

PREFACE:

Flood hazard mapping is crucial for effective disaster management, particularly in flood-prone regions like the Kamrup Metropolitan and Kamrup districts of Assam, India. This study employs advanced techniques leveraging Sentinel-1 synthetic aperture radar (SAR) data and Google Earth Engine (GEE) to develop comprehensive flood risk maps for these urban districts. The project aims to determine the extent of flooded land and its impact on land use and land cover (LULC), as well as assess the effectiveness of Sentinel-1 SAR data processed using Otsu's thresholding algorithm in differentiating water and non-water areas during flood events.

The integration of Sentinel-1 SAR data and GEE facilitates efficient processing and analysis of large geospatial datasets, enabling the creation of up-to-date flood maps. The study reveals that the Kamrup Municipality and Kamrup District have experienced significant flooding over the past three years, with the flooded area varying annually. The total flooded area in 2021, 2022, and 2023 was 21,477 Ha, 21,159 Ha, and 27,445 Ha, respectively, within a study area of 434,846.0052 Ha.

Analysis of LULC changes indicates an increase in water bodies in 2022 followed by a slight decrease in 2023, attributed to flood mitigation efforts by the development authority.

Vegetation and agricultural land continuously decreased from 2021 to 2023 due to urbanization, while range land exhibited fluctuations, decreasing in 2022 and increasing in 2023.

The Otsu algorithm applied to Sentinel-1 SAR data demonstrates high accuracy (89%) in identifying flooded areas without requiring extensive training or site-specific knowledge. These flood risk maps provide valuable insights for policymakers, aiding in the development of mitigation and response strategies. Improved flood risk assessment and management are imperative for building resilient communities in the face of increasing flood frequency and intensity exacerbated by climate change.