GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
LOK SABHA
STARRED QUESTION NO. *17
TO BE ANSWERED ON 2ND FEBRUARY, 2022

SUBMERSION OF MUNROE ISLAND VILLAGE

*17. SHRI KODIKUNNIL SURESH:

Will the Minister of Earth Sciences be pleased to state:

(a) whether the Government is aware of increasing instances of submerging of Mundrothuruthu/Munroe which is an island village in Kerala's Kollam district;
(b) if so, whether any study has been initiated by the Government to assess the reasons and to suggest remedial interventions;
(c) whether the Government intends to depute a team of experts to study and assess the impact of such change in Munroe Island; and
(d) if so, the details thereof?

ANSWER
THE MINISTER OF STATE (INDEPENDENT CHARGE) FOR
MINISTRY OF SCIENCE AND TECHNOLOGY
AND EARTH SCIENCES
(DR. JITENDRA SINGH)

(a)to (d): A Statement is laid on the Table of the House.

STATEMENT LAID ON THE TABLE OF THE LOK SABHA IN REPLY TO (A) TO (D) OF STARRED QUESTION NO. *17 REGARDING "**SUBMERSION OF MUNROE ISLAND VILLAGE**" TO BE ANSWERED ON, FEBRUARY 2, 2022

(a) to (d) Yes, The Munroe Island, in Kollam district, Kerala State is a cluster of eight islands located on the eastern end of the Ashtamudi Lake in southwest Kerala. It is subjected to flooding, saltwater intrusion and subsidence affecting housing, livelihood, agriculture, potable water, etc., due to the vulnerable natural setting and typical environmental conditions.

National Centre for Earth Science Stuides (NCESS), Thiruvananthapuram, an autonomous institution under the Ministry of Earth Sciences(MoES) had investigated the area to understand the geological/geophysical aspects. Based on continuous measurements of Global Positioning System (GPS) at certain identified locations, satellite image-based interferometry, in situ water quality measurements, detailed bathymetric surveys of Ashtamudi Lake, tidal measurements, electrical resistivity surveys, and core sampling at identified locations, certain inferences were drawn. The key inferences are:

1. The island area with ground elevation less than 2 m (w.r.t. MSL), for the most part, was artificially built on a reclaimed region, in the beginning of 19th century. In fact, these low-lying parts of the islands are the problematic zones, where submergence and flooding are occurring. Persistent Scatterer Interferometry have yielded stable signatures within the island negating the presumption that the entire island is subsiding, which was also supported by the long static GPS measurements. However, the scatterers have shown certain unstable pixels along the railway line as well as at certain ground points, denoting the slumping into the clayey substratum due to natural consolidation and compaction of the organic-rich modern sediments, filled to build the island. The geomorphological settings of the island also support the view of self-weight consolidation of the buildings and sinking of rail track built on earth bunds, due to continuous ground acceleration of trains.

2. The entire low-lying parts of the island have wells with brackish water. Measurements revealed that the phreatic aquifer is in hydraulic continuum with tidal waters having considerable salinity. During monsoon flood when the Thenmala Dam on the Kallada River was open, considerable reduction in salinity has been observed in the wells due to freshwater influx. Before the dam was built, the Kallada River was charging the aquifers of the island with freshwater. This has almost ceased because of the dam. Moreover, the continuous semidiurnal forcing of the flood tides getting into the unmaintained small channels within the islands make the situation conducive for the aquifer salination, which seldom drains even during the ebb tides due to clogging.

3. The island system, being an integral part of the Ashtamudi Lake, responds to variations in the morpho-hydrodynamics of the lake. Comparison of the detailed bathymetry of the lake conducted by CESS/NCESS in 2000 and 2017 shows considerable decrease in its water-holding capacity. A reduction of ~15% within a matter of 17 years is due to shallowing of the lake, mainly from sediment influx due to tidal exchange. Therefore, tidal excursion, especially during the ebb tides, becomes sluggish leading to accumulation and slow draining of tidal water.

4. The bed level of Kallada River has been going down because of unauthorized sand mining. This and the sea level rise have caused the tidal regime to reach far inland, more than 31 km along the course of the river from the confluence with Arabian Sea. This process has made floodplains/areas adjacent to the river susceptible to salinity incursion.

5. Sediment accumulation in the islands, especially along with the swift monsoonal flow of the Kallada River, has stopped because of the damming. Annual accumulation of fresh sediment has been naturally compensating the consolidation of the sub-surface organic-rich layers, thus maintaining the elevation of the island along with fertility of the soil. Changes in this input mechanism might have affected the sustenance of the agriculture and coconut plantation of this island as well. Periodic flushing of Thenmala Dam may partly overcome this issue.

6. In the recent years, intermittent flooding has been recorded, from October through April. Processing of tide data shows erratic results pointing to the fact that the flooding in the island is not always concurrent with the spring tide events. It has been noticed in other similar systems that while the wind forcing frequency matches with one of the natural frequencies of the basin-scale internal seiches (standing waves), resonant amplification of the seiches can occur. Apart from the above, sea level rise due to remote forcing is also considered as one of the supplementing factors in the increased frequency of such events.

   The information generated by NCESS, MoES in this regard in the following two Figures (1 &2) can be used for further evaluation. The possible “remedial measures” require (i) engineering solutions along the railway track zone within the Munroe island are, (ii) biological and ecological solutions in the wetland areas namely mangrove and tidal flat, and (iii) adaptability, social awareness and sociological options in the settlement areas.

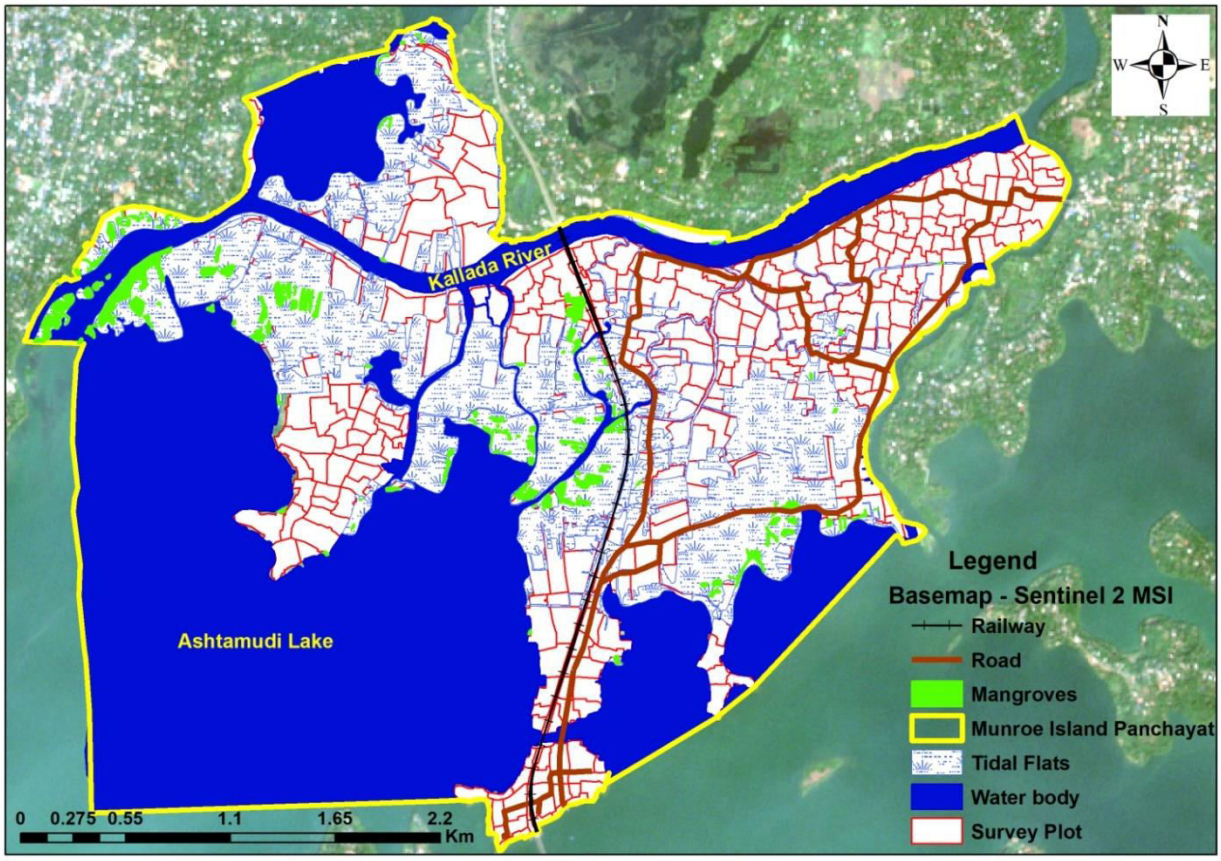

Figure 1: Map showing the physical settings of the MurothuruthuGrama Panchayat

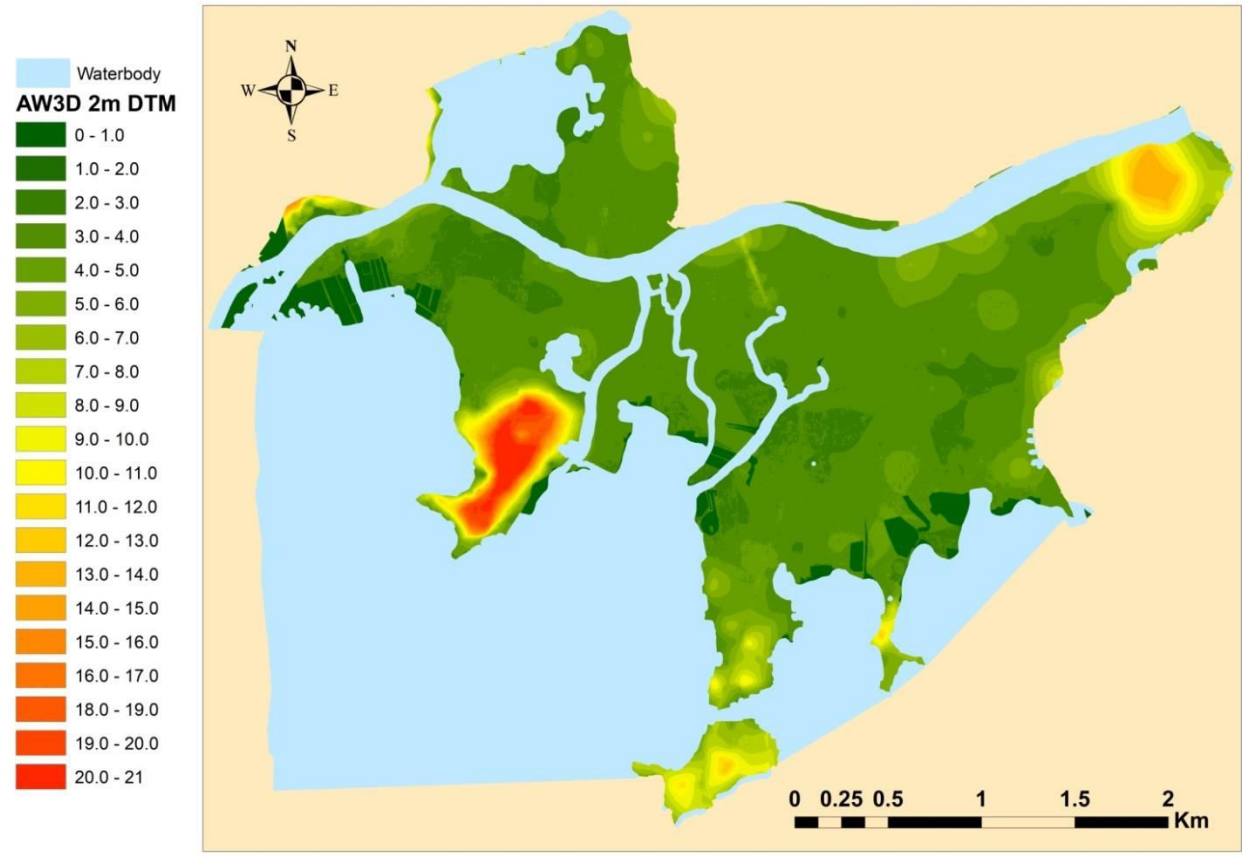

Figure 2: Map showing the spatial distribution of elevation in the Munroethuruthu Grama Panchayat

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