

TITLE

IMPLEMENTING PARTICIPATORY ECOSYSTEM SERVICES SHARED VALUE ASSESSMENT IN MALAYSIA

AUTHOR(S)

Z. Sharip¹, H. M. Salim¹, M. H. Zulkifli¹, M. F. Kasim¹, M. N. F. Abd Wahap¹, J. Nakai², Z. Johar¹, M. Z. M. Amin¹, M. Nakamura²

AFFILIATION(S)

¹ National Water Research Institute of Malaysia, Malaysia

² International Lake Environment Committee, Japan

ABSTRACT

Reservoirs, lakes, and ponds provide important ecosystem services for both human and natural life. Despite their importance, managing these lakes - both natural and man-made - remains a challenge due to the intrinsic nature of the lentic water bodies, anthropogenic pressures and climatic conditions. There is still no comprehensive integration of the shared value of lake ecosystem services to support sustainable management of the lake basin. Stakeholders' views on ecosystem services (ES) varied, making it difficult to successfully manage the lake basin and associated services. This paper provides an overview of the implementation of the Participatory Ecosystem Services Shared Value Assessment (PESSVA) in Malaysia. The work involves developing questionnaires, conducting social surveys, and confirming with stakeholders in workshops. The survey for Chenderoh Lake was carried out from January to March 2023 covering two districts namely Lenggong (upstream) and Kuala Kangsar (downstream). More than 300 respondents from ten sub-districts took part in the survey. The initial findings of the survey of the local communities and stakeholders in Chenderoh Lake basin revealed that more improvement was required to strengthen lake basin governance. Lack of knowledge and programs was perceived by community to may limit their involvement in lake basin management. PESSVA survey is currently being undertaken in Bukit Merah Lake Basin. A comparative analysis of the survey data from the two lakes will provide better understanding on the role of PESSVA in supporting the planning process, management actions and overall governance of lake basin in the two water bodies.

Keywords: Bukit Merah Reservoir, Chenderoh Reservoir, Ecosystem Services Shared Value Assessment, Lake Basin Management and Governance

1. INTRODUCTION

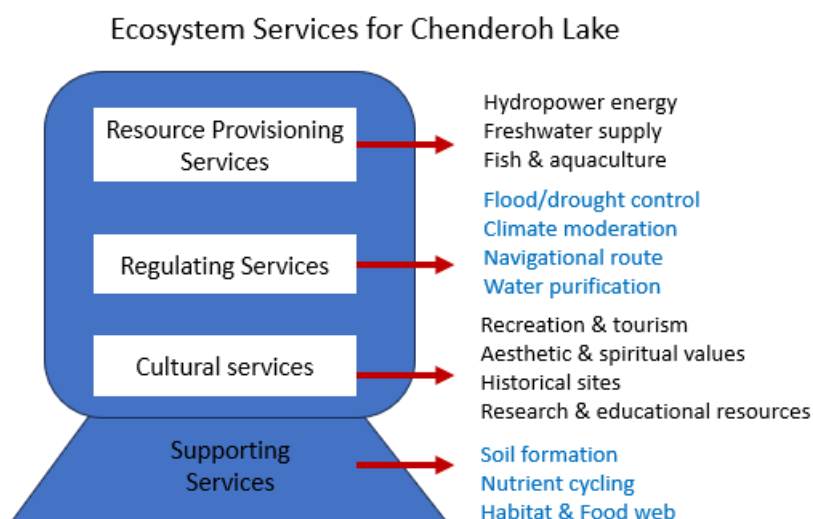
Lentic water bodies such as reservoirs, lakes, and ponds offer important ecosystem services for human and natural life. Yet, maintaining lake and ecosystem services - both natural and man-made - remains difficult due to various factors such as the nature of the Lentic water, human pressures and climatic conditions. Comprehensive integrations of the shared value of lake ecosystem services to support sustainable governance of lake basin is limited. Stakeholders' perspectives on ecosystem services (ES) varied depending on their knowledge and focus, making it difficult to successfully manage the lake basin and the services connected to it. Ecosystem Services Shared Value Assessment is a methodology used to incorporate the ES

concept into the lake basin management planning (Nakamura et al. 2022). The method has been successfully used in few African lakes to encourage people to take an active part in lake management (Nakamura et al. 2022). The concept of involving communities to develop shared values to improve the participatory process of basin management is still new in Malaysia. This paper provides an overview of Malaysia's implementation of the participatory ecosystem services shared value assessment (PESSVA). The study is a collaborative project between the National Water Research Institute of Malaysia and International Lake Environment Committee on PESSVA starts with the Chenderoh Lake Basin followed by the Bukit Merah Lake Basin, both located in Perak, Malaysia.

2. METHODOLOGY AND FINDINGS

The work involves developing questionnaires, conducting social surveys, and confirming with stakeholders in workshops (NAHRIM & ILEC 2023). The questionnaire was adapted from the survey form developed for African lakes as illustrated in the newly published guideline (Nakamura & Muhandiki 2023) and modified to the Malaysian scenario. The details on the ecosystem services perceptual profiles is given in Table 1. Chenderoh Lake is the oldest hydropower reservoir in Malaysia. The dam was constructed in 1926 by damming the Perak River. The surface area of the reservoir is 21 km² and while catchment area is 975 km². Resource provisioning services are the main ecosystem services for Chenderoh Lake (Figure 1). According to its main function, the most important provisioning service is energy production through hydroelectric power generation. The lake is also used to supply water for drinking and industrial purposes, with water being drawn from the Perak River at various points downstream of the lake.

Figure 1: Ecosystem services for Chenderoh Lake, Perak



The Chenderoh Reservoir also serves to control the impact of flooding on downstream areas such as the city of Kuala Kangsar. Cultural services are also important where the lake's scenic views make it a popular destination for recreation and ecotourism. Within the lake basin is the Lenggong Valley which is home to a UNESCO World Heritage Site. Important historical features of outstanding universal value includes the skeleton of the Perak Man, the oldest most complete human skeleton and four open-air and cave sites with Palaeolithic tool (UNESCO, 2021)

Table 1: Ecosystem services perceptual profiles

Question	Details	
Demographic information	Age Ethnic Occupation group Income levels	Gender Education level Period of residence
Resource Use and development activities, and the degree of stress	Agriculture Manufacturing Domestic water uses Tourism Transport	Livestock production Mining activities Fishing Hydropower
Impairment of the Nature's function	Biodiversity Pollution absorption Drought mitigation	Climate moderation Flood mitigation Erosion mitigation
Direct impact from sub-basin activities	Upstream	Downstream
Infrastructure and facilities	Effluents discharges Water treatment	Solid wastes Sanitation/hygiene
Status of Cultural services	Aesthetic/scenic values Historical significance Educational values	Traditions Religious value Natural heritage
Impact on human health	Family Basin community	Local Community
Impact on economy	Family Basin community	Local Community
Improvement of basin governance	Existing measures and action Possible Improvement	Responsibility and proactive role

Source: Nakamura et al. 2022; Nakamura & Muhandiki 2023, NAHRIM & ILEC 2023

The survey for Chenderoh Lake was conducted from January to March 2023 and covered two districts, namely Lenggong (upstream) and Kuala Kangsar (downstream). More than 300 respondents from ten sub-districts participated in the survey. The majority of respondents are men (> 60%), ethnic Malaysian (86%), married (76%), and have low incomes (70%) and primary to secondary education (52%).

The preliminary results of the survey among local communities and stakeholders in the Chenderoh Lake basin revealed that agriculture and mining, as activities that exert some stress or influence on the lake basin (NAHRIM & ILEC 2023). Further improvements to strengthen the management of the lake's catchment area is necessary to ensure ecosystem services and lake basin sustainability. Lack of knowledge and appropriate programs were viewed by the community as a possible barrier to their participation in lake basin management.

3. CONCLUSIONS AND RECOMMENDATIONS

A PESSVA survey is currently underway in the nearby Bukit Merah Lake Basin, Perak. A comparative analysis of the survey data of the two lakes will lead to a better understanding of the role of PESSVA in supporting the management planning process, action programs and overall basin governance of the two lakes. Some recommendations for the study include improving monitoring of alien fish releases and solid waste pollution, and as well as promoting awareness programs and encouraging participation. Strong financing mechanisms are needed to preserve the lake and river environment.

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