

Research and Development on Integrated Lake Basin Management Plan for Chenderoh Lake, Perak

STATE OF LAKE BASIN HEALTH
CHENDEROH RESERVOIR

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Water Quality and Environment Research Centre

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2023

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Published by:
National Water Research Institute of Malaysia (NAHRIM)
Lot 5377, Jalan Putra Permai,
43300 Seri Kembangan,
Selangor Darul Ehsan

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State of Lake Basin Health: Chenderoh Reservoir
e ISBN: 978-967-0382-73-9

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Published in Malaysia by National Water Research Institute of Malaysia (NAHRIM)
Printed by: Reka Cetak Sdn Bhd

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EXECUTIVE SUMMARY

Chenderoh Reservoir's ecosystem services have numerous economic values. The estimated annual conservation value for Chenderoh Reservoir based on the contingent valuation method is RM10.4 million.

Chenderoh Reservoir, or Tasik Empangan Chenderoh, in Perak is one of the oldest reservoirs in Malaysia. This reservoir is located about 30 km from Kuala Kangsar, Perak, and 210 km from the mouth of Sg Perak. The dam, which was built across the Perak River by the British administration of the Federated Malay States in the 1920s, was completed in 1930 and was the country's first hydropower reservoir.

The dam is operated and managed by TNB Chenderoh Station. The dam structure is designated as "Kawasan Sasaran Penting tahap 1", which means it is an important area for security protection. Chenderoh lake lies among the earliest human settlements such as kampongs, new villages, and smallholder farms. The lake basin contains important archaeological sites such as the "Perak Man - Lenggong Valley ", and supports recreational activities near Tasik Raban. Therefore, the development of an Integrated Lake Basin Management Plan (ILBMP) for the lake is necessary to ensure appropriate measures in the



management of the lake basin, resolve any conflicts in resource provision and sustain the overall ecosystem services.

The lake's water quality varied significantly depending on the season, due to water releases from the Cascading Dam upstream of Chenderoh lake. As the lake's water level is also highly regulated by the release of water from the dam for flood control and hydroelectric power. In general, the trophic status of the lake during the study was in meso-eutrophic conditions; supported by the increasing presence and occurrence of invasive plant species such *hydrilla (*water thyme*)* and water hyacinth, as well as pronounced seasonal diversity. The distribution of these plants, however, was localized to the settlement areas south of the lake. The lake is still rich in aquatic biodiversity; with the exception of fish communities threatened by introduced species and recreational fishing. The lake basin is also at risk from sedimentation problems in certain areas. Despite the low sedimentation rate due to large undisturbed catchments, measures should be taken to control unsustainable land use conflicts.

Chenderoh Reservoir's ecosystem services have numerous economic values. The estimated annual conservation value for Chenderoh Reservoir based on the contingent valuation method is RM10.4 million. Using an 8% discounted rate, the estimated net present value (NPV) for conserving the Chenderoh Reservoir is RM130.7 million. The NPV varies from RM116.1 and RM145.3 million. This value indicates the asset value of the Chenderoh Reservoir if managed sustainably for conservation purposes. Accordingly, the potential annual tourism benefit or consumer surplus for Chenderoh Reservoir is estimated to be RM1.97 million using the travel cost method. If the lake is managed sustainably, the estimated recreational benefit at 8% discount rate is RM24.6 million. Based on a 30-year management plan with a discount rate of 8%, the total recreational benefit is estimated at RM22.2 million. The recreational benefit accruing to society appear substantial and are justified for the authority's long-term management of the lake. The net present value of sustainable management of Tasik Empangan Chenderoh for hydropower production at 8% discounted rate is estimated at RM312.7 million.

Based on stakeholder consultations, important management measures include the development of nature tourism, delineation of areas as a national heritage to better conserve the lake basin, and strengthening governance, including the establishment of key management institutions for management and financing mechanisms.