

# Role of GIS

Navya

DAV Public School, Sector-8 C, Chandigarh.

**Abstract:-** The aim of this work is to briefly explore and shedlight on Role of GIS on Environment.

**Keywords:-** Topography; Spatial; Remote Sensing; Sustainability.

## I. INTRODUCTION

Information Technology is the most important mean in Industrial Revolution 4.0. By using information technology, topography can also be studied along with computerized mapping and spatial analysis.

We won't have been at the present status if close interactions among topographic mapping, utility network, surveying, remote sensing, rural and urban planning, earth science, and geography won't have been studied.

The GIS technology correlates with all the disciplines. It has become the standard tool for the management of natural resources. GIS has assisted environmentalists in development and conservation planning to protect the environment. It helps in remodeling by analyzing the information or outcomes compiled by researchers. Thus actions are taken for the execution of plans in view of the protection of the environment and sustainable development.

GIS is a computer-based information system that digitally represents and analyzes the geographical features of Earth's Surface and the events that are taking place on it.

The fundamental key of the GIS associating database is that every object present on the Earth can be geo-referenced. Database means a collection of information about things and their interrelation, whereas geo-referencing pertains to the location of a layer or coverage in space with respect to a co-ordinate referencing system. GIS is a fairly new analytical and planning tool for the visual impact of GIS-produced maps related to agriculture, natural resources, urban planning, tourism, etc.

This paper addresses the application of GIS in various environmental issues and opportunities in environmental sciences. GIS process follows the same ordered process as that of normal research. It includes framing of the question, i.e. hypothesis, then data is collected, analyzed, and processed. The final step is to look at the result of the analysis. Action is taken based on the result. The result is displayed as a digital map or a printed map.

## II. GIS FEATURES FOR ENVIRONMENTAL ENGINEERING

- Mapping lets you find places that have features you are looking for.
- Map can be used to see where or what an individual feature is.
- On the map, instead of an individual feature, a pattern of distribution of features can be seen.
- We can map quantities like finding density.
- The density map lets us measure the number of features using the uniform areal unit, such as acres, and miles. So you can see the distribution.

We can use GIS to monitor what's happening within a set distance of a feature by mapping what's nearby. By mapping where and how things move over a period, we can gain insight into how they behave.

## III. APPLICATION OF GIS ON ENVIRONMENTAL SCIENCE/ENGINEERING

Issues that are being faced today are related to the protection of the natural environment and the maintenance of a good quality of life.

GIS can be effectively applied for:

- Agriculture Management
- Climate Change Study
- Conservation of Woodland and wetland
- Assessment of forests
- Mining
- Wildlife Conservation & Management
- Wastewater Management
- Health and Human Services
- Early detection and response to infectious diseases
- Petroleum
- Fire Mapping GIS
- Natural Resource Management
- Air quality monitoring
- Forest Carbon management
- Earthquake Studies

### A. GIS in Agriculture

GIS is used in a variety of agricultural applications, such as monitoring crop yield, the effect of crop rotation technique, temperature, pests, and quality of soil for individual farms or the entire agricultural region.

It has proved to be helpful to those who are involved in the farming industry. Thus, balancing the inputs will lead to better output and results in profitability.

#### B. GIS in Air Quality Management

GIS aids in monitoring pollutant emissions. This technique allows us to locate where pollutants are coming from. Monitoring such areas for change to conserve the quality of our air.

#### C. GIS for Conservation of Woodlands and Wetlands

GIS allows the user to manage geospatial information for monitoring change in woodland and wetland areas by analyzing the damage due to deforestation, resource depletion, due to global climate change, carbon dioxide emissions, forest fire, etc. GIS permits conservationists to make well-informed decisions about protection, policies, and land use practices that will most benefit the conservation of forests, biodiversity, wildlife, other resources, etc.

#### D. GIS for Forest Assessment

GIS is highly beneficial for forest managers. They can monitor changing conditions and take suitable decisions. GIS can help in assessing conditions such as soil types, changing weather patterns, and land use practices. Geospatial records provide forest managers with a baseline for evaluating plans.

#### E. GIS for Mining & Earth Sciences

This technology is a great help to geologists and mine operators as it guides them to mine in a particular area intelligently, safely, judiciously, and efficiently.

Geophysical images, geologic maps, mineral deposits, and geologic data sets can be displayed, interrogated, and analyzed simultaneously. By keeping track of existing infrastructure and integrating it with the mine plan, a future model can be prepared by using GIS.

#### F. GIS for Wildlife Conservation

Various factors, such as climate change, habitat loss, deforestation, and pollution, are a threat to wildlife biodiversity. This can cause fragmentation and extinction. GIS manages and analyzes wildlife data. Then, policies to conserve wildlife are made.

#### G. GIS in Wastewater Management

GIS Technology is used by a majority of wastewater utilities in the integration of various types of information and applications concerning topography and geographic component.

GIS technology gives one manageable system by its software which has fully developed automated mapping, and facilities management to automate and integrate the organization's information.

Use geospatial technology to:

- Discover the geographic origin of symptomatic populations
- Identify specific locations of vulnerable populations
- Helps organizations to locate sensitive zones
- Create maps for the establishment of clinics

#### I. GIS for earthquakes, fire disaster management, and Homeland Security

GIS is used as an interface for integrating and accessing massive amounts of location-based information in public safety. It helps the emergency personnel in managing the impact of disasters by assessing risky and hazardous locations in relation to population property and natural resources by integrating data and reconnecting preventive measures for mitigating the problems.

GIS can be used while en-routing to an incident to assist tactical planning prioritizing search and rescue operations by identifying staging area location divisions, etc.

#### J. GIS and Sustainable development

GIS has been measuring our resources to understand the pattern of change and the impact of human-induced geographic change. It guides the sustainable development agencies by giving information about predicting drought conditions, monitoring water resources, visualizing remote sensing and image processing, model data for many resources, evaluating of impact on the environment, and sharing data and maps to the agencies helps in giving solution by complying with planning and reporting regulations.

## IV. CONCLUSION

GIS is becoming a primary repository of information that can be quickly analyzed and viewed when needed. It can present a large amount of data in a short time duration on a map, using a geographical coordinate system.

It is a quite useful tool in the collection, storage, manipulation, and representation of spatial data. GIS by giving rapid access to information, safety, efficiency, and mitigation solution will continue to play a vital role in the identification and exploration of a wide range of environmental issues.

#### H. GIS in Health & Human Services

GIS software is used extensively throughout the medical field, keeping the medical community to study health and facilities epidemiology and map any system that is spatial or visual, including the internal body of patients. Medical professionals

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