An International Multidisciplinary e-Magazine www.sabujeema.com

APPLICATION OF GEOSPATIAL TECHNOLOGY IN AGRICULTURE

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Volume 2 | Issue 2 | February, 2022

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Volume 2 - Issue 2 – February, 2022

An International Multidisciplinary e-Magazine



APPLICATION OF GEOSPATIAL TECHNOLOGY IN AGRICULTURE

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INTRODUCTION

cospatial technologies are a term used to describe the range of modern tools contributing to the geographic mapping and analysis of the Earth and human societies. These technologies have been evolving in some form since the first maps were drawn in prehistoric times. In the 19th century, the long important schools of cartography and mapmaking were joined

by aerial photography as early cameras were sent aloft on balloons and pigeons, and then on airplanes during the 20th century. The science and art of photographic interpretation and map making was accelerated during the Second World War and during the Cold War it took on new dimensions with the advent of satellites and computers. Satellites allowed images of the Earth's surface and human activities therein with certain limitations. MultidiComputers allowed storage and transfer of imagery together with the development of associated digital software, maps, and data sets on socioeconomic and environmental phenomena, collectively called geographic information systems (GIS). An important aspect of a GIS is its ability to assemble the range of geospatial data into a layered set of maps which allow complex themes to be analysed and then communicated to wider audiences. This 'layering' is enabled by the fact that all such data includes information on its precise location on the surface of the Earth, hence the term 'geospatial'.

> Especially in the last decade, these technologies have evolved into a network of national security, scientific, and commercially operated satellites complemented by powerful desktop GIS. In addition, aerial remote sensing platforms, including unmanned aerial vehicles (e.g., the



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Volume 2 - Issue 2 – February, 2022

Global Hawk reconnaissance drone), are seeing increased non-military use as well. High quality hardware and data is now new audiences such as• available to universities, corporations, and nongovernmental organizations. The fields and sectors deploying these technologies are currently growing at a rapid pace, informing decision makers on topics such as industrial engineering, biodiversity conservation, forest fire suppression, agricultural monitoring, humanitarian relief, and much more.

resulting from toxins, sub-optimal water access, etc.

Global Positioning System (GPS): a network of U.S. Department of Defense satellites which can give precise coordinate locations to civilian and military users with proper receiving equipment (note: a similar European system called Galileo will be operational within the next several years while a Russian system is functioning but restricted).



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TYPES OF GEOSPATIAL TECHNOLOGY

Remote Sensing: imagery and data collected from space- or airborne camera and sensor platforms. Some commercial satellite image providers now offer images showing details of one-meter or smaller, making these images appropriate for monitoring humanitarian needs and human rights abuses.

Geographic Information Systems (GIS): a suite of software tools for mapping and • analysing data which is georeferenced (assigned a specific location on the surface of the Earth, otherwise known as geospatial data). GIS can be used to detect geographic patterns in other data, such as disease clusters **Internet Mapping Technologies**: software programs like Google Earth and web features like Microsoft Virtual Earth are changing the way geospatial data is viewed and shared. The developments in user interface are also making such technologies available to a wider audience whereas traditional GIS has been reserved for specialists and those who invest time in learning complex software programs.

Geospatial technology involves GPS (global positioning systems), <u>GIS</u> (geographical information systems), and RS (remote sensing). This technology offers a radically different way in which we produce and use maps required to manage our communities and industries.



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TYPES OF SPATIAL TECHNOLOGIES USED IN INDUSTRY APPLICATIONS

Remote Sensing: <u>satellite</u> imagery and geospatial data collected from satellite sensors or airborne cameras. Some commercial satellite image can produce details of 30 centimetres'. Satellite imagery greatly enhances a <u>GIS mapping</u> project and serves as a source of information and data to support analysis and classification for geospatial assessment and modelling.

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• Geographic Information Systems(GIS): mapping tools for analysis of geospatial data which is georeferenced. GIS can be used to support environmental management for <u>natural hazards</u>and disasters, global climate change, natural resources, wildlife, land cover and GIS is also sometimes known as GIScience as it the science underlying geographic concepts, application and system.

- Crop mapping yield estimation
- Crop assessment and Crop health
- Irrigated landscape mapping
- Application development for GIS agriculture
- Soil and irrigation amendment analysis
- Suitability assessment studies
- Erosion identification and remediation
- Agricultural mapping for detailed vegetation cover and monitoring



Components of Geospatial Technology

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- Change detection studies and developing crop models
- Damage and land degradation assessment studies
- Elevation models for efficient drainage
- These studies and projects can be executed on any standard GIS formats using high end software such as ArcGIS, ERDAS Imagine/ER Mapper, MapInfo and AutoCAD Map, and ArcFM.
- GIS application in agriculture has been playing an increasingly important role in crop production throughout the world by helping farmers in increasing production, reducing costs, and managing their land efficiently. resources more GIS application in agriculture such as agricultural mapping plays a vital role in monitoring and management of soil and irrigation of any given farm land. GIS agriculture and agricultural mapping act as an essential tool for management of agricultural sector by acquiring and implementing the accurate information into a mapping environment. GIS application in agriculture also helps in management and control of agricultural resources. GIS agriculture technology helps in improvement of the present systems of acquiring and generating GIS agriculture and resources data.



GLOBAL POSITIONING SYSTEM (GPS):

Satellite-based navigation system made up of a network of 24 satellites placed into orbit to collect coordinates locations.

Today there thousands of are geospatial technology applications in use. Organizations, agencies and companies throughout the world are using the geospatial technology to transform manually produced maps and associated descriptive records into powerful digital databases. Once a tool that only affordable to the was largest organizations, geospatial systems have become a cost-effective option for even the smallest organizations.



TopCon Agriculture Solutions

TopCon is a diversified manufacturer of geospatial solutions—both software and hardware—for use across a variety of industries. Their catalogue of agricultural decision support system products includes solutions for preparation and planning, planting and seeding, growing, harvesting, and animal feeding.

<u>Trimble</u>

Best known for GPS technologies, Trimble has an array of agricultural products, including both field solutions (such as guidance and steering, correction services, flow and application control, vield monitoring, and water management), as well as software's (farm software, crop advisor software, ag retail software, and food processor software), and agronomics services.