

Generation of slope map using remote sensing and geographic information system techniques

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ABSTRACT

The research study was undertaken to generate slope 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 slope map. The digitized contour information was used for preparation of slope map. The contours of 20 m were digitized from topographic map on 1:50000 scale. By using, ARC command TOPOGRID DEM (Digital Elevation Model) in grid was generated. A slope map on 1:50000 scale was generated from the DEM-grid. 50 per cent of land is having slope less than 5 per cent, which should undergo cultivation. Whereas, for the topography having slope of about 45 per cent, conservation practices are necessary for cultivation purpose and on the remaining piece of land different plantations should be taken.

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

A thematic map displays the spatial pattern of a theme or series of attributes. In contrast to reference maps which show many geographic features (forests, roads, political boundaries), thematic maps emphasize spatial variation of one or a small number of geographic distributions. Slope is important in identifying constraints and evaluating potential environmental impacts related to landform alteration. Major constraints can be tied to grades/inclinations that are either too steep or too gentle. Major impacts related to inclination include erosion/loss of soil/non-point source pollution and slope failure (linked to weak rock, soils with low bearing capacity, steep slopes, etc.). Coupled with aerial photographs, slope maps are excellent tools to look for potential erosion areas, drainage patterns, landform and soil patterns, land use suitability, etc. Slope maps are isoline (lines of equal value) maps of selected slope categories. To construct a slope map one select specific slope categories to map and know the scale of the map and the contour interval. The easiest approach to mapping slope is to measure slope between two contour lines - such measurements are always perpendicular to the axis (direction) of two contour lines.

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.