

Abstract of thesis presented to the Senate of Universiti Malaysia Terengganu in
fulfilment of the requirements for the degree of Master of Science

**THE EFFECTS OF TWO EMERGENT MACROPHYTES
(*Hanguanamalayana* AND *Pandanus helicopus*) ON THE WATER
PARAMETERS AND SEDIMENTATION RATES IN TASIK BEROMBAK,
SETIU, TERENGGANU**

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Emergent macrophytes plays crucial role in maintaining health and functionality of lake ecosystems, but their rapid growth can have adverse effects. In Tasik Berombak, Setiu, anthropogenic activities have altered macrophyte abundance and lake structure, with *Hanguana malayana* emerging as a dominant species, reducing lake's surface area. However, the specific impacts of *H. malayana* on Tasik Berombak remain poorly understood. This study aimed to investigate the effects of emergent macrophytes on water parameters and sedimentation rates in the lake. Three sampling sites were selected: areas dominated by *H. malayana*, areas dominated by *Pandanus helicopus*, and a non-vegetated control site. Kruskal-Wallis test indicated that concentrations of chlorophyll-a and total dissolved nitrogen (TDN) at *H. malayana*-dominated site were significantly different from those at *P. helicopus*-dominated and non-vegetated sites, $H(2) = 8.3$, $p = 0.015$ (chlorophyll-a); $H(2) = 15.7$, $p < 0.001$ (TDN). *Hanguana malayana*-dominated site had the highest chlorophyll-a (0.02 ± 0.01 mg/L) as compared to *P. helicopus*-dominated (0.02 ± 0.01 mg/L) and non-vegetated sites (0.01 ± 0.01 mg/L). By contrast, the concentration of TDN was the lowest in *H. malayana*-dominated site (0.22 ± 0.02 ppm), as compared to *P. helicopus*-dominated (0.31 ± 0.07 ppm) and non-vegetated sites (0.38 ± 0.13 ppm). Total suspended solid (TSS) values varied significantly across all three sites, H

(2) = 23.0, $p < 0.001$, with the highest mean TSS value observed in *P. helicopus*-dominated area (8.60 ± 4.38 mg/L), followed by *H. malayana*-dominated area (6.09 ± 3.37 mg/L) and non-vegetated area (3.67 ± 0.76 mg/L). Sediment deposition rate was significantly higher in the unvegetated area compared to the vegetated area, $H(2) = 15.0$, $p < 0.001$. The sedimentation rate in non-vegetated area was 0.132 ± 0.092 g/m²/day, while in *H. malayana*-dominated and *P. helicopus*-dominated areas was 0.067 ± 0.01 g/m²/day and 0.03 ± 0.015 g/m²/day, respectively. Each sampling site also displayed different controlling factors which influenced sedimentation rates. Total dissolved phosphorus (TDP) was the primary factor in vegetated areas, while pH was most influential in non-vegetated area. In conclusion, emergent macrophytes significantly influence water quality parameters and reduce sedimentation rates in Tasik Berombak.

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**KESAN DUA MAKROFIT MUNCUL (*Hanguana malayana* DAN *Pandanus helicopus*) TERHADAP PARAMETER AIR DAN KADAR PEMENDAPAN DI
TASIK BEROMBAK, SETIU, TERENGGANU**

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Makrofit muncul memainkan peranan penting dalam mengekalkan kesihatan dan kefungsi ekosistem tasik, tetapi pertumbuhannya yang cepat membawa kesan buruk. Di Tasik Berombak, Setiu, aktiviti-aktiviti antropogenik telah mengubah kelimpahan makrofit dan struktur tasik, dengan *Hanguana malayana* sebagai spesies dominan yang mengurangkan keluasan permukaan tasik. Walau bagaimanapun, kesan *H. malayana* terhadap Tasik Berombak masih kurang difahami. Kajian ini bertujuan untuk menyiasat kesan makrofit muncul terhadap parameter air dan kadar pemendapan di Tasik Berombak. Tiga kawasan pensampelan dipilih, iaitu kawasan didominasi *H. malayana*, kawasan didominasi *Pandanus helicopus*, dan kawasan tanpa tumbuhan sebagai kawalan. Ujian Kruskal-Wallis menunjukkan kepekatan klorofil-a dan jumlah nitrogen terlarut (TDN) di kawasan didominasi *H. malayana* berbeza secara signifikan daripada kawasan didominasi *P. helicopus* dan kawasan tanpa tumbuhan, $H(2) = 8.3$, $p = 0.015$ (klorofil-a); $H(2) = 15.7$, $p < 0.001$ (TDN). Kawasan didominasi *H. malayana* mempunyai klorofil-a tertinggi (0.02 ± 0.01 mg/L) berbanding kawasan didominasi *P. helicopus* (0.02 ± 0.01 mg/L) dan kawasan tanpa tumbuhan (0.01 ± 0.01 mg/L). Sebaliknya, kepekatan TDN adalah terendah di kawasan didominasi *H. malayana* (0.22 ± 0.02 ppm), berbanding kawasan didominasi *P. helicopus* ($0.31 \pm$

0.07 ppm) dan kawasan tanpa tumbuhan (0.38 ± 0.13 ppm). Sementara itu, nilai jumlah pepejal terampai (TSS) berbeza secara signifikan di ketiga-tiga kawasan, $H(2) = 23.0$, $p < 0.001$, dengan nilai TSS purata tertinggi di kawasan didominasi *P. helicopus* (8.60 ± 4.38 mg/L), diikuti oleh kawasan didominasi *H. malayana* (6.09 ± 3.37 mg/L) dan kawasan tanpa tumbuhan (3.67 ± 0.76 mg/L). Kadar pemendapan sedimen di kawasan tanpa tumbuhan adalah jauh lebih tinggi berbanding kawasan bertumbuhan, $H(2) = 15.0$, $p < 0.001$. Kadar pemendapan di kawasan tanpa tumbuhan adalah 0.132 ± 0.092 g/m²/hari, manakala kawasan didominasi *H. malayana* dan *P. helicopus*, adalah 0.067 ± 0.01 g/m²/hari dan 0.03 ± 0.015 g/m²/hari, masing-masing. Setiap kawasan persampelan menunjukkan faktor kawalan berbeza yang mempengaruhi kadar pemendapan. Jumlah fosforus terlarut (TDP) adalah faktor utama di kawasan mempunyai tumbuhan, manakala pH adalah faktor paling berpengaruh di kawasan tanpa tumbuhan. Kesimpulannya, kehadiran makrofit muncul mempengaruhi parameter kualiti air secara signifikan dan mengurangkan kadar pemendapan di Tasik Berombak.