Sustainable Forest Monitoring for Climate Change Mitigation and Adaptation based Satellite Land Monitoring System, A case study in Lumphat Wildlife Sanctuary, Ratanakiri and Mondulkiri PROVINCE

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Background

Lumphat Wildlife Sanctuary was selected in this study, is a coastline region in Lumphat district Ratanakiri province and Koh Nhek district Mondulkiri province, north-east Cambodia. Lumphat Wildlife Sanctuary established by Royal degree in 1993 with an area of 250,000 hectares were covered by a heavily forested area straddling.

GIS Remote Sensing based satellite land monitoring system is the powerful tools that support for land use land cover and change data analysis, It's functional to provide spatial information to detect and map the location, extent, and variability of forest cover change and quantify the climatic effects resulting from forest cover change in the study area, it's shall be support to climate change mitigation and adaptation management plan. Thereby, this study examined the perceptions to provided data of current land use land cover 2020 A supervised classification was performed with difference year satellite imageries every 2 years from 2010 2012, 2014, 2016, 2018 and 2020 with a total of 16 major land use land cover (LULC) classes were identified and mapped, and land use land cover change 2010 to 2020 of fourth major were classifies to detected a deforestation and forest degradation including Forest Loss, Forest Gain, Forest Stable and Non-Forest Stable.

Results LULC 2010-2020

2010

2012

2014

2016

2018
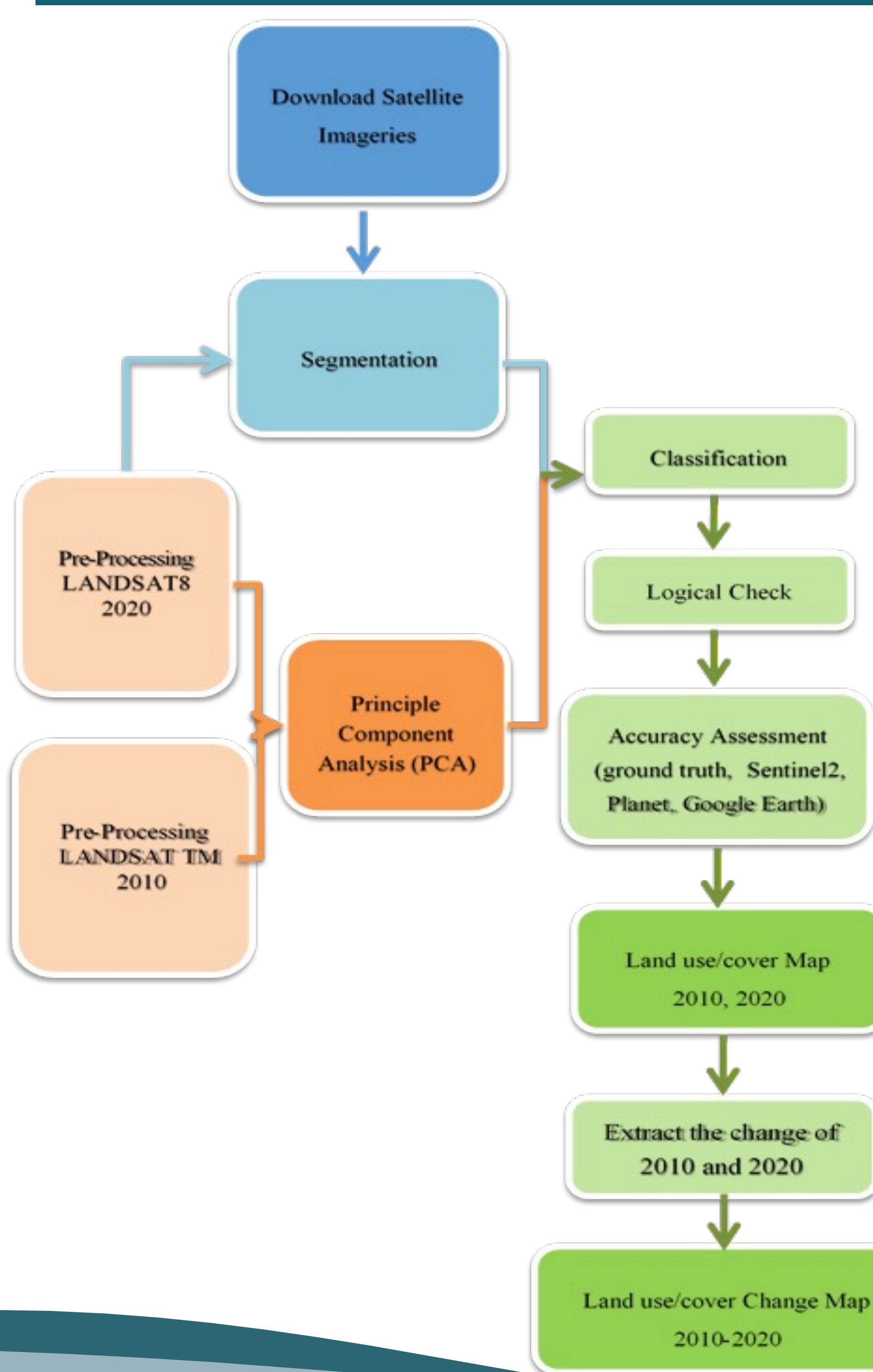
2020

Lumphat Wildlife Sanctuary F-NF 2010-2020
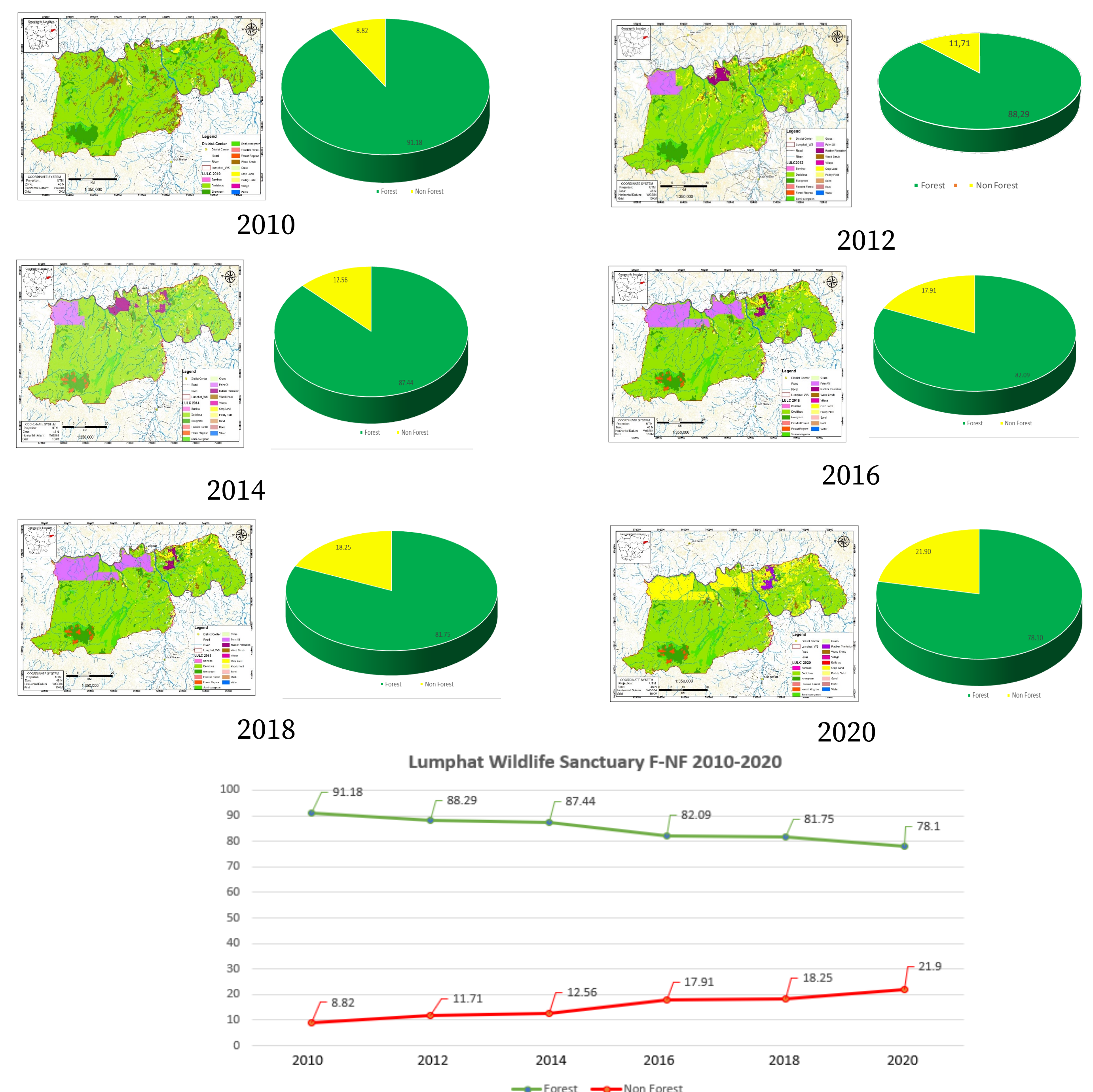
Objectives

The aims of the research are to provide specific information on land use land cover resources in Lumphat Wildlife Sanctuary. The research has three main objectives:

• To produce Land use land cover map 2020 (Activity Data) and determine trend of Land use land cover Change in 2010-2020
• To identify the driver of deforestation and forest degradation base on medium and high resolution satellite imagery
• To estimate the carbon storage based on LULC Change in PLWS from 2010-2020
• To provide recommendation for climate change mitigation and adaptation in the protected area as well as support Protected Areas Management Plan

Results LULC Change 2010-2020

LULC Change in ELCs

LULC Change in CPAs

LULC Change in Zoning

LULC Change by Forest Types

LULC Change for Lumphat wildlife sanctuary which were estimated as 91.18% in 2010, 87.44 %, in 2012 %88.29%, in 2014, 82.09 % in 2016, 81.75 % in 2018 and 78.10 % in 2020. LULC change assessment 2010 – 2020, the result show that forest cover loss 13.08% equivalence to 32699 ha in ten years period, with an average annual variation rate of 1.31% equal to 3269 hectares compared to Lumphat wildlife sanctuary's total land area, most of the deforestation and forest degradation were happened at the north, northwest, northeast part and along Srea Pok river, most of declined are deciduous forest and wood shrub cause of economic land concession that convert to agriculture land.
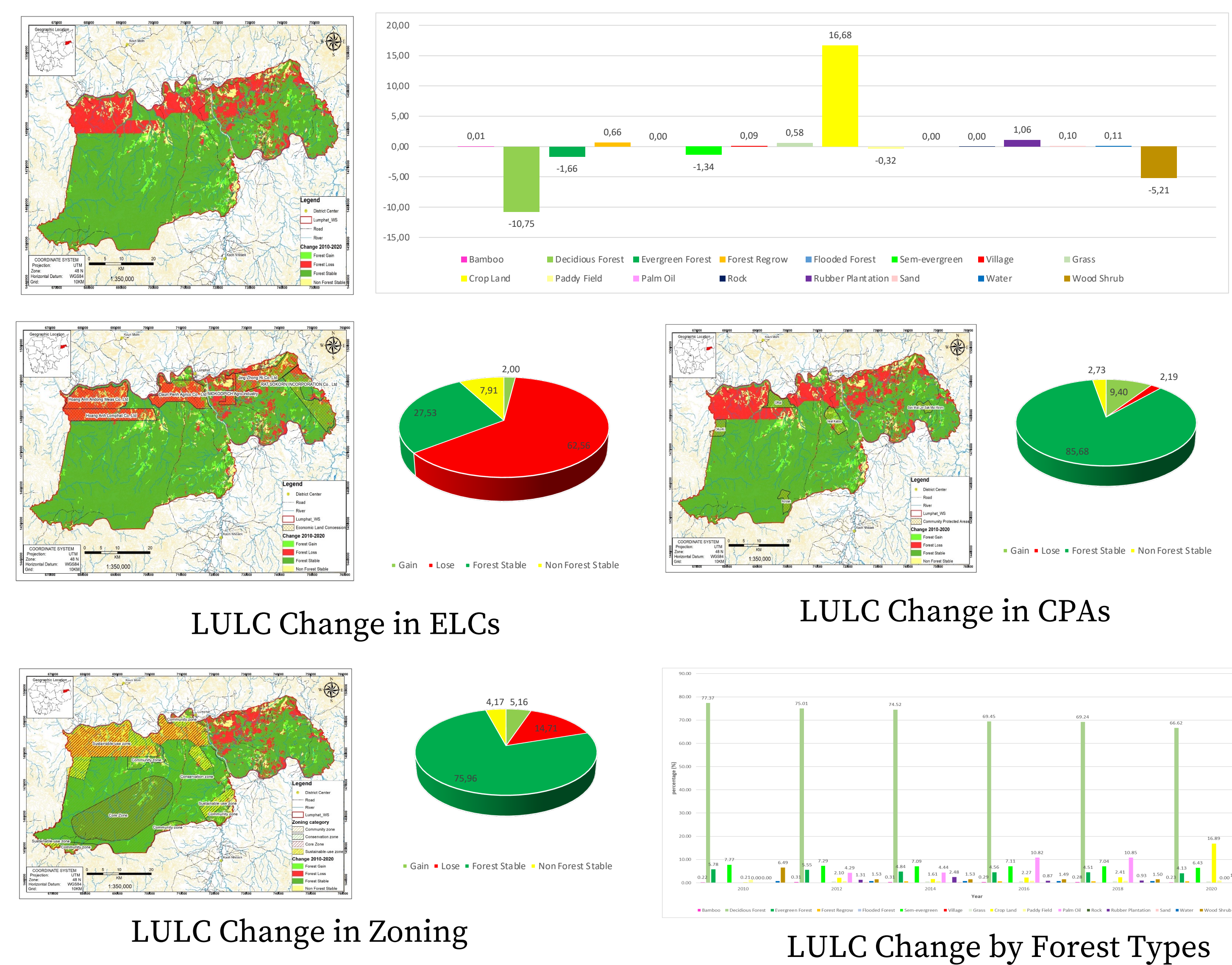
Approaches and technology used

This section describes of research methodology pre-processing, post classification change analysis, comparative analysis and accuracy assessment. These phases were investigated in manually controlled environment, typically using RS and GIS tools. The methods were used based on multispectral satellite-acquired data have demonstrated potential as a means to detect, identify, and map changes of LULC. Medium resolution satellite imagery Landsat 8, combined with aerial photographs and existing land use data can be used to reliably estimate the forest cover changed. Land use/cover assessment 2010 and 2020.
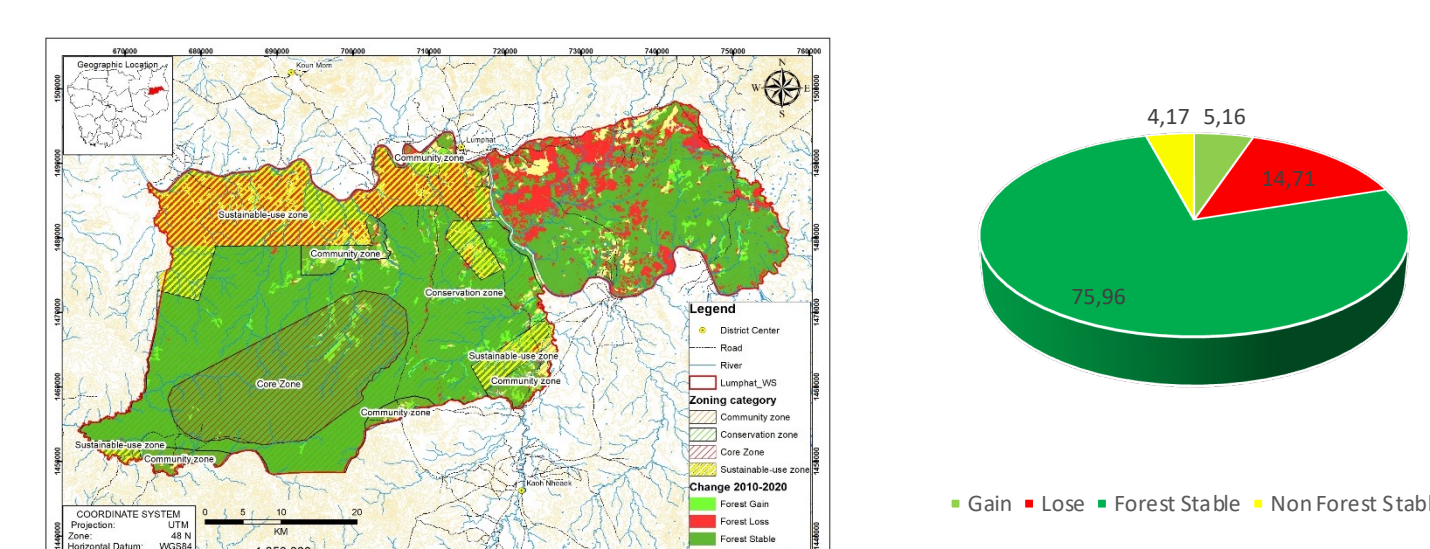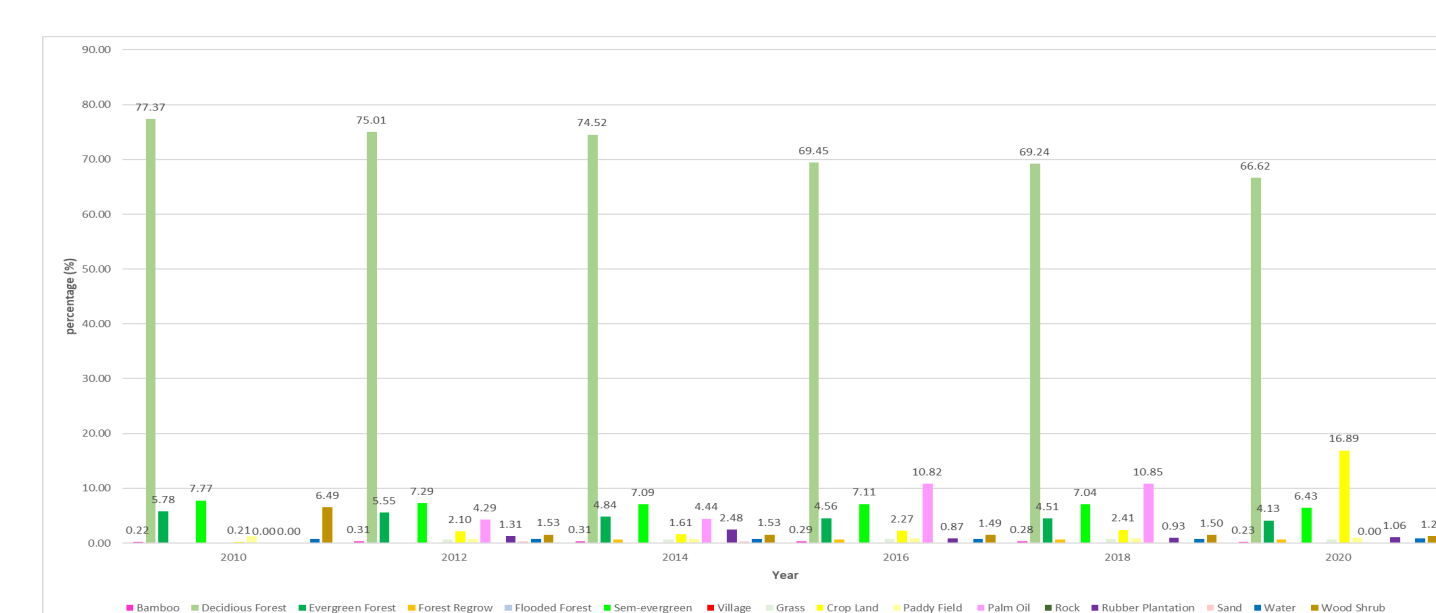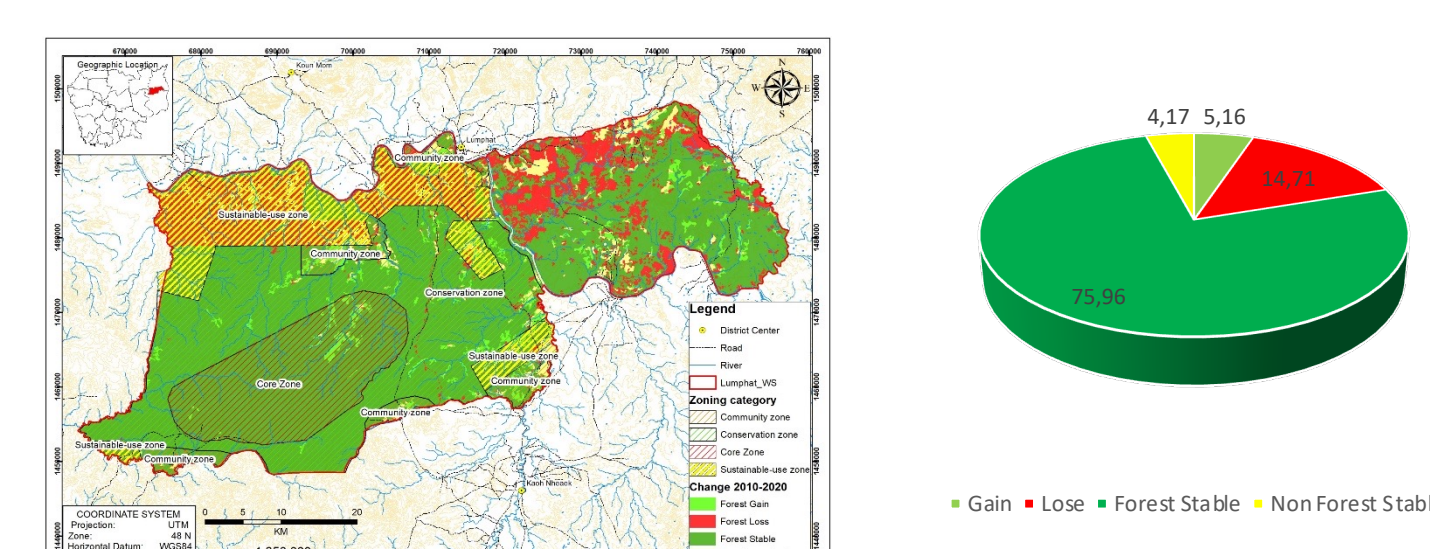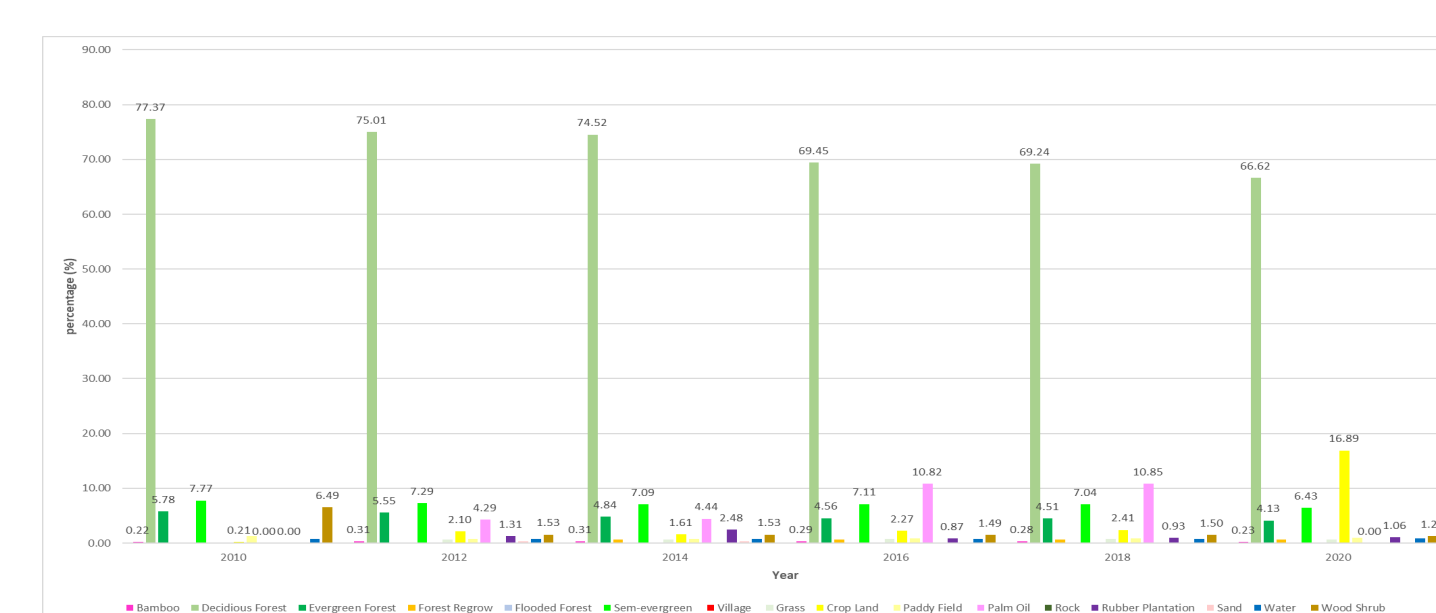
The research methodology base GIS/RS by following to the main step as below:

➢ Step 1: Download and Mosaic free cloud satellite imageries with GEE Script
➢ Step 2: Image segmentation
➢ Step 3: Image classification
➢ Step 4: Logical check
➢ Step 5: Accuracy assessment
➢ Step 6: Extract the land use land cover change

Scale up plan

There are some more recommendation for protected area management plan to reduced deforestation and for further improvement in the future for climate change mitigation and adaptation below;

1. Afforestation and landscape restoration: Establishment of mixed species plantations are more likely to support a greater level of structural, functional, and biological diversity,
2. Forest management activities reducing deforestation and degradation: Forest degradation results from human activities, Degradation can be reduced through improved forest management practices,
3. Sustainable forest and local livelihood improvement: Forests have a crucial role to play as the climate change mitigation and adaptation, The protected area management plan should be involve local people to some activities through providing opportunity to protect the natural resource,
4. Conservation of biodiversity through direct conservation of forests: Biodiversity is a key factor in maintaining ecosystem services and livelihood products provided by forests.
5. Satellite land monitoring system and land use land cover data can be use to support REDD+ activities in the study area