The influence of hydrographic parameters on the vertical and spatial distribution of calanoid copepod species on the shelf off SW Sulawesi (Indonesia)

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Introduction and Aim

Science of the Protection of Indonesian Coastal Marine Ecosystems - A German-Indonesian Initiative in Earth System Research (2003 - 2007)

Marine ecological assessments of coral reefs, seagrass beds and plankton focussing on anthropogenic impacts, blast-fishing and land-based sources of pollution.

Zooplankton studies with focus on copepods and meroplanktonic larvae.

Is there a distinct separation between offshore and coastal regions in the copepod community structure?
Indonesian Throughflow

http://tryfan.ucsd.edu/woce_ioe/woce_ioe.htm
SW Sulawesi
Spermonde Archipelago

Outer rim

Outer shelf

Midshelf

Nearshore

Strait of Makassar

Sampling stations

September 2005
Hydrographical conditions

Temperature (°C)

Salinity

Nitrate (μMol)

Phosphate (μMol)

September 2005
Chlorophyll a

September 2005

Chl a [μg/l] At 3 m depth
Chlorophyll a concentration higher near shore
Near shore area phosphate enriched
Temperature, Salinity and Nitrate show southern inflow of colder, more saline and nitrate enriched water
SW inflow might be a result from a local upwelling event during the SE Monsoon
Zooplankton sampling

Sampling period: September 2005 (Dry season)

Zooplankton sampling: Apstein-net
Mesh size 200 μm
Stratified vertical tows

Species identification only for adult calanoid copepods
Vertical distribution

Temperature (°C)

Depth (m)

Salinity

Standing stock (ind. m⁻²)

Depth (m)
Total number of species: 67+ (+5 juvenile)

**Dominant group with 15+ species:**

- *Paracalanidae*
  - Acrocalanus gibber
  - Acrocalanus gracilis
  - Acrocalanus longicornis
  - Acrocalanus monachus
  - Bestiolina similis
  - Calocalanus spp.
  - Calocalanus pavo
  - Calocalanus plumulosus
  - Delius nudus
  - Paracalanus cf. tropicus
  - Paracalanus aculeatus
  - Paracalanus denudatus
  - Paracalanus indicus
  - Parvocalanus crassirostris
  - Parvocalanus scotti

**Other important species:**

- Canthocalanus pauper
- Cosmocalanus darwini
- Clausocalanus farrani
- Clausocalanus furcatus
- Metacalanus aurivilli
- Temora turbinata
- Acartia negligens
- Acartia erythraea
- Acartia pacifica
- Tortanus gracilis
Species number:  
- Near shore 9 – 20
- Midshelf 11 - 25
- Outer shelf 12 - 25
- Outer rim 21 - 36

Paracalanidae dominant at all stations: 70 – 90% of all adults

Dominant species:  
- Paracalanus indicus 9%
- Parvocalanus crassirostris 8%
- Bestiolina similis 6%
- Parvocalanus scotti 4%
- Paracalanus cf. tropicus 4%
Paracalanidae - Females

Paracalanus indicus

Paracalanus aculeatus

Bestiolina similis

Parvocalanus spp.

8000 ind. m⁻²
4000 ind. m⁻²
2000 ind. m⁻²
Oceanic - Coastal species

**offshore**

- Acartia danae
- Acrocalanus longicornis
- Calanopia australica, C. minor
- Candacia catula, C. curta,
  C. pachydactyla
- Centropages calaninus, C. elongatus
- Clausocalanus furcatus,
  C. mastigophorus
- Cosmocalanus darwini
- Euchaeta media
- Labidocera acuta
- Mecynocera clausi
- Pareucalanus attenuatus, P. sewelli
- Rhincalanus rostrifrons
- Scolecithricella timida
- Scolecithrix danae
- Subeucalanus crassus, S. mucronatus,
  S. pileatus, S. subcrassus
- Temora discaudata, T. stylifera
- Undinula vulgaris

**coastal**

- Acartia erythraea, A. pacifica
- Metacalanus aurivilli
- Pseudodiaptomus aurivilli, P. clevei
- Temora turbinata
- Tortanus gracilis, T. barbatus
Neritic species - Adults

Metacalanus aurivilli

Acartia erythraea

○ 2000 ind. m⁻²

○ 1000 ind. m⁻²

○ 500 ind. m⁻²

Temora turbinata

Tortanus gracilis

4536

2946
Oceanic Species - Adults

- **Clausocalanus farrani**
- **Subeucalanus pileatus**
- **Cosmocalanus darwini**
- **Canthocalanus pauper**

Legend:
- ● 2000 ind. m^{-2}
- ○ 1000 ind. m^{-2}
- ◼ 500 ind. m^{-2}
Summary - Calanoida

Higher abundance below 10 m at most stations

Species numbers distinctly higher at the offshore stations

Paracalanidae dominant at all stations, but importance differs

Offshore species composition considerably different from that of coastal stations

Other calanoid species are distinctly separated by their distribution
Conclusions

Clear separation between oceanic and coastal communities

Oceanic species hardly occur on the reef area

Coastal pollution probably does not result in a lower species number

Species of the Paracalanidae are not separated according to hydrography but rather by food preferences or competition
Thank you for your attention!!