

Identification of Potential Habitat and the Threat for Wetland Birds in Vedanthangal

Ms.R.Iswariyalakshmi

Assistant Professor

Department of Civil Engineering

J.J.College of Engineering and Technology Anna University, Trichy-620009

Abstract— The Remote Sensing and GIS plays a vital role to investigate wildlife and its habitat. Wetland is the most prominent place for bird habitats and for their breeding, nesting, and rearing young. Also it's a source for drinking water, feeding, resting, shelter, and social interactions. Vedanthangal wetland acts as a feeding site for many migratory and resident bird species. The rapid encroachment and changes in the wetland surroundings, pose a great threat to the birds that come to the wetland for feeding. It is essential to analyze the level of potentiality to the birds, to find the threats and to study the influences of bird occurrence. Therefore, this study involves to prepare a map showing the potential feeding sites for the wetland birds and also to provide detailed spatial information showing the levels of threat. In the total study area of 158.44 sq.km, it is found that 27.67% of area is potential as feeding site for birds and 10.48% of the area is under threat. Thereby, action plan maps are prepared which could aid in the conservation of wetland for the sustainable feeding site for the birds. This study enhances the innovative ideas to apply for large area extent and for the sustainability of birds.

Key words: Birds Habitat, Vedanthangal, Threats, Remote Sensing and GIS

I. INTRODUCTION

A. General:

Wetland are define as permanent or temporary area of marsh fence, peat land or water ,whether natural or artificial with water that is static or flowing, fresh ,brackish or salt , including area of marine water where the depth does not exceed six meter and low tide. Many water birds migrate between different areas to exploit seasonally available food supplies. During their migration, these water birds cross political boundaries that have no inherent meaning for the birds, but have dramatic influence on their annual survival chances, because of differences between countries in conservation and hunting policies.

The most critical threat facing threatened birds is the destruction and fragmentation of habitat. The loss of forest, plains and other natural system into agriculture, mine, and urban development, the draining of swamps and other wetland, and logging reduce potential habitat for many species. In additional the remaining patches of habitat are often too small or fragment by the Fragment Island to become vulnerable to localized extinction.

The value of the world's wetland is increasingly receiving due attention as they contribute to healthy environment in many ways. They retain water during dry period, thus keeping the water table high and relatively stable. During period of flooding, they mitigate flood and trap suspended solids and attached nutrient. Thus, streams flowing in to the lakes by way of wetlands area will transport fewer suspended solid and nutrient to the lakes

than if they flow directly into the lakes. The removal of such wetland system because of urbanization or other factor typically causes lake water quality to worsen.

B. Wetlands are features

Wetlands are features in any landscape. They are primary habitat for hundreds of species of waterfowl as well as many other birds, fish, mammals and insects. Wetland naturally filter and recharge the water that later comes out of our faucets downstream. They act like giant sponges, slowing the flow of surface water buffer water bodies from potentially damaging land use activities such as agriculture. And wetland can remove and store greenhouse gases for the Earth's atmosphere, slowing the onset of Globalwaring.

Wetlands prevent flooding by holding water much like a sponge. By doing so, wetland help keep river level normal and filter and purify the surface water. Wetland accepts water during storms and whenever water levels are high. When water levels are low, wetlands slowly release water wetland also release vegetation matter into river which helps feed fish in the river. Wetland helps to counter balance the human effect on river by rejuvenating them for migration or reproduction.

One of the best known functions of wetland is to provide a habitat for birds. Humans have known of the link between birds and wetland for thousands of year. Prehistoric people drew picture of birds and wetland on cave walls, scratched them onto rocks and used them, in the design of artifacts and Native American lore provides account of birds and hunt in wetlands. Wetlands are important bird's habitats, and birds use them for breeding, nesting and rearing young. Birds also use wetlands as a source of drinking water and for feeding, resting, sheltering and social interaction .some waterfowl, such as grebes, have adapted to wetlands to such an extent that their survival as individual species depends on the availability of certain types of wetlands within their geographic range. Other species, such as the northern pintail or the American widgeon, use wetland only during some part of their lives

C. Need for the study

- Climate change affects birds population, In such case, temperature is one of the important criteria.
- Precipitation and moisture are critically important climate variables to birds for example inland water birds such as ducks are highly dependent on precipitation to sustain their wetland habitat.
- Wetlands are important bird habitats, and birds use them for breeding, nesting, and rearing young
- Some waterfowl, such as grebes, have adapted to wetlands to such an extent that their survival as individual species depends on the availability of certain types of wetlands within their geographic range.

D. Objectives of the study

- To map the major threats for the bird sanctuary (Vedanthangal), leading to havoc for bird sustainability.
- To identify potential sites in Vedanthangal for habitat of birds.
- To study the geophysical changes in wetland areas for potential habitat of birds.
- To identify the climate change on bird occurrence

II. STUDY AREA

Vedanthangal is the oldest water bird sanctuary in the country. Vedanthangal in Tamil language means 'hamlet of the hunter'. This area was a favorite hunting spot of the local landlords in the early 1700s. The region attracted a variety of birds because it was dotted with small lakes that acted as feeding grounds for the birds. Realizing its ornithological importance, the British government undertook steps to develop Vedanthangal into a bird sanctuary as early as 1798. This was established in 1858 by the order of the Collector of Chingleput. The best time to visit this sanctuary is from November to March.

It supplies water to 250 acres of agricultural land around the area. The west and south sides of the lake are bordered by a long bund, whereas the northern and eastern sides extend to the agricultural lands. More than 40,000 birds (including 26 rare species), from various parts of the world visit the sanctuary during the migratory season every year. Vedanthangal is home to migratory birds such as pintail, garganey, grey wagtail, blue-winged teal, common sandpiper.

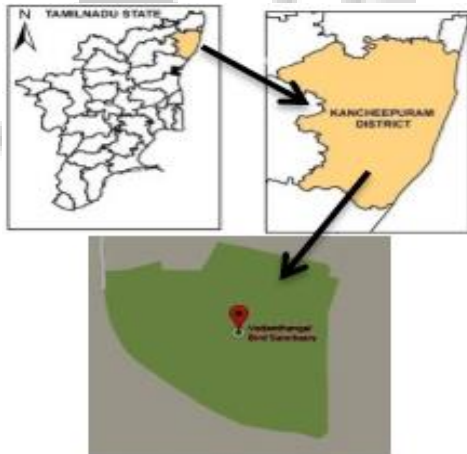


Fig. 1: Study Area

As shown in figure 1 study area is Vedanthangal Bird Sanctuary This Bird Sanctuary is a 30-hectare (74-acre) protected area located in the Kancheepuram District of the state of Tamil Nadu, India. The latitude and longitude of the study area is ranging from 12° 32'44"N 79° 51 '21"E

III. BASE LAYER PREPARATION:

The base layers are prepared for the study area such as soil type, slope, and drainage and road network. Soil type information were collected from Institute of Remote Sensing (IRS) Anna University Chennai. Counter map derived from Survey of India (SOI) Top sheet No 66D01, to generate the Slope layer with the help of Digital Elevation Model (DEM). To analyses water quality for this study area we

have collected corresponding data from Tamil Nadu Public Work department (TNPWD) Chennai, similarly the drainage and road network is extracted from Survey of India (SOI) Top sheet No 66D01.

IV. METHODOLOGY

The adopted methodology is shown below (Fig 2)

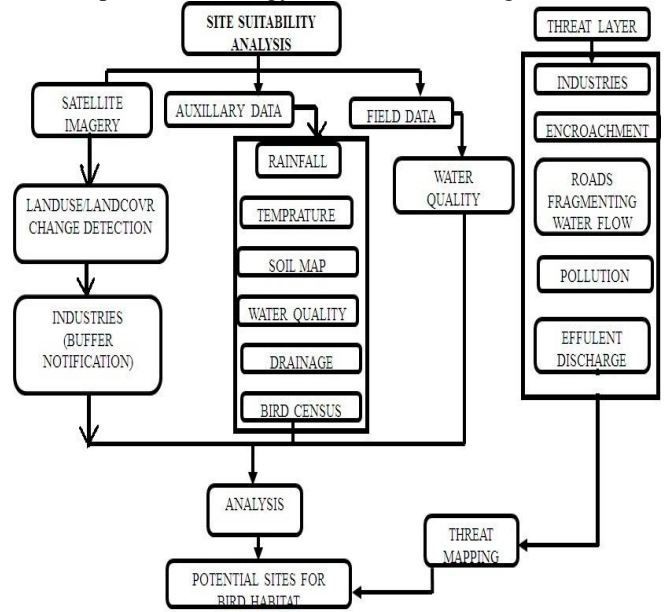


Fig. 2: Methodology-Flow chart

V. RESULTS AND DISCUSSION

A. Land Use/Land Cover Map Preparation:

The Level 1 Land use Land cover Map (LULC) of the study area, was prepared from IRS LISS III and Cartosat merged datasets with a spatial resolution of 2.5m using ARCGIS 9.2 software. The Land use Land cover (LULC) provides a very valuable method for determining the extents of various land uses and cover types, such as urban, wetland, scrubland, agriculture, etc. the level 2 LULC Map of wetland having area 7.505sq.km was also prepared. The accuracy assessment was done to check the accuracy of the prepared LULC Maps. Ground truth verification was done by random sampling method using handled GPS.

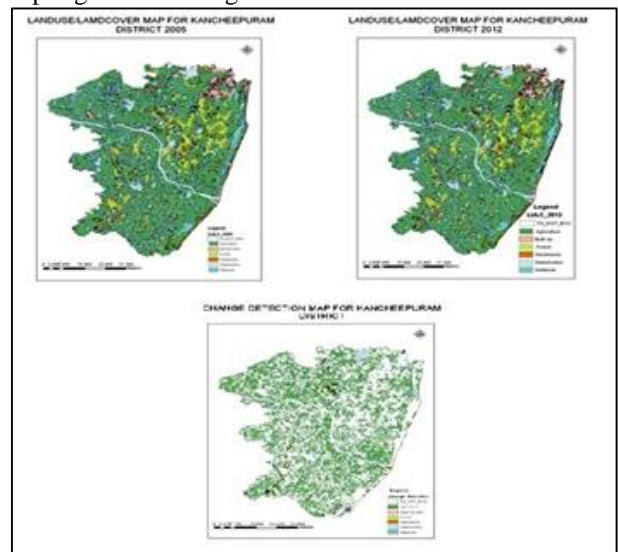


Fig. 3: Change Detection Map

B. Rainfall Distribution Map

The rain fall is one of important parameter consider in identify the suitable site for wet land birds Analysis of rainfall would enhance the management of water resources applications as well as the effective utilization of water resources. Such information can also be used to prevent floods and droughts, and applied to the planning and designing of water resources related engineering, such as reservoir design, flood control work, drainage design, and soil and water conservation planning, etc. All these works require the rainfall data as a design basis. All rainfall stations at the same area cannot be described by just a single probability distribution, assuming these stations belong to ascertain probability distribution and form a cluster. All the stations in the same area can be classified into several clusters in accordance with their Probability distribution. If there existed special characteristics among clusters, such as a certain part of stations are similar for rainfall characteristics and therefore belong to the same probability distribution, these characteristics may cause the stations of a cluster to have spatial relationship to a certain extent.

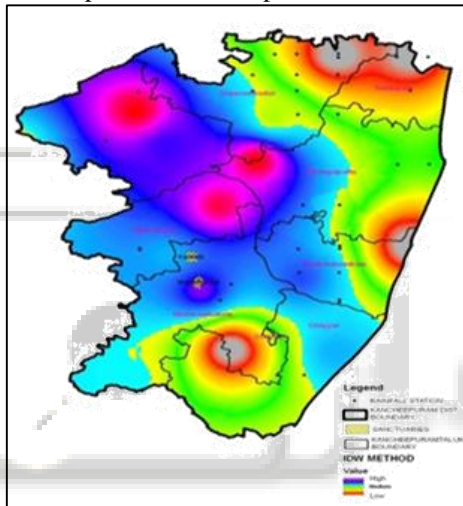


Fig. 4: Rainfall distribution Map

C. Temperature Map

Temperature distribution is also an important layer for potential site identification. The eggs of almost all domestic bird species can be incubated at the same incubation temperature because of that, eggs of several different bird species can be incubated at the same time within the natural temperature. The birds need certain temperature to live but some time the high temperature led to death.

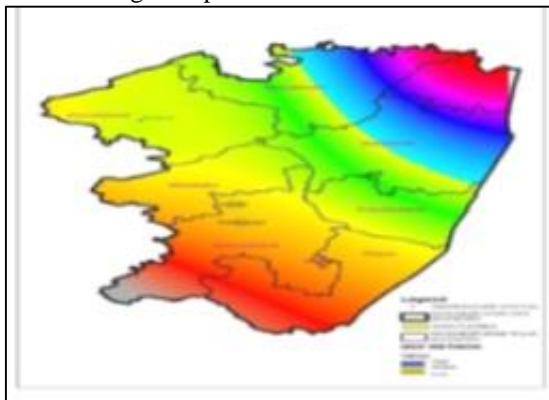


Fig. 5: Temperature distribution Map

D. Slope Map

The effects of topographic features, aspect of slope, appear to have a significant impact in these studies. Such an effect may not be a direct influence, because of the occurrence of bird's over some aspects. Slope of terrain, elevation and distance to settlements also appeared to have significant influence in suitable habitat selection. Terrain and human influences are also significant predictors. Then the birds avoiding steeply slop for the nesting breeding and other process. The slope less than 20° and at 2 Hec are considering as a suitability site.

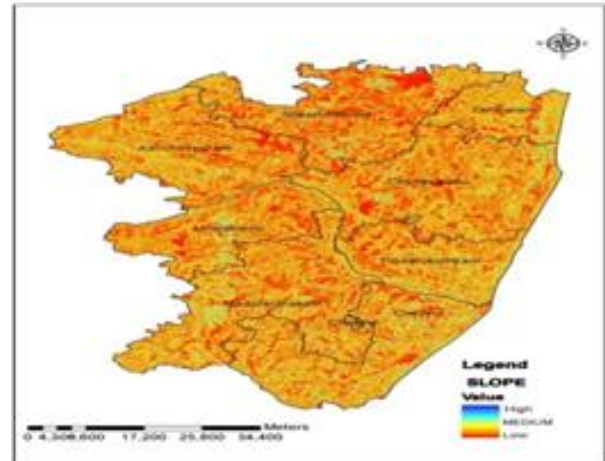


Fig. 6: Slope Map

E. Road Influence on the Occurrence of Birds

The potential sites that fall under the road buffer zone are identified. 500m road buffer has been given for Kancheepuram district road. Though they are potential, the influence of vehicles on the roads affects the bird occurrence. So this is considered as a threat and the layer is prepared.

500m ROAD BUFFER FOR KANCHEEPURAM DIST

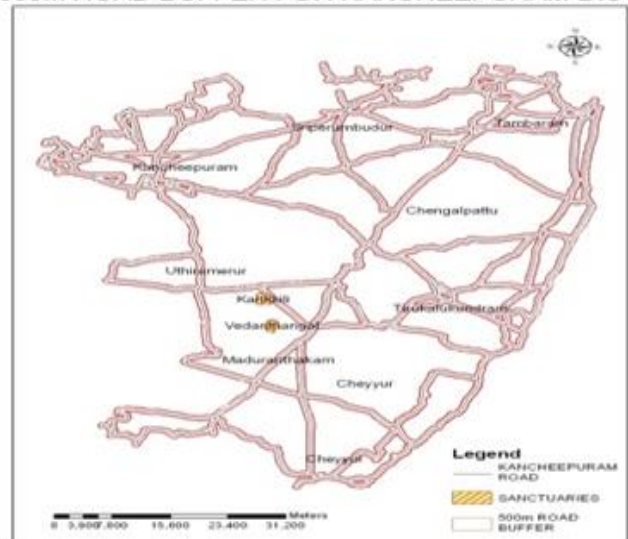


Fig. 7: Road Buffer Map

F. Industrial Buffer

The industries are the major threat for the birds the pollution emitted from the industries are affects the birds so as per IBWL (Indian Board of Wild life) the industries are 5 km away from the sanctuaries. Near our study area when a 5 km buffer was generated around the study area industries that

manufacture Chemical dyes, rubber, Optical fiber, ORCHID chemical, Blood bag industries are available.

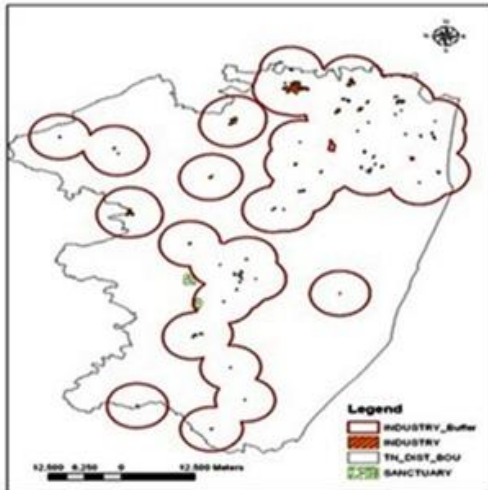


Fig. 8: Industrial Buffer Map

G. Water Quality Detail

Water is an important dietary requirement for wetland bird. They typically consume twice as much water as feed, and other uses. Unsuitable water can reduce performance, retard growth, curtail egg production, produce lower egg quality, cause illness or in severe cases cause death. When chronic poor bird performance continues despite changes in management, nutrition, environment or the health program, water quality problems may become suspect.

1) Water Quality Maps

a) Water Quality map For Chlorine (Cl)

Excessive chloride has a detrimental effect on metabolism. It reduces the amount of energy availability to be used for maintenance, for production of body tissue (for growth and replacement), activity and egg production, when a food material or feed is eaten. It includes the heat lost during metabolism.

b) Water Quality map For Magnesium (Mg)

Magnesium in water interferes with blood's capacity to absorb oxygen. Excess magnesium levels can affect weight gain, feed conversion and overall performance. Magnesium level have been suspected to affect performance like the rate of growth in young birds or egg production in adults is controlled. Effects are especially likely on young birds.

c) Water Quality map For Nitrogen Oxided NO_3

Young chicks can also be poisoned by high NO_3 levels in the feed water. That level can cause kidney disease in young chicks. It makes the egg layer thin.

d) Water quality map for sulfate (SO_4)

High sulfate in water is usually a natural problem in Vedanthangal. The primary problem with excessive sulfate in water is its laxative effect. The effect is related to body size reducing and young birds are most susceptible. High sulfate may also impart a bitter taste to water that can result in reduced water intake, and cause diarrhea and death.

e) Water Quality map For Total Dissolved Solid (Tds)

Total Dissolved Solids are effectively a measure of salinity. Poor water quality may cause refusal to drink and watery feces, increased mortality and decreased growth. And leg of bird's abnormality, and it make poor hatchability.

f) Overlay map for water quality parameter:

The above parameters are overlaid and the distribution level of water quality will identify the level will classified in to five groups

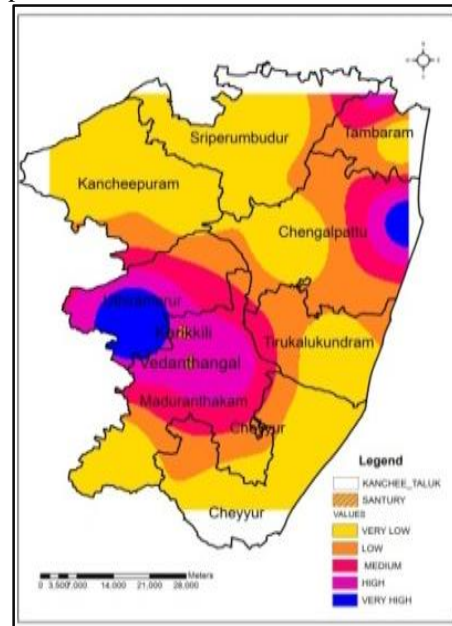


Fig. 9: Overlay Map For Water Quality

H. Stream Slope Overlay Map

The stream of study area is over lay with the slope map for identifying the low slope area to make the water logging.

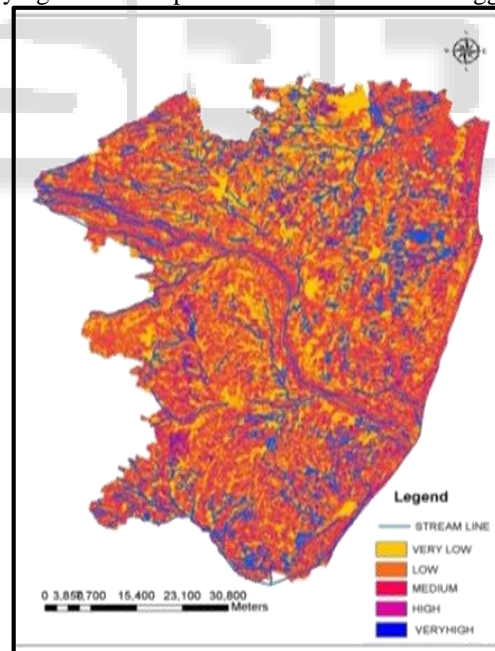


Fig. 10: Stream Slope Overlay Map

VI. CONCLUSION

A. Weighted Overlay Analysis

To identify the potential site the following maps were overlaid, Rainfall distribution map, Temperature distribution map Land use and Land cover map, Road buffer zones, Industrial buffer zone, Slope map, Soil map the following are converted into raster file, weightage were assigned for each layers based on their influence and the weighted

overlay analysis is run. Potential site has been identified and they come under open barren ground, lakes, scrubs/grassland, and wetland/swamp area.

The weighted overlay analysis model, a map showing different habitat potential zones with high, moderate and low has been prepared. The habitats which are most suitable for species is probably due to the least anthropogenic disturbance, low altitudinal location, presence of dense and water logged area.

The overlay analysis carried out based on the potential condition of birds life style and protection condition.

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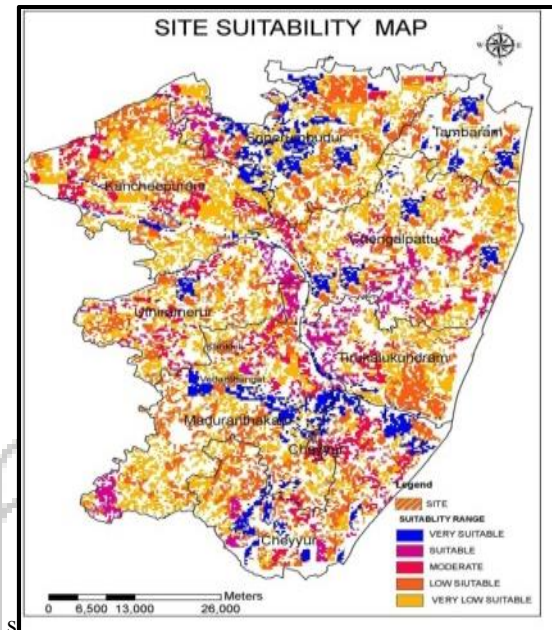


Fig. 11: Site Suitability Map

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