IEEE Students Branch CEPT UNIVERSITY

IEEE GRSS Geoscience and Remote Sensing Society

ISRS Ahmedabad Chapter

CEPT UNIVERSITY | FACULTY OF TECHNOLOGY

M.Tech Geomatics

World Environment Day | 5th June 2023

Map Making Competition

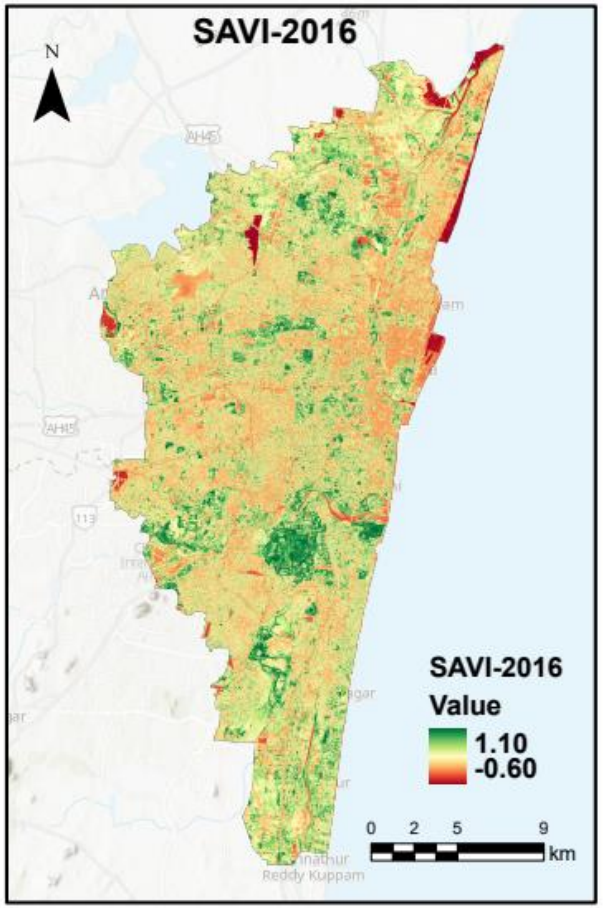
Jointly organized by ISRS Ahmedabad chapter & IEEE CEPT University Student

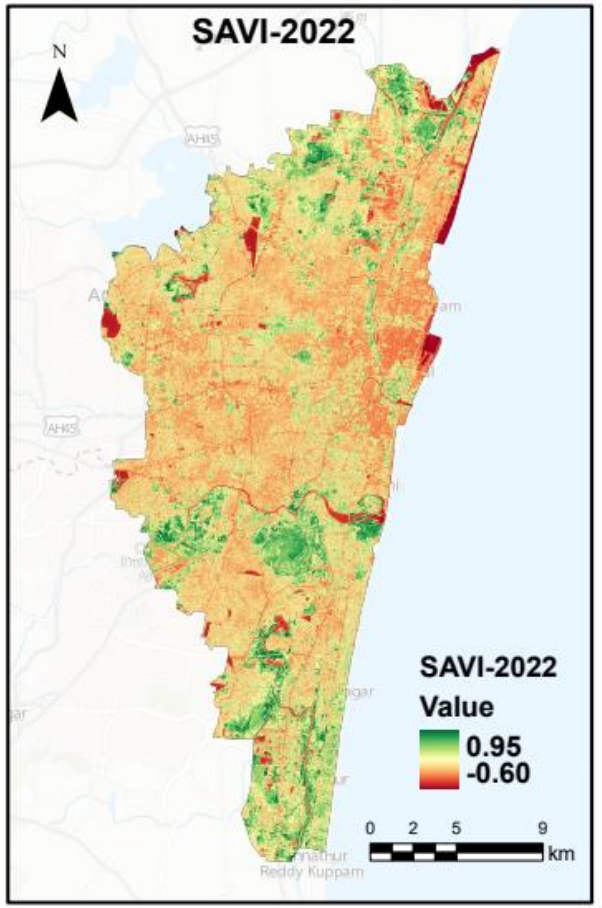
CLIMATE  CHANGE

Third place

- Name: Prajwal Kiritkumar Parmar
- Team Size- Individual
- College: Faculty of Technology, CEPT University
  Program: MTech Geomatics

Green cover change in Chennai for 2016-2022





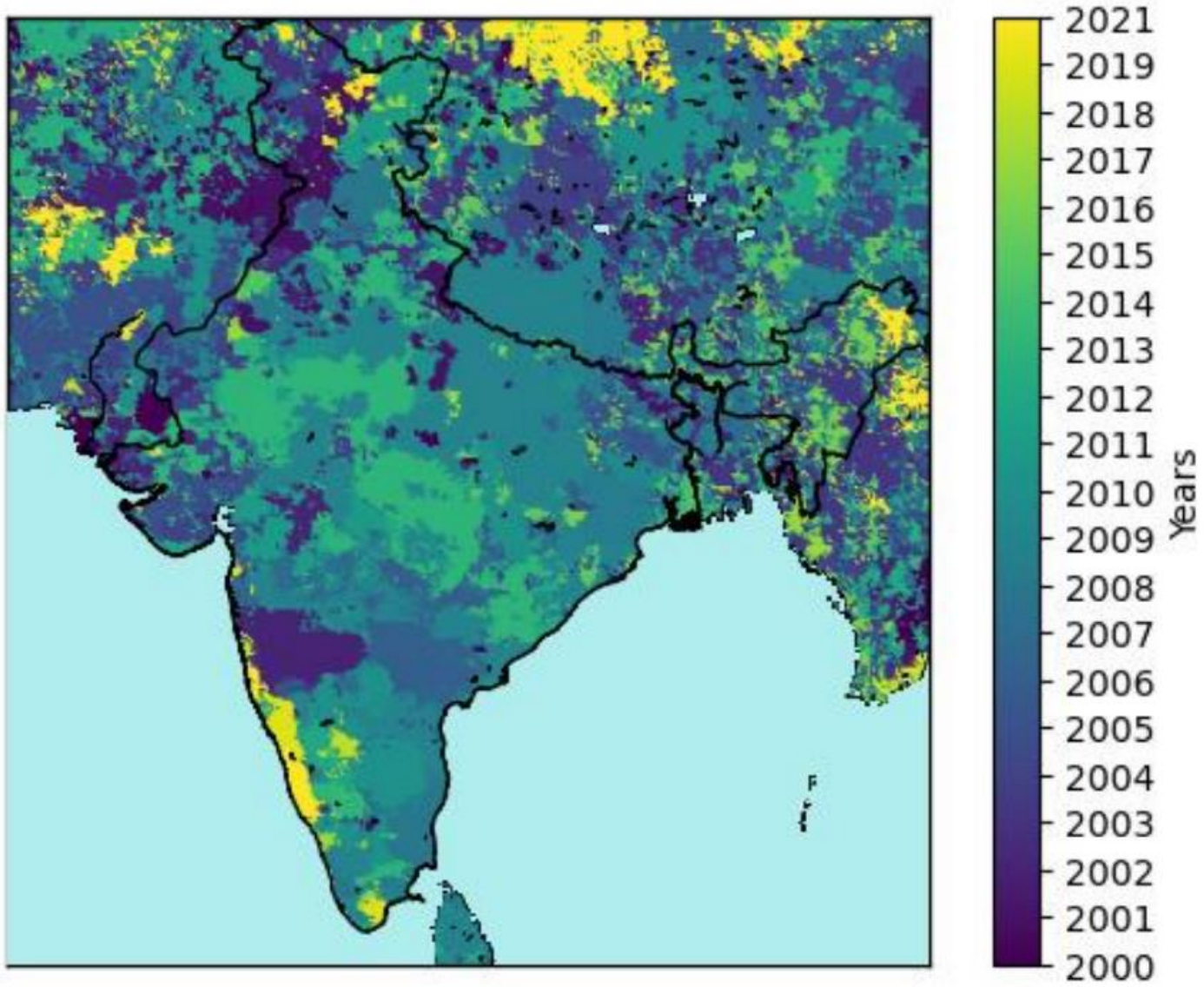
The world is now facing an ecological crisis due to unsustainable patterns of urban growth. Green cover loss is another implication of such uncontrolled expansion. Decrement in green spaces has been observed in most Indian cities for the last decade. Chennai is capital of Tamil Nadu state that lies in southern India. As per 2011 census, it has a population of nearly 47 lakhs. Chennai has also experienced rapid growth in terms of infrastructure and economy in the recent decade which is posing an issue of loss of biodiversity and affecting natural green spaces. In order to identify the extent of change in green cover, satellite imagery can be used. In the present study, Sentinel-2 data has been used to generate a vegetation index. The bands used have a spatial resolution of 10 meters which allows to identify the change in better way. Soil adjusted Vegetation Index has been utilized to extract vegetation by reducing the effect of bare soil reflectance in the index values. Since, the study area has a considerate amount of bare soil, this particular index was used. SAVI uses a normalized difference of Near Infrared and Red bands of satellite data to extract the green cover. Also, a soil brightness correction factor(L) is factored in to reduce the reflectance of bare soil. The value to 'L' ranges from 0 to 1 where, one is used for areas with less green cover and presence of bare soil, 0.5 is taken for areas with moderate amount of green cover. Here the L-value was taken as one due to presence of bare soil in the area and less green cover. The range of values for SAVI is from -1 to +1, where values close to one indicate vegetation and values close to -1 indicate water bodies and built-up areas. The results show that from 2016 to 2022 the green areas have vanished in the core part of city and in the western areas. The value for SAVI for 2016 and 2022 was 1.10 and 0.95 respectively, indicating the loss in green cover. This loss has implications like formation of Urban heat islands and change in microclimate in the city..

To mitigate the change in urban climate, the city authorities should invest in green infrastructure. Green drives should be encouraged in co-ordination with NGOs and environmental groups. Also, citizen participation should be encouraged to identify the areas in the city which require green space rejuvenation based on their suggestions.

Data Sources: Sentinel-2A MSIL1C dataset, 24/08/2016 and 04/02/2022: Copernicus Open access hub, Chennai boundary: Municipal spatial data master, GitHub Repository.

Second place

- Name: Tanvi Birla
- Team Size- Individual (1)
- College:JECRC University ,Jaipur, Rajasthan
- ISRO-SAC Researcher
- Guide name- Dr. Bipasha Paul Shukla, Sci-SG
- Theme- Mapping the Changing Rainfall Pattern over India



CHANGE POINT PLOTTED ON MAP OF INDIA

Mapping the Changing Rainfall patterns over India

ABSTRACT:

Rainfall is an essential part of the water cycle on Earth and has a significant impact on the climate, ecosystems, and human activities, particularly over the Indian region. Due to global warming, rainfall regimes are also expected to undergo changes. One of the most important findings would be to mine out the time-frame when there has been a shift/change in the rainfall patterns of a location. Changepoint analysis is a powerful new tool for determining whether and when a significant alteration in the temporal statistics of a parameter has taken place. Thus, a comprehensive study was carried out to delineate the precise change-points within the rainfall time series, aiming to map the junctures of significant shift in precipitation patterns over Indian region. For this, 20 years (2000-2021) of daily rainfall data from the Global Precipitation Measurement Integrated Multi-satellite Retrievals for GPM (GMP-IMERG) was used. The change points for every grid were calculated with a Bayesian Estimator of Abrupt change, Seasonality and Trend (BEAST), algorithm which is a fast-generic Bayesian model for computing change points along with their confidence level. The results show that the most recent changes in rainfall patterns over the last two decades are recorded for some parts of the states of Karnataka, Kerala and North-Eastern Part of India.

RESULTS AND FUTURE APPLICATION:

The change point map is plotted in figure, where the colorbar is set in years. Recent changes were seen in some parts of Kerala and Karnataka. Further, significant changes were also observed in Arunachal Pradesh and some parts of Ladakh. For major portion of India, the confidence calculated was between 0.8 – 1.0 indicating the accuracy of CP. On further analysis, trend was calculated in which increasing trend was seen in some parts of Ladakh and Arunachal Pradesh. North East part of India have increasing rainfall pattern whereas change points seen in these regions were around 2012- 2013. This map may be very useful for improving resource management, disaster preparedness, and sustainable development and provide a baseline for monitoring further shifts in precipitation patterns over India. For a variety of applications, such as weather forecasting, climate modelling, flood prediction, it is essential to comprehend rainfall patterns

First Place – Team TriGeo from Symbiosis Institute of Geoinformatics, Pune

Vineet Balkrishna Chavan

Suraj Ravasaheb Mane

Aniket Kishor Sonawane

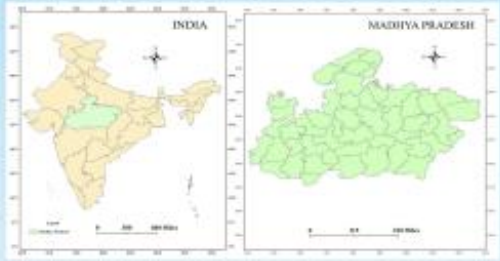
Multi-criteria analysis for the transition of conventional energy generation to PV and Analyse of reduction in CO2 emission by solar energy

INTRODUCTION

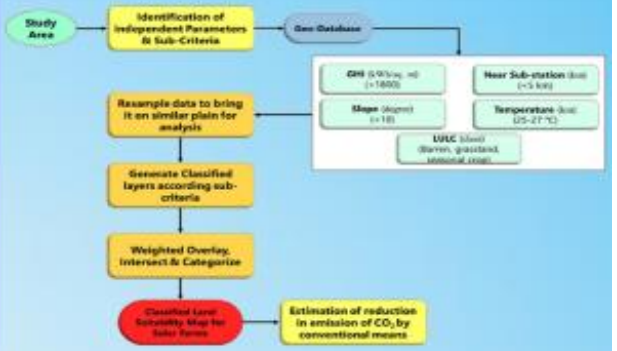
Sun is a clean, copious, and free energy source that can compensate for increased energy use in developed and developing countries. The project aims to identifying suitable locations for installation of PV panels, evaluating electricity generation capacity, and comparing CO2 emissions from conventional electricity generation **methods** (Coal, Natural gas, Petroleum). The study highlights the environmental benefits of transitioning to solar energy as a means to combat climate change.

STUDY AREA

Madhya Pradesh's total energy generation is 25,489 MW annually (2021). The state government is also focusing on agriculture and has set a target to install 45,000 solar pumps by 2023 (Energy Dept., Govt. of MP).



METHODOLOGY



DATA SOURCE

Sr. No.	Parameter	Criteria	Unit	Source
1	Solar Irradiance	>1500	kWh/sq. m	SolarGIS, World Bank Group
2	Temperature	25-27	°C	SolarGIS, World Bank Group
3	Slope	<5	Degree	SRTM, USGS
4	LULC	NA	NA	Sentinel-2, LULC
5	Accessibility (Sub-stations)	5	Number	Madhya Pradesh Power Transmission Company Ltd.

RESULTS

The Analytical Hierarchy Process and Weighted Overlay analysis result in the final map by evaluating each criterion and studying their correlation. The observations are as follows,

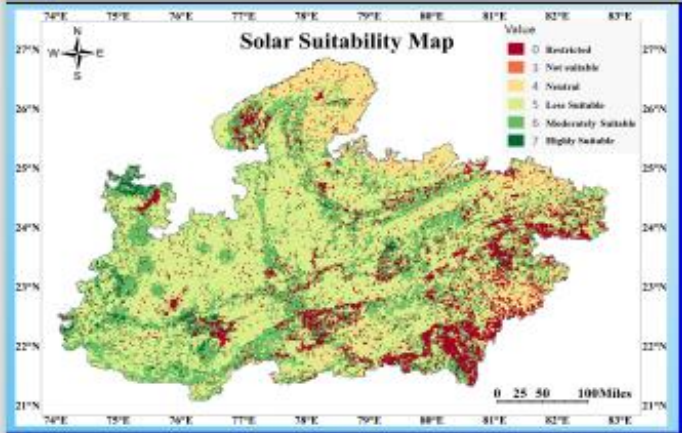
LULC: Open areas were considered highly suitable areas.
Temperature: Ideal range between 25 – 27 °C (Xiao et al. 2014).
Substations: As transmission length increases, the cost of the project also gets increases. We have considered the suitable range of <5 km from suitable site (Eshan et al., 2016)
Slope: Sites with less than a 5°C gradient considered as more suitable as economically viable (Yuhu Zhang et al., 2019).

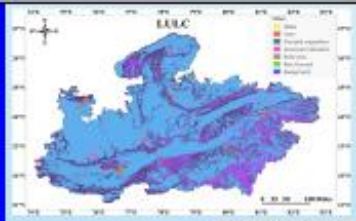
The suitable area for PV farms covers almost 1.7% of the state's total area. The Observations for reductions of CO2 emissions due to transitioning to solar energy are as follows,

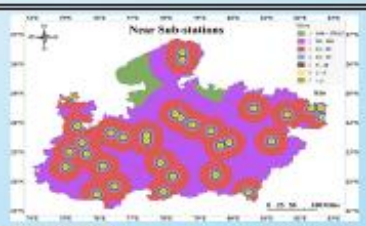
Sr No.	Particular	Value	Reference
1	Area of Madya Pradesh State	3,08,245 sq. km	Department of Land Resources, India
2	Total area suitable for solar farms	5,219.28 sq. km	NA
3	Energy generation per sq. m per day	5.5 kW	Ministry of New and Renewable Energy India
4	Total Energy generation per day	22944.82 MW	NA
5	CO_2 generation per MW energy production	0.82 Tonne	Ministry of Power Central Electricity Authority, India
	Total CO_2 emission per day	**18831.15 Tonnes**	**NA**
	The total reduction in CO_2 emission per year	**6.87 million Tonnes**	

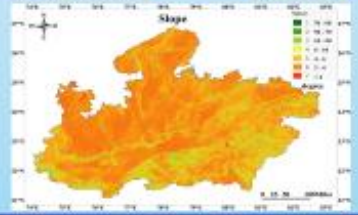
As per the study, reduction in CO2 generation can reduce by 6.87 million tonnes per year which can be considerable amount of GHG accounts for climate change.

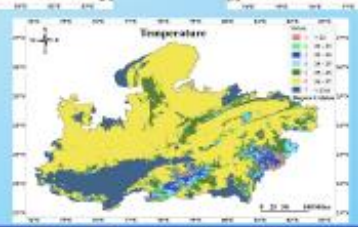
ANNEXURE











Prepared by: Suraj R. Mane, Aniket K. Sonawane, Vineet B. Chavan (Symbiosis Institute of Geoinformatics, Pune)