

Biodiversity and Socio-economic importance of the Polommaruwa Wewa, Tangalle, Sri Lanka with special reference to anthropogenic impacts

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Abstract

The present study was undertaken to investigate the biodiversity and socio-economic importance of a historically built water body viz. Polommaruwa Wewa ($6^{\circ} 01' - 432' N$; $80^{\circ} 47' - 694' E$) located in Tangalle, a coastal township in the southern province of Sri Lanka. This is the first scientific study carried out on scientifically unknown water body though its multi-aspect ecological and socio-economic significance have been long recognized by the inhabitants of the area. The present study also attempted to study the possible anthropogenic impacts on the water body and to propose recommendations for its sustainability. Transect methods, visual observations, past records and questionnaires, were the main methodologies used during the survey. Water quality parameters confirmed that average mean values of $27.6^{\circ}C$ temperature, 0.2 ppt salinity, 7.74 ± 0.19 pH and 4.10 ± 0.32 ppm dissolved oxygen concentration indicating that water is safe for both terrestrial and freshwater aquatic biodiversity. Under the biota, 63 plant species, 21 bird species and 10 fish species were identified in and around the water body. The historical significance and socio economic relevance of the water body was recognized in terms of religious values, fishing, medicinal uses, clay pottery, curd production and recreational activities. Despite the uses, pollution due to garbage dumping, land filling and usage of agrochemicals were significantly supporting the destruction of the water body and its surrounding. Present study suggested some recommendations which would help maintain the biodiversity and the sustainable use of this historically significant water body.

Keywords: Polommaruwa wewa, Flora, Fauna, Native species, Anthropogenic impacts, Biodiversity

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Introduction

The Polommaruwa water body ($6^{\circ} 01' - 432' N$; $80^{\circ} 47' - 694' E$) is an approximately 10 acre wide shallow freshwater body in Tangalle area. Irrigation data indicates that the water body is filled with south-west monsoonal, inter-monsoonal and conventional rains prevailing in October to November. Nevertheless, this water body is also fed during the rainy seasons by the drainage water that falls to 3 other smaller tanks viz. the Waduge, Ulu, and Goyam Pokuna water bodies. Historical records indicate that this water body has been used since 18th century with the purpose of conserving the natural

biodiversity and as a source of irrigating the paddy cultivation as well as household purposes. Due to failing maintenance operations, constant encroaching of the surrounding vegetation, land filling activities and other anthropogenic influences has affected both water inlet channels and available free water surface. This condition has led to a deep layer of sediments mainly composed of fine silt with an average depth of 1-2 meters of water. Reports suggest that this water body had to be rehabilitated by the state to perform its functions 3 times in the recent past. In the recent times, the water body came under the purview of the Samurdhi Authority and also under the “1000 water body program”. Therefore, the objective of the study was to investigate the current status of the water body including its water quality, biodiversity and socio-economic importance with special reference to anthropogenic impacts.

Materials and Methods

Satellite maps were used for the determination of the topographical characteristics for mapping the study area. Firstly, 6 points at the edge of the tank boundary were determined, and the exact GPS locations of the 6 points were identified using GARMIN 72H GPS receiver. Then, pH and salinity of water were measured using HACH H138 pH meter, and refractometer. Water temperature and dissolved oxygen concentrations were also measured using HACH SENSON 6 dissolved oxygen meter for further understanding the water quality. Three 100m line transects were laid along bund area, catchment and water column in order to identify distribution of flora and they were further categorized into aquatic, terrestrial and grasses indicating their abundance. Then, these plants were further classified into floating, submerged, bottom rooted plants and ferns.

Priority was given on birds and fish species under fauna. Birds were identified primarily by observations using binoculars and secondarily by literature survey of the (Wijeyrathne et al, 2000.). Birds were mainly categorized as resident and migratory species. Data on the Fish species were gathered through assessment of fish catch and discussions with fishermen. Socio-economic impacts, history and anthropogenic activities which interact with the water body were analyzed via a questionnaire.

Results and Discussion

During the study period, the water quality of the water body demonstrated a mean of 0.2 ppt salinity, 7.74 ± 0.19 pH and mean dissolved oxygen content of 4.10 ± 0.32 ppm indicating that water is safe for both terrestrial and freshwater aquatic biodiversity. Additionally, 63 species of flora including the endemic *Phoenix ceylanica* (indi) were noted growing in abundance. Of fauna, 23 bird species including *Ocyrceros gingalensis*

(Sri Lanka grey hornbill) and 10 fish species of 8 families were identified. The questionnaire study as well as historical documents and our own observations indicated rich human inter-relationships, both beneficial and detrimental, with the water body. Provision of irrigation water to paddy cultivation was found to be the major importance of the water body (Rs. 20,000 per season per farmer) in addition to provision of water for bathing and washing. Some families near the water body were engaged regularly in fishing activities (Rs. 10,000 per month) and some used to extract clay for pottery (Rs. 8,000 per month) While medicinal and edible plants provide medicines and food, the profusely growing *Nelumbo nucifera* (Nelum) provides considerable income to some families through sale of flowers mainly during the Kataragama festive season (Rs. 1,500 per month), ensuring a contribution to religious values. In addition to the naturally inhabiting fish, 4 types of fish fingerlings viz. Grass carp, Rohu, Catla and Freshwater prawns were found to be stocked by the National Aquaculture Development Authority. Moreover, curd producers make use of the vegetation in the water body as a natural feeding ground for their cattle.

Human population living in the surrounding areas were the highest responsible for anthropogenic activities. Nature observation, bird watching, canoe riding, fishing are some of the recreational activities done by visitors. Domestic water and garbage dumping, agricultural waste dumping and land filling were found to be absolute threats to this water body. Many inhabitants, especially the fisher folk that depend on this water body were of the opinion that popular fish species like *Channa* sp. has been becoming rare over the past years, probably a direct result of garbage dumping and agro chemical seepages into the water body.

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