STUDY OF CROPPING PATTERN IN HEMAVATHI LEFT BANK CANAL USING RS & GIS

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Abstract - *Our country's backbone is agriculture. Agriculture occupies the majority of the land in Tumkur District. Farmers plant a variety of crops in different areas due to a lack of awareness. They eventually run into issues with crop production due to low yield. All of these issues can be solved with a crop suitability map. The research area Tumkur District is located in Karnataka's southernmost region and has a semi-arid climate. Coconut, Arecanut, and Banana plantations, as well as Ragi, Wheat, Maize, Jowar, and other crops, dominate the cropping pattern. The crop pattern analysis was done out using Landsat 8 data processed by the USGS. The NDVI result is recoded using the training sets obtained during the field visit. Finally, Arc GIS technologies are used to create the crop pattern map. Coconut plantations, Ragi, Rice, Maize, and Wheat are among the current cropping patterns that use the least amount of water and are therefore suited for the area. However, Arecanut, rice, and banana plantations use a lot of water and aren't ideal for the region's climate. The main finding of this study is that the Mines and Geology Department in Tumkur district has 34500 bore wells. A minimum of 10 crore liters of water is removed from groundwater reservoirs per day. Our suitability crop modelling map will reduce the amount of groundwater that needs to be maintained. With respect to climatic circumstances, the suitability crop pattern map provides high revenue and yield for farmers with reduced maintenance and water usage.*

Key Words: **Remote Sensing & GIS, NDVI, Crop Pattern Map.**

1.INTRODUCTION

A basic part of a cropping system is the cropping pattern. Cropping pattern refers to the percentage of an area that is planted in diverse crops at any given time and location. Geo-climatic, socio-economic, political, and historical variables all played a role in cropping patterns. Tumkur is located in the central arid zone. Agriculture accounts for the majority of the Indian economy. Monsoons are crucial to Indian agriculture. Agriculture production requires external water resources for agricultural yields because the monsoon is seasonal. Agriculture consumes 70% of the world's water resources, according to worldwide water consumption statistics. The remaining 20% is used for industrial purposes, while 10% is used for domestic purposes. It is possible to entirely sustain the water resource by using scientific agricultural practices. Remote sensing and geographic information systems (GIS) play a significant role in cost-effective agricultural applications, and the USGS image is frequently used because to its crop biomass.

Cropping pattern is a key input for irrigation water resource management and planning. During project planning, a project cropping pattern is suggested, and irrigation water demand is evaluated based on this. The entire water demand for the project is calculated using this demand, as well as other demands for water supply, hydropower, industry, recreation, and so on. Crop and irrigated area monitoring can now be done via remote sensing. Agriculture land cover in India is highly variable in both space and time, owing to fragmented and tiny land holdings. This leads to variations in crop variety, rotation, and planting dates, among other factors, making remote sensing demarcation difficult. Various approaches for crop and irrigated area monitoring are addressed here.

2. OBJECTIVES OF THE STUDY

- Analyze the changes in long-term cropping pattern in perseverance to maximization of agriculture output and minimization of irrigation water.
- Improving productivity of field and forage of crop and ensuring sound use of natural resources.

3. REVIEW OF LITERATURE

3.1 Review: 1

E.S Mohamed et al. (2019) : Mapping soil moisture and their correlation with crop pattern using remotely sensed data in arid region.

Soil moisture has a negative and positive impact on crop quantity and quality. As a result, estimating SMC using satellite data is regarded as a critical component of accurate farm management. Remote sensing has recently been used to provide a clear representation of the spatial distribution of soil moisture.Traditional approaches are being replaced by remote sensing and GIS techniques, which can cover large areas and offer information about the spatiotemporal fluctuations of SMC. In locations with poor soil drainage and large water table variations, soil moisture content is a major environmental stressor, affecting crop survival, development, and yield.

3.1 Review: 2

Vinayak Jalikatti et al. (2019) : An Economic Analysis of Changing Cropping Pattern in Almatti Command Area of Karnataka, India

For the purpose of analyzing changes in cropping pattern, the Almatti Left Bank Canal in the Karnataka state's Upper Krishna Project command region was chosen. For a period of ten years (2009-10 to 2018-19), time series data on cropping pattern in a designated canal command region were gathered and analyzed using the First Order Markov Chain Approach. Maize was planted for fodder in the Almatti Left Bank Canal command region, while sunflower earned a high price and pearl millet was the main food source.

3.1 Review: 3

K. A. Chavan et al. (2020) : Identification of Cropping Pattern in Khadambebk using Sentinel 2 Images and Arc GIS Software.

Cropping pattern is a crucial input data variable for many global climate, land surface, and crop models, and is a substantial contributor to crop production and food security at local, regional, and national scales. As a result, MODIS images have trouble constructing yearly cropping intensity maps at large scales due to heterogeneous land cover types inside a pixel. In this study, we examine a selected village using the normalized difference vegetation index (NDVI) and Supervised classification. The Kharif crop has the most area in the normalized difference vegetation index (NDVI) classification, and the Soybean has the most area in the Supervised classification.

3.1 Review: 4

Mubashir Jamil et al. (2016) : Deriving Cropping System Efficiency Pattern Using Remote Sensing And GIS

Optimal cropping patterns within an agroecological zone can help to ensure the long-term viability of agricultural resources. During the Rabi and Kharif seasons in Bijnor District, India, multi-date satellite data from the Indian Remote Sensing Satellite (IRS)-P6 LISS III was utilized to generate the cropping pattern and crop rotation. In the research area, 17 cropping patterns were found and mapped. Sugarcane as a single crop, rice-wheat, and sugarcane-wheat were the most common cropping patterns, accounting for around 33 percent, 11 percent, and 8% of the district's total geographical area, respectively.

3.1 Review: 5

Bharathkumar L*., M.A. Mohammed-Aslam (2015) : Crop Pattern Mapping of Tumkur Taluk using NDVI Technique: A Remote Sensing and GIS Approach.

The study demonstrates how remote sensing and GIS techniques may be used effectively in crop pattern mapping and crop suitability mappings. To carry out the cropping information, Landsat 8 data is processed using NDVI and supervised classification techniques. Crop growth in a given location is influenced by climatic conditions, terrain features, and water resources. To conduct the analysis, thematic layers such as Drainage, Slope, and Current crop activity map were used. The crop suitability map strives to ensure the region's water resources are sustainable. Crop adaptability maps clearly show which crops use the least amount of water. Crop suitability maps show the crop productivity of ragi, coconut plantations, and paddy fields in

relation to the area's water resource potential. Farmers can use a crop compatibility map as a guide to obtain high yield in spatial patterns.

3.1 Review: 6

Yanjun Yang et al. (2020) : Characterizing spatiotemporal patterns of crop phenology across North America during 2000–2016 using satellite imagery and agricultural survey data.

Crop phenology is an integrated indicator of climate change that plays a critical role in terrestrial carbon dynamics and agricultural sustainability. At broad scales, however, spatiotemporal changes in crop phenology remain unknown. Our ability to realistically measure biogeochemical processes in agroecosystems, anticipate future climate, and make educated decisions for climate change mitigation and adaptation has been hampered by this information gap.Using vegetation index in combination with agricultural survey data and other auxiliary maps, we enhanced an EVI-curve-based technique and used it to discover spatiotemporal trends in cropping intensity and five key phenological stages throughout North America from 2000 to 2016.

3.1 Review: 7

Wali V.S et al. (2019) : An Analysis Of Cropping Pattern In Malaprabha Project Command Area

The key cereal crops were maize and pigeon pea, green gramme, and Bengal gramme, while the major pulse crops were pigeon pea, green gramme, and Bengal gramme. The main oil seed crops were groundnut and sunflower. Sugarcane, cotton, and chilly were the principal annual/bi seasonal crops farmed by the sample farmers in the command area throughout the summer. The study found that cotton, maize, and groundnut were the most often planted crops, and that farmers can diversify their cropping patterns by include additional cereals to keep cropping patterns stable. Farmers also departed from the Command Area Development Authority's suggested farming pattern (CADA).

3.1 Review: 8

A. A. Belal et al. (2014) : Effect Of Irrigation Improvement On Crop Pattern And Crop Water Requirements Using Remote Sensing And GIS Techniques

Remote sensing techniques have the capability to detect and quantify regional disparities in information and agricultural growth phases, among other things. This method could reduce the number of additional observations that need to be filed. The seasonal variation in crop fraction follows a similar pattern in remote sensing-based estimation. The changes in etc. may be attributed to the increased availability of water resources because the meteorological differences were minimal.

4. CONCLUSIONS

- The study demonstrates how remote sensing and GIS techniques may be used effectively in crop pattern mapping and crop suitability mappings. To carry out the cropping information, Landsat 8 data is processed using NDVI and supervised classification techniques. Crop growth in a given location is influenced by climatic conditions, terrain features, and water resources. Thematic layers like Drainage, Slope and Current crop activity map we taken into consideration to perform the analysis. The crop suitability map strives to ensure the region's water resources are sustainable. Crop adaptability maps clearly show which crops use the least amount of water. Crop suitability maps show the crop productivity of ragi, coconut plantations, and paddy fields in relation to the area's water resource potential. Farmers can use a crop compatibility map as a guide to obtain high yield in spatial patterns.
- Satellite remote sensing and other emerging technologies can be successfully employed to derive spatial and temporal agricultural information. For recognizing cropping patterns, such information, which is often not collected and maintained in any structured manner by conventional processes, is extremely useful. Furthermore, classifying satellite imaging data is an effective technique for determining cropping patterns.
- Using three seasons data and multi-year satellite data, as well as the accuracy of digital interpretation and picture improvement of remotely sensed data, the accuracy of crop pattern change can be increased. Land usage, land cover, and other data were only taken into account for two seasons. As a result, reliable crop pattern change analysis requires frequent updating of land use/land cover and other theme information over three seasons.

- The digital data base built by Arc GIS and picture techniques utilized by Erdas envision software can be used to improve irrigation canal cropping pattern management. The most essential criterion is Crop Water Requirement. As urbanization accelerates, creating a drinking water shortage, the water saved could be used for drinking or other household purposes. These concepts are being implemented in India's Water Resource Departments and government sectors. A large amount of water can be conserved and used for other purposes by employing the modified penmen method. The government sectors will benefit from this CWR and crop pattern change study tool.

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BIOGRAPHIES

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