International Journal of Science and Research (IJSR)
ISSN: 2319-7064
ResearchGate Impact Factor (2018): 0.28 | SJIF (2019): 7.583

Physical Geography of Edava - Nadayara and Paravur Backwaters, Kerala, India

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Abstract: ***Water is the important phenomenon that differentiates the Earth from other members in the Milky Way. Besides being the prominent life sustaining component in the ecosystem, water plays a versatile role in the functioning of the bio-geo-chemical cycles. A backwater means the network of interconnected lakes and they were formed by the actions of shore currents and sea waves constructing low depressions at the mouth of rivers. The backwaters of Kerala are located where the freshwater from rivers meet Lakshadweep Sea in the west. Man has been using the backwaters for ages for fishing, transportation, agriculture and other related activities. Edava- Nadayara and Paravur backwaters lies between Lakshadweep Sea and Western Ghats in the south-western part of Kerala, India and is well known for their scenic beauty. Ithikkara river is the main feeder of Paravur lake and Ayiroor River, which is the second smallest river in Kerala finally emptying into the Edava- Nadayara lake. The backwater system has a total area of 101.026 sq. kms including the lakes which covers 10.325 sq. kms. The main objective of this study is to analyse the physical settings and characteristics of Edava- Nadayara and Paravur backwaters by inventorying the geomorphology, geology, climate, soil, slope, flora and fauna with the help of primary and secondary data sources. The finalised information is depicted through maps with technical supports.***

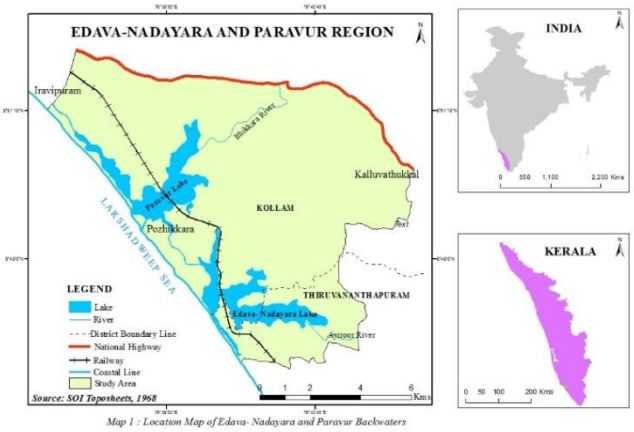
Keywords: Backwaters, Bio-geo-chemical cycle, Flora and Fauna, River

1. Introduction

About 70% of the earth surface is covered with water and most of this is stored in the ocean. 97% of the water available in our planet is saline. Of the remaining 3% only a tiny portion is found in lakes and rivers (Bansil, 2004).Limnology is a broader discipline between Geography, Hydrology and Biology and is closely connected with other sciences (Petre, 2009). A backwater means the network of interconnected lakes. According to Cambridge Dictionary it is a part of a river where the water does not flow and it is either temporarily or permanently connected to the sea and it is very fragile and sensitive to environmental changes. Edava- Nadayara and Paravur backwaters is a unique water system with unshared scenic beauty and specific limnological features. This paper depicts the physical settings and characteristics of the backwaters.

2. Study Area

The Edava- Nadayara and Paravur backwaters lie between 8^0 44'50" N to $8^0$54'70" N latitudes and $76^0$36'20" E to $76^0$45'50" E longitudes. The two backwater systems are located in the Thiruvananthapuram and Kollam districts of Kerala State, India. The backwaters are bounded by Kollam Municipal Corporation in the north, Varkala Municipality in the south, Lakshadweep Sea in the west and Adhichanalloor, Chathannoor and Kalluvathukkal Grama Panchayats in the east. The study area has a total area of 101.026 sq. kms including the lakes which covers 10.325 sq. kms and it spreads over seven Grama Panchayats, namely Adichanalloor, Chathannoor, Chirakkara, Kalluvathukkal and Poothakkulam included in the Ithikkara Block of Kollam district, Edava and Elakamon Panchayats included in the Varkkala Block of Thiruvananthapuram district, two Municipalities such as Varkkala Municipality and Paravur Municipality and Kollam Municipal Corporation.



Map 1 : Location Map of Edava- Nadayara and Paravur Backwaters

3. Objectives

The main objective of this study is to conduct an inventory of the physical settings and characteristics of Edava-Nadayara and Paravur backwaters.

4. Methodology

The study is mainly based on primary and secondary data sources. Maps were prepared from Survey of India Toposheets published in the year 1967-68 (Toposheet No: 58D/9 and Scale: 1:50, 000) using Arc GIS 10.5. Moreover other primary data were collected from personalised interviews with the natives and local transects conducted by the investigator. Whereas, secondary data were consolidated from the reports provided by governmental and non-governmental organizations. Tables, charts and other calculations were done in Microsoft Excel.

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5. Results and Discussions

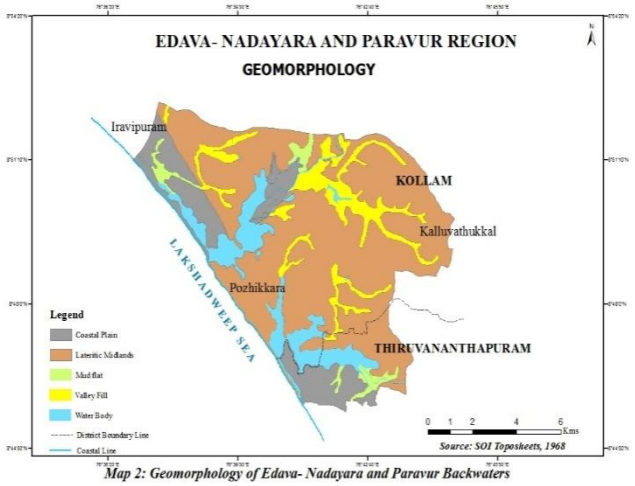
The Edava- Nadayara and Paravur backwater system has so many peculiarities both ecologically and limnologically. The physical settings and characteristics of the backwaters are portrayed below in detail:-

5.1. Location

The Edava- Nadayara and Paravur backwaters, situated in the south western part of Kerala State lies between 8^0 44'50"N to $8^0$54'70" N latitudes and $76^0$36'20" E to $76^0$45'50" E longitudes and is spreads in the Thiruvananthapuram and Kollam districts of Kerala, India. The Ayiroor River originating near Navaikulam of Thiruvananthapuram having a total length of 17 kilometres, which is the second smallest river of Kerala, is the major feeder of the Edava- Nadayara Lake. The 56 kilometres long Ithikkara River has its source from Madathara Hills in Kollam, finally emptying into the Paravur Lake. The Paravur Lake is connected to Edava- Nadayara backwaters through Maniyamkulam Canal in the south, whereas the northern part of the lake is connected to Ashtamudi backwaters through Trivandrum- Shoranur Canal (TS Canal). Both the lakes are well known for their scenic beauty and tourism potentiality. Thus it makes an unimaginable unique experience to enjoy the charming beauty of the backwaters.

5.2. Geomorphology

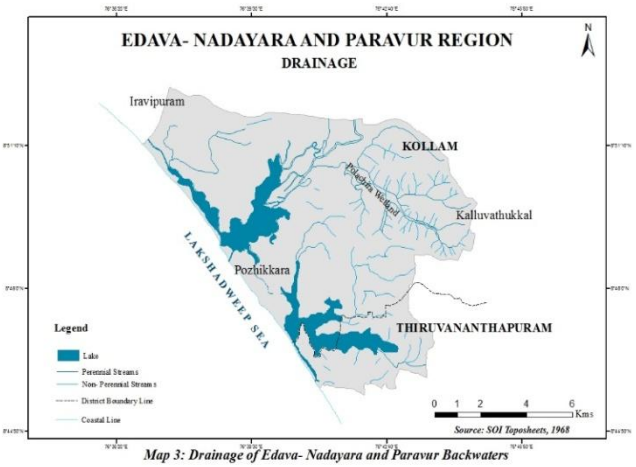
Geomorphology is a significant branch of physical geography. It is defined as the science of description (discourse) of various forms (morphe) of the earth surface (Singh, 2017). Edava- Nadayara and Paravur backwaters extended from the Lakshadweep Sea coastal plains to the midlands of Kerala and show low altitudinal characteristics in most of the regions. The major geomorphic features of the area are coastal plain, lateritic midlands, valley fill and small patches of mudflats. Theportions of the lake basin have been subjected to various processes such as marine, fluvial and lacustrine erosion. The lateritic midlands cover majority of the area with 60.63% to the total area followed by coastal plains with 13.25%. Valley fills cover a total area of 8.505 square kilometres. Mud flats with 6.565 square kilometres that is 6.49% to the total area occupy the lowest portion of the region.



Map 2: Geomorphology of Edava- Nadayara and Paravur Backwaters

5.3. Drainage

Drainage is a type of process by which excess water is drained from a place and stored in different forms. Drainage can be either natural or artificial and it may be found in surface or subsurface. Here the study area primarily encompasses two lakes, two rivers, two water canals and one wetland area. Paravur lake is the major water body in this area. The total area of the lake is about 5.352 square kilometres and the river Ithikkara drains into the lake after its 56 kilometres long journey. The Ithikkara River flows about three kilometres through the Paravur Lake via Ithikkara, Pullichira, Kakkotmoola and Mayyanadu before flowing into the Lakshadweep sea through the natural estuary at Lakshmipuram Thoppu, Mayyanadu (Peter, 2011).The Edava- Nadayara Lake has a total area of 4.973 square kilometres and the major feeder of the lake is Ayiroor River which has a total length of 17 kilometres. Kappil is the estuary mouth where the lake meets the sea. Ithikkara River locally known as Ithikkara Ar originating from Madathara hills, near Palodu 240 above msl, located to the south- west of Kulathupuzha in the Western Ghats, traverse through the Southern region of Kollam and finally drains into the Paravur lake. The Paravur lake is connected to the Edava- Nadayara backwaters through the narrow Paravur Canal also known as Maniamkulam Canal at Maniamkulam where the lake is enclosed by bunds for the retting of coconut husks (Shibu, 1991). It has a total length of 6.1 kilometres. Quilon Canal or Kollam Thodu connects the Paravur Lake and the Ashtamudi Lake to the north as a continuation of Trivandrum- Shoranur inland canal (Jayadev, 2012). Polachira wetland lies between 8^0 50' 00'' N to 8^0 51'00'' N Latitudes and 76^0 41'00'' E to 76^0 42' 30'' E longitudes. It is one of the major wetlands in Southwestern part of Kollam district lying adjacent to Paravur lake. The wetland spreads over 6.50 square kilometres of sprawling land and at a depth of 5 metres above sea level.



Map 3: Drainage of Edava- Nadayara and Paravur Backwaters

5.4. Soil

Soils are, next to water, man's most vital natural resource (Thornbury, 2008).Only two types of soil can be found in the Edava- Nadayara and Paravur region, namely gravelly clay and sandy soil. Gravelly clay occupies the significant segment of the region. Due to small particle size and small pores gravelly clay tends to stick together causing water to

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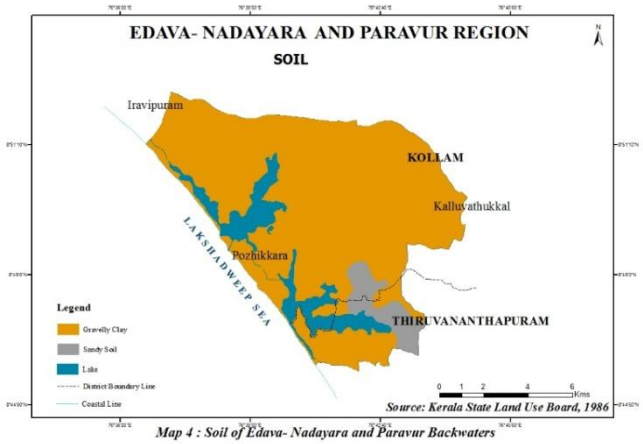
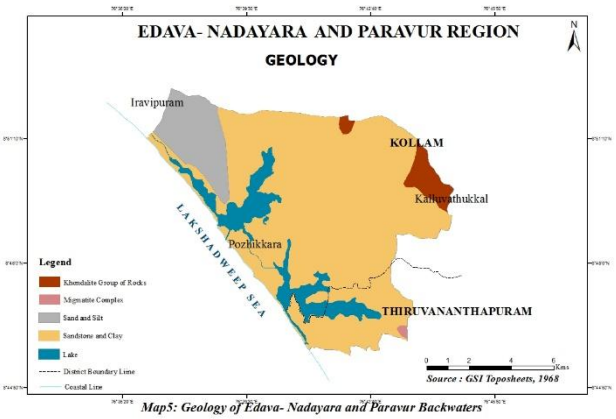
fill up the air spaces. This type of soil is very much suitable for paddy and coconut cultivation. Sandy soil contains large particles with large pore spaces. It is poor in nutrients and low water holding capacity. Some kind of vegetables can survive in this soil. The important crops cultivated in this soil are coconut, banana plantations, and mango and jackfruit trees. Cultivation of tapioca is also widespread. Gravelly clay soil comprises an area of 89.612 square kilometres this is 88.70% to the total area whereas sandy soil covers only 1.08% to the total area.



Map 4 : Soil of Edava- Nadayara and Paravur Backwaters

5.5. Geology

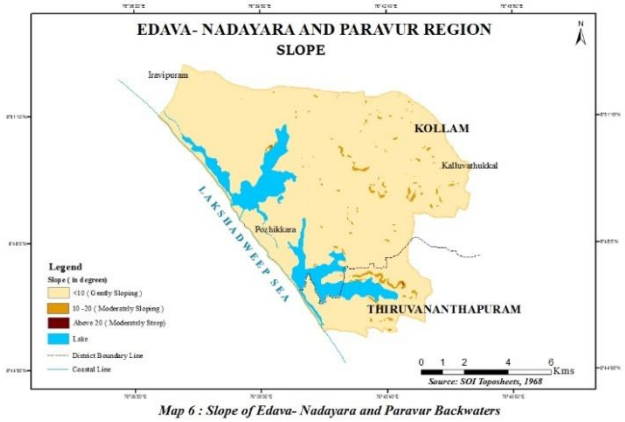
The geological setting of a region affects the various human activities of that area. Geologically, the study area is mainly filled by Archaean Crystalline rocks and Tertiary and Quaternary sediments (Department of Mining and Geology, Government of Kerala). The Khondalite group of rocks and Migmatite rocks included in the Archaean Crystalline groups. The principal rock types dominated in the study area are Migmatite Complex and Khondalite group of rocks. Both are significant examples of metamorphic rocks. When compared to Khondalite, the presence of Migmatite Complex is very less that is Khondalite group of rocks has a total area of 3.566 square kilometres, whereas Migmatite complex only occupies 0.21% to the total lake basin. But Sand stone and Clay, examples of semi- consolidated sediments cover up most of the area with 76.10% to the total area. Apart from that the remaining portion filled by unconsolidated sediments of sand and silt with 10.047 square kilometres.



Map5: Geology of Edava- Nadayara and Paravur Backwaters

5.6. Slope

Slope indicates the inclination of the land surface at a particular spot (Trewartha et.al., 1967). The Edava-Nadayara and Paravur region displays predominantly a gentle slope. About 78.82% of the total area falls in slope less than 10 degrees. Whereas 9.89% falls in moderately sloping category. Only 1.06 % constitutes more than 20 degrees that is moderately steep sloping category.



Map 6 : Slope of Edava- Nadayara and Paravur Backwaters

5.7. Climate

As we all know climate is the aggregate of weather in long term and weather is the disintegration of all climatic conditions in short term. As per the Koppen's climatic classification, Kerala experiences tropical monsoon with seasonal excessive rainfall and hot summer except over southernmost districts where the climate is Tropical Savannah with seasonally dry and hot summer (Ishaque Abdu, 2018). The Edava- Nadayara and Paravur region experience a tropical humid climate with an oppressive summer from March to May and plentiful seasonal rainfall mainly through southwest monsoon from June to September and northeast monsoon from October to November. When compared to the interior regions temperature is less in the coastal and estuarine regions. The average temperature varies between 32^0 to 33^0 Celsius in the coastal region and 35^0 to 36^0 Celsius whereas the average annual rainfall is 2272 mm (Kerala State Land Use Board, 2014).

5.8. Flora and Fauna

Moderate temperature, adequate rainfall and the presence of lakes, rivers and other water resources help in the growth of varieties of flora and fauna in the area. The presence of mangroves is abundant in the lake water. The residents of the locality and a non-governmental organization named HELP Foundation, which is formed for the protection and conservation of Paravur lake are promoting mangrove afforestation especially for shore protection. Edava-Nadayara and Paravur backwaters are well known for their fish varieties. Marine, estuarine and freshwater fishes can be found in this backwater system. The area is rich in prawns, fin fishes, crabs etc…and aqua culture is also makes a good source of income to farmers and fishermen. The reports published by Help Foundation bring out very important information that the Paravur lake was famous for its Asian Small-clawed otter, which is the smallest otter species in the

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world. The oriental small-clawed otter lives in extended family groups with only the alpha pair breeding and previous offspring helping to raise the young. Paravur lake and Ithikkara river ecosystem is perfect habitat for this otter variety (Pradeep, 2011). Loss of some mangrove population due to aqua culture and other related activities, silting of the lake water due to sand and silt accumulation in the lake from the sea, presence of chemical pesticides in the water body and above all pollution resulted in the complete destruction of otter habitat. The backwater system is enriched with water birds like kingfishers, terns, darter and cormorants. Finally Polachira wetland area and the backwaters are a famous destination for migratory birds.

6. Conclusion

This paper figured out some important physical characteristics of Edava-Nadayara and Paravur backwaters such as location, geomorphology, drainage, slope, soil, geology, climate and biodiversity. The physical setting of the backwater system portrays its unique nature and unshared scenic beauty. But pollution, mining, sea sand filling, over exploitation of the natural resources, habitat degradation etc…have negatively affected the virginity of the lake nowadays. So the protection and conservation of the earth resources is the duty of each of us for a better and brighter future.

7. Acknowledgment

The authors highly acknowledge the financial support in the form of Junior Research Fellowship (JRF) provided by University Grants Commission (UGC), Government of India.

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