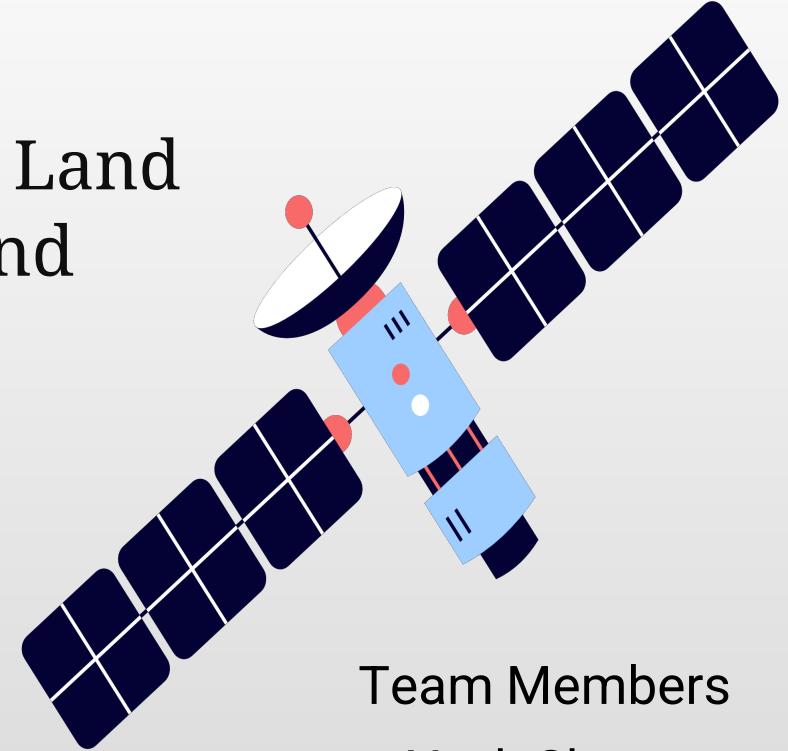


Comprehensive Analysis of Dakshina Kannada: Land Usage, Land Cover, Flora, Fauna, Climate, and Temperature Variations



Team Members

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Yashwanth R

Kagwade Abhishek

Anirudh Kamath

Saneesha Prashant Kadam

Project Details



1. Land Usage and Land Cover:

- Classification of land usage and land cover in Dakshina Kannada.
- Identification and mapping of different land types such as agricultural areas, urban spaces, forests and water bodies.
- Analysis of changes in land usage patterns from 2014 to 2022

2. Flora and Fauna:

- Detailed study of the plant and animal species in Dakshina Kannada.
- Identification and documentation of the region's biodiversity.

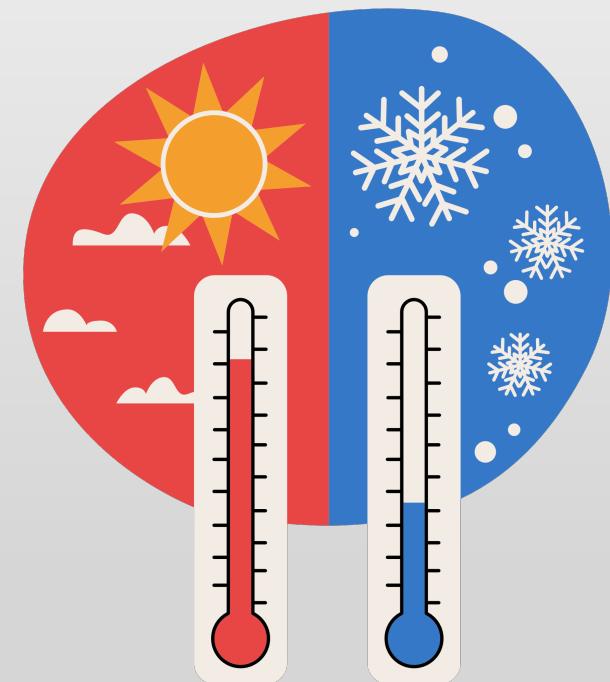


Project Details



3. Climate, Soil and Temperature Variations:

- Analysis of the climate patterns in Dakshina Kannada.
- Examination of temperature variations over the years.
- In-depth study of rainfall distribution across the region.
- Creation of Surface Temperature Map
- Types of Soil in the district
- Land Surface Temperature



Methodology



- The satellite images of Landsat and Sentinel were downloaded from the portals of USGS and Copernicus.
- Open Source Softwares were used to import, process and analyze the images and derive the results.
- Google Earth Engine which is a cloud based software, which contains a catalog of petabytes of satellite data and provides a range of analysis capabilities for tasks such as image classification, time-series analysis, and machine learning.

Methodology



Google Earth Engine

Search places and datasets...

ee-4al21cs139

DakshinaKannada

```
function applyScaleFactors(image) {
  var opticalbands = image.select('SR_B_').multiply(0.0000275).add(-0.4);
  var thermalbands = image.select('ST_B_').multiply(0.00341862).add(149.0);
  return image.addBands(opticalbands, null, true);
}

var data = ee.ImageCollection('LANDSAT/LC08/C02/T1_L2')
  .filterDate('2022-12-15', '2022-12-18')
  .filterMetadata('CLOUD_COVER', 'less_than', 0.5)
  .map(applyScaleFactors)
  .first();
var data = ee.ImageCollection('LANDSAT/LC08/C02/T1_L2')
  .filterDate('2022-12-22', '2022-12-25')
  .filterMetadata('CLOUD_COVER', 'less_than', 0.5)
```

Map Satellite

United States

North Atlantic Ocean

Script Editor

1. Google Earth Engine

Untitled Project — QGIS

Project Edit View Layer Settings Plugins Vector Raster Web Mesh Processing Help

Recent Projects

Project Templates

New Empty Project

mod

mud

Search QGIS

Search string...

Filter by extent All

Last used

Google Satellite

TMS delete/revert problem

Type to locate (Ctrl+H)

Ready

Coordinate

Scale 1:29854292 Magnifier 100% Rotation 0.0°

Download metadata for your project

EPSG:4326 WGS 84

2. Quantum GIS (QGIS)

GRASS GIS 7.8.8 Layer Manager

GRASS GIS Map Display: 1 - newLocation/lvc

File Settings Raster Vector Imagery 3D raster Database Temporal Help

Display 1

Layers Console Modules Data Python

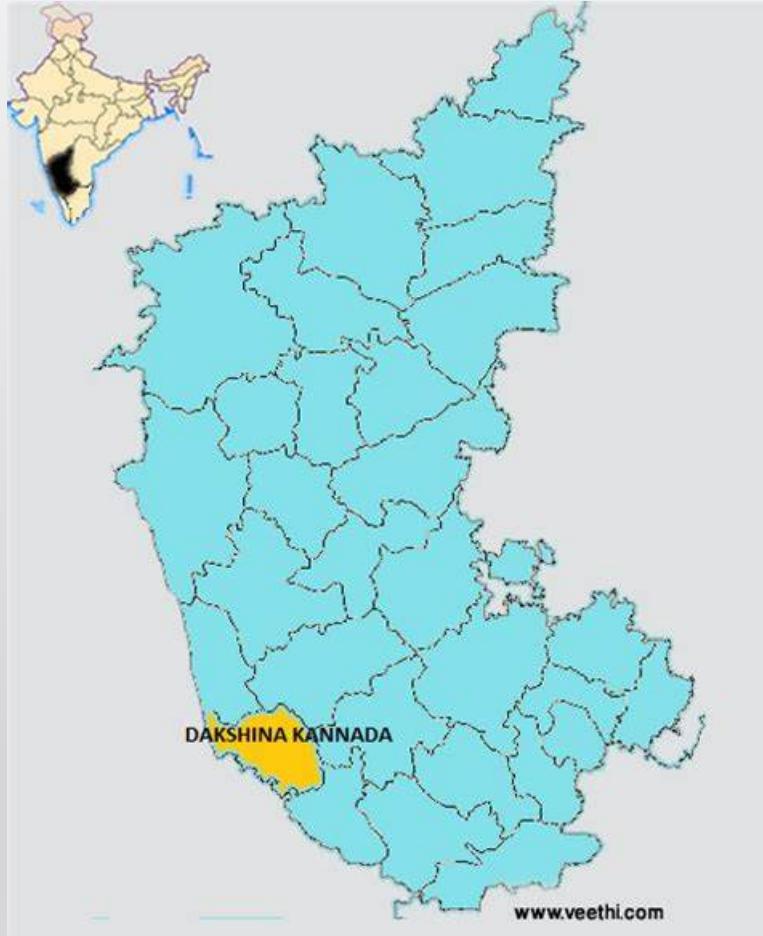
Coordinates

458405.81;1392360.85

Render

3. Grass GIS

Study Area



- Dakshina Kannada (South Canara) is the southern coastal district of Karnataka State with an area of 4859 Sq KM. The district is bound by sea in the west and Western Ghats in the East, Udupi district in the North and Kerala State in the South.
- Dakshina Kannada has become an education hub with a number of reputed institutions offering variety of courses attracting students from all over the country and abroad.

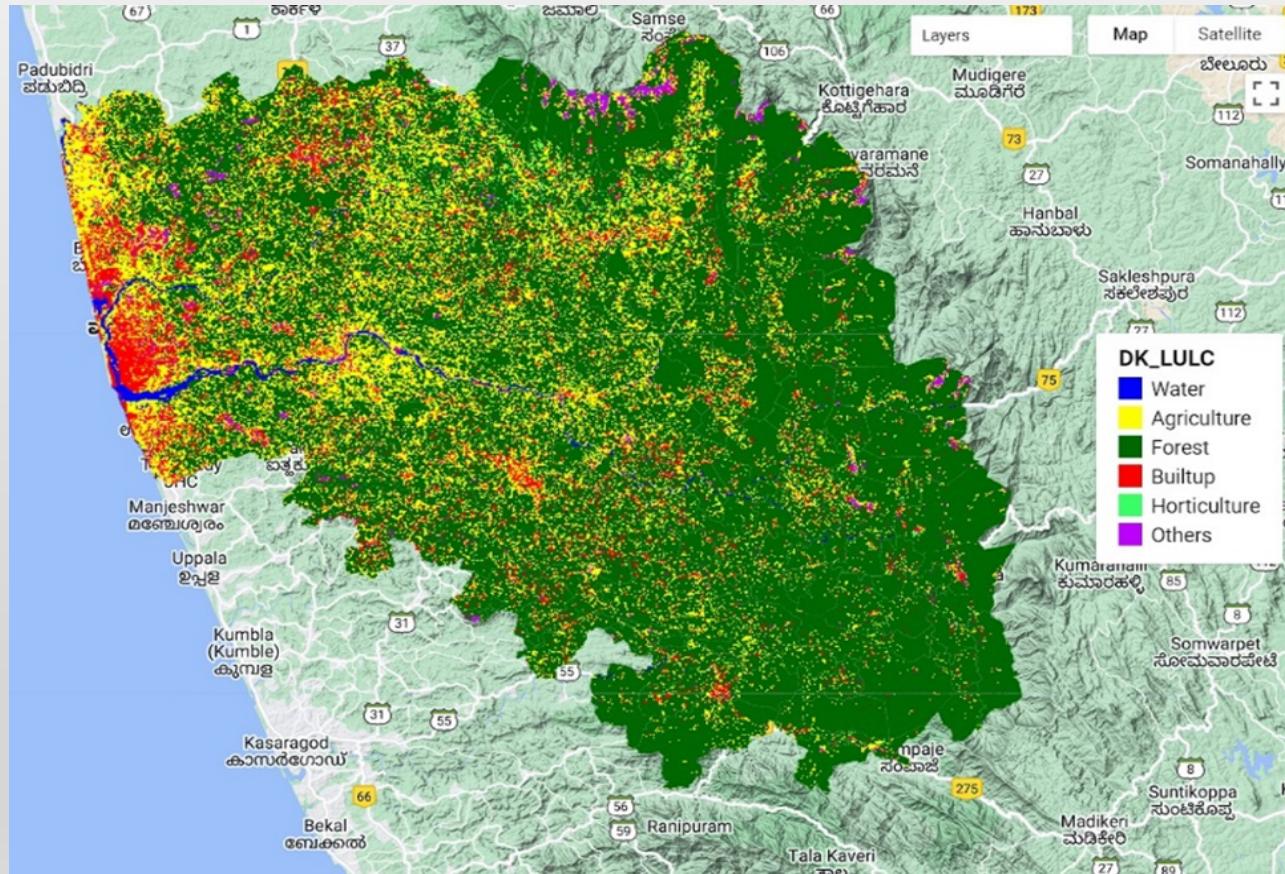
Study Area



- In essence, Dakshina Kannada is a dynamic blend of tradition and modernity, making it a unique and compelling part of Karnataka.
- Situated in the southwestern part of Karnataka, India, features a diverse climate and rich biodiversity. The region experiences a tropical climate with significant influence from the Arabian Sea, resulting in moderate to high temperatures and distinct wet and dry seasons.
- The Western Ghats, a UNESCO World Heritage site traversing the district, contributes to its exceptional biodiversity

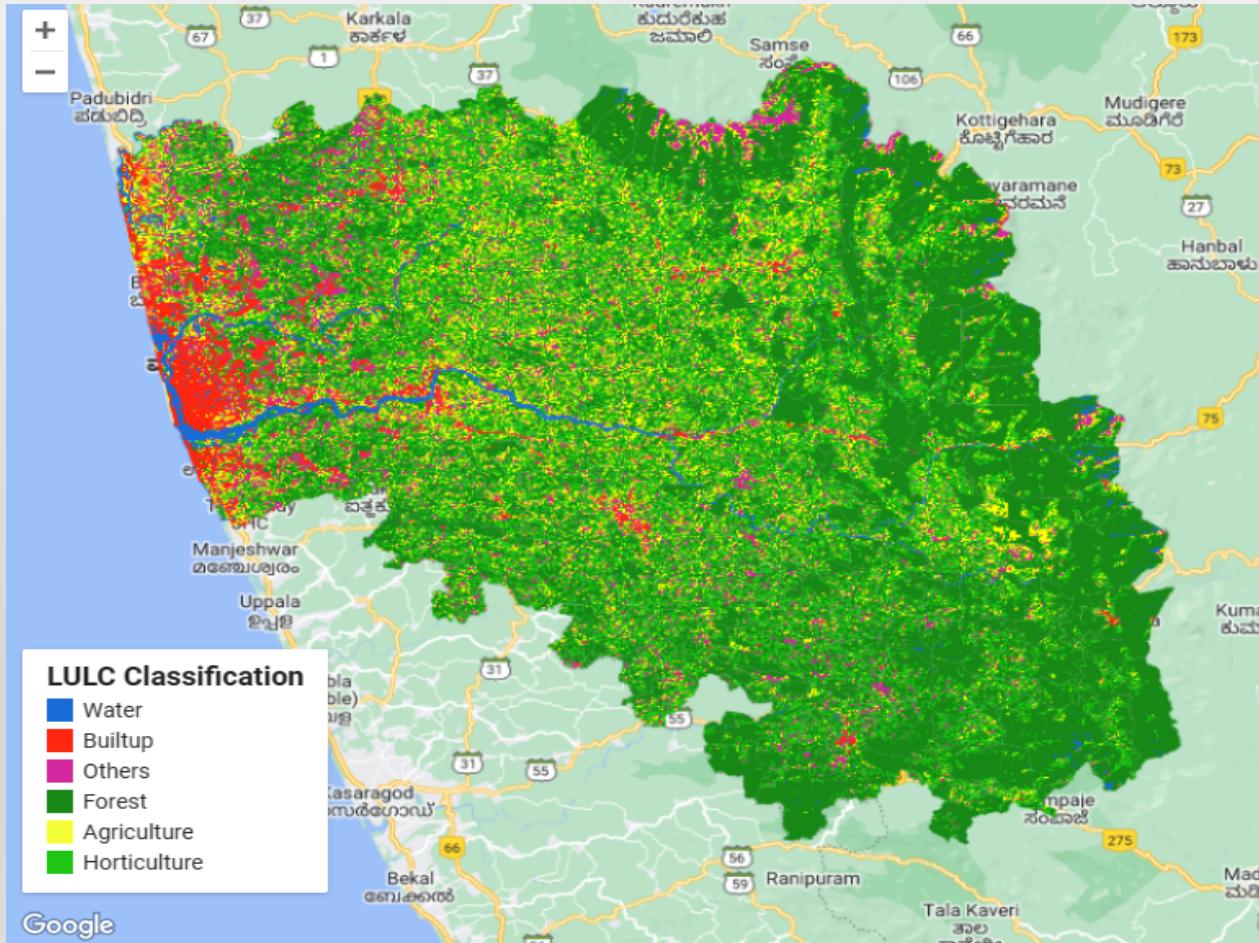


Land Use Classification



Land Use and Land Cover for year 2014

Land Use Classification



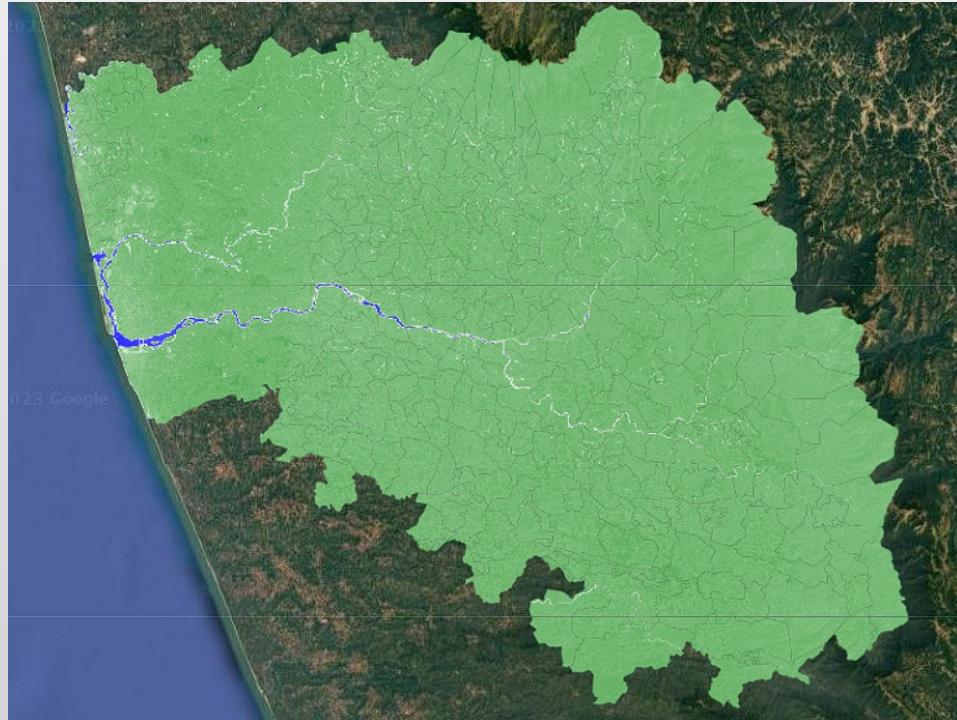
Land Use and Land
Cover for year 2022

Land Use Classification

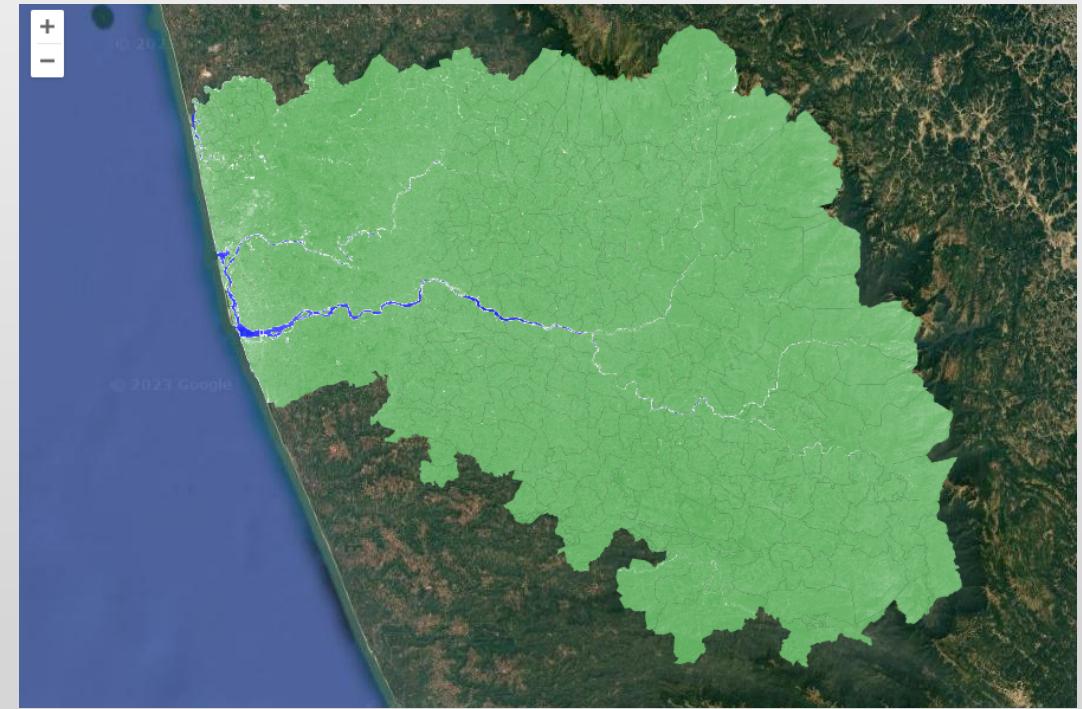


- The Land use and Land Cover (LULC) classifications were done using the Google Earth Engine (GEE) using the random forest classifier.
- The satellite data of Landsat 8 and 9 were downloaded from the website of United States Geological Survey.
- The satellite data was used to visualise the False Colour Composite which was used as the base layer for the creation of training polygons. The default satellite layer by Google was used as the reference layer.

Land Use Classification

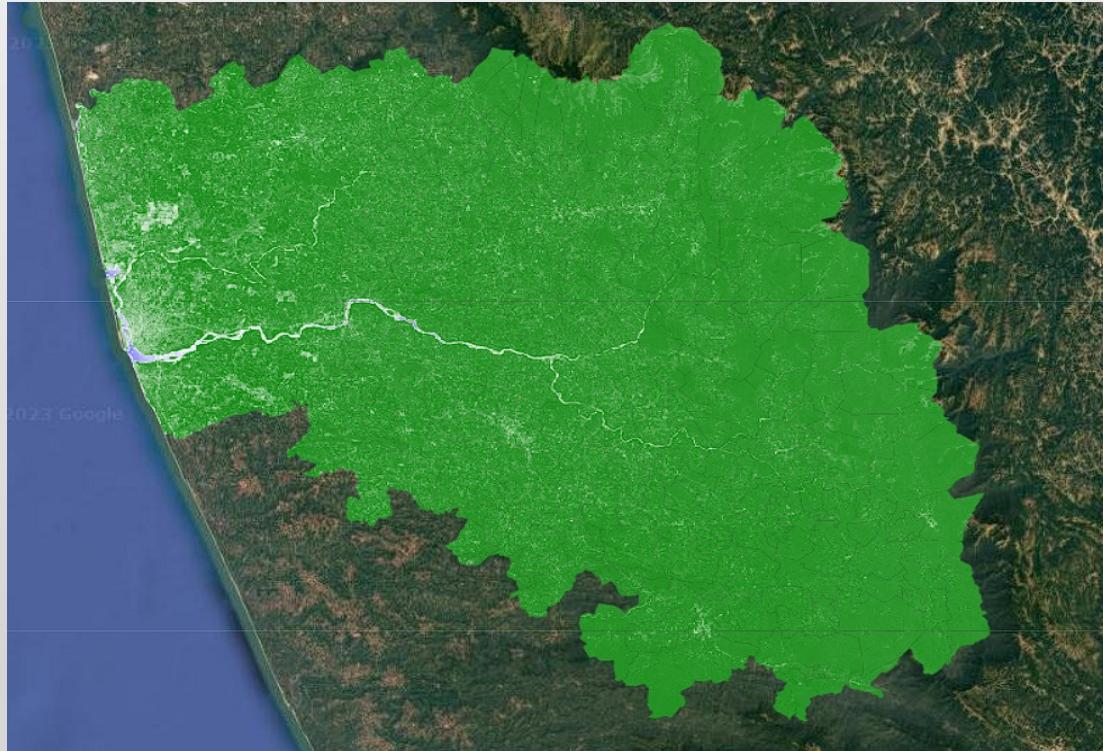


NDWI for the year 2014

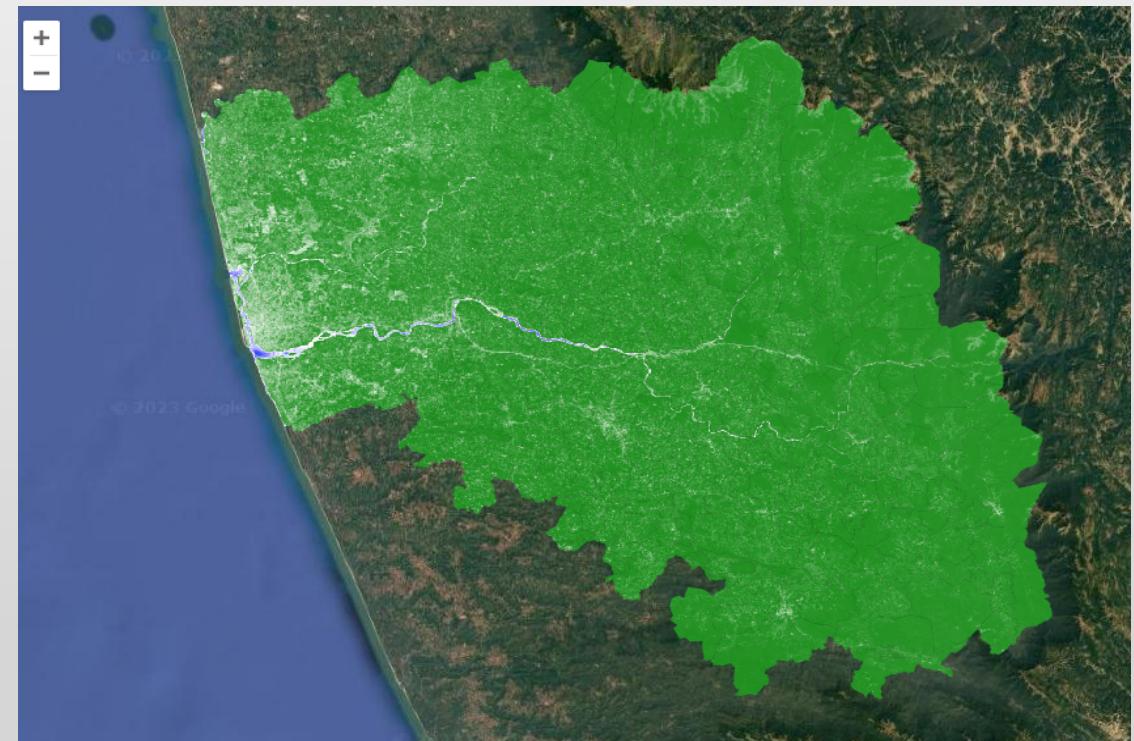


NDWI for the year 2022

Land Use Classification

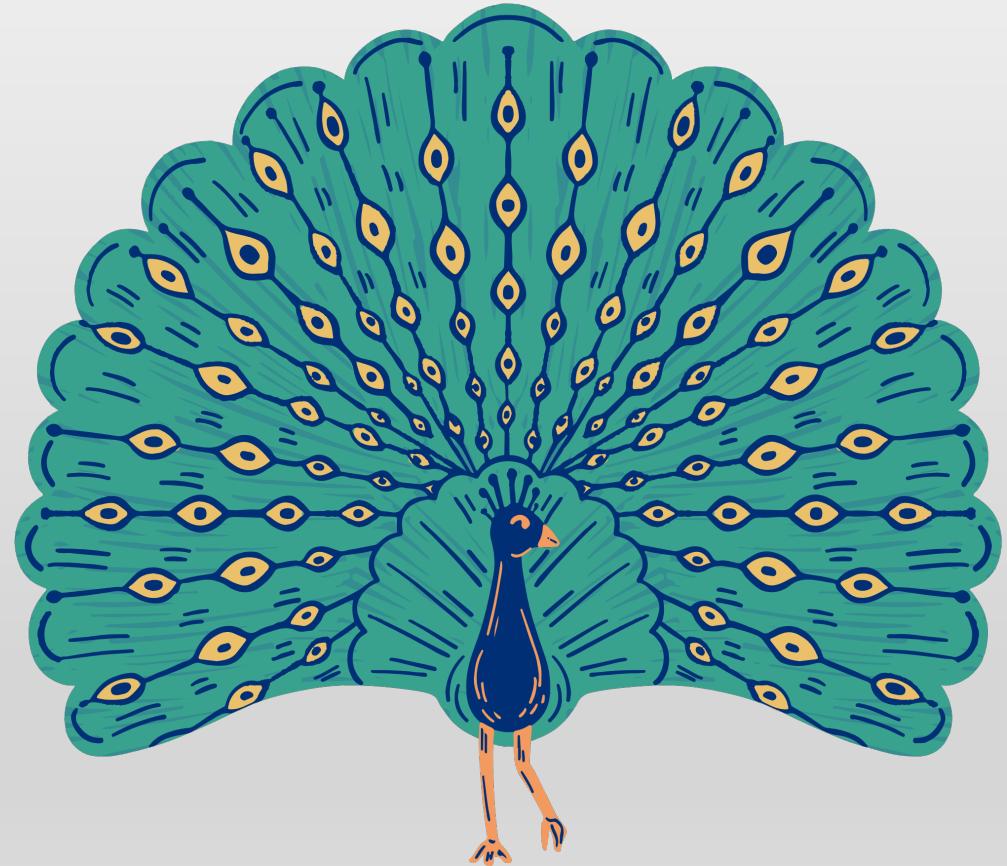
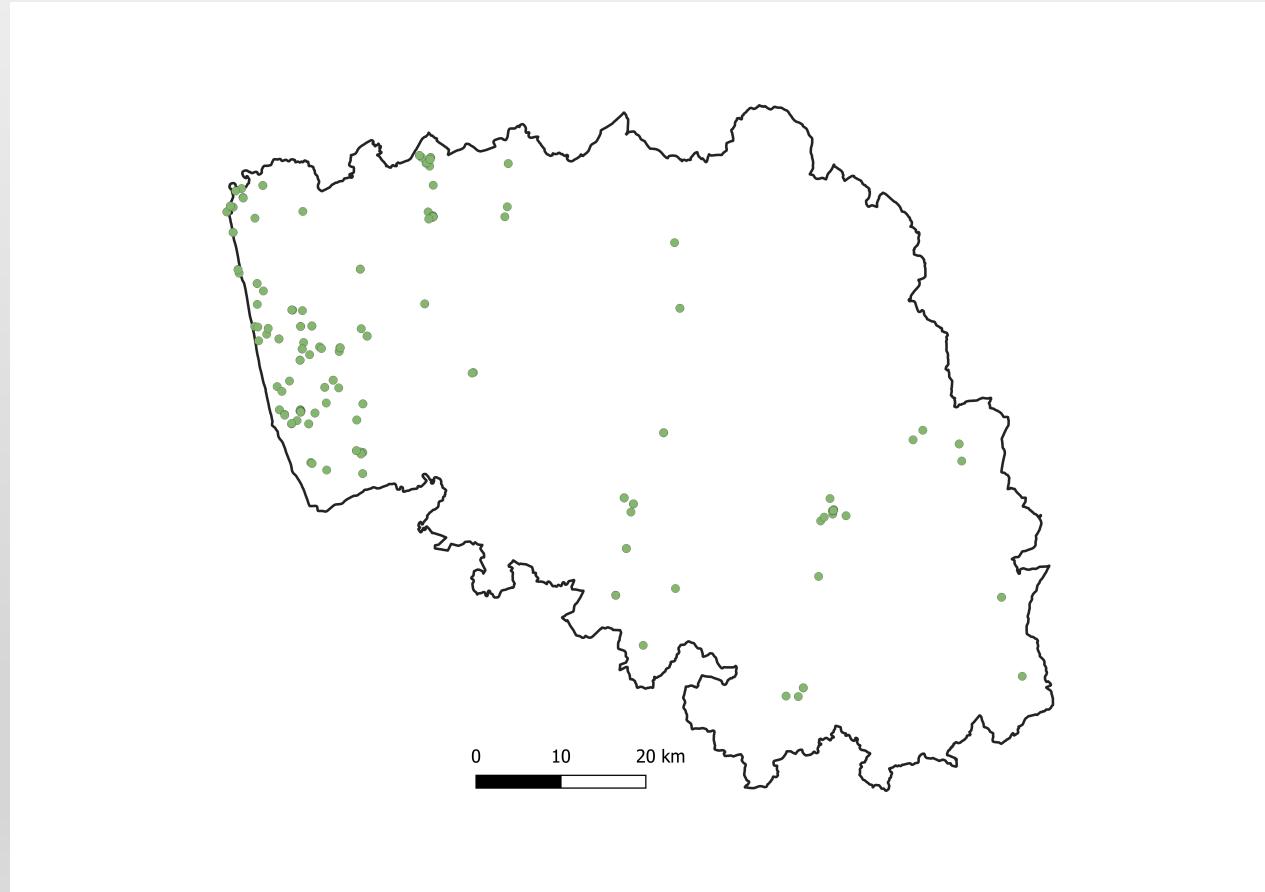
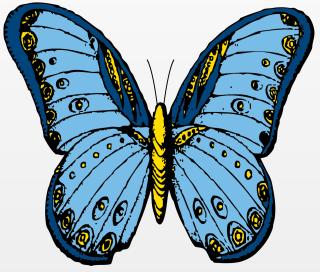


NDVI for the year 2014

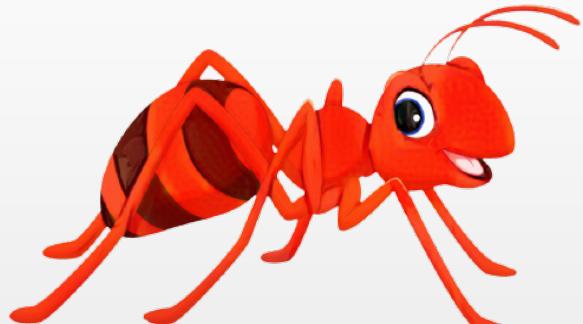


NDVI for the year 2022

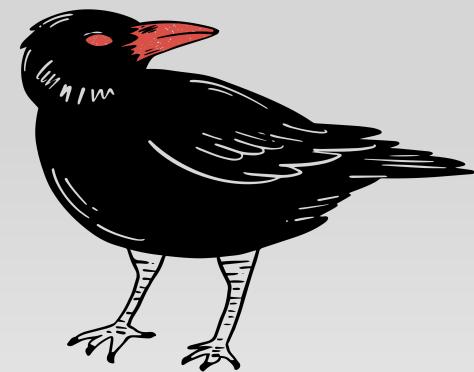
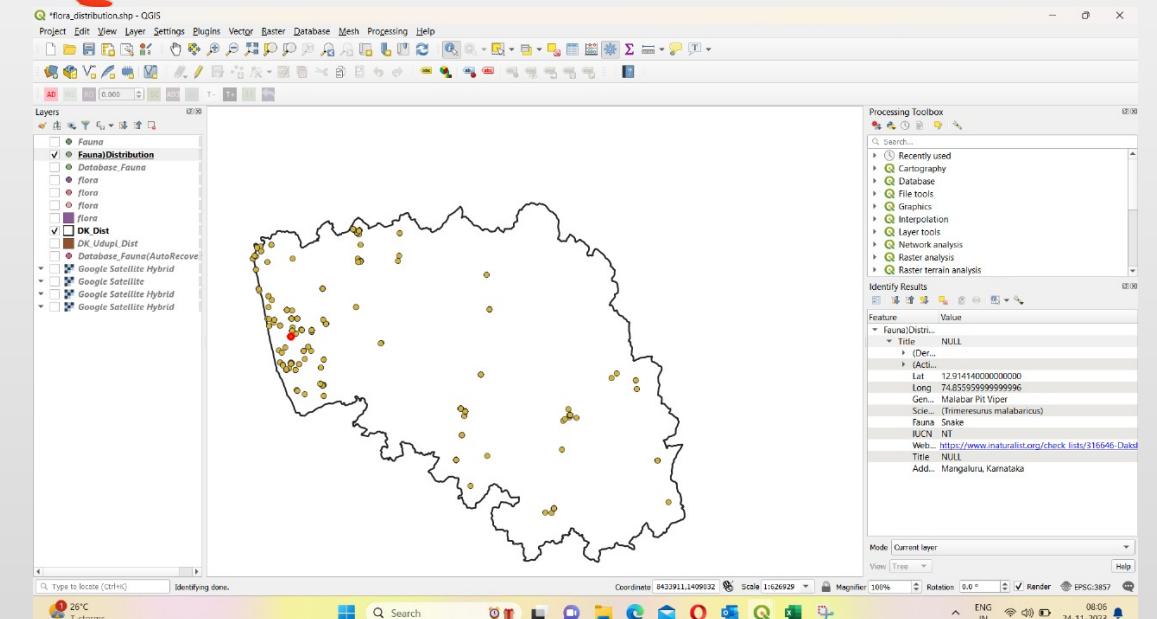
- Fauna in the region



• Fauna in the region



	ID	Common Name	Scientific Name	Catagory	Conservation Status	Link
11	12.969	75.267 Domestic Bos tauri Cattle	Bos tauri	LC	https://www.inature.com/Dakshina_Kannada	
12	12.901	75.044 Giant Go Nephila p Spider	Nephila pilipes	NA	https://www.inature.com/Belthangdi_Dakshina_Kannada	
13	13.038	75.262 Small Thi Argyrodes Spider	Argyrodes	NA	https://www.inature.com/Savanhal_high_School_savanalu_karnataka	
14	12.686	75.418 Ladybird Theridula Spider	Theridula	DD	https://www.inature.com/Munulya	
15	12.937	74.833 Arabian Chiloscytus Fish	Chiloscytus	Arabian	NA	
16	12.937	74.833 Arabian Chiloscytus Fish	Chiloscytus	Arabian	NA	
17	13.01	74.783 Maroon E Menippe Crab	Menippe	NA	https://www.inature.com/NITK_Beach_Surathkal_Karnataka	
18	12.798	74.885 Monkey i (Eupterot Moth	Eupterotis	LC	https://www.inature.com/QVXP+324_Kotekar_Karnataka_575022	
19	12.933	74.886 Oleander (Daphnis Moth	Daphnis nerii	LC	https://www.inature.com/Oleander_Hawkmoth_from_Bajpe_Road_Mangaluru_KA_IN	
20	12.817	74.924 Green Peacock (Pergesa Butterfly	Pergesa acuta	NA	https://www.inature.com/Green_Peacock_Hawkmoth_from_Mangaluru_University	
21	12.817	74.924 Lucas's i (Theretra Moth	Theretra lucasii	NA	https://www.inature.com/Lucas's_hawkmoth_from_mangaluru_university	
22	12.967	74.848 Brown-B (Theretra Moth	Theretra cingulata	EN	https://www.inature.com/Brown-Banded_Hunter_Hawkmoth_from_Jokatte_Karnataka	
23	12.559	75.396 Elephant Elephas i Elephant	Elephas maximus	NA	https://www.inature.com/Elephant_sulya	
24	13.006	74.793 Sea Sparkle (Noctiluc Boulommia	Noctiluc Boulommia	LC	https://www.inature.com/sea_sparkle_from_NITK_Beach_Surathkal_Karnataka_India	
25	12.914	74.856 Golden J Canis aur Jackal	Canis aureus	VU	https://www.inature.com/Golden_J_Canis_aureus_Jackal	
26	12.914	74.856 Indian G (Bos gau Wild Catt	Bos gaurus	LC	https://www.inature.com/Indian_G_Wild_Catt	
27	12.914	74.856 Sambar (Rusa un Deer	Rusa unicolor	LC	https://www.inature.com/Sambar_Rusa_unicolor	
28	12.914	74.856 Malabar I (Ratufa ir Squirrel	Ratufa indica	NA	https://www.inature.com/Malabar_I_Squirrel	
29	12.914	74.856 Indian Py (Python r Snake	Python molurus	LC	https://www.inature.com/Indian_Python_snake	
30	12.914	74.856 Malabar F (Trimeresurus Snake	Trimeresurus malabaricus	NT	https://www.inature.com/Malabar_F_Trimeresurus_snake	
31	12.914	74.856 Malabar F (Psittacula Parakeet	Psittacula eupatria	LC	https://www.inature.com/Malabar_F_Psittacula_parakeet	
32	12.914	74.856 Malabar T (Harpact Malabar	Harpactes fasciatus	VU	https://www.inature.com/Malabar_T_Harpactes_fasciatus	
33	12.914	74.856 King Cob (Ophiophagus King Cob	Ophiophagus hannah	NA	https://www.inature.com/King_Cob_Ophiophagus_hannah	
34	12.969	75.267 Long Hor (Gastera Spider	Gasteracantha longirostris	NA	https://www.inature.com/Long_Hor_Gastera_Spider	
35	12.613	75.228 Black-ear (Gastera Spider	Gasteracantha nigrotaeniata	NA	https://www.inature.com/Black_and-white_Spiny_Spider_from_Paduvannur_Karnataka_India	
36	12.901	75.042 Signature (Argiope Spider	Argiope	LC	https://www.inature.com/Signature_Argiope_spider	
37	12.568	75.401 Psilopogon (Boddaet Butterly	Psilopogon	LC	https://www.inature.com/Psilopogon_Boddaet_Butterfly	
38	12.568	75.401 Chalcopteryx (Linnaeus Butterly	Chalcopteryx	LC	https://www.inature.com/Chalcopteryx_Linnaeus_Butterfly	
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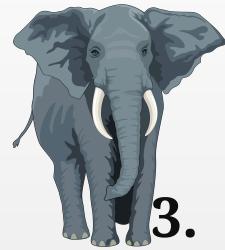




Fauna in the region

1. **Avian diversity:** Dakshina Kannada is a paradise for bird enthusiasts. The district is home to a plethora of avian species, both resident and migratory. Notable species include the Malabar Trogon, Indian Pitta, and the threatened Nilgiri Wood Pigeon.
2. **Mamalian diversity:** The fauna of Dakshina Kannada includes a range of mammals, from the elusive Malabar Civet to the majestic Indian Elephant. The district's forests provide habitat for species like the Malabar Giant Squirrel, Indian Gaur, and several species of deer. The region's wildlife sanctuaries play a crucial role in the conservation of these mammalian wonders.

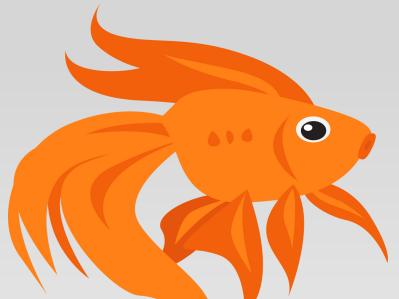


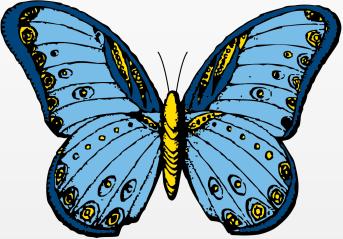


Fauna in the region

3. Reptiles and Amphibians: Dakshina Kannada is home to a diverse array of reptiles and amphibians. The district's numerous water bodies harbour various species of frogs, while reptiles such as King Cobras, Indian Rock Pythons, and several species of turtles thrive in the region. The delicate balance of ecosystems in Dakshina Kannada contributes to the flourishing biodiversity.

4. Aquatic life: With a vast coastal stretch along the Arabian Sea, Dakshina Kannada supports a rich diversity of marine life. Mangrove ecosystems are vital for several fish species, crabs, and mollusks. The district is also known for its traditional fishing practices, contributing to the sustainable utilization of aquatic resources.

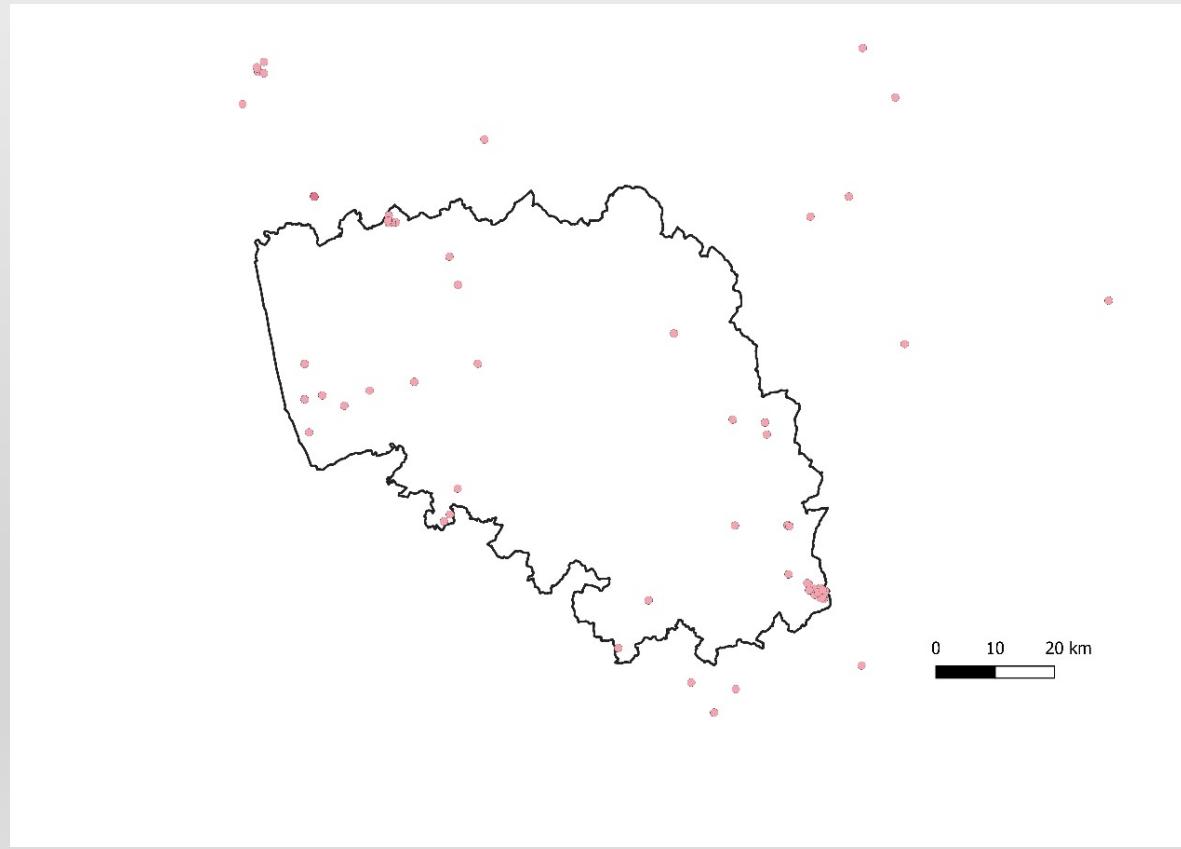




- Indian Elephant (*Elephas maximus indicus*): The forests of Dakshina Kannada are home to the Indian Elephant, an iconic and majestic mammal that plays a crucial role in the region's ecosystems.
- Indian Gaur (*Bos gaurus*): Also known as the Indian Bison, the gaur is the largest extant bovine species and can be spotted in the wildlife sanctuaries of Dakshina Kannada.
- King Cobra (*Ophiophagus Hannah*): A highly venomous snake, the King Cobra inhabits the forests and is part of the region's reptilian diversity.
- Indian Rock Python (*Python Molurus*): Dakshina Kannada is home to this non-venomous constrictor, found in various habitats, including forests and agricultural areas
- Fish Species: The district's coastal areas harbor various fish species, including those important for local fisheries and marine biodiversity.



Flora in the region



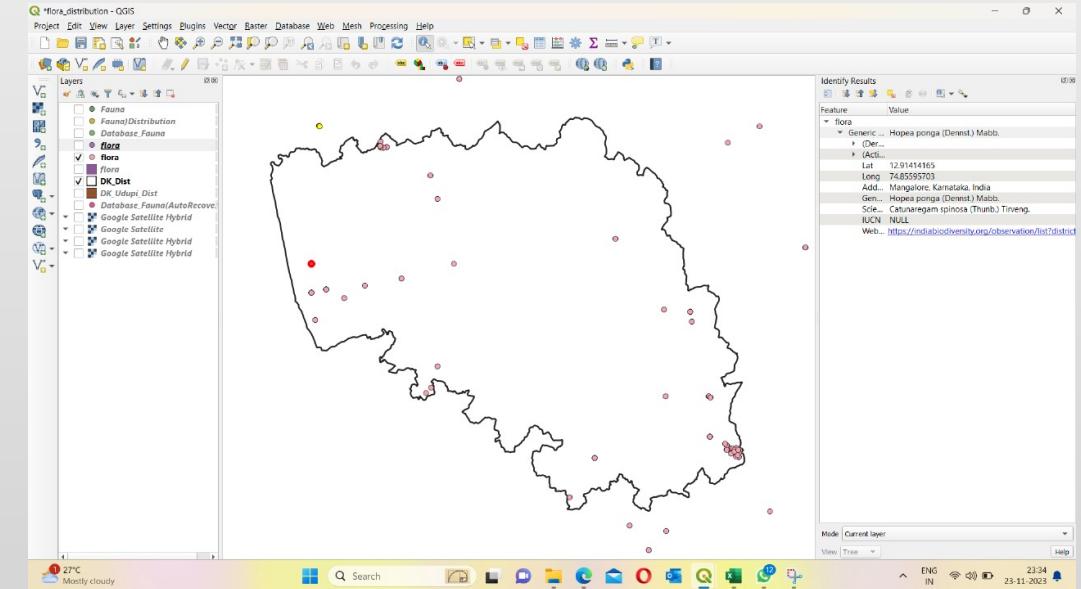


Flora in the region

File Edit View Insert Format Data Tools Extensions Help

View only

A1	B	C	D	E	F	G
Lat	Long	Address	Generic Name	Scientific Name	IUCN	Website
12.8509674	74.9173682	Harekala JHC, Karnataka 574199	Capsicum	<i>Capsicum</i>	LC	https://indabiodiversity.org/observation/list?district=D
12.9141417	74.8559568	Mangaluru, Karnataka, India	Sphagnicola trilobata (L.) Pruski	<i>Sphagnicola trilobata</i> (L.) Pruski	CE	https://indabiodiversity.org/observation/list?district=D
13.07609841	75.0604531	Shirthatdy	Rotheca serrata (L.) Steane & Mabb.	<i>Rotheca serrata</i> (L.) Steane & Mabb.	LC	https://indabiodiversity.org/observation/list?district=D
12.8606801	74.8559603	Manamikatta Jeppu - Dakshina Kannada, Kankanady, Souterpet, Kankanady, Mangalore, Karnataka 575002, India	Manihot esculenta Crantz	<i>Manihot esculenta</i> Crantz	LC	https://indabiodiversity.org/observation/list?district=D
12.8606801	74.8559603	Manamikatta Jeppu - Dakshina Kannada, Kankanady, Souterpet, Kankanady, Mangalore, Karnataka 575002, India	Colocasia esculenta (L.) Schott	<i>Colocasia esculenta</i> (L.) Schott	NT	https://indabiodiversity.org/observation/list?district=D
12.8606801	74.8559603	Manamikatta Jeppu - Dakshina Kannada, Kankanady, Souterpet, Kankanady, Mangalore, Karnataka 575002, India	Episcia	<i>Episcia</i>	DD	https://indabiodiversity.org/observation/list?district=D
12.8606801	74.8559603	Manamikatta Jeppu - Dakshina Kannada, Kankanady, Souterpet, Kankanady, Mangalore, Karnataka 575002, India	Piper betle L.	<i>Piper betle</i> L.	CE	https://indabiodiversity.org/observation/list?district=D
12.8606801	74.8559603	Manamikatta Jeppu - Dakshina Kannada, Kankanady, Souterpet, Kankanady, Mangalore, Karnataka 575002, India	Alstonia scholaris (L.) R. Br.	<i>Alstonia scholaris</i> (L.) R. Br.	GNR	https://indabiodiversity.org/observation/list?district=D
12.8606801	74.8559603	Manamikatta Jeppu - Dakshina Kannada, Kankanady, Souterpet, Kankanady, Mangalore, Karnataka 575002, India	Calotropis	<i>Calotropis</i>	NA	https://indabiodiversity.org/observation/list?district=D
12.86067963	74.8559494	Gerosa, Father Muller's Rd, St Joseph Nagar, Attavar, Mangalore, Karnataka 575002, India	Chrysopogon zizanioides (L.) Roberty	<i>Chrysopogon zizanioides</i> (L.) Roberty	LC	https://indabiodiversity.org/observation/list?district=D
13.1281813	74.9974060	Beluvai, Karnataka 574213, India	Mussaenda frondosa L.	<i>Mussaenda frondosa</i> L.	VL	https://indabiodiversity.org/observation/list?district=D
13.1281813	74.9974060	Beluvai, Karnataka 574213, India	Clerodendrum paniculatum L.	<i>Clerodendrum paniculatum</i> L.	LC	https://indabiodiversity.org/observation/list?district=D
13.1281813	74.9974060	Beluvai, Karnataka 574213, India	Lantana camara var. aculeata	<i>Lantana camara</i> var. <i>aculeata</i>	LC	https://indabiodiversity.org/observation/list?district=D
12.86067963	74.8559494	Manamikatta Jeppu - Dakshina Kannada, Kankanady, Mangaluru, Karnataka 575002, India	Centella asiatica (L.) Urb.	<i>Centella asiatica</i> (L.) Urb.	NT	https://indabiodiversity.org/observation/list?district=D
12.86067963	74.8559494	Manamikatta Jeppu - Dakshina Kannada, Kankanady, Mangaluru, Karnataka 575002, India	Leucas zeylanica (L.) Vahl	<i>Leucas zeylanica</i> (L.) Vahl	Not Foothold	https://indabiodiversity.org/observation/list?district=D
13.1281813	74.9974060	Kannur, Kerala, India	Taurina taurina (L.) L.M.T. Almeida	<i>Taurina taurina</i> (L.) L.M.T. Almeida	Not Foothold	https://indabiodiversity.org/observation/list?district=D



Flora in the region

Dakshina Kannada's flora can be broadly categorized into the following types:

- Evergreen Forests: The Western Ghats mountain range runs through Dakshina Kannada, providing a habitat for dense evergreen forests.
- Mangroves: Along the coast of Dakshina Kannada, there are extensive mangrove forests. These forests are adapted to the salty conditions of the tidal zone and play a crucial role in protecting the coastline from erosion.
- Agroecosystems: Dakshina Kannada is a predominantly agricultural region, with a diverse range of crops cultivated. These include coconut, areca nut, rice, and pepper.



Some of the notable flora species found in Dakshina Kannada include:

- King Cobra Lily (*Arisaema caudatum*): This stunning plant is known for its large, hooded flowers that resemble a cobra's head.
- Indian Rosewood (*Dalbergia latifolia*): This valuable timber tree is prized for its beautiful reddish-brown heartwood. It is found in both evergreen and deciduous forests.

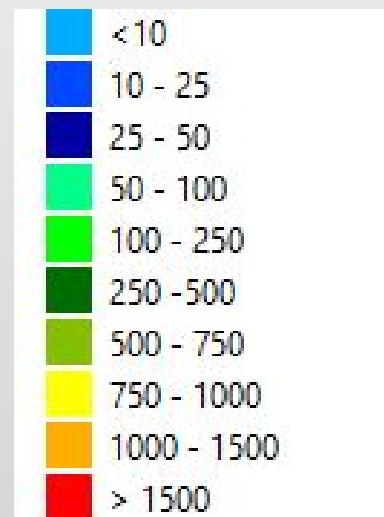
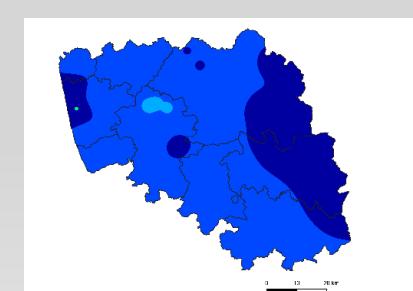
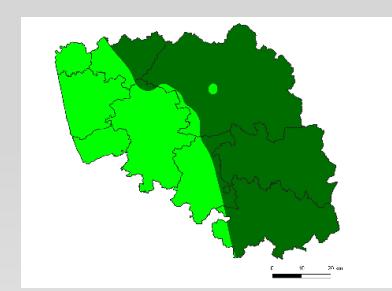
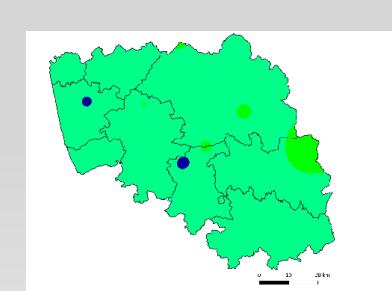
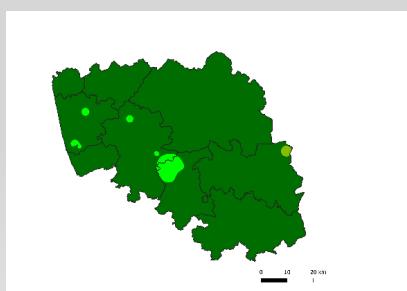
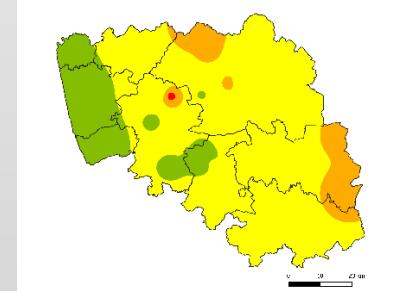
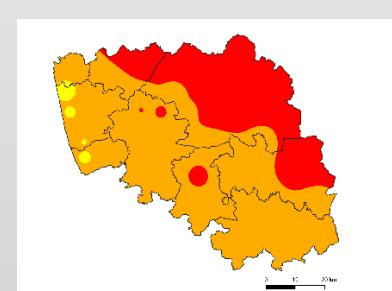
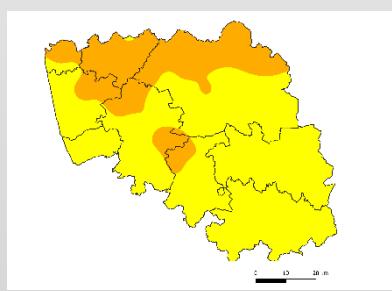
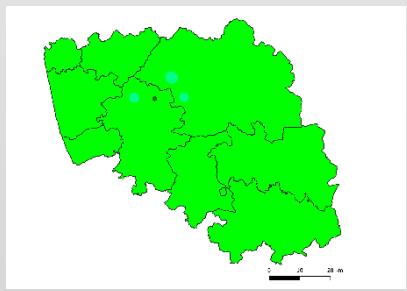
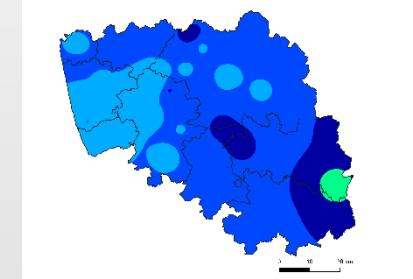
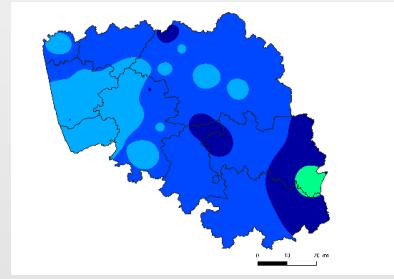
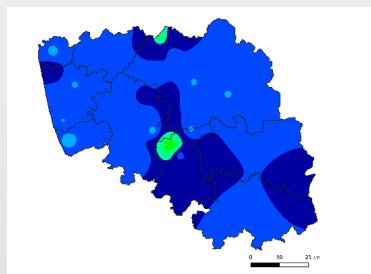
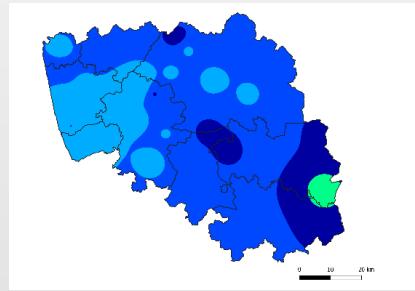
Ecosystem Understanding: Classification helps identify plant communities, their interactions, and dependencies. This knowledge is crucial for conservation efforts and understanding the balance within an ecosystem.

Biodiversity Conservation: It helps in cataloging and protecting endangered species, preserving biodiversity, and understanding the role of each species in the ecosystem.

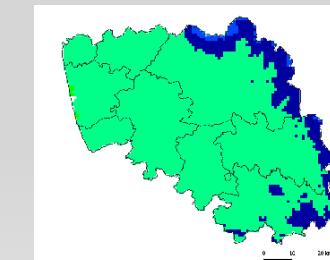
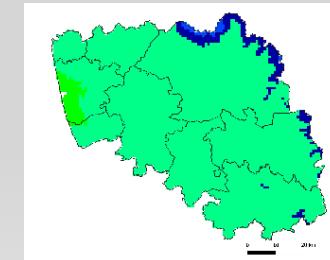
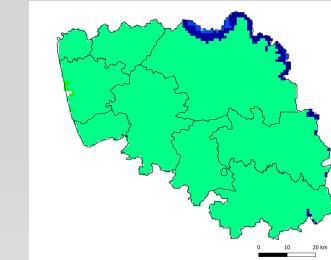
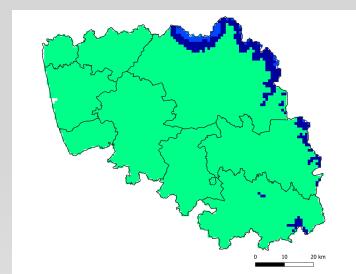
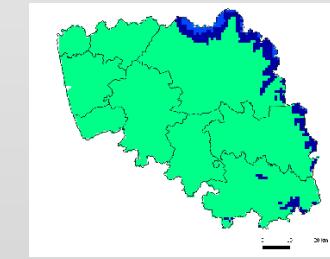
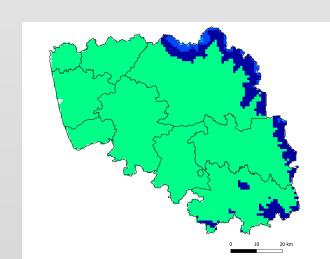
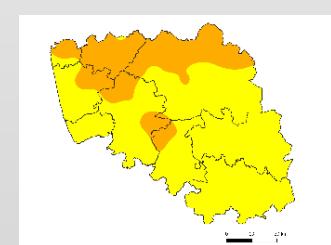
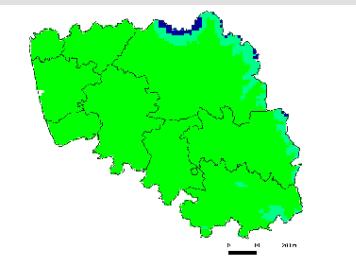
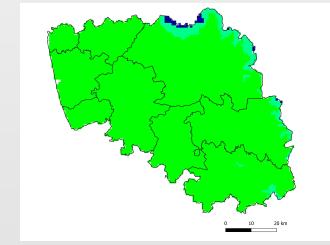
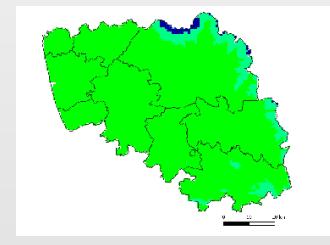
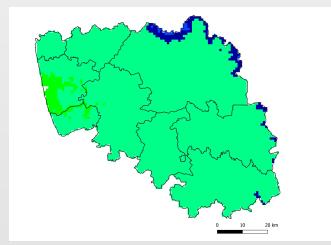
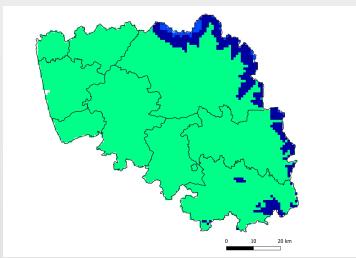
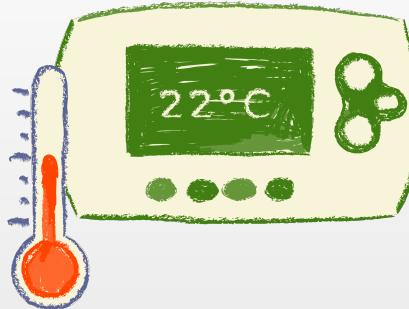
Educational and Recreational Purposes: Classifying flora allows for educational opportunities, like botanical studies or nature tours, fostering appreciation for the natural world.



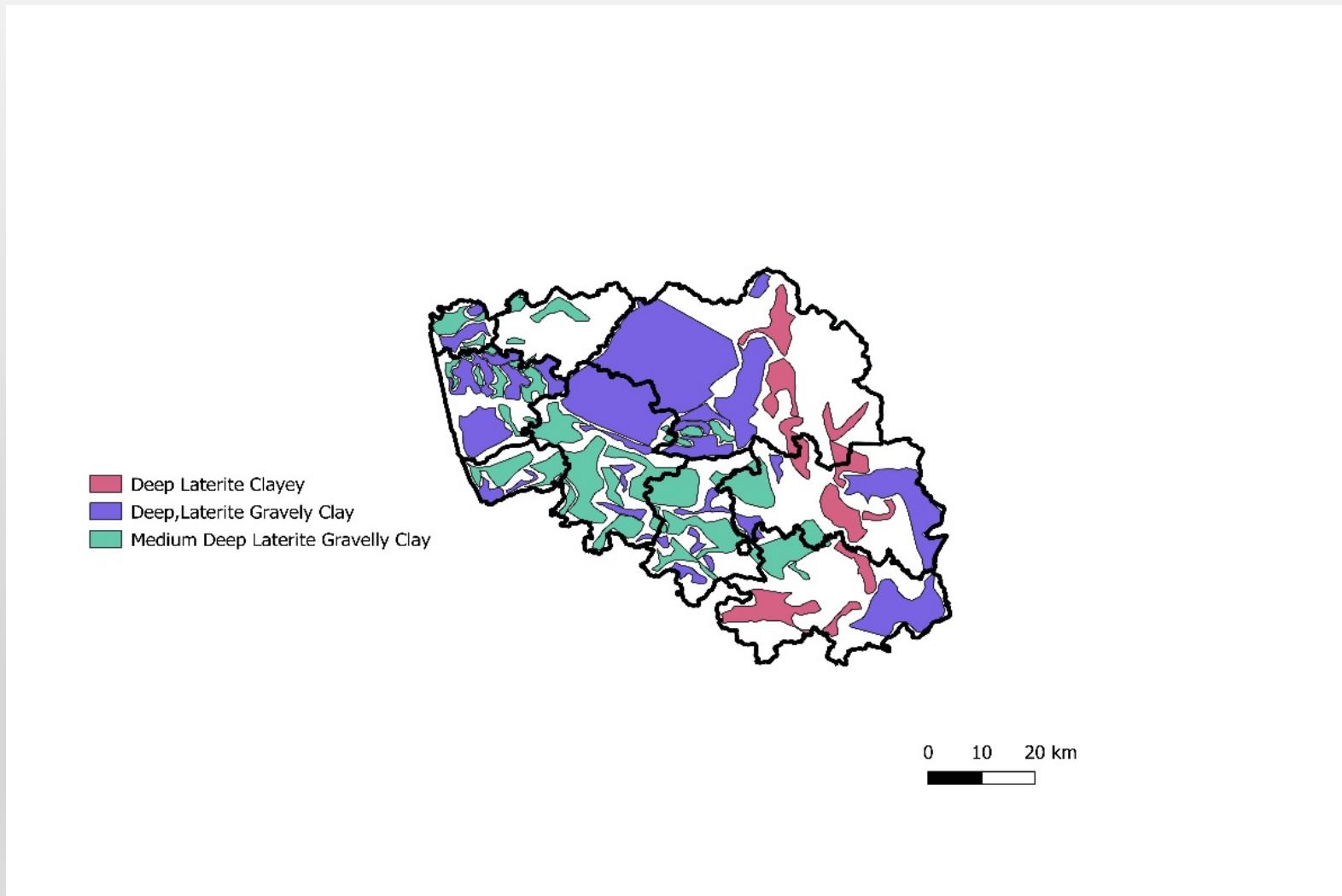
Rainfall



Temperature Distribution



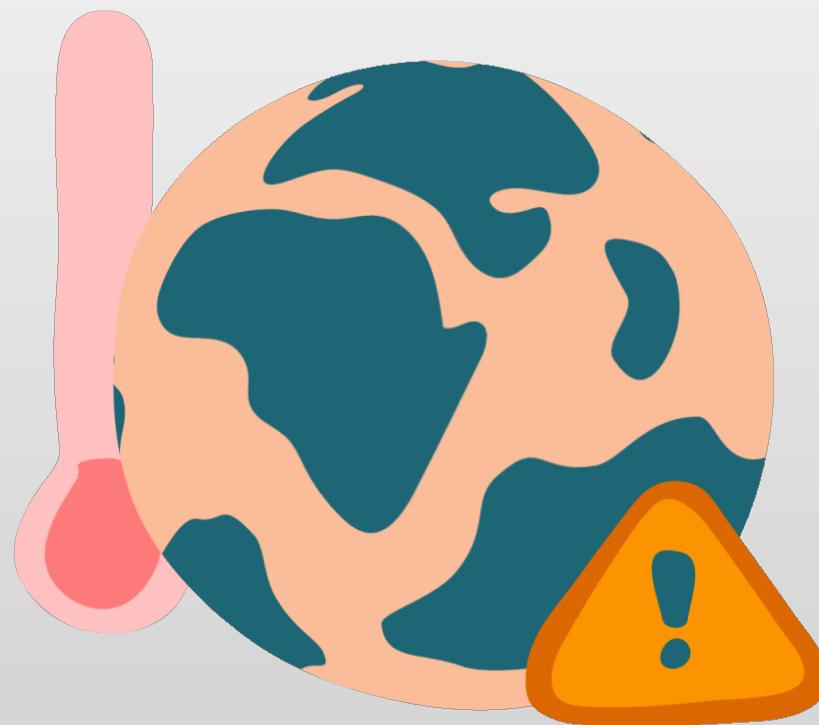
Soil Distribution



Land Surface Temperatures (LST)

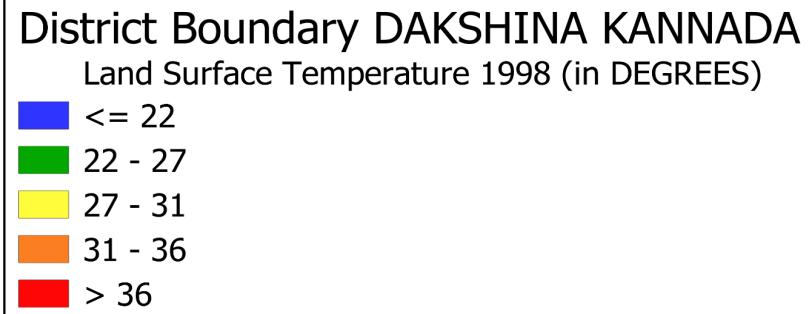
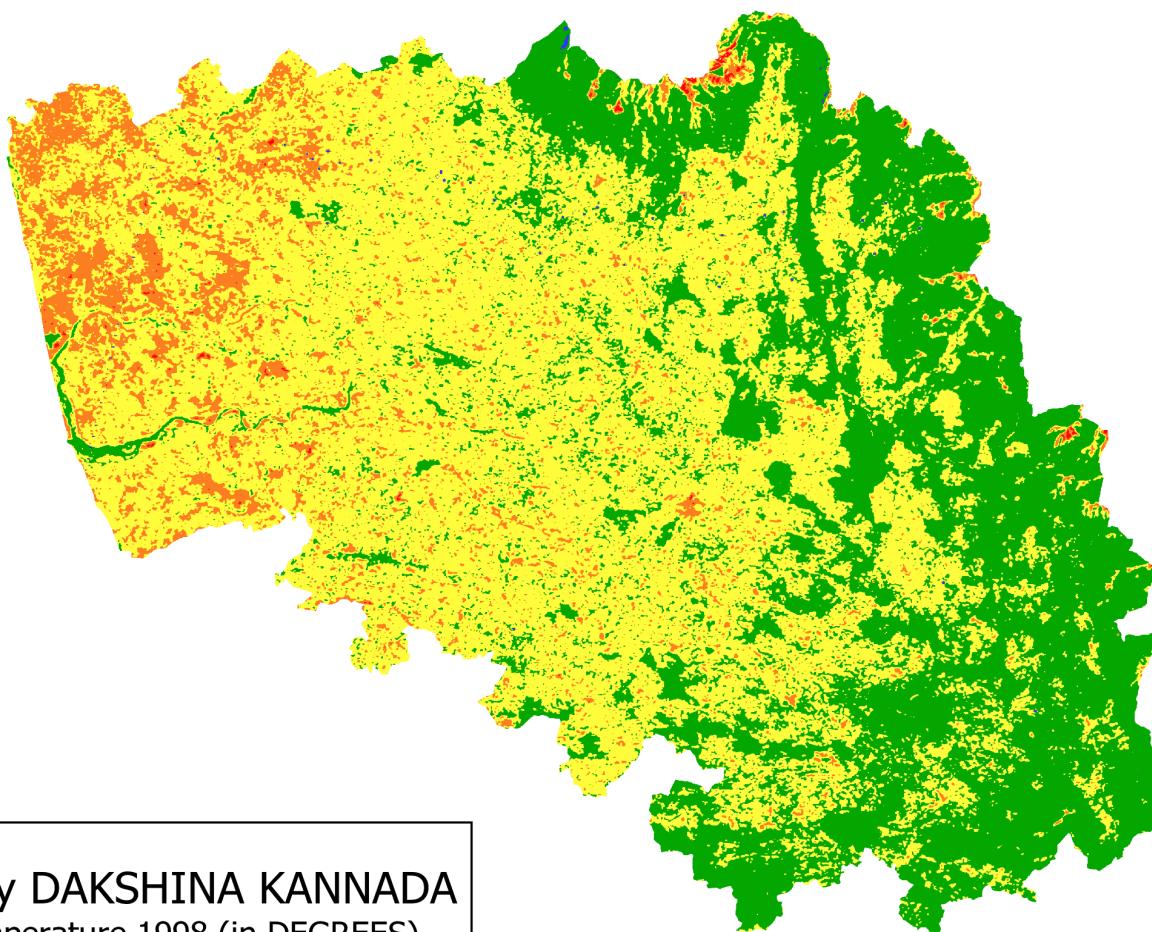
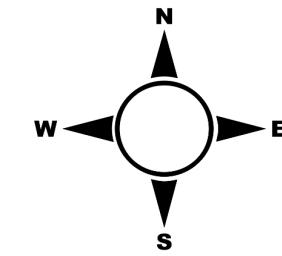
Land Surface Temperatures (LST) is a key parameter in Earth observation and climate studies that refers to the temperature of the Earth's Surface as measured from satellite or other remote sensing platforms.

- **Factors Influencing LST:**
 - Solar Radiation
 - Reflectivity
 - Vegetation
- **Applications:**
 - Urban Heat Islands (UHI)
 - Climate Change Monitoring
 - Agriculture
- **Remote Sensing Platforms:**
 - Satellites
 - Aerial Surveys

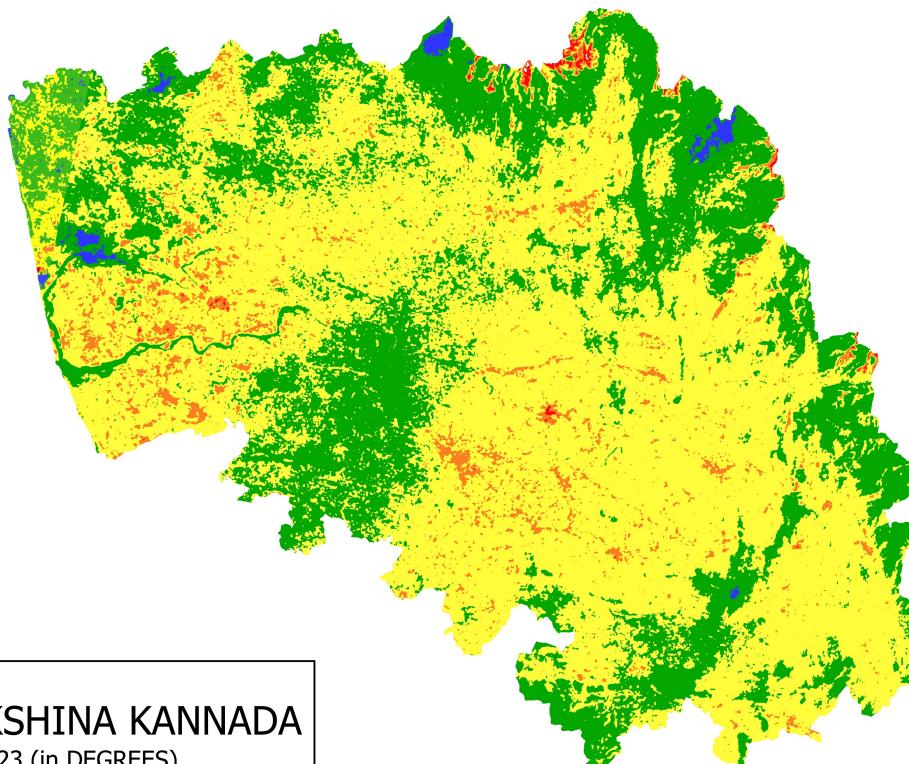


- **Challenges and Considerations:**
 - Cloud Cover
 - Temporal and Spatial Resolution
- **Impact on Ecosystem:**
 - Vegetation Dynamics
 - Wildfire Prediction
- **Human Health:**
 - Heat-Related Illnesses
 - Vector-Borne Diseases





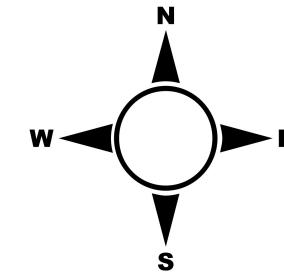
0 10 20 km



District Boundary DAKSHINA KANNADA

Land Surface Temperature 2023 (in DEGREES)

- <= 22.0000
- 22.0000 - 27.0000
- 27.0000 - 31.0000
- 31.0000 - 36.0000
- > 36.0000



0 10 20 km

Thank You