

REMOTE SENSING GPS AND GIS IN AGRICULTURE

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ABSTRACT-

Remote sensing and GIS concepts are important components in agriculture. GPS is being used to achieve precision farming and enables farm planning, field mapping, soil sampling, crop scouting, and yield mapping. GPS also allows farmers to work during low visibility field conditions such as rain, dust, fog and darkness. By using GPS, one can track data of our agriculture fields which includes the slope of the field, Nutrients of crops, yield assessment of our crop. We can also track continuously calculates and records the correct position. By this, it can create a large database for its users. GIS is also required for further analysis, by which one can store and handle data that is collected by GPS. This paper will discuss how using remote sensing, GIS and GPS, one can improve our agricultural practices and can bring changes towards agricultural fields.

Keywords: Agriculture, Remote Sensing, GIS (Geographic Information System, GPS (Global Positioning System)

Crops health and growth can be monitored using remote sensing by analyzing spectral data obtained from satellites, airborne sensors, or ground-based instruments. This information can help farmers identify areas of their fields that may need additional attention or water, fertilizer, or pest management. Global Positioning Systems or GPS are used to find the exact location of things. Geographic Information Systems or GIS are used to record information on to maps. Remote sensing and GIS work together to gather, store, analyze, and visualize data from virtually any geographic position on Earth. Irrigation and soil moisture monitoring and management are major components of remote sensing in agriculture.

Remote sensing and Geographic Information System (GIS) technologies are commonly used for real-time analysis and forecasts of weather, floods, and monitoring crop area sown, lost, or damaged due to floods and rainfall.

Over the past few decades, Remote Sensing and GIS have grown exponentially in many sectors for visualization, monitoring, management, and potential development. Remote Sensing and GIS technology enable agencies to get reliable information of natural and man-made features or processed and interpreted appropriately phenomenon occurring over the earth's surface without making any physical contact. Nowadays, farmers rely on these technological improvements. In the field of agriculture, remote sensing has found significant use. There are many applications of remote sensing in the agricultural sector. In this paper we will discuss remote sensing and GIS applications in agriculture.

The expected crop yield can be predicted and production in agricultural land and one can also estimate the quantity and quality of crops under specific situations by using remote sensing. It is also helpful in



estimating Crop progress and crop damage. A ratio of crop that has been damaged and progress of crops, left in farmlands.

By using remote sensing technology, one can study the planting system of various crops. These technologies can also be used for flower growth in the industry of horticulture. By which we can analyze the pattern of flower growth and predict with the help of various analyses.

It is helpful in observing and identifying some strange characteristics of crops, Further, the collected data has been taken to labs where on different aspects of crop and the culture of crop study can be conducted.

It is usually a large procedure if we estimate manually the size of land so by using remote sensing technology, we can estimate agricultural land where we can plant our crop. It can also assess the crop health condition and assess the stress of crops. Further, these data can be used to calculate the quality of the crop.

This is primarily used for the assessment of vegetation dynamics, particularly in determining the crop health status. With Normalized Difference Vegetation Index NDVI, the possibility of understanding the crop phenology escalates as it explains the crop chronology and their relationship with weather and climate (season). NDVI is measured using mathematical calculation of spectral bands within the satellite image which measures the healthiness of vegetation, as it has a robust correlation with green biomass indicating healthy vegetation or crop.

By using remote sensing technology, now farmers can notice a wide variety of components which includes types of soil and weather patterns to forecast the harvesting and planting dates or seasons of each crop. experts and farmers can predict the expected yield of the crop for agricultural land by analyzing the crop quality and the area of that land.

Remote sensing technology can identify the pests in agricultural land and provide data on correct mechanism to control pests. Which help in getting rid of their disease and pests on the land.

By using remote sensing technology, Change in farming system and land management results in soil change which compromises the current and future capacity for primary production and provision of crops and by micro nutrition mapping as the soil is a very important aspect of agriculture with characteristics like soil pH, soil organic matter, soil texture among many others. These characteristics infer information about soil condition by observing what happens on the surface in terms of vegetation growth. it can also measure soil moisture. With the help of these technologies, we can get soil moisture data that will help us in determining the moisture quantity in soil and estimates about the crop type that can be sown in that soil.

Soil moisture related information can be gathered by using remote sensing technology. On the other sides, this extracted information can also be used in determining the deficiency in soil moisture and we also can plan if soil needs irrigation or not. Mapping of Soil: By using remote sensing technology, we can map our soil as it plays an important role. With this technology, farmers can get to know what type of soils are good for which crop type and which soil needs irrigation and which one does not need to be.

Patterns of weather and drought patterns for a given agricultural land can be monitored by remote sensing technology. Further this information can be used to predict the rainfall patterns for an area and told us the time difference between the current rainfall and next rainfall that helps us to keep drought record.



By using remote sensing technology, one can design the land cover for a particular area. With this data experts can predict which land area has been degraded and which area are still in good condition. It also helps them for measures curb land degradation during its implementation

Remote sensing is useful in identifying the soil problems, while sustaining in the planting season for optimum crop yield. Detection of Crop nutrient deficiency: By using remote sensing technology, we can help experts and farmers to determine the proportions of deficiency of crop nutrients and provide treatment that helps to increase the level of nutrients in crops, so that we can increase crop yield.

Remote sensing help in extracting information about the reflectance of the crop, and it is the only technology that provides this information. This reflectance of crop is depending upon the amount of moisture present in soil and nutrients in the crop, that have a significant effect on crop yield

One can determine the moisture content of soil and estimation of content of water in crop

One can estimate accurately about the expected yield of the crop during planting season with the help of various crop information such as crop and soil moisture level, crop quality, and crop land cover. Further combining all this data, we can estimate accurately crop yield with the help of remote sensing technology.

Agricultural experts and farmers with the help of remote sensing can map out the areas that are hit by floods and areas having poor drainage functions. With the help of this data, we can prevent any future flood disaster Collection of current and past weather data-one can collect and store, current and past data of weather that can be used for prediction and future decision making.

Natural Catastrophe modeling is a system to estimate the real-time or possible forecast of risk assessment, using the probabilistic approach to predict the outcome and behavior of natural hazards. This includes risk mapping and measuring hazards through computer-simulated catastrophe models where scientific studies and historical occurrences are linked with advanced information technology and geographic information system (using Remote Sensing & GIS). Flood risk maps are prepared depending on the estimated depth of inundation of flood. The estimation is commonly derived from various hydrological and remotely sensed data where the process ensures that areas having a higher depth of inundation will be assigned a high 'hazard denomination'.

One can collect important crop data such as crop rotation, crop pattern and crop diversity for a particular soil of land. Mapping of water resources: By using remote sensing technology, we can use it for mapping water resources for agricultural land. With the help of such technology farmers can get to know about the availability of water resources and the adequacy for farmlands.

Remote sensing technology also plays an important role in precision agriculture has been taken place the cultivation of healthy crops which guarantees by farmers to harvest crop after an ideal period.

Remote sensing technology can monitor climate change and keep a track record of climatic conditions. It also plays an important role in the finalizing of what crops can be grown

Remote sensing technology helps farmers and agricultural experts can keep records of farming practices and ensure all compliance by all farmers. It will help all farmers to ensure the accurate process of planting and time of harvesting crops. Soil management practices: By using remote sensing technology, we can manage soil practices and determination of soil by collecting data from agricultural lands.

Remote sensing technology estimate the level of air moisture by which one can determine the humidity of specific area. With the help of humidity level, we can determine the crop type that can be grown in such



areas. Analysis of crop health: By using remote sensing technology, we can analyze the health of crop by which we can determine the crop yield.

Remote sensing technology helps in mapping agricultural land for different purposes like landscaping and crop growth. With this mapping technology can be used for specific land soil purposes in precision agriculture.

CONCLUSION –

After Going through all above technologies used for our agricultural lands, we came to know that by using them we can improve our land and crop assessment. We can also determine erosion controls, long-term cropping plans, assessment of tillage systems and salinity controls by using these map data. Nowadays our farmers also adopting new technologies and work with agricultural professionals like GPS and computing sciences. Hence, we can say that GIS, GPS, and remote sensing can be a foundation of agriculture. After all the above studied points we know that with the help of remotely sensed data, we can identify different plant-related issues like as weed infestations, plant populations, wind damage, water deficiency or surplus, nutrient deficiencies, insect damage, herbicide damage, and hail damage. While in variable rate application of pesticides and fertilizers we can use collected information from remote sensing can be used as base maps. Farmers can easily treat their affected areas with the provided information from remotely sensed images. Those problems are faster captured by remote images before being identified visually. Ranchers use remote sensing to find areas of weed infestations, overgrazed areas, and prime grazing areas. Hereby, all above points proved that remote sensing, GIS, and GPS are playing beneficial role in agricultural practices.

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