REMOTE SENSING AND ITS APPLICATIONS IN GEOGRAPHY - 18MAG24E

(Syllabus - UNIT – V:. Applications of Remote Sensing in Geography: Geomorphology, Water Resources, Disaster studies, Forestry, Agriculture, Land use and Land cover and Urban planning.)

Applications of Remote Sensing in Geomorphology,

- Multi-spectral data can provide information on lithology or rock composition based on spectral reflectance.
- Radar provides an expression of surface topography and roughness.
- It is not limited only to direct geological applications but it is also used to support logistics,such a route planning for access into mining area,reclaimation monitoring and generating base maps upon which geological data can be referenced or superimposed.
- Structural geology plays an important role in mineral and hydrocarbon exploration and potential hazard identification and monitoring.
- Structural mapping is the identification and characterization of structural expressions.
- Structures can indicate potential location for oil and gas reserve and provide clues to potential hazards such as earthquakes landslides and volcanic activities.
- Aerial photos can be used in temperate areas where large scale imagery is used, particularly to map potential geohazards.
- Geological Unit Mapping consists primarily identifying physiographic units and determining the rock lithology or coarse stratigraphy of exposed units.
- Remote sensing can be used to describe the lithology by the color, weathering and erosion characteristics, drainage patterns and thickness of bedding.
- Unit Mapping is useful in oil and mineral exploration since this resource are often associated with specific lithologies.
- Regional lineaments and structural trends along which groups of mining districts may occur.
- Mapping local fracture patterns that may control individual ore deposits. Detecting hydrothermally altered rocks associated with ore deposits.
- Providing basic geologic data.
- It deals with different landforms that characterize the earth’s topography, origin, sequence of evolution, present status and their future trend.
- Until space age, scientists conducted most geomorphic analysis by mapping (generally topographic and geologic) and by field observation and measurements.
- Eventually, aerial photographs became a prime tool for mapping and interpreting.
- Modern macro-geomorphology makes extensive use of global observation from space crafts that employs a variety of imaging and sensing systems. Eg: Vidicon imaging, multi spectral scanning, radiometers and Radars.

Applications of Remote Sensing in Water Resources,

Operational Applications

- Flood Mapping & Management
- Snowmelt Runoff moelling
- Hydrological modelling
- Irrigation water Management
- Drought Monitoring
- Rain Water Harvesting
- Flood Inundation Mappingand Damage Assessment
- Near Real-Time Flood Inundation Mapping
- Flood Damage Assessment
- Flood Risk Zone Mapping
- Flood forecasting and Spatial Warning System
- Snow Melt Runoff Modelling

Space-borne spectral measurements have been used for

(i) Rainfall estimation,

(ii) Snow and glacier studies leading to snow melt runoff forecasting,

(iii) Irrigation water management and identification of potential irrigable lands,

(iv) Reservoir sedimentation

(v) Watershed management

(vi) Disaster management

(vii) Water quality assessment,

(viii) Ground water assessment and prospecting,

(ix) Planning and implementation of developmental activities,

(x) Infrastructure development,

(xi) Disaster management and environmental monitoring.

Remote sensing data for Urban Planning.:

- Urban Landuse/Landcover detection,
- Urban Landuse/Landcover change detection,
- Analyse Transportation network,
- Solid waste management,
- Urban disaster management,
- Urban sprawl,
- Urban pollution,
- Town planning.
- Urban Navigation,

Remote sensing data for Landuse/land Cover:-

- Landuse/Landcover detection,
- Landuse/Landcover Change detection,
- Landuse/Landcover area calculation,
- Landuse/Landcover Temporal analysis.

Applications of Remote Sensing in Disaster studies

Cyclone monitoring and warning:- Early warning, long-range climate modelling Identifying escape routes; crisis mapping, impact assessment, cyclone monitoring, storm surge predictions, Damage assessment; spatial planning.
Flood management:- Mapping flood-prone areas; delineating floodplains, land-use mapping, Flood detection, early warning, rainfall mapping, Flood mapping, evacuation planning, damage assessment, Damage assessment, spatial planning.
Earthquakes:- Building stock assessment, hazard mapping, Measuring strain accumulation, Planning routes for search and rescue, damage assessment, evacuation planning; deformation mapping, Damage assessment, identifying sites for rehabilitation.
Drought vulnerability analysis, land and water management planning Weather forecasting, vegetation monitoring, crop water requirement mapping, early warning.
Monitoring vegetation- damage assessment- Informing drought mitigation.
Volcano hazard mapping; digital elevation models, Emissions monitoring, thermal alerts, Mapping lava flows, evacuation planning, Damage assessment, spatial planning.
Fire Mapping fire-prone areas; monitoring fuel load, Fire detection, predicting spread/direction of fire, early warning. ..etc

Applications of Remote Sensing in Agriculture

Crop production forecasting- Assessment of crop damage and crop progress- Horticulture, Cropping Systems Analysis- Crop Identification- Crop acreage estimation- Crop condition assessment and stress detection- Identification of planting and harvesting dates- Crop yield odeling and estimation- Identification of pests and disease infestation- Soil moisture estimation- Irrigation monitoring and management- Soil mapping- Monitoring of droughts- Land cover and land degradation mapping- Identification of problematic soils- Crop nutrient deficiency detection- Determination of water content of field crops- Crop yield forecasting- Flood mapping and monitoring- Collection of past and current weather data- Crop intensification- Water resources mapping- Precision farming- Climate change monitoring- Compliance monitoring- Soil management practices- Air moisture estimation-Crop health analysis- Land mapping.

Applications of Aerial Photography in Forestry

- Forest cover types

- Identify individual species
- Species composition
- Forest fire detection
- Forest fire hazard
- Detecting forest trees health (vigor and stress)
- Forest trees diseases and insects infestation
- Forest trees under air, soil and water pollution
- Assessment of wind damage and other sever climatic condition
- Detecting deforestation and forest degradation
- Forest monitoring:
- Logging activities
- Reforestation and afforestation
- Timber harvesting planning
- Forest roads planning
- Forest inventory
- Forest management
- Assessing slope failure and soil erosion
- Assessing and managing forest recreation resources
- Assessing and managing wildlife habitat

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