

Generation of hydrogeomorphology and ground water potential map using remote sensing and geographic information system

S.L. SURYAWANSHI, M.D. ABUI, S.H. BHUTADA AND V.S. BHANDARE

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See end of the article for authors' affiliations

Correspondence to:

S.L. SURYAWANSHI
Department of Soil and
Water Conservation
Engineering
Aditya College of
Agricultural Engineering
and Technology, BEED
(M.S.) INDIA

ABSTRACT

The research study was undertaken to generate hydrogeomorphology map for Malegaon watershed of Nasik district. The base maps such as watershed boundary, drainage network were prepared with the help of Survey of India (SOI) topographical map. The satellite data of IRS-1B (LISS-II) of 11th November 1993, 30th January 1994 and 8th May 1994 of the study area were used for generating thematic map of hydrogeomorphology map. The hydrogeomorphological map was prepared based on visual interpretation of IRS-1B (LISS-II) data of three years and SOI topographical maps. The geomorphic units were classified based on the origin of the landforms and the geological process acting upon it. The hydrogeomorphological setup of the area was broadly divided into three major units namely, structural origin, denudational origin and fluvial origin.

Key words : Base maps, Thematic map, Remote sensing, GIS

Water resources assessment of a region involves a detailed study of the surface and sub-surface water. To integrate the entire surface and sub-surface data manually requires huge manpower and time. By adopting a GIS platform the result obtained will be faster and more accurate. Till recently, ground water assessment was based on laboratory investigation, but the advent of Satellite Technology and GIS has made it very easy to integrate various databases. Groundwater is a most important natural resource required for drinking, irrigation and industrialization. The resource can be optimally used and sustained only when quantity and quality of groundwater is assessed. It has been observed that lack of standardization of methodology in estimating the groundwater and improper tools for handling the same, leads to miscalculation of estimation of groundwater. It is essential to maintain a proper balance between the groundwater quantity and its exploitation. Otherwise it leads to large scale decline of groundwater levels, which ultimately cause a serious problem for sustainable agricultural production.

Remote sensing and Geographic Information System (GIS) are the most handy and accurate tools to measure the various earth resources and their potentials. Using satellite based remote sensing various resources maps can be generated and using GIS tools these maps can be further analysed to derive a composite maps with numerous information, which finally derives new maps like land capability and land suitability maps.

Mohanty (1994) made an attempt to detect the changes in land use pattern using sequential aerial

photographs of 1974 and 1989 and compared with SPOT data of 1988 with the help of 'USEMAP' GIS software package. He suggested that in order to know the trend of development and land use patterns, analysis of sequential aerial photographs and satellite imagery of different years is useful tool. Das *et al.* (1997) conducted the study for groundwater exploration and development in Keonjhar district of Orissa. In this study, air borne and space borne data was used for qualitative evaluation of groundwater resources. Rao *et al.* (1997) undertook a study in Neelkanthpuram Watershed with the objective of generating action plans for sustainable development of land and water resources through the integration of information on soils, land use/land cover, slope, hydrogeomorphology etc. using GIS approach. Chaurasia and Sharma (1999) studied the land use through IRS-1C (LISS-II) data of the Saroa block in Nawanshahr district, Punjab. Pandit *et al.* (1999) carried out a case study of Nasik district (Maharashtra) using remote sensing and GIS based integrated watershed development.

METHODOLOGY

The information provided by the satellites in combination with other sources of information can be integrated through GIS to quantify the various parameters for efficient management of land and water resources in watershed.

Study area:

The study area covers the Malegaon watershed of Nasik Tehsil, which is located in the south-western part