Mangrove woodlands are salt tolerant woodland eco system of intertidal zones along coastlines. These distinct coastal woodlands are among the most vulnerable habitats in the planet. Mangroves are declining due to climate change, industrial advancement; shrimp cultivation etc these destructions are caused only in south east Asia and Latin America. Mangrove Deforestation has numerous natural, social and economic consequences one of which is the loss of bio diversity. So there should be some urgent action to protect the mangrove timberlands. Remote sensing has the power to give spatially referenced data on the status of mangrove woodlands. This information can be obtained for broad regions simultaneously which is virtually impossible using traditional field survey methods. In addition, remote sensing empowers users to investigate areas which might be not accessible on the ground because a succession of images can be obtained at regular intervals remote sensing enables the possibility of monitoring ecosystem changes. By Utilizing this technology we can show the transformation of Mangrove woodland cover in a region and integrating distinctive thematic maps indicates us environmental conditions of particular area, and plantation site suitable of various species for plantation. The study concentrates on mangroves along the coast of Kakinada, India. The purpose of this research is to find changes in mangrove cover from past 20 years and also to find suitable locations where new mangrove sites can be developed. And this study also focuses on what human activity is responsible for the mangrove loss. And what environment and ecological damage is occurring due to mangrove loss. What are the disasters occurring due to mangrove loss. And by doing mangrove afforestation will it help livelihood for local people. The field work is crucial in acquiring the information and also for verification of work done on remote sensed data and this can be achieved by talking to people and experts for mangrove status and also by using G.P.S and by boat survey.

Keywords: Mangrove deforestation, Mangrove forests, Coringa mangroves.
woodlands are salt tolerant forest eco system of
intertidal areas along coastlines (Hamilton and
Snedekar, 1984; referred to Aschbacher et al.,
1994). Mangroves are coastal vegetation that have
unique characteristics which permit survive on
both marine and terrestrial environment. They
have biological adaption system to adjust to day
by day changes of nature, for example, temperature, saltiness and inundation period. In
a few nations mangroves are utilized as wild life
sancturies, securing coastline and river banks
against tidal bores and cyclones.

**PROBLEM STATEMENT**

Coringa mangrove woodlands are under threat
and are declining day by day. The changing
aspirations, changing lifestyles, contamination of
ocean water, unpredictable and low rainfall;
chopping woodlands, limited access to clean
water/sanitation and the inappropriate and
degraded fishing practices has created problems
at the coastal regions in general In addition to this
The East Godavari estuarine area is facing the
difficulties of erosion of coastline from the
Godavari river mouth, shifts in sand spits bringing
out the loss of mangrove vegetation and low
discharge of river water to the Kakinada bay. The
mangrove woodlands of the area is highly
vulnerable to the climate change. Increasing
saltiness and precipitation pattern also affects the
species distribution, change in biodiversity and
species migration

Referring to the current situation, the integrated
technical research of remote sensing and GIS
Plays a very crucial part in detecting present
situation. Integrating and compilation of all data
related to Land use activities and forest cover
variations provide detailed guide line for managing
natural resources urgently.

**METHODODOLOGY**

The general flowchart below describe some main
tasks for making land use maps of 1996, 2001,
2006, 2010, 2015 and mangrove forest cover
change detection and site suitable zoning for
Mangrove afforestation in Kakinada.

**RESULTS AND DISCUSSION**

**LU/LC Analysis**

The images utilized for this study were extracted
from a Landsat 5 Thematic Mapper (TM) and
Landsat 8 (OLI) scenes are taken. Ground
resolution of these images is 30 meters. Landsat
TM records data in seven different bandwidths.
These bandwidths are broken down into portions
of the visible, infrared, and thermal infrared
regions of the electromagnetic spectrum. From
these various bandwidths a great deal of
information about the land cover can be displayed
and analyzed.

**Land Cover Categories**

For the purposes of this study the terms LU and
LC have been joined as one of the entity for the
depiction of the landscape within the study area.
It will be noted that while land use and land cover
are considered as isolated entities they have been
combined in this study in order to conform with
the level of detail. Also, finer levels of inquiry would
most likely need to separate measures of land
use and land cover and/or to use more detailed
levels of the classification scheme.

**Supervised Classification**

The LULC maps of the whole five years present
mangrove woodlands occupied area near
coastline. Shrimp farm were found surrounding
the mangrove territory. The outputs from
maximum likelihood were utilized to establish
preliminary land use mapping of each five
images. The maps were verified and recoded form ground data and produced the LULC map. Urban area was found decreasing from 1996-2001 because of the terrific cyclone occurred in the 2000 lot of built up area got damaged in kakinada but its area was constant in 2001, 200, 2015. In 2010 its area is slightly decreased which might be caused from misclassification between stable mud flats and urban area. Some of the water bodies also misclassified with aqua culture due to the similar spectral characteristics.

Table 1: LU LC Classification Categories

<table>
<thead>
<tr>
<th>LULC Classification Categories</th>
<th>Level-1</th>
</tr>
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<tbody>
<tr>
<td>1</td>
<td>Mangroves</td>
</tr>
<tr>
<td>2</td>
<td>Aqua culture or salt pans</td>
</tr>
<tr>
<td>3</td>
<td>Agriculture</td>
</tr>
<tr>
<td>4</td>
<td>Builtup area</td>
</tr>
<tr>
<td>5</td>
<td>Stable mud flats</td>
</tr>
<tr>
<td>6</td>
<td>Sand</td>
</tr>
<tr>
<td>7</td>
<td>Water body</td>
</tr>
</tbody>
</table>

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From the results we can clearly observe that the mangrove area was decreased from 1996 to 2001 due to increase of aquaculture and salt pans and from 2001 to 2005 we can see increase of mangrove forests because in 2004 afforestation is done by M.S Swaminathan foundation. So we can see the tremendous increase in mangrove forests and from 2005 to 2010 again there is a decrease in mangroves due to the increase in aquaculture and salt pans and from 2010 to 2015 again there is a gradual decrease of mangroves.

These are LULC 1996, LULC 2001, LULC 2010, LULC 2015:
Figure 4: Pie Chart of LULC (1996)

Figure 5: Landuse Map Derived from Landsat-5 (2001)

Figure 6: Pie Chart of LULC (2001)
Figure 7: Landuse Map Derived from Landsat-5 (2006)

Figure 8: Pie Chart of LULC (2006)

Figure 9: Land Use Map Derived from Landsat-5 (2010)
Suitability Analysis

To predict the suitable sites for plantation suitability of mangroves these factors were considered they are LULC (2015), Soil pH, Soil salinity, Soil texture, Distance from sea were considered. These factors are converted in to raster format using interpolation techniques. Using these factors with the help of AHP technique suitable sites are generated based on the experts advice.

- LULC 2015
- Soil texture
- Soil salinity
- Distance from sea
- Soil pH
- Final land suitability map

From the result we can see that the place near to the sea are highly suitable and the mangroves

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Mangroves</td>
<td>-10.72%</td>
<td>14.93%</td>
<td>-2.08%</td>
<td>-10.45%</td>
</tr>
<tr>
<td>Aqua culture or salt pans</td>
<td>-5.49%</td>
<td>1.53%</td>
<td>9.54%</td>
<td>14.22%</td>
</tr>
<tr>
<td>Agriculture</td>
<td>9.35%</td>
<td>-2.20%</td>
<td>-0.70%</td>
<td>-9.20%</td>
</tr>
<tr>
<td>Builtup</td>
<td>-3.28%</td>
<td>0.28%</td>
<td>-0.91%</td>
<td>1.03%</td>
</tr>
<tr>
<td>Stable mud flats</td>
<td>18.45%</td>
<td>-16.59%</td>
<td>-1.56%</td>
<td>-1.19%</td>
</tr>
<tr>
<td>Sand</td>
<td>-0.93%</td>
<td>2.37%</td>
<td>-2.93%</td>
<td>-1.49%</td>
</tr>
<tr>
<td>Water body</td>
<td>-7.92%</td>
<td>0.38%</td>
<td>-1.31%</td>
<td>12.45%</td>
</tr>
</tbody>
</table>

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Figure 14: Reclassification of Soil Texture

Soil texture map of coringa region

- Sandy clay (Highly suitable)
- Loam (Moderately suitable)
- Typic ustipsammens (Low suitable)

Figure 15: Reclassification of Soil Salinity

Soil salinity map of coringa region

- 0.56 - 0.66 (Highly suitable)
- 1.16 - 1.19 (Moderately suitable)
- 1.11 - 1.63 (Low suitable)
Figure 16: Reclassification of Distance from Sea

Figure 17: Reclassification of Distance from Sea

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are moderately suitable in the places where there are fish farms and stable mudflats and not suitable in the places where there are built up lands and agriculture. From the outcome it is clear that the spots where mangroves are highly suitable is the spots where mangroves are already existing.

REFERENCES


