

GEOGRAPHIC INFORMATION SYSTEM – A NOVEL APPROACH IN AGRICULTURE DEVELOPMENT

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Agriculture is the backbone of the Indian economy, and one of the few countries in the world has started using space technology and land-based observations to produce daily reports on crop production statistics and provides inputs for sustainable farming. While there are recent developments in the field of agriculture, the Geographic Information System (GIS) is fairly new and has vast potential to explore.

GIS in agriculture is not a new phenomenon anymore. The agricultural sector is the cornerstone of the rural Indian economy, around which socio-economic privileges and deprivations revolve, and any changes in its structure are likely to have a corresponding effect on the current social equality pattern. No economic reform strategy will succeed without sustained and broad-based agricultural production, which is critical to increasing living standards, alleviating poverty, ensuring food security, creating a thriving market for industrial and service expansion and making a major contribution to national economic growth. Future growth in agriculture will come from new technologies that are not only cost-effective but also consistent with the country's natural environment regime; technologies that are directly applicable to rain-fed areas; ongoing genetic improvements for better seeds and yields; data improvements for better study, better results and sustainable planning; bridging the gap between information and practice; and responsive surveys of land use, good management practices and sustainable use of natural resources.

Sustainable agricultural production depends on the sensible use of natural resources (soil, water, livestock, plant genetics, fisheries, forests, environment, rainfall and topography) inappropriate management of technology under the prevailing socio-economic infrastructure. In developed countries, technology plays a significant role in the rapid economic growth and social change.

Response towards geospatial technology

Technology plays a significant part in developed countries' rapid economic growth and social change. Although it supported approximately Rs 66 billion for the use of different types of technology under different ministries, it also mandated the use of geospatial technologies in some of the mission projects such as the National Land Records Management Programme (NLRMP), Restructured Accelerated Power Development and Reform Programme (RAPDRP), Jawaharlal Nehru National Urban Renewal Mission (JNNURM), National Rural Employment Guarantee Act (NREGA), Though recognizing that “location-specific planning using spatial information systems helps in sustainable development planning”.

Agricultural mapping

Technological advances and geospatial technology help to create a dynamic and efficient farm that protects the environment and provides people with excellent nutrition. Though natural inputs cannot be regulated in agriculture, they can be better understood and managed with GIS applications. GIS can contribute significantly to accurate estimates of crop yields, analyzes of soil modifications and detection and remediation of erosions. More specific, reliable crop estimates help to reduce uncertainty.

A key problem for agricultural growth is the need to increase the production, employment and income of poor segments of the agricultural population and this situation can be resolved by applying GIS in agriculture. GIS software and online web services enable farmers to forecast crops and control their production through the use of multi-spectral satellite imagery. GIS 'ability to evaluate and envision agricultural environments and workflows has proven to be very useful for those working in the agricultural sector. GIS is capable of analyzing soil data and deciding which crops should be planted where and how to maintain soil nutrition in order to best support the plants. GIS in agriculture helps farmers achieve higher production and cost savings through better use of land resources. This also decreases the risk of marginalization and insecurity of small and marginal farmers, who account about 85 percent of farmers worldwide.

Agricultural geographic information systems using geomatic technology allow farmers to monitor current and future variations in precipitation, temperature, crop production, etc. Agricultural mapping is becoming day by day critical to the control and

management of soil and farmland irrigation. It supports agricultural production and rural growth. Precise mapping of the geographic and geological features of farmland enables scientists and farmers to establish more productive and successful farming techniques as farmers are able to take more corrective action in the form of better fertilizer use, the management of infestations of pests and weeds, the conservation of natural resources, etc..

Smart farming

The data are continuously collected by sensors in fields and on satellites high above farms. Advanced technologies can transform these data into information that can be used by farmers and land managers to make more informed and timely decisions. This, in effect, improves productivity and reduces impacts on the environment. With the introduction of advanced technologies such as precision equipment, the Internet of Things (IoT), sensors and actuators, geo-positioning systems, big data, unmanned aerial vehicles, robotics etc., farming is becoming smarter.

A term in agriculture which is gaining broad popularity because of the multitude of benefits it provides is precision agriculture. It helps farmers to collect geospatial information on soil requirements in a timely manner, and to prescribe and apply site-specific treatments to increase agricultural production and protect the environment. Precision agriculture is tied to more reliable, cost-effective, and user-friendly high-tech devices.

Application of GIS Data in Watershed Management

Over the years, water as a tool has diminished. In all developing and developed countries, there has always been a limited supply of clean water. Hence, water supply became a concern in developed countries. Using satellite data, water bodies such as rivers, lakes, dams and reservoirs can, however, be mapped in 3D using GIS technology. These data can be used to manage water bodies sustainably because the respective authorities will determine which regions require effective security and management. At the same time, decisions can always be made about the most successful means of the utilization of these regions.

Prospective of GIS

- GIS can visualize spatial information.
- It can be used for a large array of geographical tasks
- It provides the remedies for the disaster, and it provides the model of natural disaster as well as for the predicted it accurately

- Its serves time management
- It emphasis faster data collection
- It provides a catalogue of database
- It shows spatial information (Spatial = Graphics + Tables)
- It is highly predictive and offers better forecasts and review
- Has the potential to strengthen the organizational alignment that allows the program to talk to each other
- GIS will also allow data to be viewed, challenged, understood, visualized and interpreted in a variety of ways revealing relationships, trends and patterns in globes, maps, charts and reports.
- A GIS lets you answer questions and solve problems by quickly and meaningfully evaluating the data and outputting it
- GIS data is used to manage natural resources which may include hill slope gradients, dimension, stream network, stream gradient, slope, catchment area, etc.

Conclusion

The application of GIS provides us with the capability to identify high priority areas which need maternal care. Through the result of the GIS, it is wise to plan proper schedules to improve the efficiency and accurate application based on the prediction.

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