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Critical Appraisal Of Tools And Techniques To Assess And Map The Impacts Of Relative Sea Level Rise

Due to Global warming induced Climate Change, Sea Level Rise is said to be an inevitable scenario. It was said to raise progressively to 1m (30-90cm) by 2100. But the recent research and studies have come to a conclusion that, with the current Global Climatic Crisis the effects are found to be more critical and more than the actual said data by IPCC (Intergovernmental Panel on Climate Change). It is also said that the amount of rise by 2100 will be seen by 2050 itself. These will inflict severe damages to the Coastal areas and cities nearby. Where and when these effects are going to take place is a thing of uncertainty. The medium of uncertainty is a drawback for the Planning and Real Estate projects as these hold for the major part in urban landform and economy. Thus it is really important to carefully assess and map the Relative Sea Level Rise and its impacts and include them while planning for future Development Projects and build Resilience/Adaptive plans for already existing projects.

For this purpose, it is necessary to understand the use of appropriate methods, tools and techniques that are required for accurate spatial analysis, timing and inundation of coastal flood, the rise in Relative Sea Level and its impacts. The study analyses the Conventional Methods used for assessing and mapping the impacts of Sea Level Rise, their knowledge gaps and also puts effort on understanding the requirement of new models and tools to improve the accuracy of mapping. Conventional method includes 'Bath tub or Bucket fill' analysis approach processed in GIS (Geographical Information System) which uses Digital elevation data (DEM - Digital Elevation Model) for assessing the vulnerability and inundated areas due to coastal flooding and sea level rise. Studies have found that this approach ignores 35-55% of total land vulnerable to these impacts. For example, this process considers all the areas under 1m elevation for a 1m sea level rise. DEM is improved with the Lidar (Light detection and ranging) technique. These approaches lack the hydrodynamic components related to sea level like, wave's movement, storm surges, ocean circulation etc. Through this study it has been identified that there is a knowledge gap in the use of appropriate models for increasing the accuracy of inundation maps regarding the impacts of Relative Sea Level Rise. The lack of use of Hydrodynamic models currently available is identified as the gap. Models like Delft3d, Xbeach, Mike21 can provide detailed analysis of coastal inundation over various spatial scales and various climate scenarios. These models can fill in the gap. This is ascertained with the help of an expert panel interview conducted.

Study thus reaches to the conclusion that incorporation of bath tub analysis (for analysis of environmental, social and economic sectors spatially of particular area) and hydrodynamic model process is essential to acquire accurate and improved maps for identifying inundated areas of present and future conditions of Relative Sea Level Rise and its impacts.