

# FEASIBILITY STUDY OF ROLL ON-ROLL OFF TRANSPORT ACROSS VEMBANAD LAKE

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**Abstract** - Kerala, famously known as 'God's own country' is blessed with backwaters in abundance. Studies prove that water transportation is the cheapest mode of transportation. However, currently only 20% of the inland waters in Kerala are used for navigation. Vembanad Lake (Vembanad Kayal) is the largest lake in Kerala and also counted as one of the largest lakes in India.

Vembanad Lake is bounded by Kottayam and Alappuzha districts. Currently the two road networks connecting Alappuzha and Kottayam traverse the perimeter of the Vembanad Lake. By providing a Roll on - Roll off service on Vembanad Lake connecting the two districts, traffic congestion on these roads can be reduced. This project aims to study the feasibility of providing a Roll on - Roll off service across the lake.

The literature review highlights the current inland waterway scenario in India focusing the state of Kerala. Despite the abundance of navigable inland waterways in Kerala, studies have revealed that the waterways for transportation are largely underdeveloped in the state.

From the study, it is concluded that the provision of the Roll on-Roll off service across the lake is technically feasible. More studies have to be carried out to analyze the feasibility of the service from the financial and economic perspective.

**Key Words:** Backwater, Navigation, Roll on - Roll off, Feasibility

## 1. INTRODUCTION

Water transport refers to movement of goods and passengers through the waterway. Inland water transport is the fuel efficient and environmental friendly mode of transport. IWT for passenger and freight movement involves lower operating cost and environmental pollution than roads, rails and air options. The number of boat accidents compared to road accidents is countable by fingers. More than one lakh road accidents were reported during the period 2005 to 2016, while the boat accidents were just 48 numbers.

In India only .4% of the domestic surface transport is accounted for by IWT compared with 68% by road and 30% by rail even though India is richly endowed with navigable waterways, comprising of rivers, canals, backwaters, creeks, lagoons etc.

The Inland Water Transport in Kerala includes rivers and backwaters. This has paid a major role in the transportation right from the old period. Coastal Shipping and Inland Navigation Department (CSIND), State Water Transport Department (SWTD), and Kerala Shipping and Inland Navigation Corporation Ltd. (KSINC) are the agencies which are responsible for the development of inland water transport in Kerala.

Ro-Ro is an acronym for Roll-on/roll-off. Roll-on/roll-off ships are vessels that are used to carry wheeled cargo. The vehicle in the ship are loaded and unloaded by means of built-in ramps. The vessels can be of both military and civilian types.

The main objective of this study is to assess the feasibility of Roll on - Roll off (Ro-Ro) transport across Vembanad Lake. The specific task of the study is given below:

1. Asses the alignment for inland water navigation between Kottayam and Alappuzha
2. Identify the road network connecting Kottayam and Alappuzha.
3. To determine the passenger and tourist movement through roads and the divertible traffic through waterway.
4. Evaluate the technical feasibility of Ro-Ro operation through inland waterway.

## 2. STUDY AREA

### 2.1 Muhamma- Kumarakom

Muhamma is a place at a distance of 12.9 km from Alappuzha town, lies beside (Alappuzha-Madurai) SH 40. This route lies on NW3 and crosses the Vembanad lake. Muhamma is at a distance of 10.2 km from the thanneermukkom bund.



**Fig -1:** Map of the Muhamma-Kumarakom Region

Kumarakom is one of the major tourism attraction in Alappuzha district. Tourism in Kumarakom largely revolves around the backwaters of the Vembanad Lake. Kumarakom has been declared a Special Tourism Zone by the Kerala state Government, as legislated for by Kerala tourism Act, 2005.

### 3. METHODOLOGY

#### 3.1. Reconnaissance survey

Reconnaissance survey is conducted to study the advantages and disadvantages of various routes and the present tourist scenario. Location for traffic survey and bathymetric survey is identified.

#### 3.2. Bathymetric survey

This is carried out at five cross sections in the Vembanad Lake out of which three were taken before the Thanneermukkom lock and remaining after the lock. The survey has been conducted to obtain the canal depth, width etc. using the ultrasound technique (Doppler principle) and also to find the velocity of flow.

Bathymetry survey is carried out using the Eco sounder for the water body. The existing bed profile of the canal and the water level are collected at 50m cross-section interval. The Differential Global Positioning System (DGPS) is deployed to measure the coordinates of the cross section. The combination of Eco sounder and DGPS using the HYPACK software which is a hydrographic software to determine the dredging quantity as well as the sub-bottom strata.

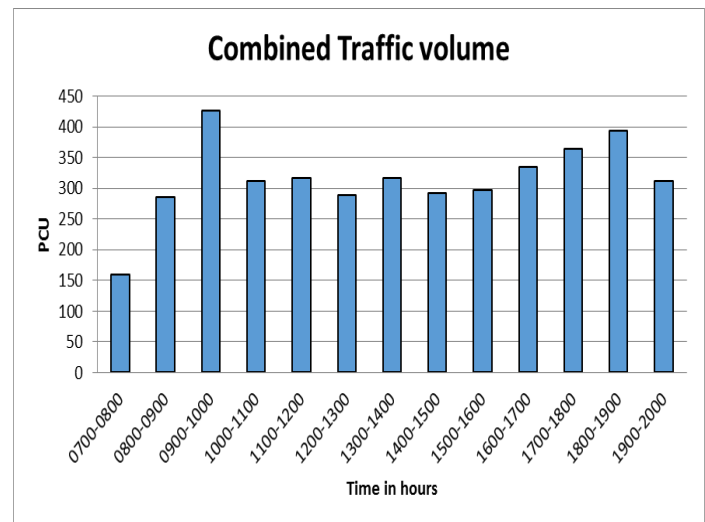
The bed profile of Kumarakom- Muhamma route is plotted based on the data. The average depth is taken as 2.5m.

#### 3.3 Traffic studies

Traffic volume survey and origin-destination survey was conducted at midblock section of Vechoor bund road and o Thanneermukkom to Muhamma road. Both the survey was

conducted simultaneously, from 08 hrs. to 18 hrs. with one break at noon.

The vehicles are classified as buses (KSRTC, private, tempo), private vehicles (car/jeep, two wheelers, auto-rickshaw), goods vehicles (LCV, mini truck, truck, MAV, goods auto) and slow moving vehicles (cycles & others). By the analysis of traffic data, the peak hour and non-peak hour of traffic was obtained. Figure show the details.



**Chart -1:** Combined traffic volume chart

A vessel operating in Mumbai is taken for reference. This particular vessel can carry 42 cars at a time. The draft of the vessel is 2.1m.

From origin destination survey it is found that more than 50% of the vehicles can be diverted through this operation.

#### 3.4. Water quality analysis

Water sample was collected from Kumarakom region (9°44'36.28" N 76°23'24.41" E) and is analyzed for the standard parameters as per Central Pollution Control Board guidelines. The tests such as pH, total dissolved solids, turbidity, total alkalinity, dissolved oxygen, suspended solids, hardness, chloride, sulphate and nitrate was performed. The results obtained are shown in table-1.

**Table -1:** Water Characteristics

Characteristics	Obtained Values
pH	5.86
Turbidity	0.88 NTU
Total Dissolved Solids	18.35 ppm
Total Alkalinity	6 mg/L
Dissolved Oxygen	5.85 mg/L
Total Suspended Solids	0.18 mg/L
Chlorides	41.91 mg/L
Total Hardness	5.23 mg/L
Sulphates	0.13 mg/L
Nitrates	5.49 µmol/L
Fluoride	.02 µg/L

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**4.RESULTS AND DISCUSSIONS**

- Based on the bathymetry survey conducted a navigational route is fixed. The selected route satisfies the operational criteria of having the least dredging volume and relatively shorter distance. The navigational route selected for the Roll on –Roll off is between Kumarakom to Muhamma and the same is shown in fig.
- The result of the traffic volume survey helped to determine the frequency of operation of the Roll on –Roll off transport. A continuous operation is recommended.
- The origin –destination matrix data indicates that such an operation is technically feasible.

Based on the data collected, it is observed that provision of a Roll on-Roll off service across the Vembanad Lake is technically feasible. Further studies have to be carried out to determine the financial and economic feasibility of the project.

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