

## **Abstract**

Agriculture being one of the prime contributors to India's Gross Domestic Product needs constant monitoring so that the bearing on the economy can be better judged. Periodic monitoring of Indian agriculture is an essential task. The monitoring would greatly help to understand the variations of crop health, the progress of cropped area and the variability of the monsoon. The agricultural scenario would change from year to year based on the monsoon, the socio-economic conditions and the government policies.

To monitor agriculture scenario in timely manner needs a lot of data related to agriculture and meteorological parameters and efficient computing resources, which is time consuming process. Decision makers need remedial solutions at the time of disaster for the implementation of quick responses to the affected area or community. The system which would provide the timely information with decision making capabilities would be greatly appreciated by the planners and decision makers. The research undertaken was aimed at designing and development of a Spatial Decision Support System for Drought Management. The two major objectives covered in the study are (1) The potential use of geospatial data for drought analysis and (2) the development of a spatial decision support System for drought management. This study can act as a prototype, for the drought management from interactive and user-friendly developed SDSS on an open-source platform as a case study of Lakhpat and Nakhtrana Taluk of Kutchh district.

The Multispectral remotely sensed data was essentially used as the source of remote sensing images for the study area in conjunction with other ancillary data. Some of the ancillary data like weather data, soil type maps, Landuse / Landcover maps, Demographic data, and Geo-physical data were obtained from authentic sources. Open source tools have the advantage of

being free of cost and licensing issues. Postgres was used as DBMS with PostGIS as a spatial extension to handle vector and raster data. All queries were developed making use of the SQL. Java, JSP, and HTML were the coding languages employed for the development of the Graphical User Interface.

The present study has developed and demonstrated a pathway of drought assessment and analysis using various freely available datasets. The present study is to develop an SDSS for drought management which will help decision-makers, planners, researchers, and citizens to visualize and analyze various Agri-meteorological parameters over study areas.

The developed system has a Graphical User Interface (GUI). The present GUI provides facilities to the user to conveniently select and visualise data for the required week/month/season (as the case may be) and display the generated outputs. The generated satellite-based indicators such as NDVI, NDWI, SPI, PCI, SMC and ISDI were able to characterize agricultural drought at a space-time scale.

With the help of various Agri - meteorological indices year 2011 and 2015 experienced normal conditions whereas, the year 2012, 2013, 2014, and 2016 experienced normal to severe drought conditions. The developed ISDI model-generated results illustrates the year 2015 and year 2016 experienced moderate to severe drought condition over the majority of the villages in the study area.

The approach, conceptualized and implemented in the present study, could be a step forward for the existing conventional approaches in providing a new pathway that is feasible and can be operationally implementable with current and future satellite data for growth stage-wise, and seasonal agricultural drought assessment in the study area or district level for disaster management planning.