

**A STUDY ON DIFFUSE ATTENUATION COEFFICIENT OF  
LIGHT ( $K_d$ ) AT CORAL REEF AREA OF BIDONG ISLAND**

**HARTINI BT MOHD MUKHTAR AFFANDI**

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2014**

**SCHOOL OF MARINE SCIENCE AND ENVIRONMENT  
UNIVERSITI MALAYSIA TERENGGANU**

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PUSAT PEMBELAJARAN DIGITAL SULTANAH NUR ZAHIRAH  
UNIVERSITI MALAYSIA TERENGGANU (UMT)  
21030 KUALA TERENGGANU

1100093354		

Lihat Sebelah

**A STUDY ON DIFFUSE ATTENUATION COEFFICIENT OF LIGHT ( $K_d$ ) AT  
CORAL REEF AREA OF BIDONG ISLAND**

**By**

**Hartini Binti Mohd Mukhtar Affandi**

**Research Report submitted in partial fulfillment of  
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SCHOOL OF MARINE SCIENCE AND ENVIRONMENT  
UNIVERSITI MALAYSIA TERENGGANU

DECLARATION AND VERIFICATION REPORT  
FINAL YEAR RESEARCH PROJECT

It is hereby declared and verified that this research report entitled A Study On Diffuse Attenuation Coefficient Of Light (Kd) At Coral Reef Area Of Bidong Island by Hartini Mohd Mukhtar Affandi Matric No UK26678 have been examined and all errors identified have been corrected. This report is submitted to the Department of Marine Science as partial fulfillment towards obtaining the Degree of Marine Biology of Faculty of Maritime Studies and Marine Science, Universiti Malaysia Terengganu.

Verified by:

First Supervisor

Name: DR. MD. SUFFIAN B. IDRIS  
Lecturer  
School of Marine Science and Environment  
Universiti Malaysia Terengganu

Date: 15/6/2014

Second Supervisor

Name:  
Official stamp: Date: 15.06.2014

DR. LEE JEN NIE  
Pensyarah  
Pusat Pengajian Sains Marin dan Sekitaran  
Universiti Malaysia Terengganu  
21030 Kuala Terengganu

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## LIST OF ABBREVIATIONS

Kd	-	light attenuation coefficient
nm	-	nanometer
km	-	kilometer
Zeu	-	zone euphotic depth
CC%	-	live coral cover percentage

## ABSTRACT

The coefficient of vertical light attenuation ( $K_d$ ) can describes the underwater light field, with the variability of attenuation light in coral reef ecosystems. This experiment shows that attenuation can be vary with order of distance in near shore environment, increasing or decreasing with proximity to land and to the depth. Also due to various factors that may influence the light to attenuate into the water column. As Euphotic zone depth ( $Z_{eu}$ ), defines as the water body which the solar radiation diminishes to 1% of its initial value at the surface. Open ocean waters usually recorded with low  $K_d$  value. When light is attenuated by these water constituents,  $K_d$  increases as  $Z_{eu}$  decreases. These light attenuation plays a role in determining the rate of live coral cover of coral reef area. This experiment were done mostly to characterize  $K_d$  in different stations around Bidong Island and the variations of  $K_d$  and zone euphotic depth ( $Z_{eu}$ ) reading on reef coral community. Twenty six data were collected around Bidong Island, with eleven main stations. Out of four stations (St1,St2.St3,St4) were do coral quadrates set in order to infer coral reef community composition within live coral cover on the correlation of the light attenuation of water. The distance from shore also being compared in order to observed the differences of light diffusion according to deeper depth. Average  $K_d$  reading data indicates a clear water without any high turbidity occurs around Bidong Island.  $K_d$  data are shows a poor relation with distance from ashore that may influences external and internal factors. The relationship of live coral with  $K_d$  in this experiment is also poor, but it usually used in determining the light factor that may affect the coral health. Significant changes in the water optical parameters in coral reef areas usually needed a long term monitoring to

examine the impacts of these factors on with extra experiment on the community structure, diversity and coral health. An euphotic zone depth shows that the light can penetrates up to 25 % and the live coral abundance not affected much on the light factors.

Kajian mengenai pekali pengecilan/pemupusan resapan cahaya ( $K_d$ ) di sekitar kawasan terumbu karang di Pulau Bidong.

### ABSTRAK

Pekali pemupusan atau pengecilan cahaya menegak ( $K_d$ ) menerangkan bidang cahaya di dalam air, dengan kepelbagaian cahaya pemupusan yang juga ada di dalam ekosistem terumbu karang. Eksperimen ini menunjukkan bahawa pengecilan atau pemupusan boleh berbeza-beza dengan faktor jarak dalam persekitaran pantai terdekat, peningkatan atau penurunan dengan kedalaman. Juga disebabkan oleh pelbagai faktor yang boleh mempengaruhi cahaya untuk melemahkan ke dalam ruang air. Zon Euphotic mendalam ( $Z_{eu}$ ) pula mentakrifkan sebagai badan air yang radiasi solar terhapus kepada 1% daripada nilai asalnya di permukaan. Perairan laut terbuka biasanya dirakam dengan nilai  $K_d$  rendah. Apabila cahaya dilemahkan oleh jujuk air,  $K_d$  meningkatkan dan  $Z_{eu}$  berkurangan. Pemupusan atau pengecilan cahaya memainkan peranan dalam menentukan kadar perlindungan karang hidup di kawasan terumbu karang. Eksperimen ini dilakukan kebanyakannya untuk mencirikan  $K_d$  di stesen yang berbeza di sekitar Pulau Bidong dan variasi  $K_d$  dan zon euphotic mendalam ( $Z_{eu}$ ) membaca kepada kawasan karang. Dua puluh enam data dikumpulkan di sekitar Pulau Bidong, dengan sebelas stesen utama. Daripada empat stesen ( $St_1$ ,  $St_2$ ,  $St_3$ ,  $St_4$ ) adalah dilakukan kaedah quadrates untuk membuat kesimpulan mengenai komposisi komuniti terumbu karang yang hidup secara langsung dengan korelasi pengecilan cahaya air. Jarak dari pantai juga dibandingkan untuk diperhatikan perbezaan penyebaran cahaya mengikut dasar yang lebih dalam. Purata bacaan data  $K_d$  menunjukkan keadaan air jernih tanpa sebarang kekeruhan

yang tinggi berlaku di sekitar Pulau Bidong. Data Kd adalah menunjukkan hubungan yang lemah dengan perbandingan jarak dari pantai yang boleh mempengaruhi faktor-faktor luaran dan dalaman yang lain. Hubungan karang hidup dengan Kd dalam eksperimen ini juga adalah rendah , tetapi ia biasanya digunakan dalam menentukan faktor cahaya yang boleh menjejaskan kesihatan karang. Perubahan ketara dalam parameter optik air di kawasan terumbu karang biasanya diperlukan pemantauan jangka panjang untuk mengkaji kesan faktor-faktor ini di dengan eksperimen tambahan pada struktur masyarakat, kepelbagaian dan kesihatan karang. Kedalaman zon euphotic menunjukkan bahawa cahaya boleh menembusi sehingga 25 % dan komposisi karang hidup tidak dipengaruhi banyak oleh faktor-faktor cahaya.