

ANALYSING NDVI FOR INDIA

Team:

TerraTech

Group Members:

Shruti Gupta (202151151)

Tridib Nandi (202151174)

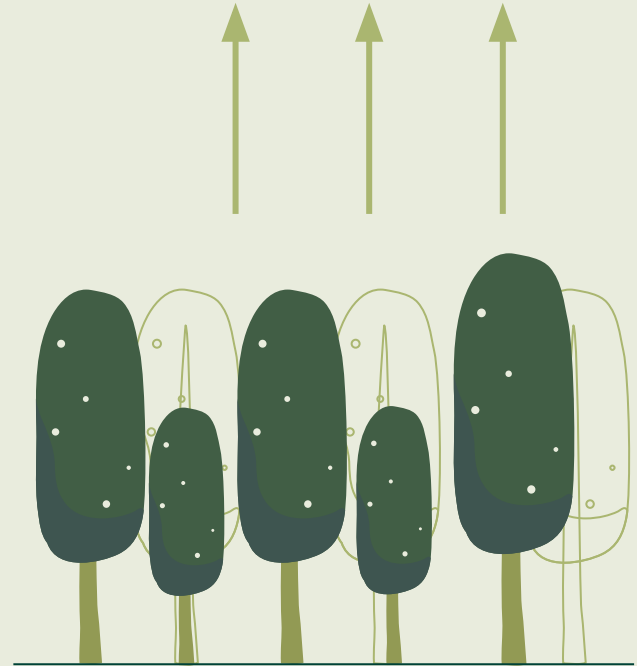


Table of contents



01 Introduction

What is NDVI? Why do we need it?

02 NDVI Trends

Visualising NDVI pattern for India using GEE

03 Analysis and Results

Important insights from the NDVI pattern for India

04 Conclusion

Summary of our project

05 Expansion Ideas

New ideas to extend our work

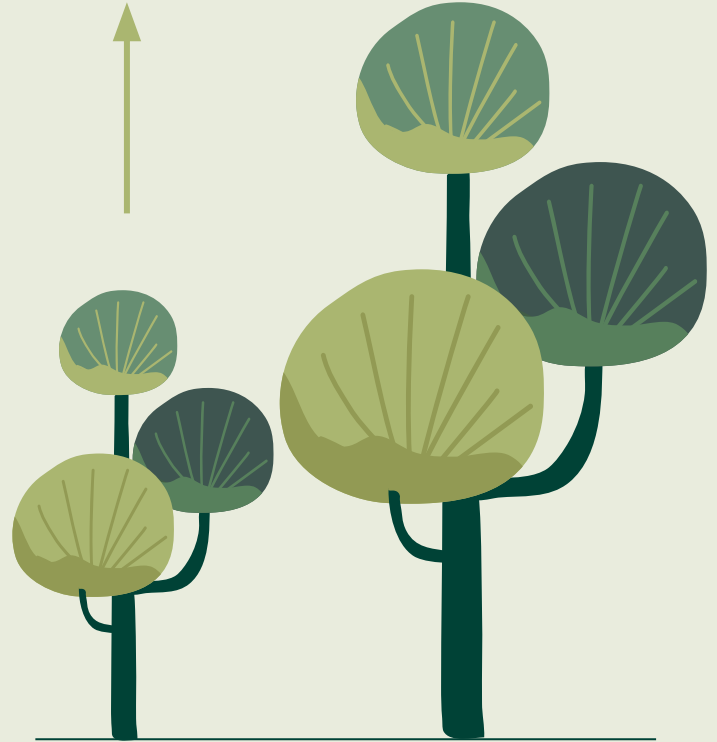
06 References

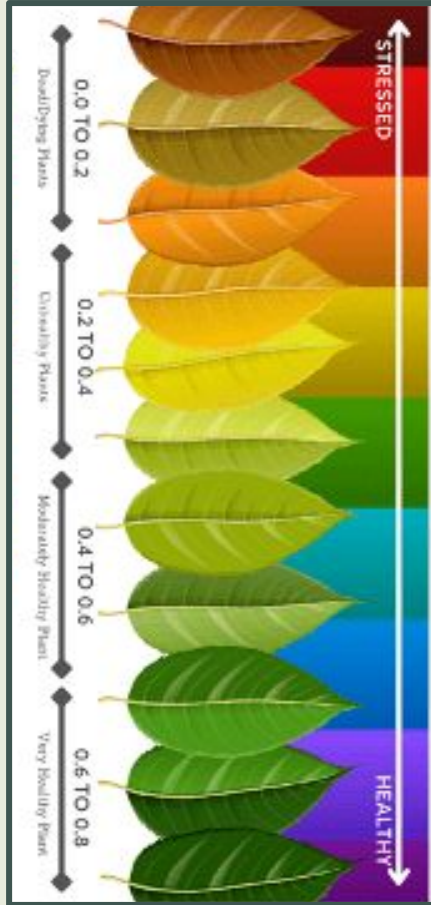
Sources that helped us

01

Introduction

What is NDVI? Why do we need it?





What is NDVI?

Why do we need it?

The Normalised Difference Vegetation Index (NDVI) is a numerical metric that remote sensing systems use to evaluate and track the vitality and health of vegetation. Computed using the difference between red light reflected by vegetation and near-infrared (NIR) light.

The ability of NDVI to offer insightful information on the state of the vegetation across wide areas is what makes it necessary. NDVI values vary from -1 to +1. NDVI assists in identifying changes in vegetation, evaluating crop health, tracking drought conditions, and analysing changes in land cover.

NDVI Formula, Datasets and Time Frame Used



NDVI Formula Used

$$\text{NDVI} = (\text{NIR} - \text{RED}) / (\text{NIR} + \text{RED})$$

where, NIR (Near-Infrared) is represented by the band sur_refl_b02 (841 - 876 nm),

and RED is represented by the band sur_refl_b01 (620 - 670 nm)

Datasets Used

- FAO/GAUL/2015/level0 dataset to obtain the boundary of India.
- MODIS MOD09GA dataset to acquire satellite imagery for NDVI calculation.

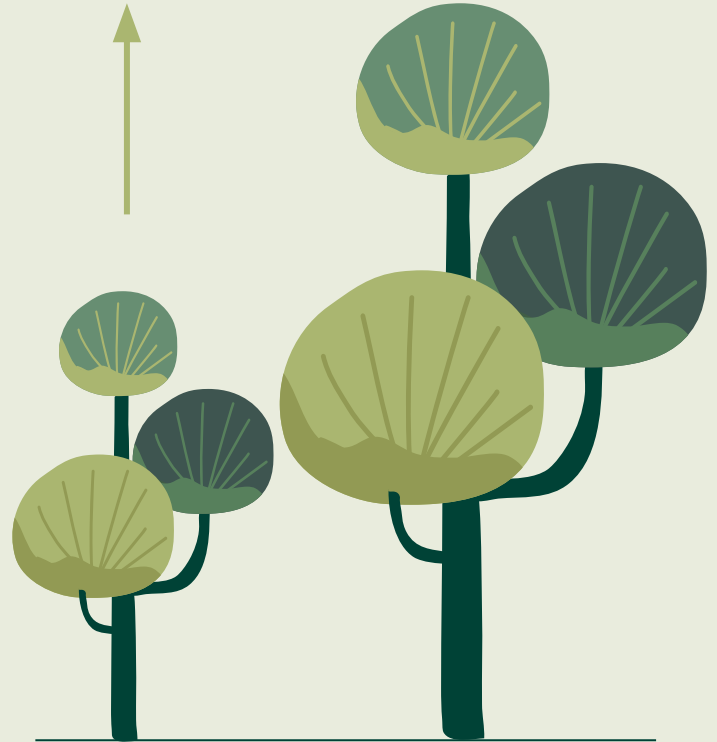
Time Frame

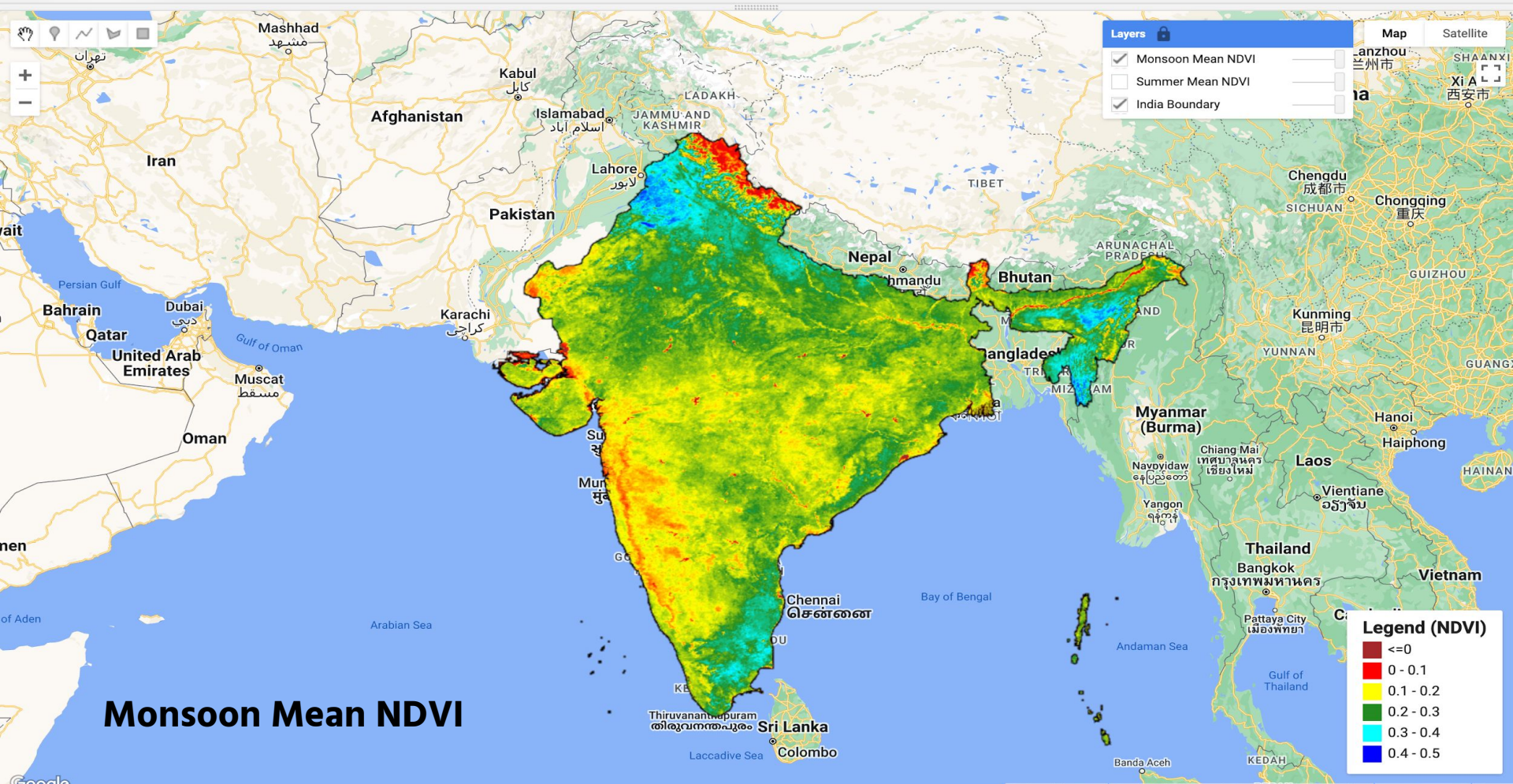
- Analyzed NDVI for the summer season of the year 2022 (April 1st to June 30th)
- Analyzed NDVI for the monsoon season of the year 2022 (July 1st to September 30th).

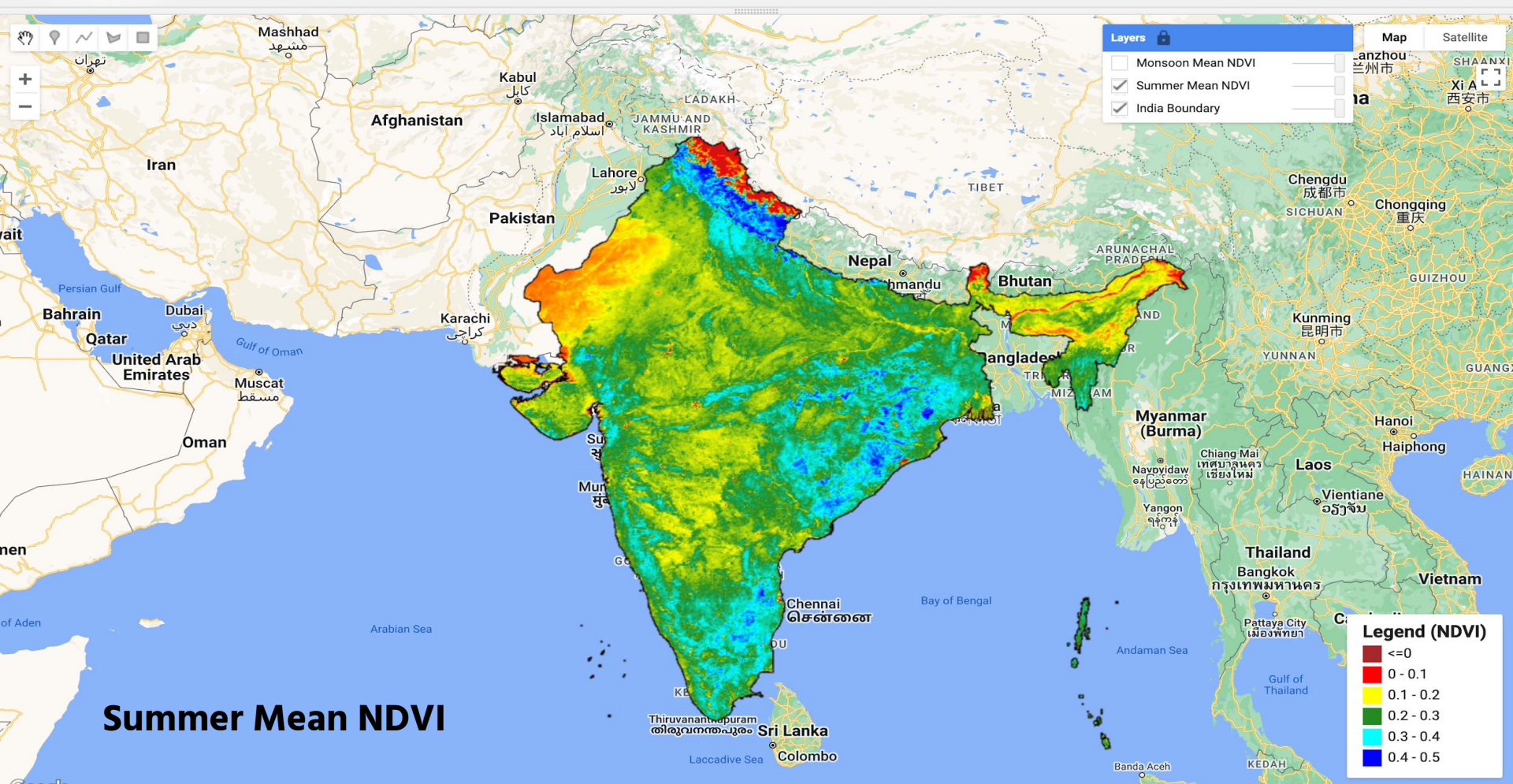
02

NDVI Trends

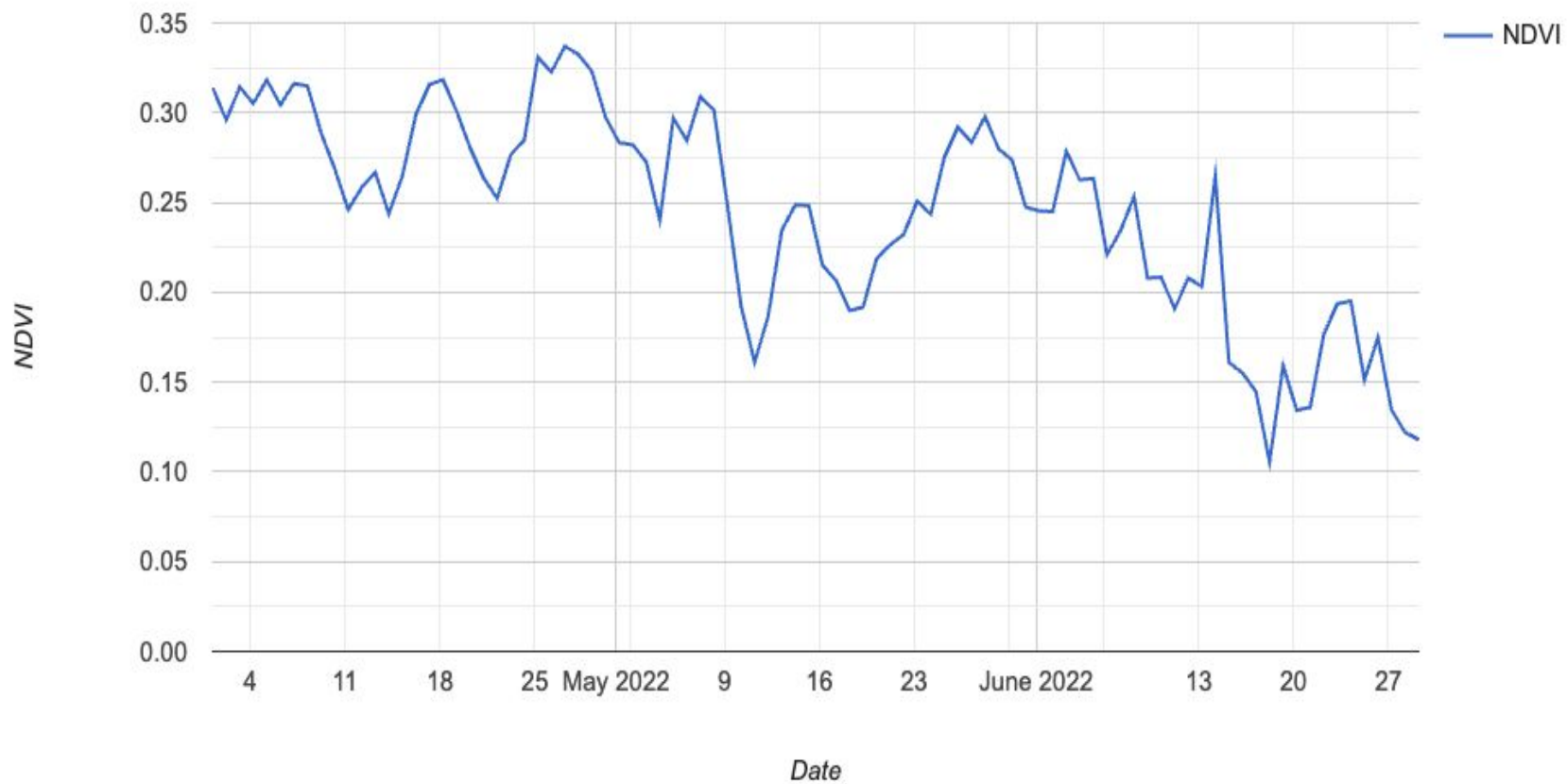
Visualizing NDVI pattern for India
using GEE



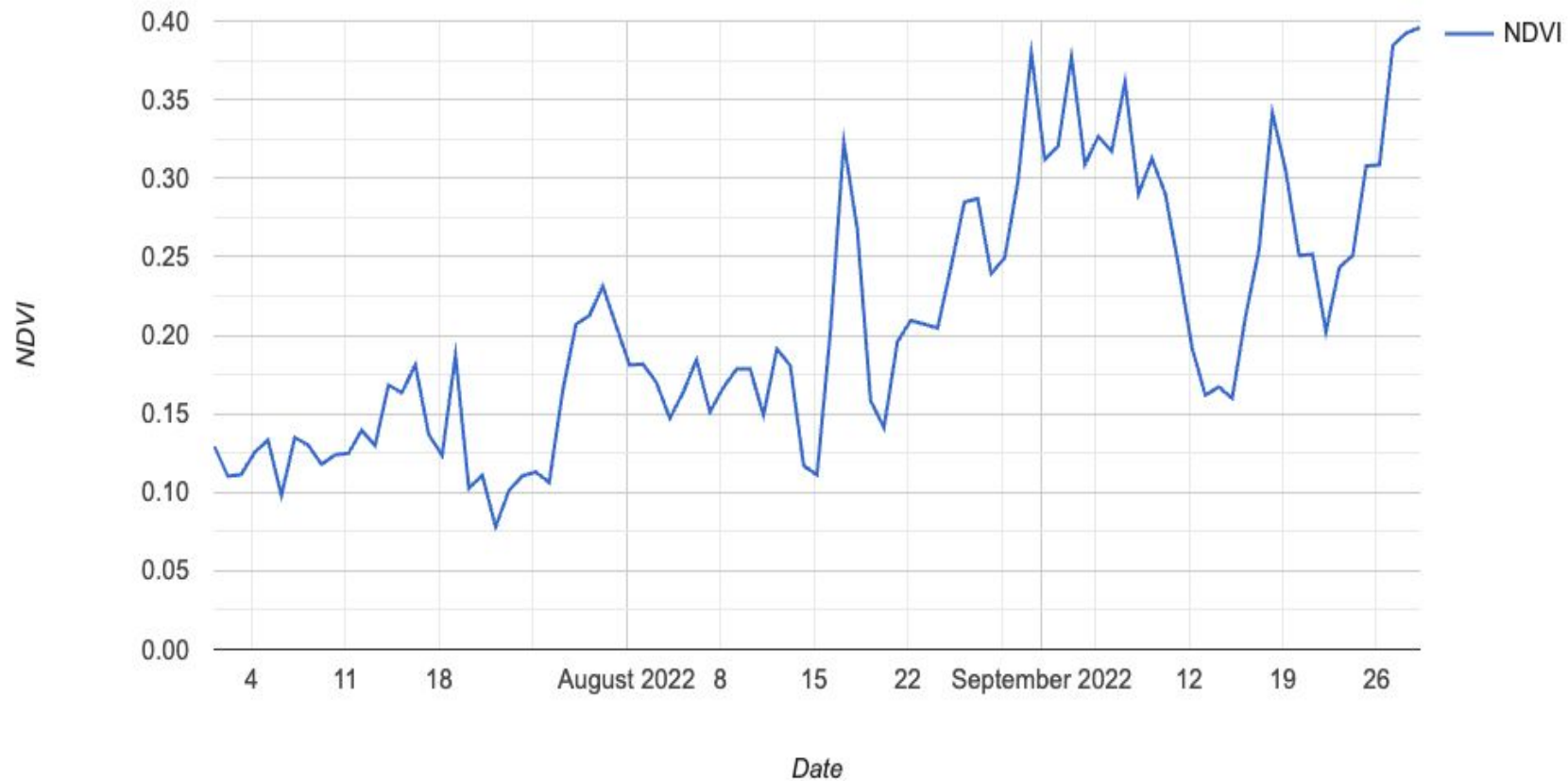




Summer NDVI Time Series

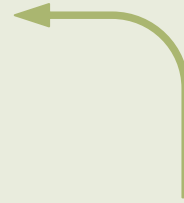
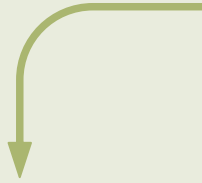


Monsoon NDVI Time Series

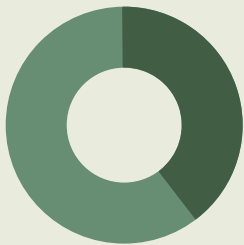


03

Analysis and Results



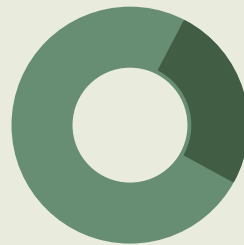
Let's see some numbers



0.078 - 0.397

Monsoon

September (Maximum)
July (Minimum)



0.105 - 0.343

Summer

May (Maximum)
June (Minimum)

Analysis using the results obtained

Monsoon

June's pre-monsoon season record lowest average NDVI as a result of greater land surface temperature and decreased soil moisture. Somewhat higher values, linked to higher seasonal land surface temperatures. Increase in surface water irrigation may be the cause of the high NDVI rating.

Summer

Due to availability of an energy source, photosynthesis is encouraged by two factors (Soil Moisture and Land Surface Temperature). The plant can create most sugar from the available carbon dioxide and water, further boosting the plant's metabolism and leading to a healthy NDVI



Some more important insights

A high NDVI denotes a climate that is more conducive to photosynthesis, whereas a low NDVI could be the result of any natural disaster and related human activity like urbanisation, etc.

The dynamic characteristics of soil moisture and precipitation are linked to agricultural productivity and natural vegetation growth, as is the fluctuation of the NDVI.

NDVI standard deviation was found to be somewhat substantial, highlighting the necessity of long-term studies to comprehend the variations brought on by certain meteorological factors.

A slightly elevated NDVI is noted in high altitude regions, primarily as a result of increased microbial activity, metabolic reactions, and nitrogen availability.

It has been noted that the NDVI is also dependent on the land cover (forest, agricultural, grassland, and urban areas), the local elevation, and the meteorological factors (temperature, rainfall, humidity, and soil moisture).

In order to influence the rate of evaporation (water from the soil) and evapotranspiration (water from leaves) in crops and plants, soil moisture is essential to the life cycle of plants.

04

Conclusion

Summary of our research





Conclusion

To sum up, the study of NDVI patterns in India offers significant understanding of the dynamic interaction between environmental conditions and vegetation health. The investigation covers both the summer and monsoon seasons, exposing complex trends and variances in the growth of plants. The findings contribute to our understanding of the ecological dynamics within India and offer a foundation for further research and applications.

05

Expansion Ideas

To help Earth, Environment and Society
from sustainable perspectives



Climate Change Impact Analysis

We can analyze long-term NDVI trends to detect potential impacts of climate change on vegetation patterns. We can also, explore how changing precipitation patterns, temperature, and extreme weather events influence NDVI values and ecosystem resilience.



Urban Planning and Green Infrastructure

We can evaluate urban green areas and vegetation cover using NDVI analysis. We can then, utilise the findings to improve urban quality of life, encourage green infrastructure, and guide urban planning initiatives while reducing the impact of the urban heat island.

Natural Disaster Monitoring and Resilience

We can investigate how NDVI data can contribute to monitoring and assessing the impact of natural disasters, such as floods, wildfires, and cyclones. We can use this information to enhance disaster resilience strategies and response planning.



Precision Agriculture

We can utilize NDVI data for precision agriculture by providing farmers with information on crop health, growth stages, and areas requiring attention. This can optimize resource use, minimize environmental impact, and enhance agricultural sustainability.

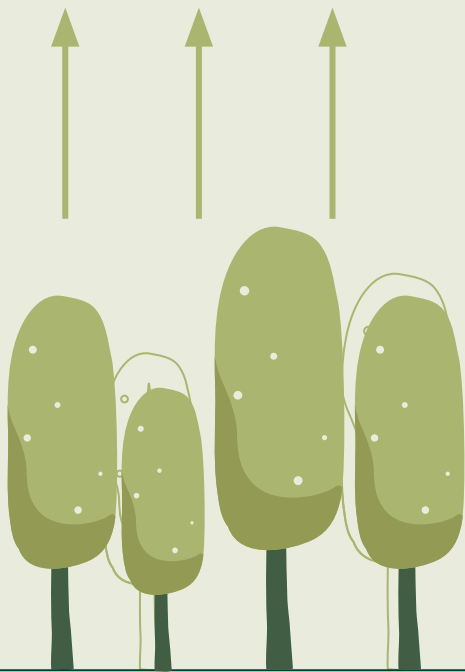
06

References

Sources that helped us



- Rendyk. (2021, May 5). Image Analysis and Mapping in Earth Engine Using NDVI. *Analytics Vidhya*. <https://www.analyticsvidhya.com/blog/2021/05/image-analysis-and-mapping-in-earth-engine-using-ndvi/>
- Thuku, P. (n.d.). Vegetation Analysis: NDVI Calculation on Google Earth Engine. *Medium*. <https://medium.com/@thukupeter487/vegetation-analysis-ndvi-calculation-on-google-earth-engine-dc6d951220>
- Justin B. (2019, Jan) Payload limit exceed. *StackOverflow*. <https://gis.stackexchange.com/questions/346697/request-payload-size-exceeds-the-limit-error-when-exporting-image-from-google>
- https://www.youtube.com/watch?v=LXrTYcUYXgc&ab_channel=StudyHacks-InstituteofGIS%26RemoteSensing
- Life in GIS. (n.d.). Computing NDVI in the Google Earth Engine. *Life in GIS*. <https://www.lifeingis.com/computing-ndvi-in-the-google-earth-engine/>



Thanks!