

ASHTAMUDI LAKE - AN OVERVIEW ON PHYSICAL CHARACTERISTICS

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Abstract

Water is one of the most important resources available on this earth that has an influence on human activities. The physical characteristics of a place make up its natural environment and are derived from geological, hydrological, atmospheric, and biological processes. Surface and ground water are the important source of water on the earth where contemporary needs focus on surface water and it leads to global deterioration. Ashtamudi Lake is a unique water system with limnological and hydrological characteristics. Ashtamudi Lake derives its name from its shape, having eight prominent arms or channels branching out, like that of a palm tree or an octopus. 'Ashtamudi' means eight-coned ('Ashta' means eight; 'mudi' means coned) in the local Malayalam language. This extensive estuarine system, the second largest and deepest in Kerala, is connected to sea at Neendakara in the western part and feed by Kallada River in the east. The main objective of this study is to find out and analyse the physical characteristics of the Ashtamudi Lake including location, topography, geology, climate, hydrology, shape and structure and bio diversity. For analysing the objective the investigator uses both primary and secondary data with technological supports. The obtained information is analysed and made appropriate charts and maps. This paper helps to conclude that the characteristics features are unique and important for future research in this area.

Key words: Ashtamudi Lake, Physical Settings, Shape and Structure, Bio diversity

Introduction

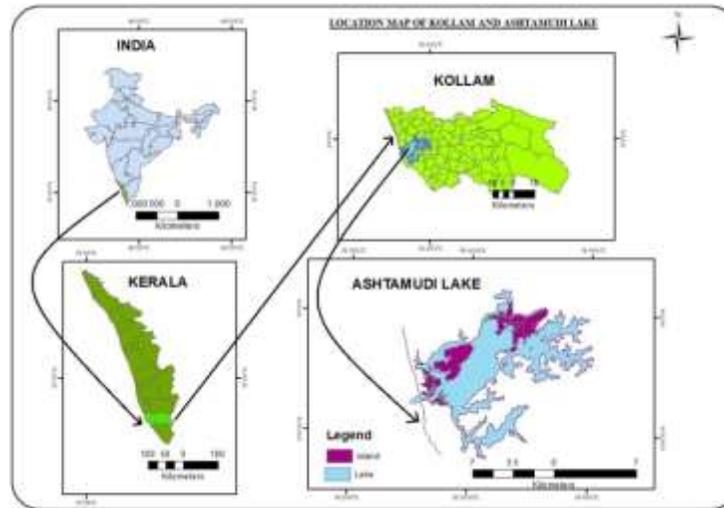
Water is one of the most important resources available on this earth that has an influence on human activities. All important aspects such as agriculture, industry, day to day life is dependent on water. It is the most important factor for survival of life on this earth. The physical characteristics of a place make up its natural environment and are derived from geological, hydrological, atmospheric, and biological processes. They include land forms, bodies of water, climate, soils, natural vegetation and animal life (The Five Themes of Geography, AAG, 1984). Surface and ground water are the important source of water on the earth where contemporary needs focus on surface water and it leads to global deterioration. Limnology is a broader discipline between Geography, Hydrology and Biology, and is closely connected with other sciences, from it borrows research methods (Gastescu Petre, 2009). A lake is a large body of natural water collected in a depression. It differs from a pond/ tank due to its larger size, presence of biotic life and many other ecological factors. (Balasubramanian, A, 2015). Ashtamudi Lake is a unique water system with limnological and hydrological characteristics. This paper helps to identify the physical characteristics of the lake.

Study area

Ashtamudi Lake, Ramsar site No. 1204, in Kollam district of South Kerala is located between 8°50'N to 9°5'N and 76°30'E to 76°40'E. It is the second largest lake after Vembanad. It has a length of 16 km with 14 km width and having maximum depth of 6.4m spreads over an area of 51.2 sq. km. Ashtamudi means 'eight braids' (Ashta means eight in

Sanskrit and mudi means hair braids, i.e., its branches). As the name indicates it has eight branches and it is a palm shaped vast water body looks like an octopus. This extensive estuarine system, the second largest and deepest in Kerala,

is connected to sea at Neendakara in the western part and feed by Kallada River in the east. The following map (Map 1) shows the location of Ashtamudi Lake.



Map 1: location map of Ashtamudi Lake

Objectives

The main objective of this study is to find out and analyse the physical characteristics of the Ashtamudi Lake.

Methods and Techniques

Methods used for conducting this study are primary and secondary. Primary sources of information are obtained through toposheet, interview (casual talks and formal questions), surveys and secondary sources used are the reports by governmental and non-governmental organisations respectively. The obtained information is analysed and made appropriate charts, diagrams and maps through Micro Soft Excel, ARC GIS 10.2.1 respectively.

Result and Discussion

Ashtamudi Lake is also an estuary which has so many ecological and hydrological importances. Here discuss its peculiarities.

The physical characteristics of the Ashtamudi Lake are given below:

1. Physical setting – location, topography, climate, geology, hydrology
2. Shape and structure
3. Biodiversity

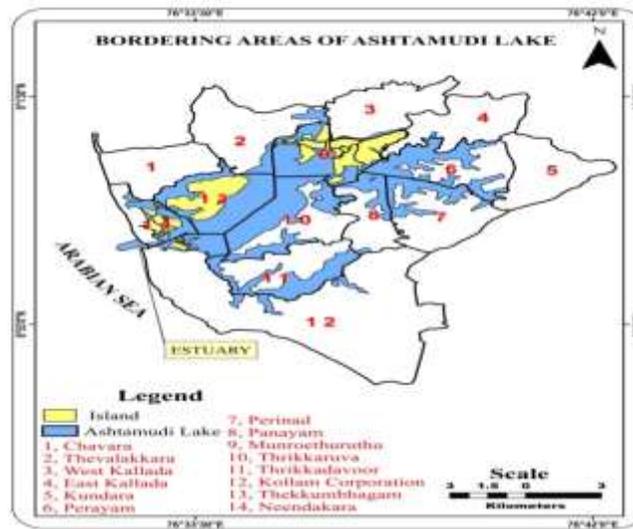
1. Physical setting

Physical setting of the Ashtamudi Lake includes location, topography, climate, geology and hydrology.

1.1 Location

Ashtamudi Lake is located between 8°50'N to 9°5'N and 76°30'E to 76°40'E in the Kollam District of Kerala, South India. The lake covers an area of 51.2 km². The bank of the water body is filled with backwater canals, clusters of coconut trees and palms which are sprinkled with towns and villages. The lake has an outlet at Neendakara, where it joins with the Arabian Sea and there forms an Estuary. That portion (seaward portion) is in the lowland, while landward side towards east and south, the hinterland falls in the midland. The lake itself is surrounded by 13 panchayat and 1 corporation.

The following map (Map 2) shows the Lake with its surrounding area.



Map 2: Ashtamudi Lake and its bordering area

1.2 Topography

Topography is a broad term used to describe the detailed study of the earth's surface. This includes changes in the surface such as mountains and valleys as well as features such as rivers and roads (Higgins, Charlie, 2017). Ashtamudi Lake, as the name indicates lake's topography with its multiple branches. The main peculiarity of the lake is that its relationship between land water. It's the only lake having an inlet and outlet. Inlet is the Kallada River and it debouches in to the lake at Peringalam and outlet is at Neendakara, where it joins with the sea. The river is originated from the Western Ghats region with an elevation of 1524 m above MSL. After covering a distance of 120 km it joins with the Ashtamudi Lake. The surface elevation of the lake is 10 m above MSL. The lake is also called the gateway to the backwaters of Kerala. Bathymetric contour of the lake varies from 2 m to 6m. Both sides of the Kallada river have vast flood plains with about 4 km wide. The Ashtamudi Lake is characterised by the presence of big as well as small islands, they are inhabited and uninhabited by human beings. The most famous islands are Munroe Island, Chavara and Thekkumbhagam.

1.3 Climate

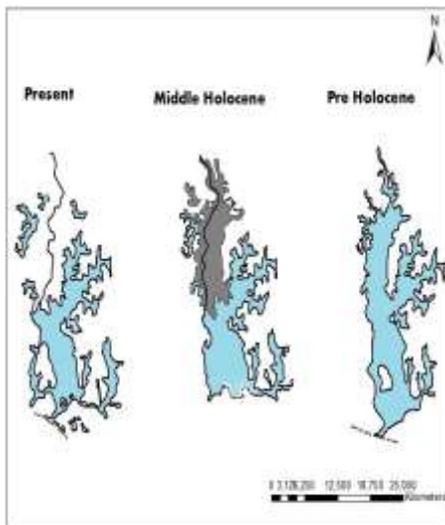
Kollam has a tropical climate. There is substantial rainfall in most months of the year. The short dry season has slight effect on the overall climate. The Köppen-Geiger climate classification is Am. It experiences hot and humid summers and sufficiently of seasonal rainfall. Temperatures recorded in the area are a maximum of 27.5 °C (81.5 °F) and a minimum of 25.5 °C (77.9 °F), due to the presence of Arabian Sea difference between summer and winter temperatures are moderate. The area receives an average annual rainfall of 2400 mm (94 in) and the humidity during the rainy days is 90%. The climate is hot and humid during April–May while cool during December–January and rainy in June–November.

1.4 Geology

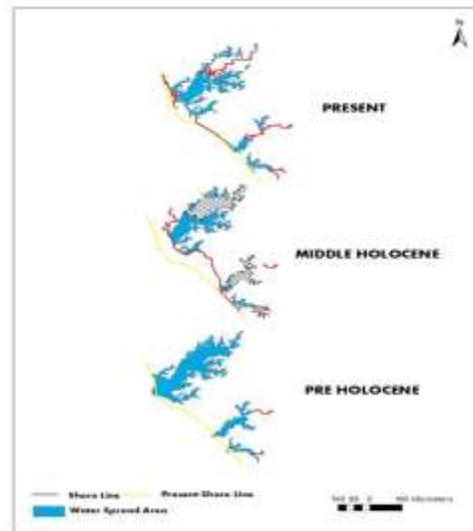
Ashtamudi Lake is confined to the Warkallis formation with eastward extension, have their long-axis perpendicular to the shoreline and the sides are fringed with escarpments of bed rock or laterite developed over the Tertiary formations respectively. These are identified with the eroding coast line stretches that experience high

wave energy. Steep slopes of lateritic cappings and escarpments of 10-15 m high, developed over rocks of the Warkalli formations are visible. It is situated in the SKSB uplifted block and this estuary shows antecedent characteristics. This estuary is the deepest among all the estuaries of Kerala with a maximum depth of 6.4 m at the confluence zone. The present Ashtamudi estuary, is wave dominated and bar built one, represents only a portion of the mega basin existed during Pre-Holocene which was later filled up in its upper half by sediments brought by the Kallada River during Early Holocene Climatic Optimum (9-6 BP); (Padmalal et al., 2011; Padmalal et al., 2013).

Map 3 shows the stages of development of the Ashtamudi estuarine basins during Pre-Holocene and Middle- Holocene along with present day scenarios. At this time, the shoreline might have shifted 3-4 kilometres (map 3.1) eastwards with respect to the present coast, a feature also reported earlier by Nair (1996). Thereafter, the coastline prograded seaward and, dunes and marshes have developed in the regressive phase which in turn is marked by substantially reduced rainfall as compared to Early Holocene.



Map 3

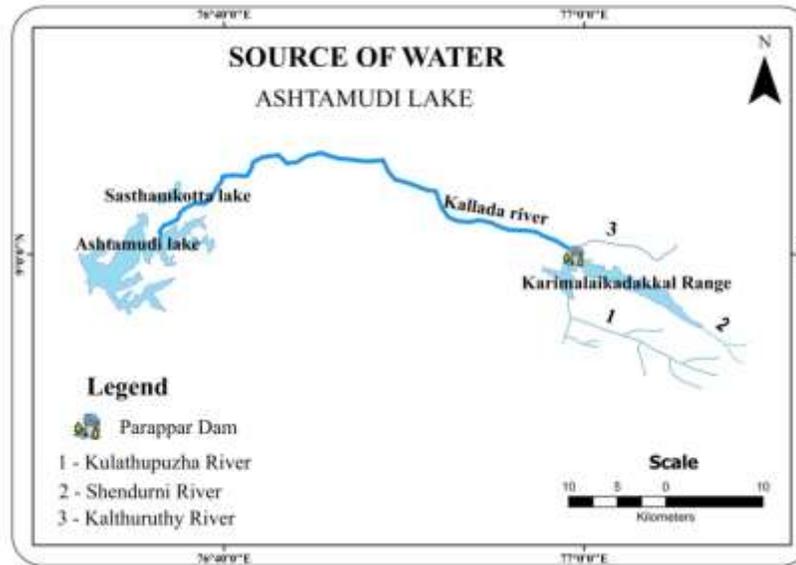


Map 3.1

1.5 Hydrology

Hydrology defines Ashtamudi, the deepest estuary in Kerala, receives discharge of Kallada River (length = 120 km; Basin Area = 1700 km² and discharge = 3375 Mm³) basin receiving an average annual rainfall of 2400 mm. The river originates from the Karimalaikadakkal ranges (1524 m) of Western Ghats. It flows towards the west and ultimately drains in to the Ashtamudi Lake. Discharge stations are Eanath, Punalur and Thenmala (Water Atlas, 1995). The river along with its tributaries namely the Kulathupuzha, the

Shendurni and the Kalthuruthy forms the Kallada River. A dam was constructed in the river at Parappan, a reservoir is formed by constructing a gravity type masonry dam. The gross storage capacity of the reservoir is 504.92 Mm³. The deltaic island Munroe Island is located at the confluence of Kallada River and Ashtamudi Lake. Occurrence of a number of water bodies on both sides of the Kallada River and presence of paleo-river channels connecting them with the river suggests that the lake was more extensive in the past. The following map (map 4) shows the source of water for Ashtamudi Lake.

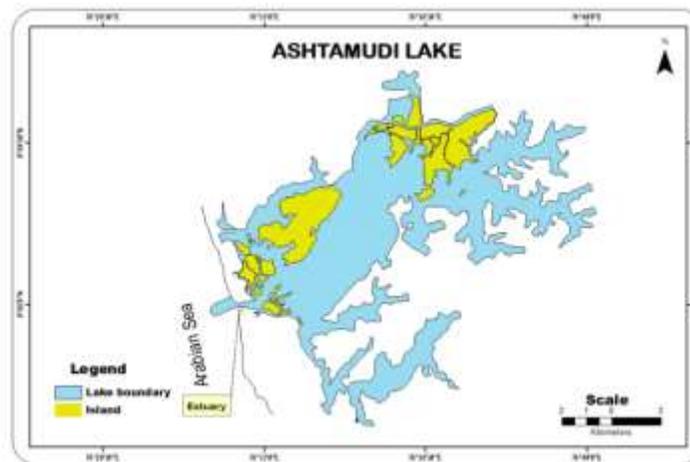


Map 4: Source of Water – Ashtamudi Lake

2. Shape and structure

Due to its configuration and extend, Ashtamudi lake is unique. The water body derives its name from the planimetric shape with eight branches radiating from near the central part. The lake looks like an octopus. Average

width of the each lobe is 3 km. The map (map 5) shows the structure of Ashtamudi Lake. The branches of the Ashtamudi Lake are known as creeks. It has eight creeks and islands are the peculiar features found in the lake. The most important island is Munroe Island, Chavara and Thekkumbhagam



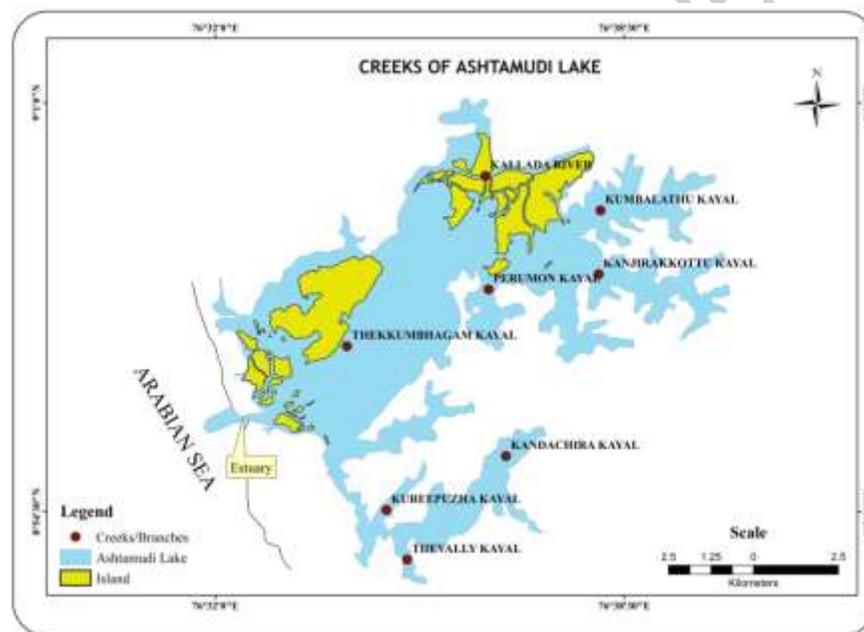
Map 5: Structure of Ashtamudi Lake

The eight creeks of the lake are described below:

No	Name of Branch
1	Kumbalathukayal
2	Kanjirakkottukayal
3	Kallada river
4	Kureepuzhakayal
5	Kandachirakayal
6	Thevallykayal
7	Perumonkayal
8	Thekkumbhagamkayal

Source: Prepared by the investigator

The following map (map 6) shows the Ashtamudi Lake with its creeks



Map 6: Creeks of Ashtamudi Lake

3. Biodiversity

Biodiversity refers to the variety of living species on Earth, including plants, animals, bacteria, and fungi.

Ashtamudi as a wetland ecosystem, a home to a wide variety of flora and fauna once had very good mangrove vegetation, but now stands reduced to a very small patch near the Asramom Park. Around 7 species of true and mangrove associates occur in this area. The floristic diversity covers around 72 species of herbs, shrubs and grasses, of which about 35% are

medicinal plants and 92 tree species have been identified from the area.

The Ashtamudi estuary is an ideal habitat for fin fishes, prawns, crabs and clams and offers livelihood to thousands of people. Ninety seven species of fishes belonging to 39 families have been identified, of which 42 species are marine, 11 are freshwater and only 3 are truly estuarine, others are transient (Table 1). Sixty nine species are commercially important. The estuary is rich in prawn resource and the season lasts for about 6 to 7 months. The prawn species observed are

Penaeus indicus, *Penaeus semisulctus*, *Metapenaeus monoceros*, *Metapenaeus dobsonii*, *Macrobrachium idella*, and *Macrobrachium seribriculum*.

only 6 species were migratory and the rest were resident ones. It supports around 43-marshy mangrove species. More than 20,000 waterfowl visit the lake annually.

Fifty seven species of birds were identified in the mangrove areas of the estuary. Out of this, Table 1: Flora and Fauna of Ashtamudi Lake.

Groups	No. of species
Flora	
Phytoplanktons	9
Herbs, shrubs	72
Trees	92
Fauna	
Fishes	97
Insects	45
Birds	57
Zooplanktons	29

Source: Prepared by the investigator based on data extracted from http://www.rainwaterharvesting.org/ashtamudi_lake/ashtamudi_lake.html

riverine, 15 marine estuarine) and unique copepod species. It is also a congenial habitat for all species of penacid and palaemonid prawns, edible crabs, black clams and a variety of fish. (WWF and forests, 2004a)

Pollution, sand mining reclamation, loss of mangrove habitat and destructive fishing methods are the main reasons for loss of fishery diversity in the Lake. Clams and oysters constitute the major molluscan resource of the estuaries of India (Raj V et al, 2014).

Conclusion

Ashtamudi Lake has its own importance in physical characteristics. This paper discussed about the physical setting includes location, topography, geology, climate and hydrology, shape and structure and biodiversity. All these factors are well explained and show that the lake has its own properties and uniqueness. As a lake, wetland and an estuary it has both hydrological as well as physical importance and helps in the sustainability and existence of life. The shape and structure and bio diversity together had great influence in the livelihood of people.

The estuary supports some endangered species according to the Red Data Book of Indian E.g. Plants, such as *Syzygium travencoricum*. It is the second biggest fish trading centre next to Vembanad estuary, thousands of fishermen depend directly on the estuary for their livelihood.

3.1 Flora and Fauna

Acknowledgement

True mangroves *Avicenna officinalis*, *Bruguiera gymnorrhiza* and *Sonneratia caseolaris* are present and around 43 species of marshy and mangrove associates are present along with two endangered species *Syzygium travencoricum* and *Calamus rotang*. The lake supports 57 species of avifauna, of which 6 are migratory and 51 resident species, 97 species of fishes (42 are typically marine, 3 estuarine, 9 estuarine-

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Reference

- Balasubramanian, A.. (2015). Classification of Lakes. 10.13140/RG.2.2.19008.33282.

- CED, “Survey of Wetlands in Kerala”, Centre for Environment and Development, Kerala, 2004.
- Jithu U. Krishnan (2015), Pollution Status of Ashtamudi Lake, Kerala, India and Its Impact on Some Key Stone Mangrove Species - A Case Study, International Journal of Innovative Studies in Aquatic Biology and Fisheries, Volume 1, Issue 2, Jul-Sep 20
- Kv, Jayakumar. (2011). Ashtamudi Wetland, Kerala: Values and Threats, National Workshop on Ramsar Designated Wetlands of India, Kolkata, <https://www.researchgate.net/publication/321804444>
- Sachin, S.R., et al (2013), Seasonal Variation in Nutrient Concentration of Kandachira Kayal of the Ashtamudi lake, Volume 1, 165-173.
- Sitaram Nagaraj (2014), Impact Of Urbanisation On Water Quality Parameters – A Case Study Of Ashtamudi Lake Kollam, International Journal of Research in Engineering and Technology, Vol 3, Issue 6.
- Sivanandan P, Ecotourism for Inclusive Growth: A Case Study of Ashtamudi Lake, CESS, TVM
- Suma, S (2012), Analysis Of Effluents Discharged To Ashtamudi Lake From China Clay Industries, International Journal of Chemistry Research ISSN, Vol 3, Issue 1
- Vimal Raj, R. V, et. al (2013), Aquatic Bio Resources Of Ashtamudi Lake, Ramsar Site, Kerala, Journal of Aquatic Biology & Fisheries, Vol. 2(1) 2014: 297-303.
- <http://www.indiainfoweb.com/kerala/lakes/ashtamudi-lake.html>
- <http://www.irrigation.kerala.gov.in>
- <https://en-in.topographic-map.com/maps/9ehe/Ashtamudi-Lake/>
- <https://sciencing.com/topography-5479604.html>
- <https://www.nationalgeographic.org/encyclopedia/biodiversity/>

Electronic Reference

- <http://kollam-prakkulam.blogspot.com/2010/01/prakkulam-picturesque-peninsula-of.html>
- <http://manomohanam-manomohanam.blogspot.com/2008/08/ashtamudi-estuary-biodiversity.html>
- http://shodhganga.inflibnet.ac.in/bitstream/10603/12677/10/10_chapter%203.pdf