North and South Vietnamese water</td>
<td>31.5</td>
<td>Trong et al., 2000</td>
</tr>
<tr>
<td>3</td>
<td>East Coast Peninsular Malaysia &amp; Gulf of Thailand</td>
<td>107</td>
<td>Piamthipmanus, 1999</td>
</tr>
<tr>
<td>4</td>
<td>East Coast of Peninsular Malaysia &amp; Gulf of Thailand</td>
<td>106</td>
<td>Yasin and Razak, 1999</td>
</tr>
<tr>
<td>5</td>
<td>Brunei, Malaysia (Sabah and Sarawak)</td>
<td>113</td>
<td>Piamthipmanus, 1998</td>
</tr>
</tbody>
</table>
Discussions

- **High** species diversity and evenness.

- Kuala Terengganu lowest in species number and abundance:
  - small area.
  - far from mainland.

- **Sediment type** is the **main factor** on **diversity and distribution** of polychaetes.
Conclusion

● Southern South China Sea - **high polychaete diversity**.

● Polychaete in southern South China Sea mainly found in **silty-clay, silty-clay-loam and silt-loam**.

● Significant **baseline information** – sustainable marine management ecosystem of southern South China Sea.

● Potential **bio-indicator** for mineral resources.
Acknowledgements

- Assoc. Prof. Dr. Zainudin Bachok
- Dr. Izwandy Idris
- Dr. Yusof Shuaib Ibrahim
- FOS LEO vessel & Sealink VANESSA 7 ship staffs
- INOS staffs
- Postgraduate friends

Terima kasih, thank you, diolch, merci, syukran!