

GEOSCIENTIFIC INVESTIGATIONS ON THE INDIAN COAST: THEIR APPLICATION TO INTERPRET THE PALEOCLIMATES AND FUTURE SEA LEVEL CHANGES WITH SPECIAL REFERENCE TO GREENHOUSE EFFECT

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Objectives:

To delineate the paleo sea level fluctuations and erosional environmental changes along the Indian Coast and their relationship with the changing coastline and human settlements in the recent past.

To study the paleoclimatic variations and their impact on future climatic trends

To establish the geochronological events of the study area.

To construct climatic model on the basis of projected changes in view of paleoclimatic studies and greenhouse effect.

To assess the horizontal spread in relation to the vertical rise in sea level and to examine the extent of loss of land, stability of coastal structures and their socio-economical implications.

Importance of proposed project in the context of current status:

Our earlier geological studies indicated that about 10,000 years before present sea level was about 80-90 m below the present and climate changed from warm and arid to warm and humid. A subsequent intensification of monsoon was also inferred. Historical records indicate that total rainfall in the Indus Valley was double than the present one and sea level during this time was 2-6 m higher than the present. After this period to date, it is observed that monsoonal precipitations had varied with a cyclicity of about 77 years. In view of the above it is summarised that sea level and climate had varied in the past. Such studies should be taken now on large scale to infer conclusively, the rise in sea level and the net vertical rise can be decided keeping in view the effect of greenhouse gases.

Once the vertical rise is decided its horizontal spread has to be assessed, as this component will be more important to examine extent of loss of land, stability of coastal structures, submersion of big cities and harbours and their socio-economical implication. Such studies can be done with an understanding of Geo Surveying. One such model study conducted for Kiltan, Kaverati, Kadmat, Kalpeni-Cheriyam and Agati-Bingaram islands of Lakshadweep has shown that the effects of the sea level rise accounted for about 76, 71, 91, 92 and 96% of the total horizontal land loss. 19, 11,

19, 21 and 18% of these islands will be submerged in view of 90 cm rise in the sea level by 2050 A.D.

In view of the foregoing it is proposed that number of cores will be collected all along the Indian Coast. These cores will be analysed for their faunal, sedimentological and geochemical/mineralogical parameters to study the pattern in climatic variations and sea level changes. The inferred changes will be coupled with anticipated changes due to greenhouse effect. The horizontal land loss and coupled socio-economical changes due to net rise will be projected for future planning.

Names of the Investigators:

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Methodology:

1. Field studies:

- collection of the bathymetric and topographic data.
- collection of long cores and surficial sediments all along the western shelf of India from the suitable locations.

2. Laboratory studies:

a) To prepare the bathymetric and shoreline maps and compare them with the historic maps to obtain the horizontal loss of land due to the rising sea level.

b) Qualitative and quantitative analyses of light, heavy and clay minerals to determine the maturity and provenance of the sediments which in turn reflect the climate of the area.

c) Identification of micropaleontological environmental indicators through surface sediments and their application in time through studies of cores. This will help us to decipher sea level changes and pattern in climatic changes including paleomonsoonal precipitations.

d) Dating of various horizons will be carried with the help of radiometric dating.

Schedule of activities:

1. Procurement of samples, equipment and recruitment of staff.
2. Field survey.

3. Sample preparation for Paleontological, Sedimentological, Mineralogical, studies and their investigations.
4. Processing of data.
5. Compilation and interpretation of data.
6. Report preparation.