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Normalized Difference Vegetation Index (NDVI) based vegetation change detection in Som River Catchment

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ABSTRACT

The Som river catchment lies in districts Udaipur, Banswara, Pratapgarh, Chittorgarh and Dungarpur. It extends from 73° 32' E to 74°50'E and 23° 50' N to 24° 58 N, respectively. It is located in southern most part of the Rajasthan. It is right bank tributary of Mahi River. In this study, a very common method of monitoring surface vegetation health, (NDVI) Normalized Difference Vegetation Index has been used. In this study, Satellite imagery LANDSAT-5 TM for the year October 1994 while for year October 2015 satellite image LANDSAT-8 OLI TIRS has been used. The two corresponding year map of 1994 and 2015 shows clear decline in the health of the vegetation. The Eastern, Southern and Northern region of the catchment were subject to severe vegetation lose during this period.

Keywords: *NDVI, Vegetation, Catchment, Landsat*

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1. Introduction

Som River originates from Southern Arawalli hills near the Som village in Kherwara Tehsil of district Udaipur. It runs south-east through Southern Arawalli region and joins river Mahi near the place Beneshwar. This catchment is natural habitat of tribes living here from decades. The river Som is a right hand tributary of river Mahi. The Som River catchment has an area of about 8007 km² (Bhalla,2012)

NDVI gives information on vegetation efficiency, greenness and phenology for large spatial-temporal scales and has been widely used nowadays. These studies are vital for vegetation efficiency and their phenology. Healthy and green vegetation absorb almost all the incoming red light that comes over it whereas it reflects back most of the near infrared light. The dead and stressed vegetation emits more red lights and less amount of near infrared. In the same way, the surface which has less vegetation cover has much more reflectance. The NDVI, ranges from -1 to 1, is derived from near-infrared and red bands of remotely sensed images $(NIR - RED)/(NIR + RED)$. The lowest values of NDVI (0.1 and lower than this) linked to barren part of land, hilly surface, sandy soil etc. The medium range values are characterized by shrub, bushes and grass field (values typically ranges from 0.2 to 0.3), whereas very high values is represented by rainforest (values ranges from 0.6 to 0.8).

The core concept of NDVI works on the principle of chlorophyll that is present in the plant and it absorbs sunlight. It is further observed in the red-light region of the EMS (Electromagnetic spectrum) by the remote sensing satellite, whereas dead and stressed plant reflects in the near-infrared region. Due to this, dense and healthy green vegetation's red light reflectance is very low and high near-infrared reflectance, and subsequently provides us high NDVI values. On the other hand, near 0 and negative values show bare and non-vegetation surface features such as bare soil, rocky surface, ice and clouds.

Formula for NDVI calculation= (Near infrared -RED) Divided by (Near infrared +RED)

NDVI provides an accurate estimation of vegetation health. It is useful in estimation of spatial and temporal change in vegetation health.

2. Literature Review

(Upadhyay et. al 2009) calculated the NDVI of Punjab for the Kharif season of the one year. This study was of 10 days (NDVI) calculation with 1 kilometer spatial resolution SPOT-IV were used for the study. The results were based upon the whole state and the sowing season period was taken as temporal analysis. It was found that crop grew faster in Eastern region than western region. The highest value of NDVI which was observed that was 0.69 and observed during the month of August.

(The Zhi-qiang G and Denis O, 2001) in their study showed spatio-temporal relationship between climatic factor such as temperature, precipitation and NDVI in Colorado River region. It revealed positive relation between NDVI and temperature on monthly basis and result shows there exits close association and impact in the changes of NDVI in study area. The spatial change was not much significant as NDVI are not impacted directly by the rainfall since these two factors were quite different from each other in terms of temporal scenario in Colorado River region. The study clearly showed the spatial variation and its spatial temporal pattern of relationship between NDVI and climatic factors in the study area.

(Guha S and Govil H, 2018) calculated the pattern of spatio-temporal relation between land surface temperature and (NDVI) in different band ranges. The study area was of Raipur City. Landsat data was used for the period of pre-monsoon phase from year 2001 to year 2018. LST data showed a negative relationship with NDVI for the Raipur city study area. The results also reveals that under the positive NDVI, the LST and NDVI relationships was still strong to moderately strong, whereas it is positive and not consistent under the negative units of it. The results also show the relationship is stronger in the early phase of it, whereas it is weaker at present time.

(Ozyavuz, Murat et al. 2015) used the LANDSAT TM data to demarcate NDVI value of the study area. They further used kappa index for data accuracy. Position accuracy assessment was also calculated.

The study is based on satellite imagery for the calculation of NDVI and demonstrated the aptness of NOAA-AVHRR images for observing vegetation cover change detection. The study emphasized on NDVI and rainfall occurrence at different interval (Doi,2001).

3. Results and Discussion

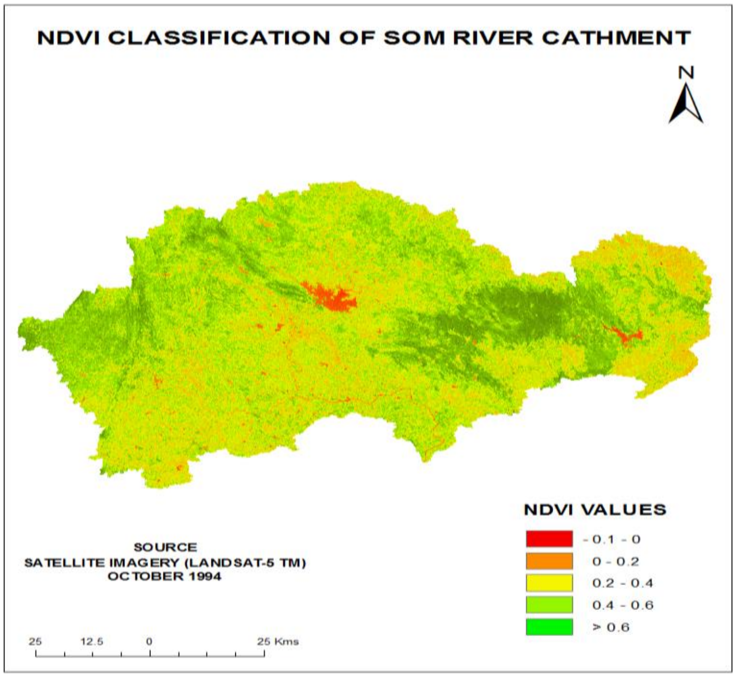

Figure: - 1 Map showing NDVI value for the year October 1994

The satellite imagery LANDSAT-5 TM for the year October 1994 for year October 2015 satellite image LANDSAT-8 OLI TIRS has been used. The two map of year 1994 and 2015 shows clear deterioration in the health of the vegetation in the catchment.

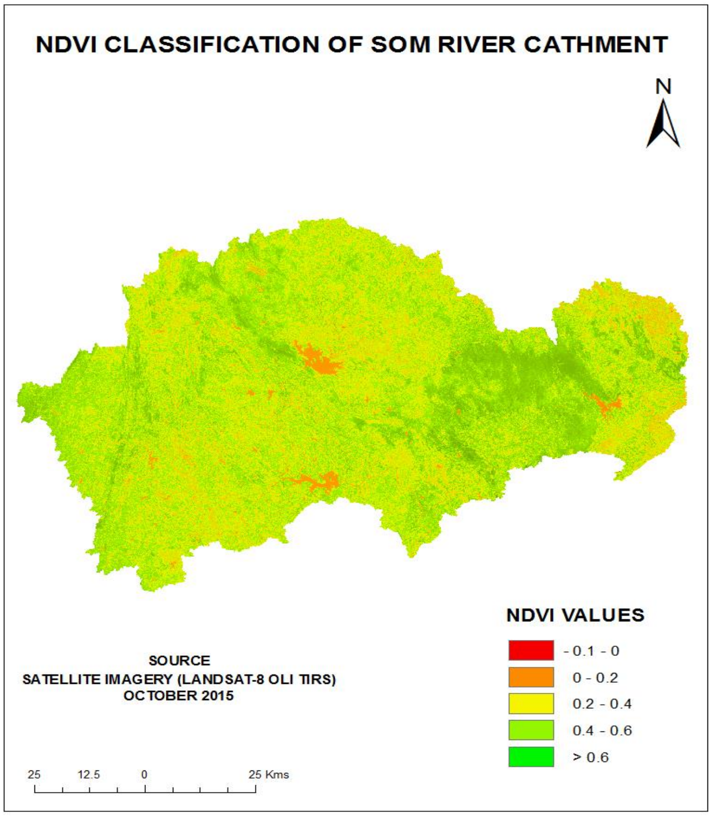

Figure: - 2 Map showing NDVI value for the year October 2015

The reason for this decline in the health of the vegetation is directly linked to the mining and deforestation in the study area since the region is highly abundant in terms of minerals. The opencast mining is still going on in this area. The deterioration was observed in the North-Eastern, Eastern and Southern part of the catchment. The lower values of NDVI in these regions are a matter of concern because this region is tribal region and there is lot of afforestation program is already going on in this study area.

References

1. Bhalla, L.R. (2012). Geography of Rajasthan, *Kuldeep Publication*, Ajmer.
2. Doi, R.D. (2001). Vegetation response of rainfall in Rajasthan using AVHRR imagery, *Journal of Indian Society Remote Sensing* 29(4), 213–224.
3. Guha, S. & Govil, H. (2018). An assessment on the relationship between land surface temperature and normalized difference vegetation index. *Environment, Development and Sustainability*. 21(3), 165-173.
4. Ozyavuz, M., Bilgili, C. & Salici, A., (2015). Determination of vegetation changes with NDVI method. *Journal of environmental protection and ecology*. 16(1), 264-273.
5. Upadhyay, G., Ray, S.S. & Panigrahy, S., (2008). Derivation of crop phenological parameters using multi-date SPOT-VGT-NDVI data: A case study for Punjab. *Journal of Indian Society of Remote Sensing*. 36(3), 37-43.
6. Zhi-qiang, G., & Dennis, O. (2001). The temporal and spatial relationship between NDVI and climatological parameters in Colorado, *Journal of Geographical Science*. 11 (4), 411–419.