MONITORING WEED INFESTATION USING GEOSPATIAL TECHNIQUES

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Weed infestation by Invasive Alien Species (IAS)

- Forest plantation using exotic trees have been developed integral part of environmental programmes.
- Planted trees and woody shrubs have provided both economic benefits and harmful effects
- Invasive alien species (IAS) has been responsible for habitat distraction and biodiversity threat.
- Prosopis juliflora also known as “velikaruvelam” a native of West Africa
- Introduced in Tamil nadu in 1960’s as fuel wood.
- Seeds germinate easily
- This tree has characteristic of high drought tolerance and very high water use efficiency
- IUCN (International Union For Conservation of Nature) has rated Prosopis juliflora as one of the world’s top 100 invasive alien species.

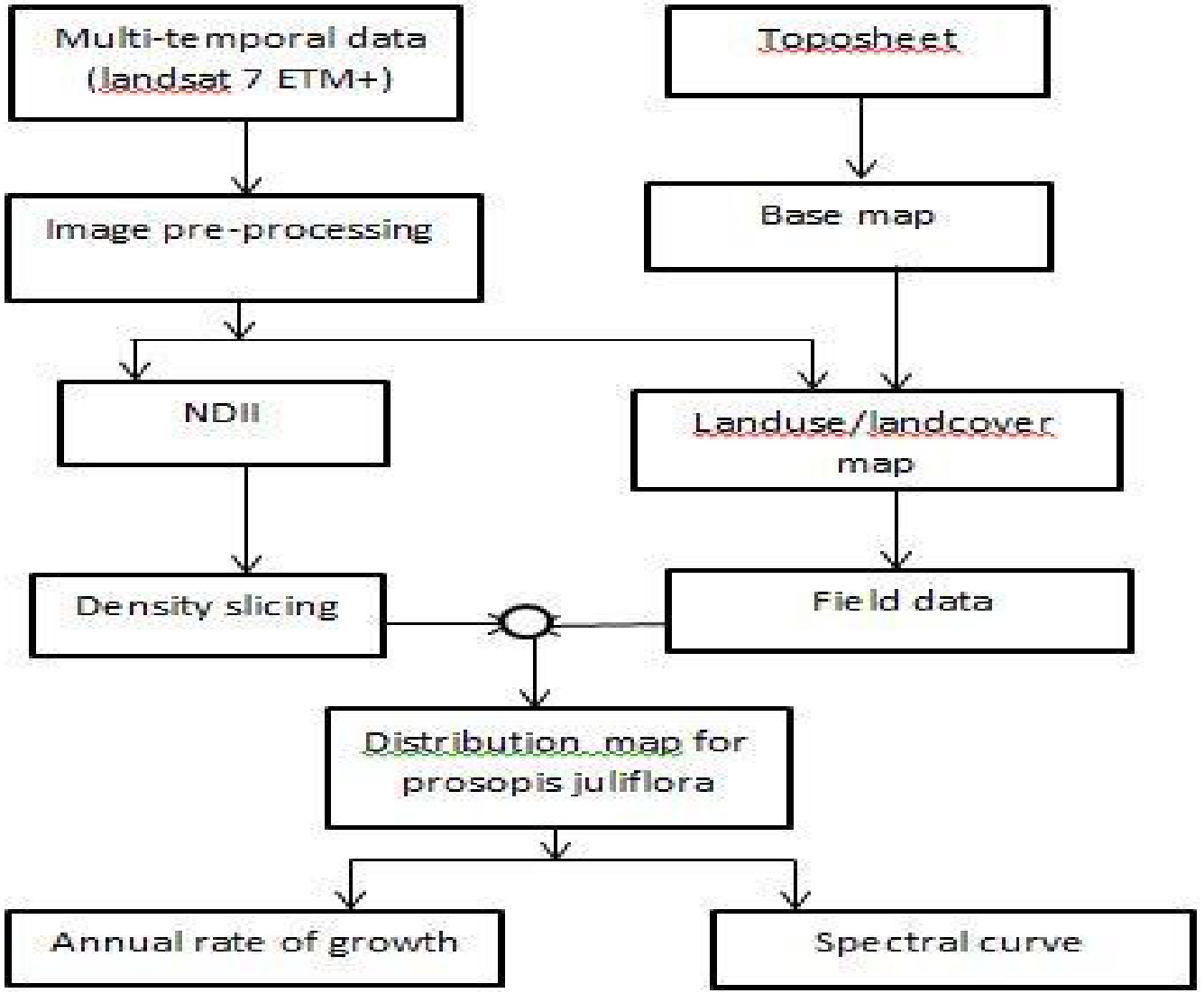
Data and Softwares

- Landsat 7 ETM+ collected for the following years 2007, 2008, 2009, 2010, 2011, 2012, data were analyzed.
- The information collected from the field was imported to GIS
- ENVI 4.8 and ARCGIS 9.3 software were used for image processing and GIS respectively.

Methodology

- The GIS coverage consists of topographic data sets that have been converted to a digital format compatible with Arc GIS
- The satellite image of the multi spectral bands is rectified for geometric and radiometric error using image processing software ENVI
- After 2003 Landsat7 ETM+ SLC-OFF, there is gap in the images
- Land sat gap fill tool used in the ENVI software to fill the gap in Land sat 7 ETM+.
- Top-of-Atmosphere reflectance was performed on multi-temporal remote sensing datasets to reduce error due to various atmospheric conditions
- The on-screen visual interpretation technique was used to map land use/land cover types on multi-temporal satellite data.
- Specific band ratios were used to identify specific reflectance properties of objects
- Prosopis juliflora remained evergreen throughout the year, while grasslands and thorn scrub vegetation types showed senescence/deciduousness
- Prosopis cover have dark red colour, brownish red colour and dark pink tone in the standard false colour composite images depending on the date of acquisition

Methodology flow chart for generation of spatial distribution map of Prosopis juliflora

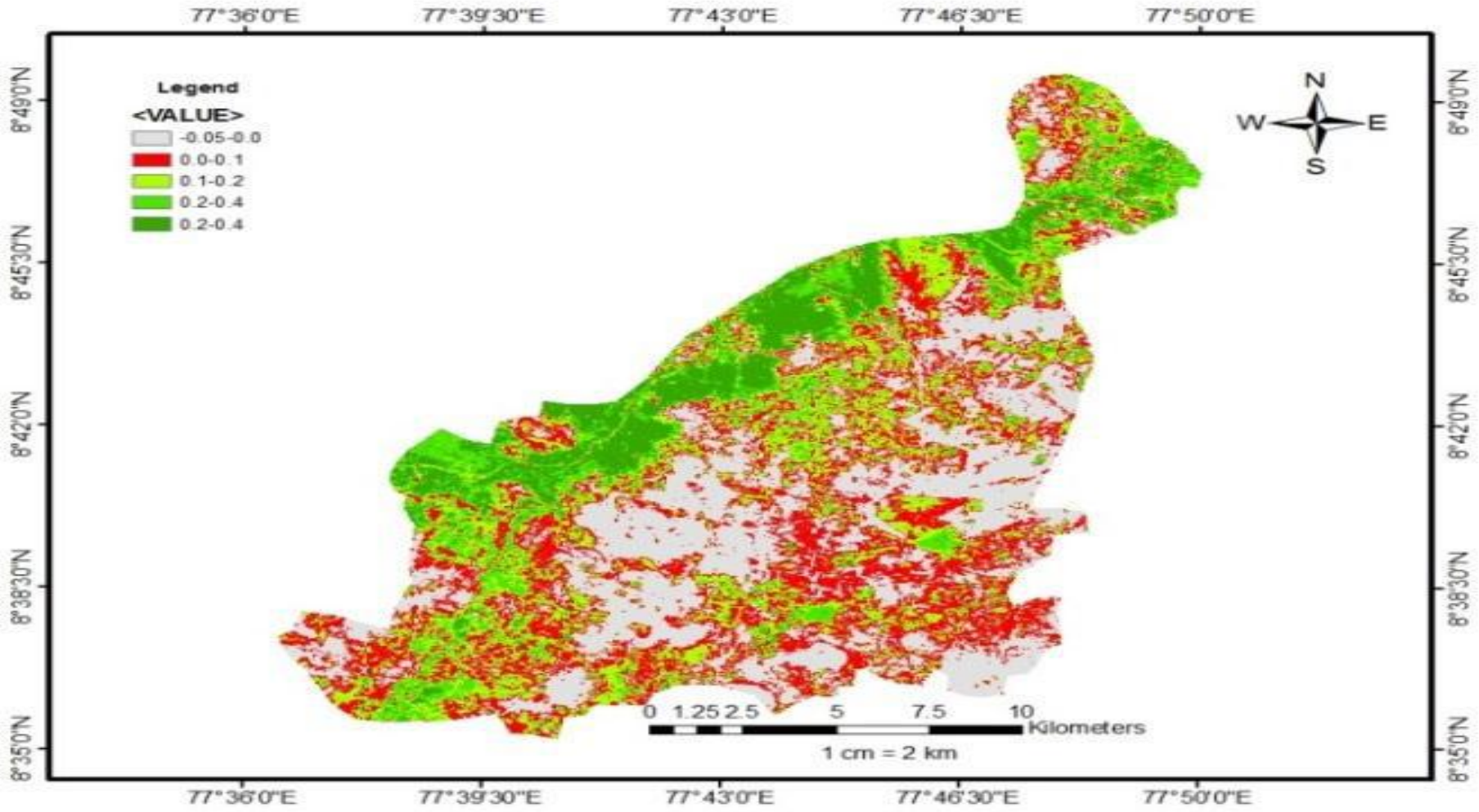


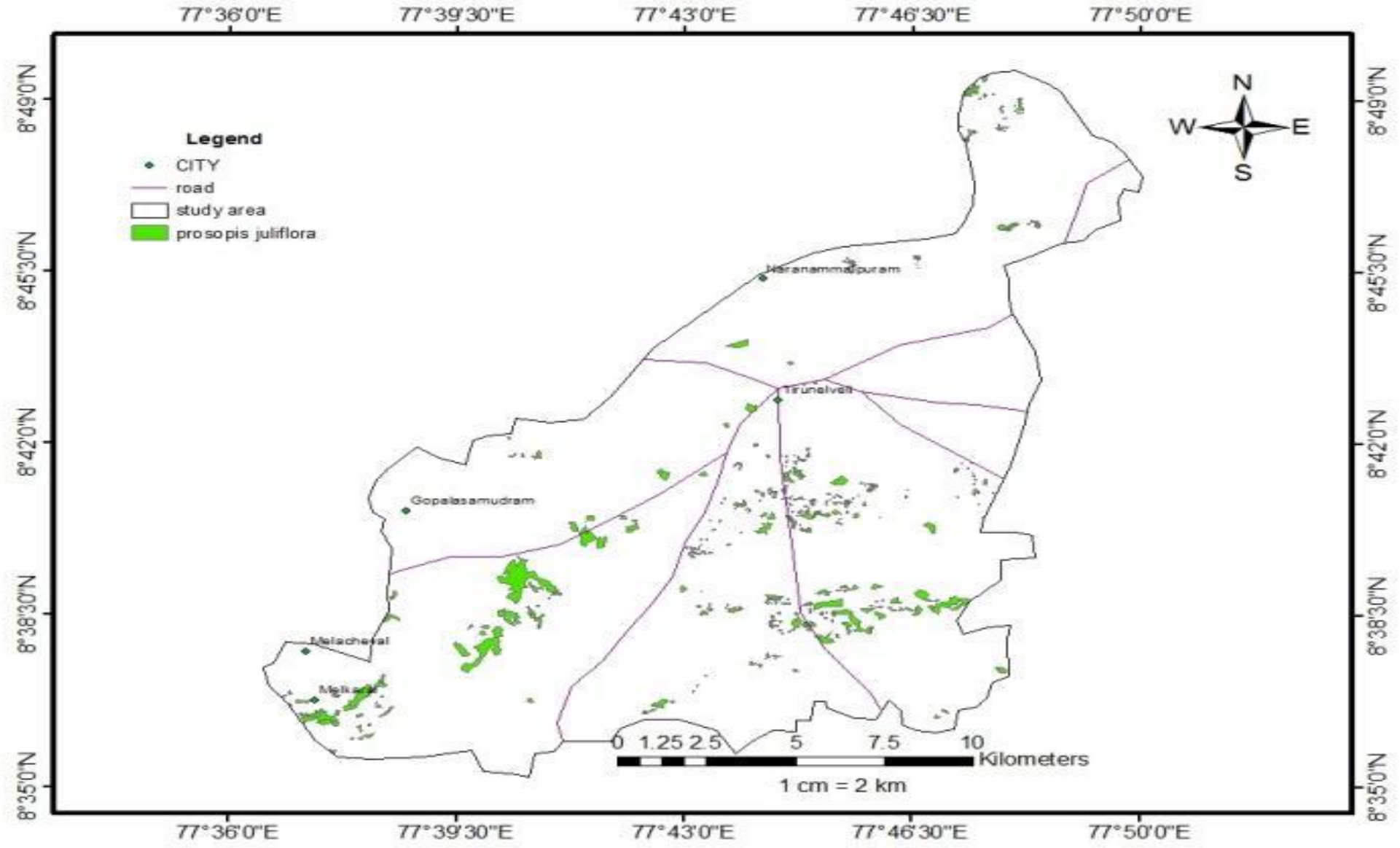
Normalized Difference Infrared Index (NDII)

- NDII = (SWIR-NIR)/ (SWIR+NIR)
- Where, NIR is reflectance of near Infrared and SWIR is reflectance of short wave infrared.
- NDII closely related to foliar water content
- The foliar water content is often divided by the density of liquid water to derive the equivalent water thickness (EWT).
- EWT of the canopy is equal to the leaf EWT multiplied by the leaf area index (LAI)

- Brightness is one of the factors influencing reflectance quality of vegetation
- Density slicing is a digital data interpretation method used in analysis of remotely sensed imagery to enhance the information gathered from an individual brightness band.
- Density slicing is done by dividing the range of brightnesses in a single band into intervals, then assigning each interval to a colour.
- Helps to obtain greater degree of variability of brightness within the remotely sensed image compared to the original image
- Results
- Vegetation index NDII maps were prepared for 2007 to 2012 years and areas with NDII greater than 0.1 was found to be mostly Prosopis area.
- Spatial distribution maps of Prosopis was also prepared

NDII map for the year 2007





spatial extent of prosopis juliflora in 2008

Salvinia aquatic weed in backwater of Kerala

Kudzu weed infecting forest trees smothering the growth


Thank You