

**DISTRIBUTION AND ABUNDANCE OF BENTHIC FORAMINIFERA IN THE
COASTAL WATERS AT KUALA PERLIS AND KUALA KEDAH**

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**SCHOOL OF MARINE AND ENVIRONMENTAL SCIENCES
UNIVERSITI MALAYSIA TERENGGANU**

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COASTAL WATERS AT KUALA PERLIS AND KUALA KEDAH**

By

NUR SAKINAH BINTI ABDUL RAZAK

Research Report submitted in partial fulfillment of

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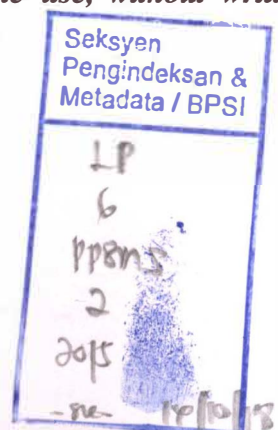
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**DECLARATION AND VERIFICATION REPORT
FINAL YEAR RESEARCH PROJECT**

It is hereby declared and verified that this research report entitled Distribution and Abundance of Benthic Foraminifera in The Coastal Waters at Kuala Perlis and Kuala Kedah by Nur Sakinah Binti Abdul Razak, Matric No. UK 28182 has been examined and all errors identified have been corrected. This report is submitted to the School of Marine and Environmental Sciences as partial fulfillment towards obtaining the Degree Bachelor of Science (Marine Science), School of Marine and Environmental Sciences, Universiti Malaysia Terengganu.

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.....

First Supervisor

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Official stamp:

Date:

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ABBREVIATIONS

μm	Micrometer
$^{\circ}\text{C}$	Celcius
G	Gram
L	Liter
mL	Milliliter

DISTRIBUTION AND ABUNDANCE OF BENTHIC FORAMINIFERA IN THE COASTAL WATERS AT KUALA PERLIS AND KUALA KEDAH

ABSTRACT

The distribution and abundance of benthic foraminifera and their relationship with the physical parameters, sediment texture and organic matter were studied in the coastal waters at Kuala Perlis and Kuala Kedah. A total of 15 genera, 11 families and 4 orders were determined with a relative abundance ($>2\%$). The living specimens of foraminifera were rare ($<2\%$) in this study therefore the total assemblage (living and dead) has been considered. The identified genera include *Ammobaculites* spp., *Ammomarginulina* spp., *Cribrostomoides* spp., *Tritaxilina* spp., *Textularia* spp., *Quinqueloculina* spp., *Asterorotalia* spp., *Pseudorotalia* spp., *Pararotalia* spp., *Ammonia* spp., *Bulimina* spp., *Discorbinella* spp., *Bolivina* spp., *Elphidium* spp. and *Nonion* spp. The assemblages were largely influenced by 4 genera namely, *Ammonia* spp. (57%), *Ammobaculites* spp. (10%), *Elphidium* spp. (9%), *Asterorotalia* spp. (9%) and *Pseudorotalia* spp. (9%). *Ammonia* spp. showed the most abundant of benthic foraminifera present in all sampling stations. Based on the result, it clearly can be seen that calcareous group was dominated compared to agglutinated group. Calcareous foraminifera prefer higher salinities (hypersaline) condition. The sediment texture mostly consisted of medium silt grained followed by coarse silt and fine silt. In term of organic matter, the contents of organic matter of the sediment for both transects did not influence much on the distribution of

foraminifera. Diversity indices showed that the value of Shannon-Wiener ($H' = 1.53$), Evenness ($J' = 0.36$) and Fisher alpha ($\alpha = 4.69$) for transect Kuala Kedah were high when compared to transect Kuala Perlis. The diversity of foraminifera assemblages increased further away from shore in both transects. The Pearson correlation showed that stress tolerant taxa such as *Quinqueloculina* spp. showed negative correlation with DO because they can tolerate with low oxygen content. *Cribrostomoides* spp. and *Quinqueloculina* spp. has strongly positive correlated with temperature and percentage of clay. *Ammomarginulina* spp. and *Bulimina* spp. showed positive correlation with percentage of sand. Last but not least, *Bolivina* spp. and *Nonion* spp. has positive correlated with DO, meanwhile only *Nonion* spp showed positive correlation with salinity. The Pearson correlation showed that the physical parameters such as temperature, dissolved oxygen, pH and salinity influenced majority of the genera found in this study. The interaction of environmental parameters influenced the foraminiferal assemblages in Kedah and Perlis waters.

TABURAN DAN KEPADATAN FORAMINIFERA BENTIK DI PERSISIRAN PANTAI DI KUALA PERLIS DAN KUALA KEDAH

ABSTRAK

Taburan dan kepadatan foraminifera bentik dan hubungan mereka dengan parameter fizikal, tekstur sedimen dan bahan organik telah dikaji di perairan pantai di Kuala Perlis dan Kuala Kedah. Sebanyak 15 genera, 11 famili dan 4 order telah ditentukan dengan kepadatan ($> 2\%$). Spesimen hidup foraminifera jarang ditemui ($< 2\%$) dalam kajian ini maka jumlah himpunan (hidup dan mati) telah dipertimbangkan. Genus yang dikenal pasti termasuk *Ammobaculites* spp., *Ammomarginulina* spp., *Cribrostomoides* spp., *Tritaxilina* spp., *Textularia* spp., *Quinqueloculina* spp., *Asterorotalia* spp., *Pseudorotalia* spp., *Pararotalia* spp., *Ammonia* spp., *Bulimina* spp., *Discorbinella* spp., *Bolivina* spp., *Elphidium* spp. dan *Nonion* spp. Sebahagian besarnya himpunan foraminifera ini dipengaruhi oleh 4 genera iaitu *Ammonia* spp. (57%), *Ammobaculites* spp. (10%), *Elphidium* spp. (9%), *Asterorotalia* spp. (9%) dan *Pseudorotalia* spp. (9%). *Ammonia* spp. menunjukkan yang paling banyak di antara foraminifera bentik hadir di semua stesen persampelan. Berdasarkan keputusan ini, ia jelas dapat dilihat bahawa kumpulan calcareous menguasai kedua-dua transet berbanding dengan kumpulan agglutinated. Foraminifera calcareous yang lebih cenderung kepada kemasinan tinggi (hypersaline). Tekstur sedimen kebanyakannya terdiri daripada kelodak sederhana secara terperinci diikuti dengan kelodak kasar dan lumpur halus. Dari segi bahan organik, kandungan bahan organik daripada sedimen untuk kedua-dua transet tidak mempengaruhi begitu banyak mengenai taburan foraminifera. Indeks kepelbagaian

menunjukkan bahawa nilai Shannon-Wiener ($H' = 1.53$), kesamaan ($J' = 0.36$) dan Fisher alpha ($\alpha = 4.69$) bagi transet Kuala Kedah adalah tinggi berbanding transet Kuala Perlis. Kepelbagaian himpunan foraminifera meningkat apabila berada lebih jauh dari pantai bagi kedua-dua transet. Korelasi Pearson menunjukkan bahawa tekanan taksa toleran seperti *Quinqueloculina* spp. menunjukkan korelasi negatif dengan DO kerana ia boleh bertolak ansur dengan kandungan oksigen yang rendah. *Cribrostomoides* spp. dan *Quinqueloculina* spp. sangat positif dengan suhu dan peratusan tanah liat. *Ammomarginulina* spp. dan *Bulimina* spp. menunjukkan korelasi positif dengan peratusan pasir. Akhir sekali, *Bolivina* spp. dan *Nonion* spp. sangat positif dengan DO, sementara itu hanya *Nonion* spp menunjukkan korelasi positif dengan kemasinan. Korelasi Pearson menunjukkan bahawa parameter fizikal seperti suhu, oksigen terlarut, pH dan kemasinan mempengaruhi majoriti genera yang terdapat dalam kajian ini. Interaksi parameter alam sekitar mempengaruhi himpunan foraminifera di perairan Kedah dan Perlis.