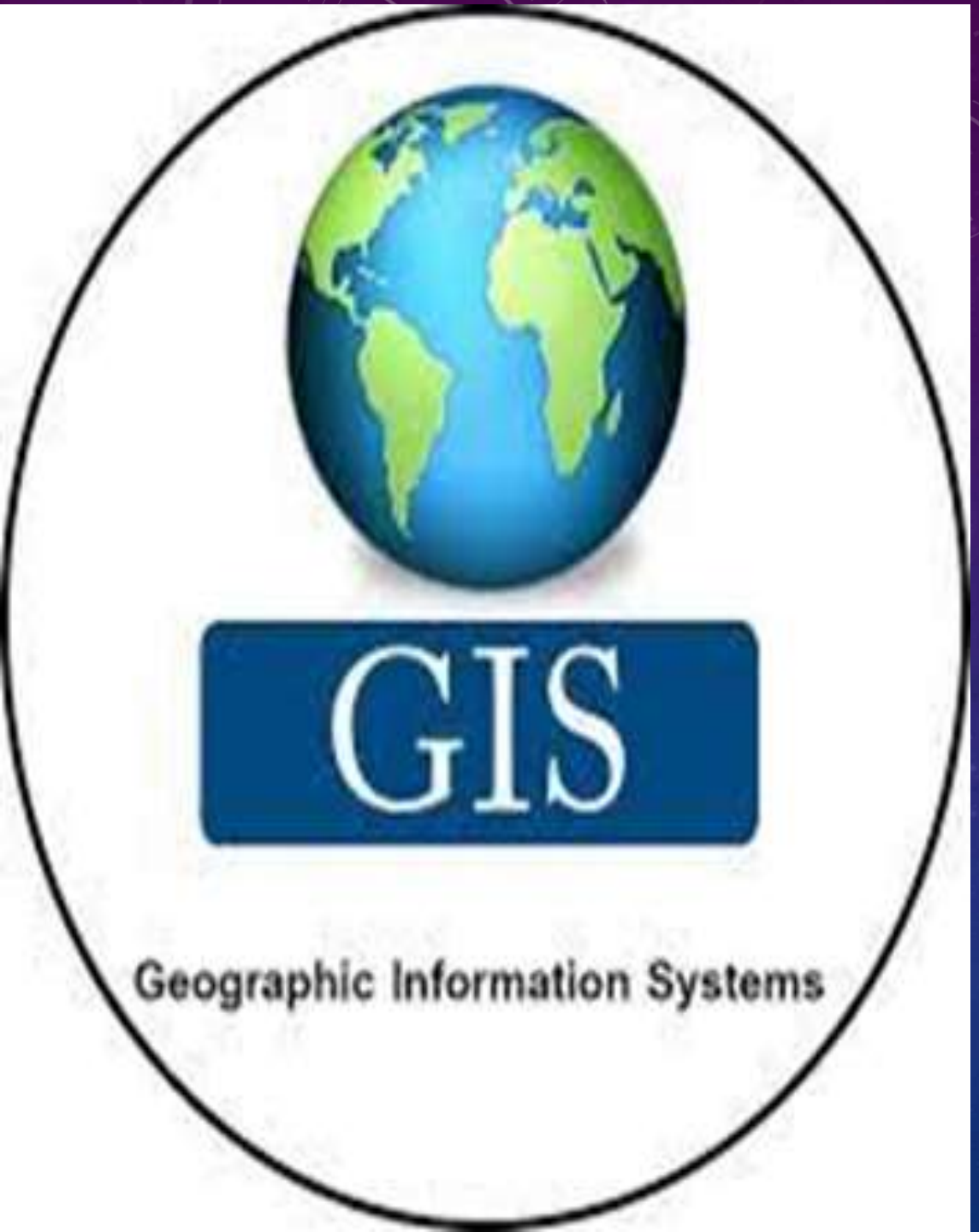


Land Use Land Cover Change Analysis in the Southern Part of Khulna Division, Bangladesh

PRESENTED BY: MST SANJIDA ALAM

DATE: 09 DECEMBER 2024

SEQUENCE OF PRESENTATION

- Introduction
- Aim and Objectives
- Methodology
- Result and discussion
- Limitation
- Recommendation and Conclusion

INTRODUCTION

- Land use and land cover (LULC) change is most critical issue, often driven by socioeconomic and natural factors (Swapan, 2020; Rahman et al, 2017).
- Khulna division of Bangladesh is characterized by diverse LULC patterns such as agricultural area, urban zone, industrial & port area, the world's largest mangrove forest Sundarbans and fresh & saline water bodies (Banglapedia, 2021).
- Understanding the LULC scenario for this area is very important for sustainable land management and ensuring economic development without disturbance of the natural environment.
- This study analyzes the LULC change (2013 to 2023) using advanced GIS tools and remote sensing data.







AIM AND OBJECTIVES

The primary aim of this study is to assess and analyze LULC changes in the southern part of Khulna division (Khulna – Satkhira District) .

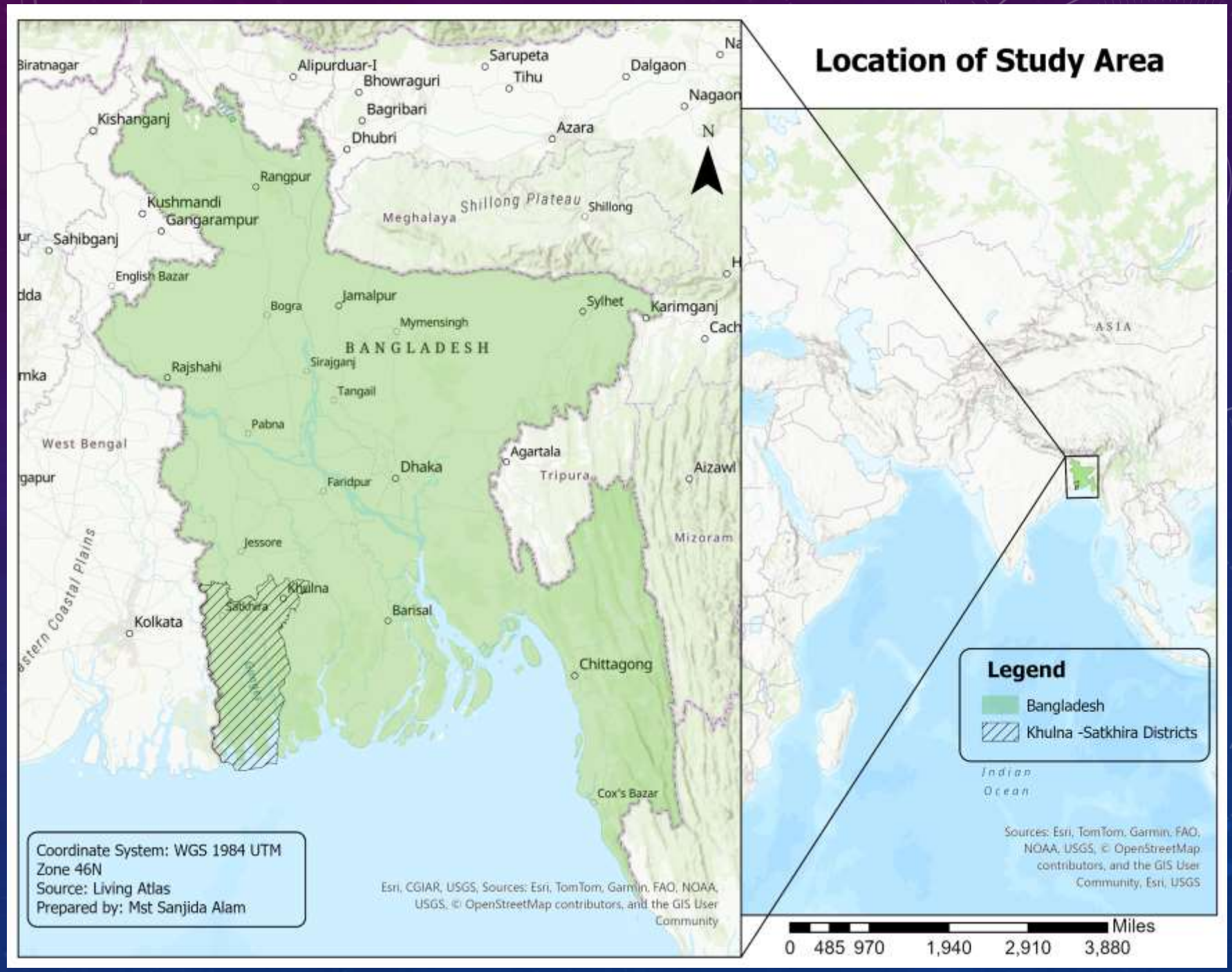
The study will be carried out with the following objectives:

- **To know the spatial and temporal changes of LULC.**
- **To identify the driving factors of land use changes.**
- **To assess the environmental and social impacts, and**
- **Provide recommendation for better land management planning.**

METHODOLOGY

GEOGRAPHICAL LOCATION OF STUDY AREA

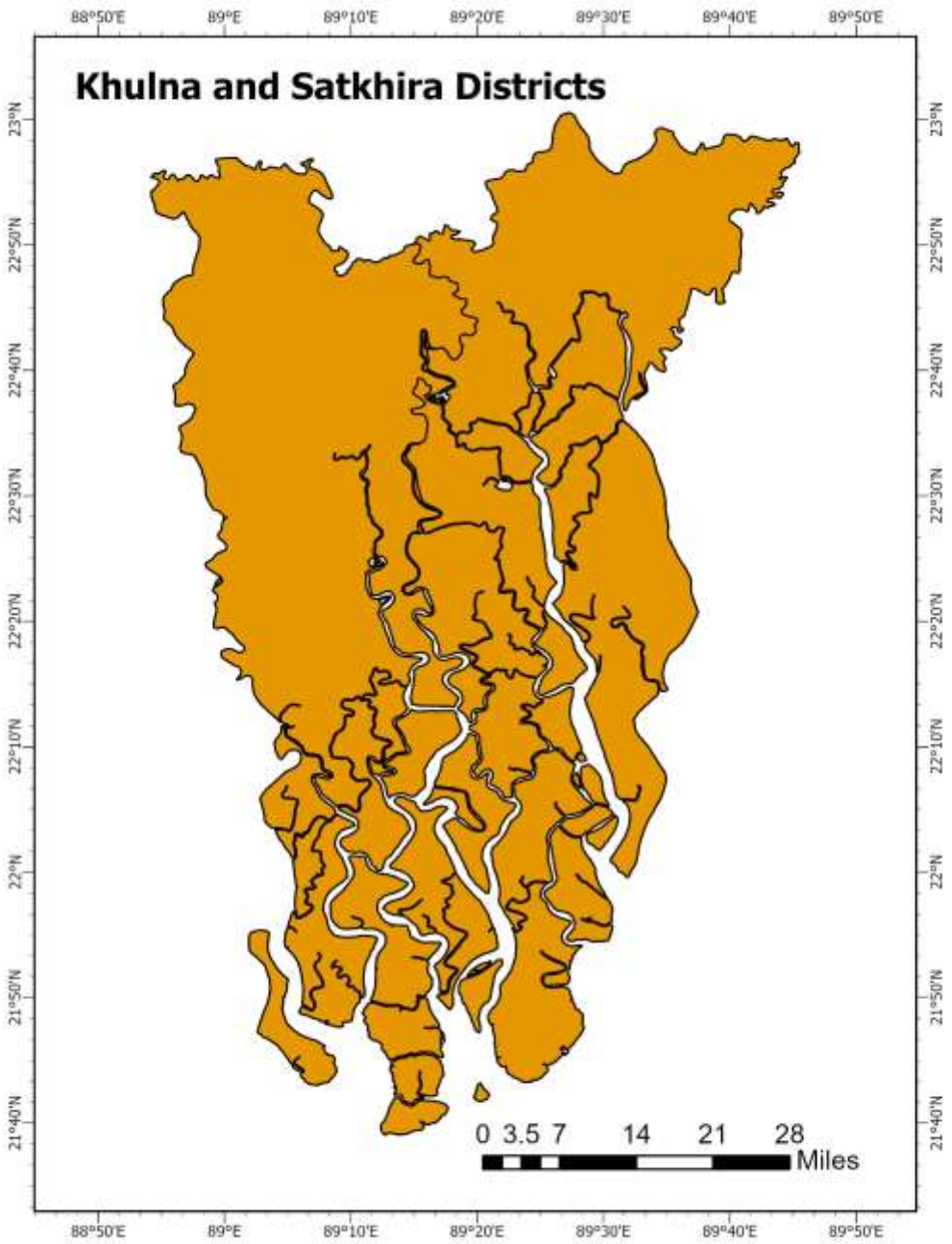
- Bangladesh is a small country in South Asia and Khulna Division is countries Eighth administrative division.
- The Khulna Division has 10 districts among them, Khulna and Satkhira districts are taken as study area (Banglapedia, 2023).

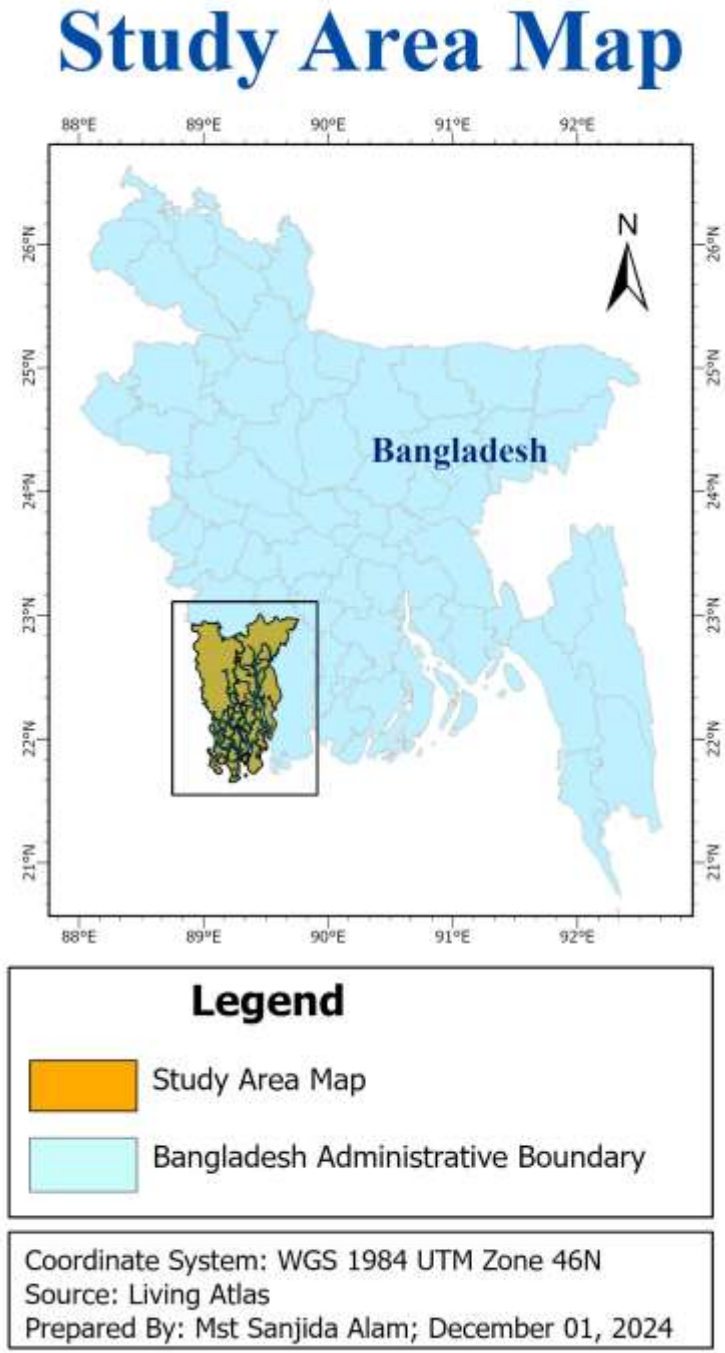


Study Area Description:

Khulna District: It is the divisional headquarters, and southern region borders the Sundarbans.

Satkhira District: It is Located southwest of Khulna district; adjacent to the Indian state of West Bengal. This area is renowned for Sundarbans and vulnerable for salinity intrusion (Abedin & Shaw, 2013 ; Banglapedia, 2023).



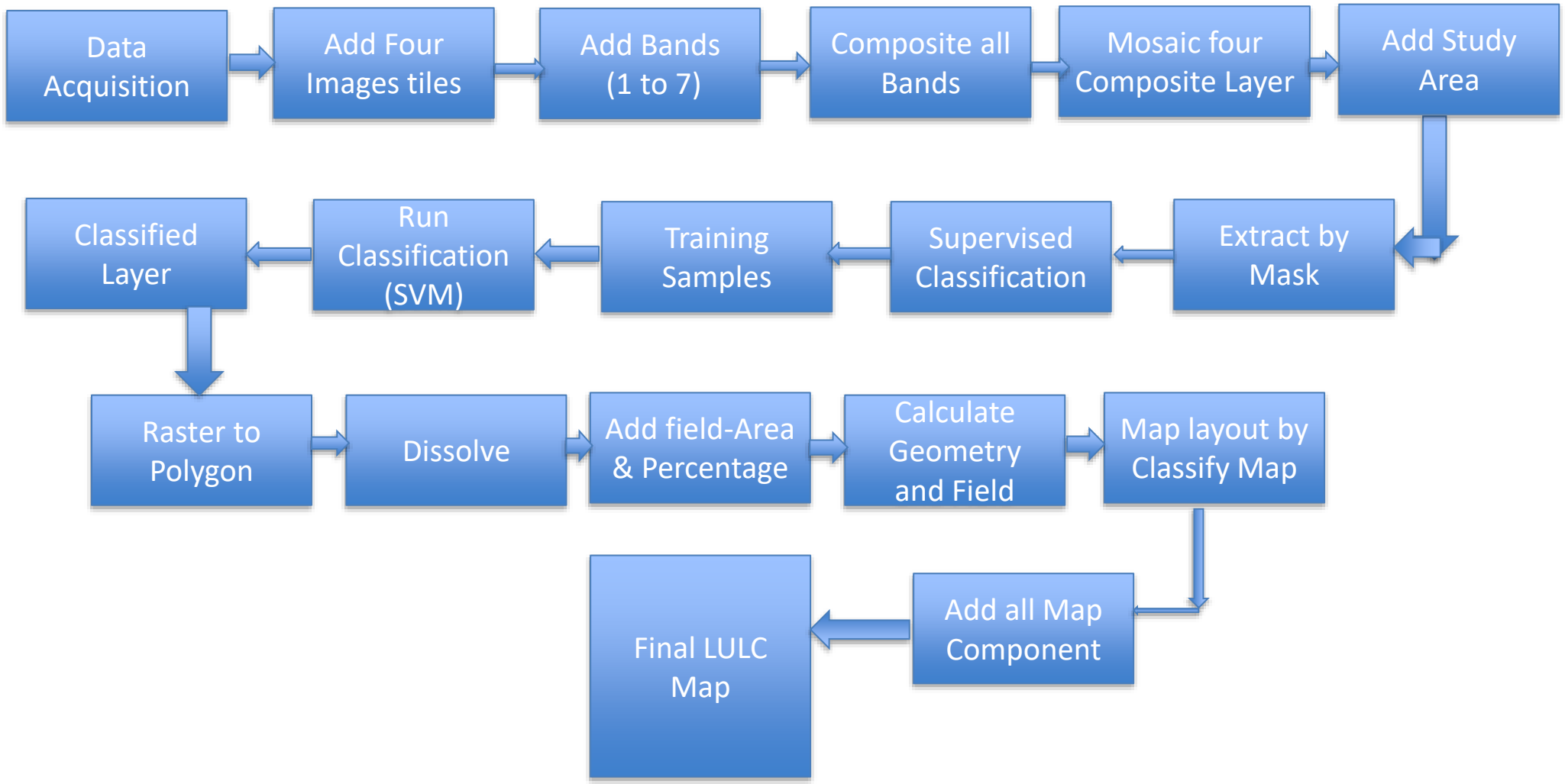


DATA COLLECTION

Characteristics of Landsat data sets

Name	Sensor ID	Date	Row and Path	Cloud Cover	Number of Image Tile	Cell-Size
LANDSAT 8	'OLI_TIRS"	03 March 2013	Raw-137, Path-45	4.14%	4	30m*30m
LANDSAT 8	'OLI_TIRS"	03 March 2023	Raw-137, Path-45	0.00%	4	30m*30m

DATA PROCESSING: LULC Mapping Workflow

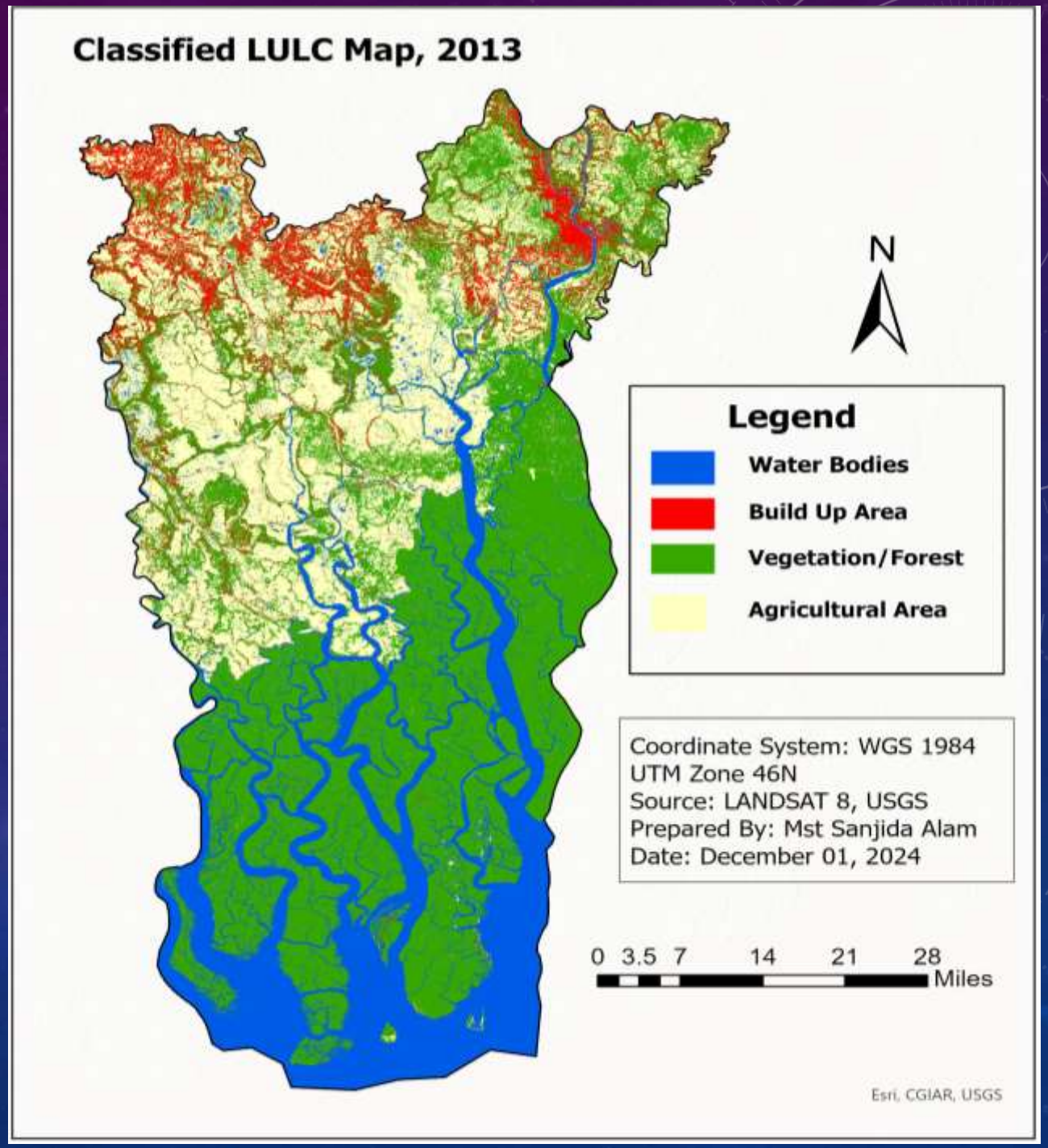


RESULTS

Spatial and temporal changes in LULC (2013-2023):

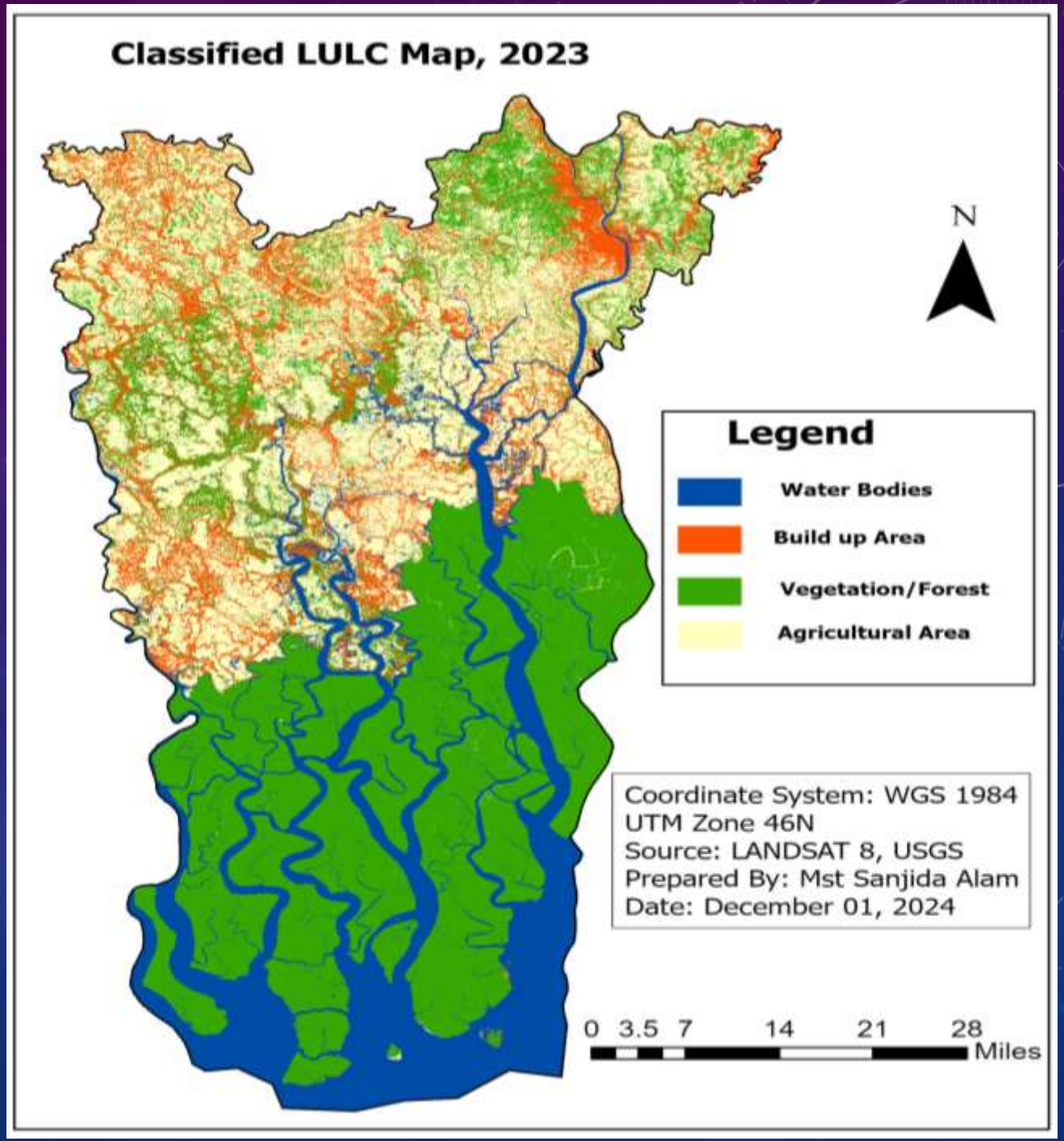
LAND USE LAND COVER SCENARIO-2013

Land Use Land Cover Pattern-2013		
Class Name	**Area (SqKm)**	**Percentage (%)**
Water	1776.71	21.479
Developed	600.82	7.26
Forest	3705.30	44.79
Planted / Cultivated	2188.73	26.46



LAND USE LAND COVER SCENARIO-2023

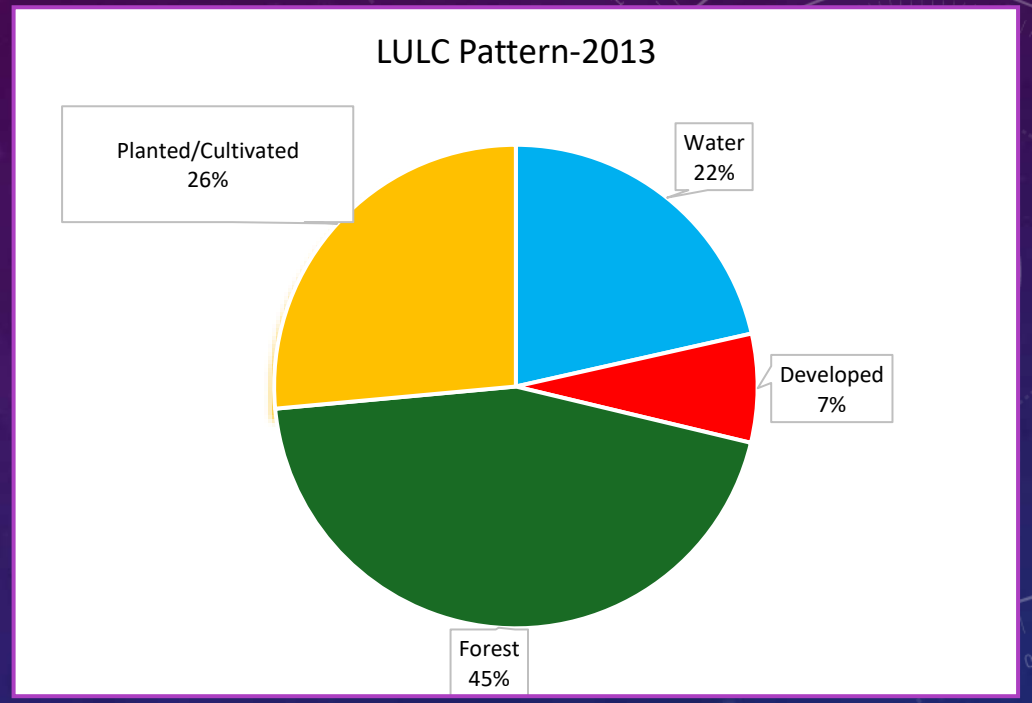
Land Use Land Cover Pattern-2023		
Class Name	**Area (SqKm)**	**Percentage (%)**
Water	1601.05	19.35
Developed	994.63	12.02
Forest	3241.20	39.18
Planted / Cultivated	2434.70	29.43

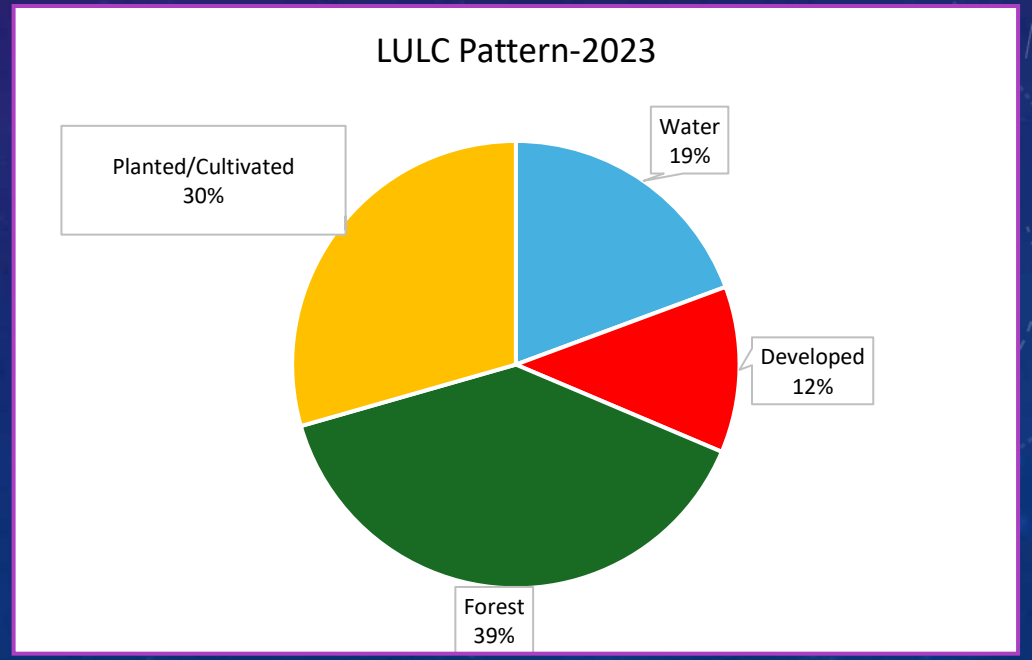


DISCUSSION

LULC Change Analysis (2013 to 2023)

- **Reduction of Water Bodies:** Water bodies reduced 3%. In 2013, it was 1776.71 Sqkm and 2023 it is reduced to 1601.05 Sqkm. Total loss 175.66 sq. km.
- **Decline in Forest Cover:** In 2013 total forest covered was 3705.30 Sqkm (46%) which declined to 3241.20 SqKm (39%) in 2023. Total forest loss 464.10 Sqkm (6%).
- **Rapid Urbanization:** Developed area increased sharply from 600.82 (7%) to 994.63 SqKm (12%). Overall, 4% (393.81 Sqkm) of build up area increased.
- **Expansion of Agricultural Land:** Cultivated Land rise 2188.73 Sqkm (26%) to 2434.70 SqKm (30%). Agricultural land increased 245.97 sq. km which is approximately 4%.





DRIVING FACTORS FOR LULC CHANGES

- **High Population growth Rate:** In 2013 the population of Khulna district was 2.4 and 2023 it was 2.7 million and in Satkhira district it was2.0 million which rose to 2.5 over the period (City population, 2024).
- **Meet up Increased Food Demand:** People are converting forest or wetland to agricultural land or shrimp farming to meet up food extra food demand and earning profit (Ferdous et al., 2023, Rahman, 2015).
- **Increasing Demand of Houses:** The built-up area has been increased by 223% during the period of 1987 to 2018 from 1343 ha to 4332 ha (Ferdous et al., 2023)
- **Poverty:** 18.6% (WB, 2024) in Bangladesh and 14.8% (BBS, 2023) in Khulna division. Extremely poor people are extracted timber, wood and honey for their livelihood which is leading to the destruction of forest (Abdullah et al, 2016).
- **Climatic Factors:** Shifts in rainfall, levels of salinity and river erosion are accelerating the change of natural landscape (Rashid et al., 2014; Abdi et al., 2024; Ferdous et al., 2023).
- Overall, urban growth, transport infrastructure development and social factors, different economic activities and environmental factors are influencing the LULC change in this area (Sultana & Miah, 2022; Abdi et al., 2024; Ferdous et al., 2023).











ENVIRONMENTAL AND SOCIAL IMPACTS OF LULC CHANGE

Environmental Impact

Impact on Ecosystem: Due to reduction of forest and water the lots of species and animals are dying like the Royal bangle tiger & local fish which are leading to biodiversity loss and ecological imbalance (Rahman, 2015).

Loss of Soil Quality: Salinity intrusion and extensive shrimp farming are increasing soil salinity which is not only decreasing soil fertility but also reducing native agricultural productivity (Miah et al, 2020; Das, 2022; Bari et al., 2024).

Environmental Pollution: Growth of urbans, industries & transports and loss of forest are rising CO2, air temperature and air pollution. Besides urban, industrial and agricultural runoff are increasing water pollution which are harmful for human, animals and water species (Hossain et al., 2006; Bari et al., 2024) .

Risk of Increasing Disaster: Urban people are experiencing frequent flooding due to river system change and poor drainage. Coastal low-lying areas are suffering by the frequent tidal flood and cyclone. The risk of disasters are increase due to loss of mangrove forest Sundarbans which is act as a buffer or protector of coastal area and coastal cities (Swapan,2020; Rahman et al., 2017; Kafy et al., 2021).

Climate Change: All these phenomenon amplified the climate change processes, and effects such as longer summer, very short winter, and low rainfall (Hossain et al., 2021; Hossain et al., 2006; Kafy et al., 2021).









Social Impacts

Income inequality: Local crops and fish production are reducing and leading to low income. But some business groups invested in the profitable export-oriented commercial shrimp production and salt production and earn huge money. That is creating income inequality, social inequality, and land disputes with the local people. (Rahman et al., 2017; Miah et al, 2020).

Increase Migration: Due unfavorable economic and environmental conditions people are migrating to urban areas which creates lots of pressure on the urban landscape and leading to accommodation crisis, unemployment, crime and low life standard of metropolitan areas (Rahman et al., 2017).

Impact on Culture and Tradition: Due to migration and searching alternative income people cannot concentrate or practice their native culture. In that way, rooted cultural heritage is shifting or declining over the period of time.
(Rahman, 2015).





LIMITATIONS OF THE STUDY

- Limited Time period
- Satellite Image
- Absent of Field Surveys
- Difficulties in data processing

RECOMMENDATIONS FOR BETTER LAND MANAGEMENT AND PLANNING

The Forest Department of Bangladesh can take long-term forest restoration and management strategies.

Bangladesh Water Development Board can implement an integrated water management plan to reduce water loss and ensure water quality.

The agriculture department also emphasizes sustainable agriculture practices and regularly monitors the activities of local farmers.

Urban planners can strengthen the existing policy so that economic development can ensure minimum disturbance to the natural environment.

The government can introduce an integrated climate change management policy with the collaboration of national and international organizations.

Overall, I recommend strengthening law and order to ensure the execution of the policies & strategies for the country's sustainable development and land management.



CONCLUSION

The outcome of the study indicates that over the last ten years LULC pattern of this area is significantly changed due to socio-economic, climatic and environmental factors. Vegetations and water bodies are remarkably reduced and converted theses areas to agricultural and build up areas or urban areas. This conversion highly affected on biodiversity, ecosystem and livelihood of local community. This trends of LULC change and its effects can be reduced through the formation of integrated LULC policy and its proper implementation.





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