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Geographic Information Systems (GIS) in Natural Resource Management

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SUMMARY

The GIS (Geographical Information System) is primarily used for mapping. A geographic information system (GIS) is a computer-based information system that collects, stores, manipulates, analyses, organises, manages, summarises, and displays all types of geographic data. GIS can be used in a variety of ways. It is equally important in the management of natural resources. The Geographic Information System (GIS) in Natural Resource Management is a useful tool for assessing natural resource assets. The Geographic Information System (GIS) in Natural Resource Management identifies human impacts on natural resources and provides support for their use. Data is collected from land cover, vegetation, soil, and geology, all of which are natural resource components, and then mapped using GIS technology.These data are collected through aerial photographs or satellite images using remote sensing techniques. The various applications of remote sensing and GIS tools that can be used for natural resource management are compiled in this article (agriculture, water, forest, soil, natural hazards). Natural resource managers can use the information to better understand and collaborate with GIS scientists to develop and apply remote sensing and GIS science to achieve monitoring goals.

INTRODUCTION

Application of GIS in Natural Resource Management: Flood, landslide, soil erosion, drought, earthquake, and other environmental issues are among the most common uses of GIS in natural resource management. Climate change, habitat loss, population growth, pollution, and other current issues are all addressed by GIS in natural resource management. Remote sensing data is now used as input data for a variety of environmental process modelling applications (Melesse et al., 2007). On a regional scale, the MOD16 ET product was compared to validated ET maps with the same spatial and temporal resolution, and it was found to be useful for irrigation scheduling and crop water management in the study area (Sanjay and Mukesh, 2020). Consultants and natural resource managers and researchers in government agencies, conservation organisations, and industry will be able to develop management plans for a variety of natural resource management applications thanks to the integration of remotely sensed data, GPS, and GIS (Philipson & Lindell, 2003). Precision agriculture is a farming method that encourages different management practises within a field depending on the conditions. This system is based on new tools and information sources made available by modern technology. Seelan et al. (2003) list the global positioning system (GPS), geographic information systems (GIS), yield monitoring devices, soil, plant, and pest sensors, remote sensing, and variable rate technologies for input applicators as examples. The application of GIS in natural resource management is the solution to these issues. Yes, the emergence of GIS has solved a number of environmental issues. GIS is a powerful tool that is used in natural resource management. The following are some examples of GIS applications in major fields.

Assessment of hazard and risk

Flood, landslide, soil erosion, forest fires, earthquakes, drought, and other natural hazards are all reduced using GIS in natural resource management. Although these natural disasters cannot be completely avoided, they can be mitigated by early planning, preparation, and strategies. GIS is being used in natural resource management to analyse, organise, manage, and monitor natural hazards. GIS in natural resource management provides spatial data of disasters that have occurred or may occur in the future, allowing for early risk mitigation. It can be seen on the GIS-based map.

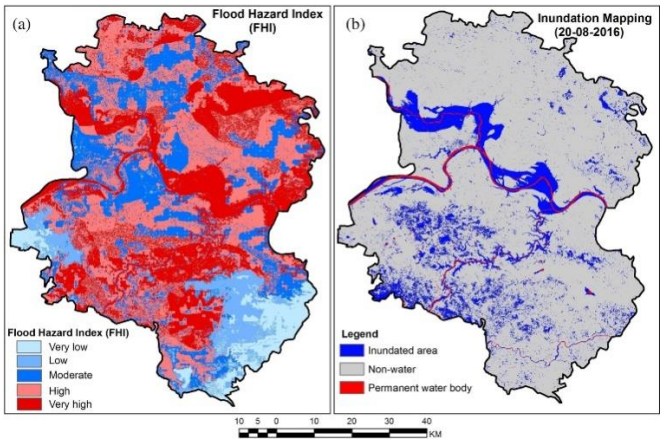

Figure 1. Identification and validation of potential flood hazard area using GIS

Land use and Land Cover Change Detection

In the field of natural resource management, GIS provides data on land area change over time. Satellite imagery or aerial photographs were used to detect land change documents. It can be used to assess land change, deforestation, urbanisation, and habitat fragmentation, among other things. The data obtained from GIS in natural resource management aids in the study of a specific area and the monitoring of the area. It is a method of studying and managing environmental changes in the landscape.

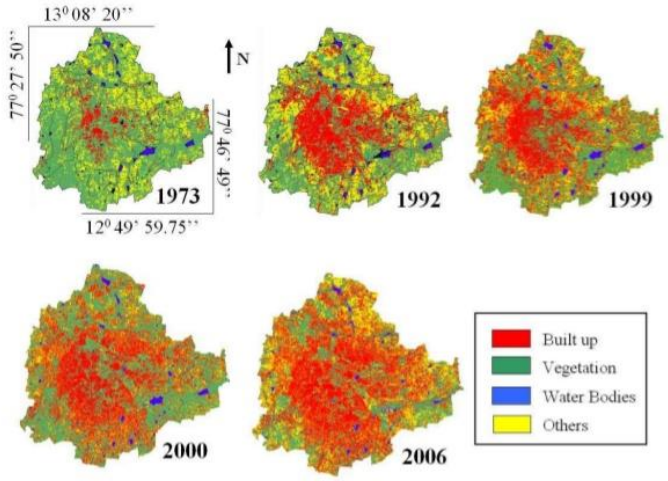

Figure2. Land use and land cover change map

Inventory of natural resources

A statistical survey of the state of natural resources is known as a natural resource inventory. It provides relevant information about the state of the environment and policies, as well as conservation programmes, obtained through GIS in natural resource management. GIS maps provide information about the location and availability of current resources.

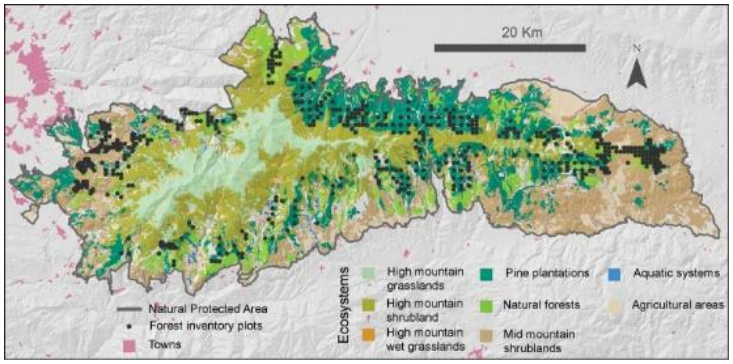

Figure 3. Location map of forest inventory plot

Environmental Surveillance

In natural resource management, GIS provides graphical data that aids in environmental monitoring. It collects qualitative and quantitative data on environmental issues like pollution, land degradation, and soil erosion, among others. In natural resource management, GIS detects these issues and forecasts future risks. As a result, GIS in natural resource management keeps track of all of these environmental issues.

GIS application in Natural Resource Management

- GIS facilitates in the management of land by providing useful data for construction and agricultural projects. Before making any changes, it chooses a suitable location.
- The pre-information obtained through GIS in natural resource management helps to conserve a wide range of biodiversity. Many biological habitats are protected, and more planning for flora and fauna protection is encouraged.
- GIS is used in natural resource management to provide hydrological data for watershed management and analysis.
- GIS is now being used in mineral exploration in a number of developed countries, including the United States, Canada, and Australia.
- Application in Soil Science, Crop-Irrigation Demand Monitoring, Crop Modelling, Water Resource management, Water Quality Monitoring, Forest Management and wildlife habitat analysis, Application in Natural Disaster Management,

CONCLUSION

As a result, GIS is an appropriate technology for conceptualising natural resource management. It is a useful technique for determining the factors that influence the environment, as well as the outcome and execution. This GIS' geospatial data supports the sustainable use of natural resources. Thus, GIS in natural resource management aids in the proper and wise management of resources for current and future generations. Furthermore, GIS in natural resource management aids in the effective and efficient management of natural resources.With increasing human population putting pressure on natural resources, remote sensing and GIS can be used to effectively and efficiently manage these precious limited resources. Geospatial data is extremely useful for identifying and analysing factors that influence how these resources are used. As a result, with a thorough understanding of these factors, sound decisions can be made to ensure the long-term use of natural resources to meet the needs of current and future generations.

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