Climatic Variability on Coastal Ecosystems using Genetic Algorithm Approach

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ABSTRACT
There is a drastic change in the environment prospect across the universe. The factors, influence are in the form of natural activities such as flood, earthquakes, hurricanes, ocean acidification, and cyclones. A recent trend shows that anthropogenic activity affects the global warming, economic loss in productivity and negative penalty on human health that is due to the climate change whose impact faces the elementary test of convolution. Landuse and landcover has been considering for getting the information more briefly by using geospatial techniques. Geospatial statistics helps in maintaining the balance between the sustainability and economic development for the environment prevention. Remote Sensing, GIS and Computer Application have been tremendously used for climate analysis and adaptations for the stimulating the sustainable development of resources. GIS and genetic algorithm for extracting the information based on the concept of landscape for multi sensorial and multi resolution satellite data. High resolution satellite data will monitor over the pre data and current data of the two similar regional climatic change scenarios considering upon the feature regarding mangrove species over a coastal area. Mangroves species plays a vital indicator for maintaining forest ecosystem service and livelihood option caused by the biodiversity loss, coastal erosion; change in temperature and precipitation change in the aspect of forest cover which highlights planning and management development.

Keywords
Geospatial, Anthropogenic, Climatic change and species**.**

General Terms
Image Classification, Remote Sensing, and Genetic algorithm.

1. INTRODUCTION
In Mangrove ecosystems are highly dynamic but extremely perceptive and fragile. Mangrove forests are undergoing constant seasonal, short term, long term changes due to their vibrant nature and greater extent through diverse natural and biotic influences [7]. Mangrove forests not only supportive for coastal marine organisms but also protective the coast from erosion which serve as breeding, feeding and nursery grounds for estuarine and marine organisms.

Furthermore they are vital for capturing and culture fisheries. Anthropogenic activities involving development projects have most often resulted in depletion of coastal resources, destruction of critical habitats, disruption of ecosystem processes and loss of biodiversity.

2. LITERATURE SURVEY
Vikrant.et.al [1] discussed the changes of mangrove system in between 1972 to 2010, mangroves distribution over River of Ulhas and efforts for regeneration of mangrove system. The area of study is under pressure due to some activities as settlement of human, waste dumping and soil dredging. The Study shows the worst area that is affected with 28.19% loss is Thane. The impact of activities of anthropogenic is worst for that region and least option for regeneration. The observation considered as the mangroves areas increasing at one side and on other side shrinking i.e. shows the combined effects related activities of anthropogenic and protection of mangrove. H.P.[2] presents dynamics assessing of land use land cover (LULC) change using the remote sensing and by GIS of Neil Island in Andaman. The base map is prepared by Survey of India (SOI) top sheet (1979).

On the basis of characteristics of image, the interpretation of geo-coded satellite imageries 1D LISS III (1998) and IRS – P6 LISS III (2010) on 1:50,000 scales have done. The study of image characteristics has performed on the basis of interpretation keys. Island covers 18.90 sq. km. area and 18.6 km length of shore. The various resources such as forests, corals, mangroves, creeks, sandy beaches and agricultural lands possesses by the island. Vijay.et.al [3] considered the technology of remote sensing for the mangrove mapping and detects changes in the habitat over the Mumbai region. Samant.et.al [4] presented the Landuse/ land cover change in the Mumbai-Navi city which is most populated city in the country. For studying the Landuse/land cover change, multi-date data and Landsat TM digital data from SOI maps have been used. By using a GIS, the quantification has been done over the Landuse change. Rawat.et.al [5] presents the combined approach of Geographical Information System and remote sensing.

The techniques of Geospatial are used for identifying the dynamics of land use/cover. The study area possesses five different classes like built-up area, vegetation, agricultural land, water bodies and sand bar. The results shows that built-up area and sand bar have increased over two decades and the other classes like vegetation, agricultural land and water body have decreased.

3. STUDY AREA
In this study the district of Maharashtra was covered. Take Mumbai image area 18.98^{o}N and 72.82^{o}E in figure 1. Figure shows the location map of the study area.

Table 1. Landsat data in detailed

S.N0.	Satellite	Sensor	Path	Row	Date of pass
1.	Landsat	TM	148	47	09 Nov1992
2.	Landsat	ETM +	148	47	25 Nov 2001

Fig 1: Location Mumbai map of the study area.

4. HOW IT RELATES TO REMOTE SENSING?

Emerge as a precious tool for fast, efficient and accurate. That means of information retrieval to identify causes, extent and adaptation of structural changes over time. The information gained can be utilised for effective planning and management of mangrove forests [8]. During all whole process we have take .tiff images and generate data of mangroves for comparison of both years. Figure 2 shows the Mumbai mangroves image.

Fig 2: Image of Mumbai mangroves, land and water body

5. USING GENETIC ALGORITHM

There are three basic types of classification strategies (i) Supervised Classification (ii) Unsupervised Classification (iii) Hybrid Classification. Supervised classification requires training areas to be distinct by the analyst. Unsupervised Classification searches for natural groups of pixels that is called clusters which presents within the data by means of assessing the relative locations of the pixels in the feature space [6]. Genetic Algorithms (GA) are stochastic search procedures introduced by J.Holland. This algorithm is based on idea and technique from genetic and evolutionary algorithm which is a part of artificial intelligence and also is a kind of searching technique for good solutions.

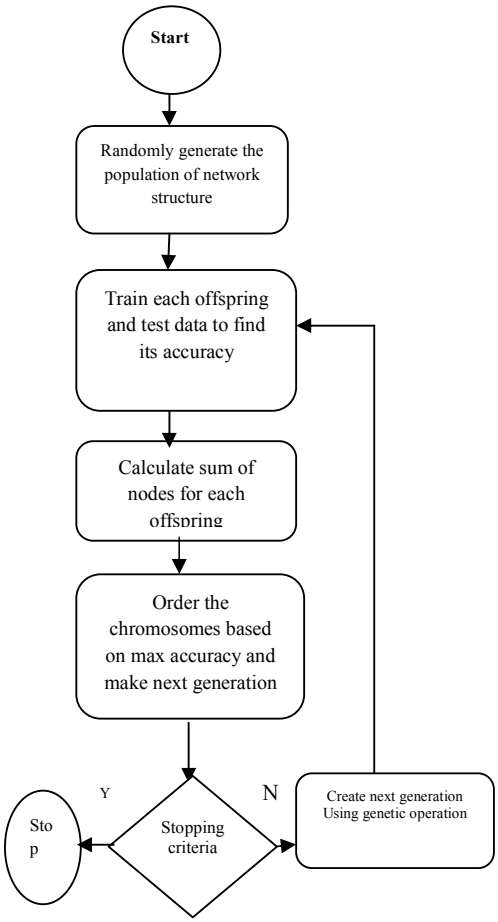

Fig 3: Genetic algorithm Process applying at training set

This is mimics the process of natural evolution, GA [10] generates precious solutions for rigid optimization problems using these techniques that are inspired by natural evolutionary operators for example inheritance, mutation, selection, and crossover. This method initially learns the population basis pattern which is used to define dataset. After the learning process apply the genetic algorithm on GA outcomes for fitness value.

6. METHODOLOGY

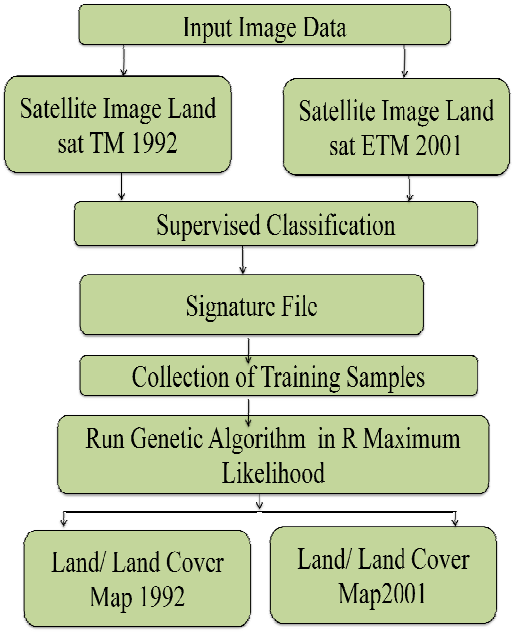

Fig 4: Methodology

Initially we have satellite Landsat TM 1992 data and ETM 2001 data. Satellite data which is the form .tiff image, so we are using supervised classification method. Take some patterns from different places at the TM and ETM images. Apply the supervised classification at the both images and save their signature images. After the all that process we have collect all the training samples and applying at genetic algorithm and create a datasheet. Compare data datasheet both of year TM 1992 and ETM 2001. At the last create land used/ Land Cover of both images.

6.1 Algorithm

Genetic Algorithm is detailed step by step [11].

STEP1: Initialize the random population.

STEP2: Calculate the fitness value of the random population

STEP3: Crossover is done between the fittest individual.

STEP4: Mutation is done between the fittest individual.

STEP5: New population is created.

STEP6: End of the generation.

STEP7: If the generation is not ended, it will calculate fitness value.

STEP8: If the generation is ended, it will calculate fitness n individual.

7. OUTCOMES

There are first image shows in figure 5

I. Landsat TM Standard FCC Image of Study Area (Mumbai) Year 1992 and

The Second Image show in figure 6

II. Landsat ETM Standard FCC Image of Study Area (Mumbai) Year 2001.

(I) (II)

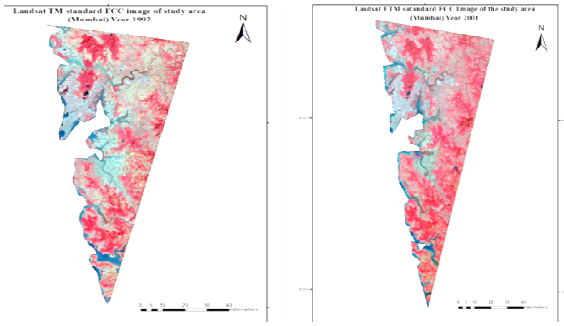

Fig 5: (I) Landsat TM 1992 and (II) ETM Standard FCC Image 2001.

After the land use land cover using on screen visual interpretation technique at Mumbai Image 1992 and also at 2001 year image.

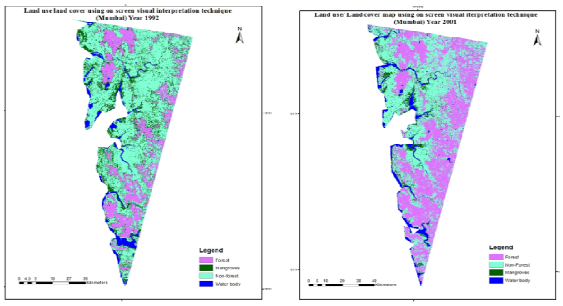

Fig 6: Land use/ Land cover Map 1992 and 2001

8. CURRENT SCENARIO

In the Current situation protected forests is more than 5800 hectares available. According to the Ecosystem services forest is $2000-9000 per hectare for healthy and it is preserved approximately $52 million every year.

9. RESULTS

After Comparison of Forest area, Non-Forest, Mangroves and Water body calculate the rate of change of actual mangrove cover per Km^2 between year TM 1992 and ETM 2001. After the comparison of 1992 and 2001 year Mangroves area is decrease and water body is increase. That is harmful for residential area and environment.

Table 2: Comparison table between TM 1992 and ETM 2001 for forest, Non- Forest, Mangroves and Water body per Km^2.

Land use / Land Cover	Year of Maps (Area in ha)			
	1992		2001	
	Km^2	%	Km^2	%
Forest	1036.9	19.839	2943.98	43.91

Non-Forest	3067.1	58.685	2937.08	43.81
Mangroves	860.31	16.461	453.1	6.76
Water body	262.11	5.015	370.679	5.53
Total	5226.356	100.00	6804.84	100.00

Table3: Rate of change of annual mangrove cover

t1	t2	a1 (Km^2)	a2 (Km^2)	Rate of change of annual mangrove cover
1992	2001	860.308	453.1	-7.8

10. FUTURE ASPECT

This research alerts hinder the progress of conservation projects and also the responsible for increase in greenhouse gases and sea level. It is responsible for the decline in loss of biodiversity species. Climate change decreases the global mangrove area by 5-10% and increase flood, earthquakes, hurricanes, ocean acidification, and cyclones that is very harmful for environment and Mangroves Species.

11. ACKNOWLEDGMENTS

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12. DISCUSSION

The change detection studies were based on the identification of 4 change detection classes. Between 1992 and 2001, the total area of mangrove species decreased from 860.308 km^2 to 453.1 km2 indicating a 7.8 % decline. This is considerable decrease in the percentage of mangroves. This not only has resulted in the reduction of the mangrove species but also has increased the chances of floods [12]. The loss in the green cover is playing its part id upsetting the natural balance. If the current trend continues the environmental balance would be affected greatly.

13. REFERENCES

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