

Criteria Based Decision Support System for Environmental Clearance in Amreli and Junagarh Districts using Geo-Informatics

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Abstract— The Ministry of Environment and forest government of India issued the Environmental Impact Assessment notification, 2006. The basic objectives of Environmental Impact Assessment is to identify, predict, mitigate the possible impact due to proposed project and the people likely to be affected. The project of Environmental Impact Assessment (EIA) leads to mitigate the negative impacts and enhance the positive impacts for the Sustainable developments. In the present study Indian Remote Sensing Satellite (IRS) data from the 2006 to 2012 were used to generate Land-use, water-bodies, transport network and waste-land maps of the Amreli and Junagarh districts. The various criteria defined by Environmental Impact Assessment were used for identifying sites for industries based on the guidelines of Environmental clearance. A Decision Support System (DSS) based on VB.NET programming were implemented for identifying sites for industries and environmental clearance in Amreli and Junagarh districts. This decision Support system uses the various criteria for locating sites for industries and Environmental Clearance in Amreli and Junagarh districts.

Keywords— Indian Remote Sensing Satellite (IRS), LISS-III, LISS-IV Data, Geographic Information system (GIS), Environment Clearance.

I. INTRODUCTION

The Environment Clearance strategy, plan should be produced with the Proper arrangement and acquiring knowledge of our surroundings resources such as Roads, Railways, Settlements, Buildings etc without harm to our nature. It is very necessary to use suitable criteria for planning and locating suitable location of industries. In this paper all the Criteria are taken from the Gujarat Pollution Control Board (GPCB) and Central Pollution Control Board (CPCB). These Criteria are helpful for managing environment to our Surroundings. Remote Sensing and GIS data is used to generate land use. In this paper firstly the waste-land is identified and then the necessary criteria is fulfilled after interpreting map, the waste-land portion is calculated. The appropriate balance between environment and human society should be maintained, in other words, the sustainable development or programme should be holistic and avoid being

single-sector (for example: coastal erosion, water, nature conservation, spatial planning, etc).

II. OBJECTIVES

The objectives of this study for Environmental Clearance in Junagarh & Amreli districts are as follows:

- Study of Waste-lands in Amreli and Junagarh Districts
- Identification of Criteria where the industries to be established
- Establish Industries with Sufficient Criteria.
- Ensure preservation of the integrity of coastal ecosystems, landscapes geomorphology
- Prevent and reduce the effect of natural hazards & in particular period which can be induced by natural or human activities.
- Proper use of land by establishment of Settlement, Agriculture, Roads, Railways etc.

III. ENVIRONMENTAL CLEARANCE

A. Environment Impact Assessment (EIA)

The purpose of Environmental Impact Assessment (EIA) is to identify and evaluate the potential impacts (beneficial and adverse) of development and projects on the environmental system. It is an useful aid for decision making based on understanding of the environment implications including social, cultural and aesthetic concerns which could be integrated with the analysis of the project costs and benefits. This exercise should be undertaken early enough in the planning stage of projects for selection of environmentally compatible sites, process technologies and such other environmental safeguards.

B. Environmental Criteria for Industries

In order to help the concerned authorities and the entrepreneurs, it is necessary to frame certain broad guidelines for citing an industry. It is also necessary to identify the parameters that should be taken into account while setting up

an industry. With this in view, the following environmental guidelines are recommended for citing of Industries to ensure optimum use of natural and man-made resources in sustainable manner with minimal depletion, degradation and/or destruction of environment. Those are in addition to those directives that are already in existence under the Industries (Development and Regulation) Act. In citing industries, care should be taken to minimize the adverse impact of the industries on the immediate neighbourhood as well as distant places. Some of the natural life sustaining systems and some specific land uses are sensitive to industrial impacts because of the nature and extent of fragility.

C. Industrial Criteria to Sustain Ecological System

It is necessary to fulfil criteria for the set up of new industries. As for example, industries should be at least 25km away from Ecological System. Coastal areas: at least 1/2 km from High Tide Line. Flood Plain of the Riverine Systems: at least 1/2 km from flood plain or modified flood plain affected by dam in the upstream flood control systems. Transport/Communication System at population): at least 1/2 km from highway and railway. Major settlements (3,00,000 distance from settlements is difficult to maintain because of urban sprawl). At the time of citing of the industry if any major settlement's notified limit is within 50 km and the industry shall be cited at least 25 km from the projected growth boundary of the settlement.

IV. STUDY AREA

The Amreli and Junagarh Districts are situated

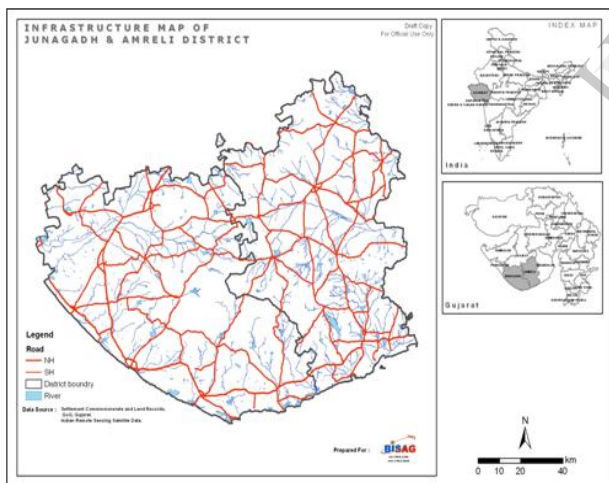


Figure 1: Location Map of study area

between 26.6200N Latitude, 71.2300E Longitude and, 21.5200N Latitude, 70.4700E Longitude in Gujarat. They Comprises the West portion of India which is shows in figure 1.

V. METHODOLOGY

A. Data Used

Following Indian Remote Sensing Satellite Data covering Junagarh and Amreli Districts was used for Data analysis shown in table1.

S.no.	Satellite	Sensor	Path/Row	Date of pass
1.	IRS P6	LISS-III	92/57	4 Jan2012
2.	IRS P6	LISS-III	97/57	11 Jan2012

Table 1 : IRS Path/Row Date

B. GIS Data

1. Districts Boundary, Taluka, Village Boundary.
2. Transport Network like National Highways and Railways.
3. Major Water Bodies Like Streams, Rivers, Ponds and Village Tanks.
4. Forest and Settlements Locations.

C. Satellite Data Analysis

In this study, Indian Remote Sensing Satellite (IRS P-6) LISS-III data is used. The IRS P-6 digital data was geo-referenced and the mosaics were created in ENVI 4.0, the study area. The resolution of LISS-III is 23 meter which helps to identify the various land use classes very clearly. Figure-2 shows the mosaic image covering two district boundary i.e. Junagarh and Amreli Districts.

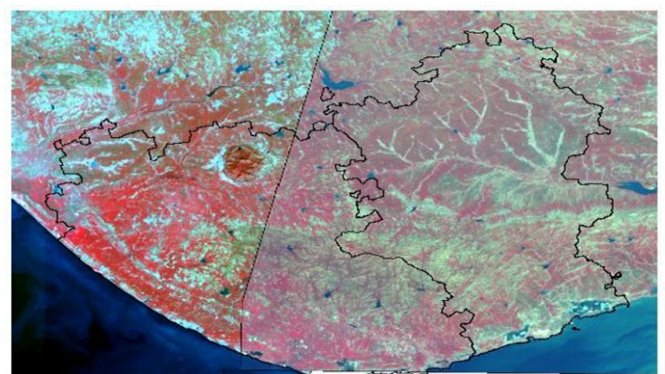


Figure 2: Liss-3 Mosaic Image of Junagarh and Amreli District

D. Geo-Spatial Data

Various GIS layers like Transport Network, Water Bodies, Taluka Boundry and village Boundary superimposed to satellite data. This is very useful to know information about the village .At which year the taluka & Village is Established. At how much the Area of Village is covered .By Geo-Spatial Data we know about the certain nformation how many taluka

is present and what their are names and which districts they belongs.

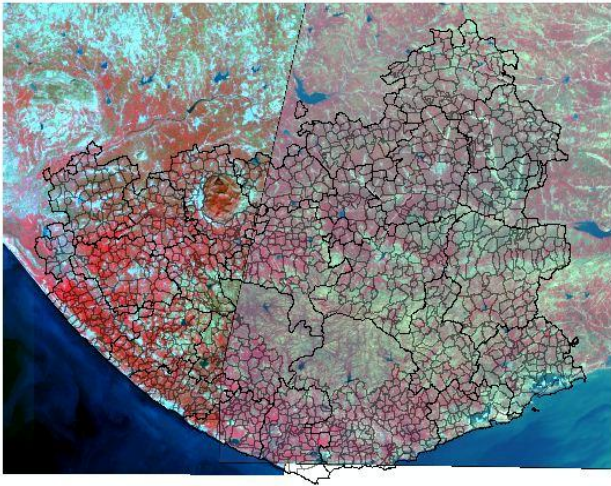


Figure 3: Taluka and Village boundaries in Amreli and Junagarh District



Figure 4: Railway and Settlement in Amreli and Junagarh Districts.

VI. RESULTS

A. Land- Use Analysis

Indian Remote Data was Analysis used for generation land maps of Junagarh and Amreli districts. The Amreli and Junagarh districts comprises all types of areas such as hilly areas, Slope areas, water-bodies ,Land with scrub, Land without Scrubs, Roads, Railways, Agricultural areas. The Amreli and Junagarh Districts is vast District and there are so many features that have to be study about this district.

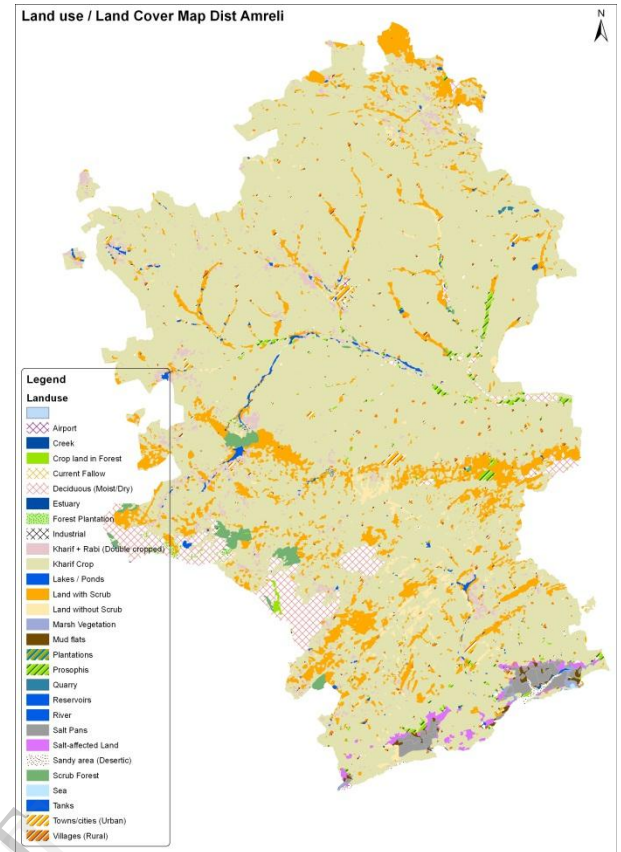


Figure 5: Land-Use Map of Amreli Districts

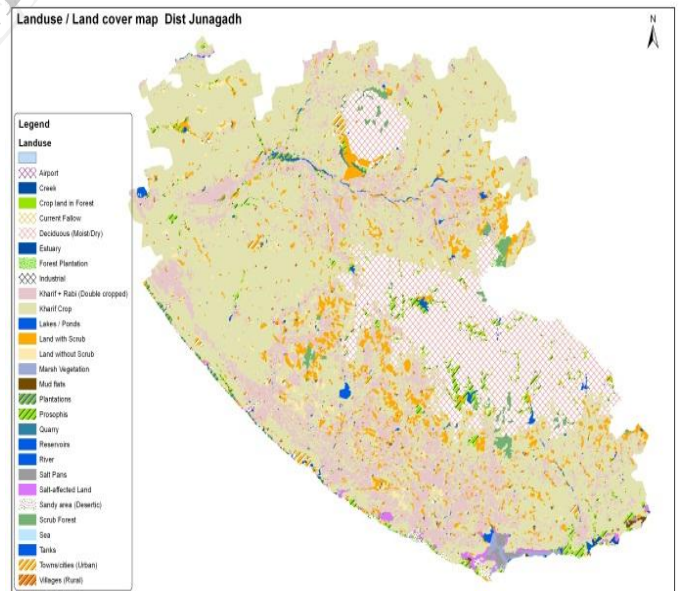


Figure 6: Land Use Map of Junagarh districts

B. 6.2 Study of Existing Water-Bodies

Existing water bodies like Rivers, Streams, Drainages, Ponds/ Lakes etc were demonstrated Using LISS III Image using Covering Junagarh and Amreli Districts.

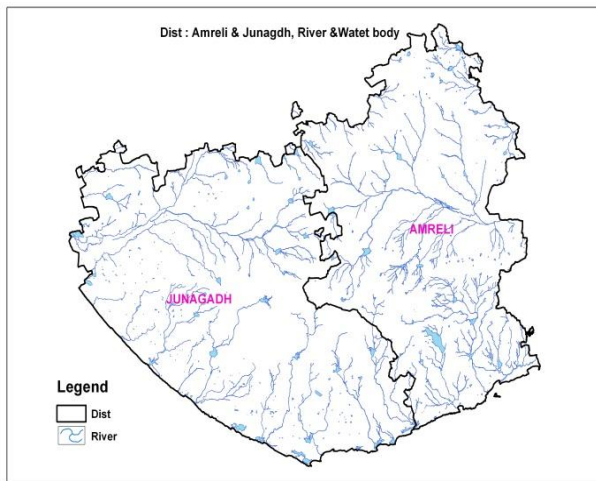


Figure 7: Water Bodies in Junagarh and Amreli Districts

C. Wasteland Analysis

Waste-Land Mapping was Carried out from the Land-Use Map of the Junagarh and Amreli, waste-land are given in figure 8.

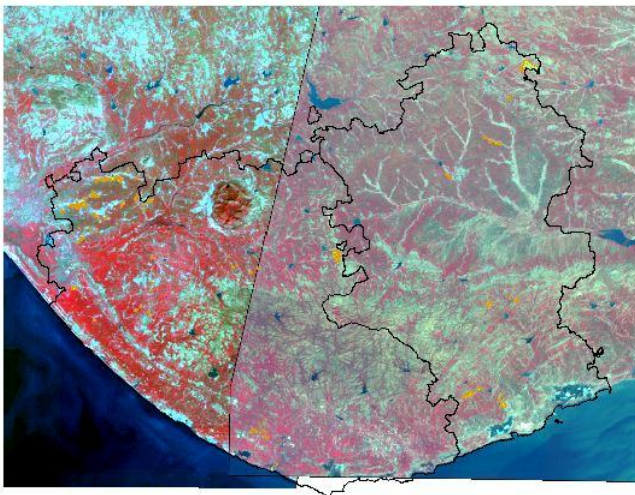


Figure 8: Waste-Land of Amreli and Junagarh Districts

D. Criteria for location of Industries

Following Criteria where analyzed for selecting suitable site Industries in Junagarh and Amreli Districts.

- Ecologically and/or otherwise sensitive areas at least 25 km depending on the geo-climatic conditions the requisite distance hall have to be increased by the appropriate agency.
- Coastal areas at least 1/2 km from High Tide Line.
- Flood Plain of the Riverine Systems at least 1/2 km from flood plain or modified flood plain affected by dam in the upstream or by flood control systems.
- Transport/Communication System at least 1/2 km from highway and railway.

- Major settlements for example 3 lac Population atleast 50 km away from the Proposed Industries.

E. Software Used

The Specific Software in VB.NET implementing various Criteria-locating industries in Junagarh and Amreli Districts. The Software developed in Arc Gis shown in figure.

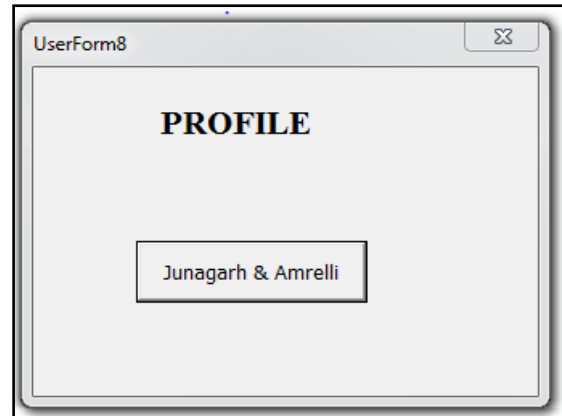


Figure 9 : User Form shows Profile of Amreli and Junagarh Districts

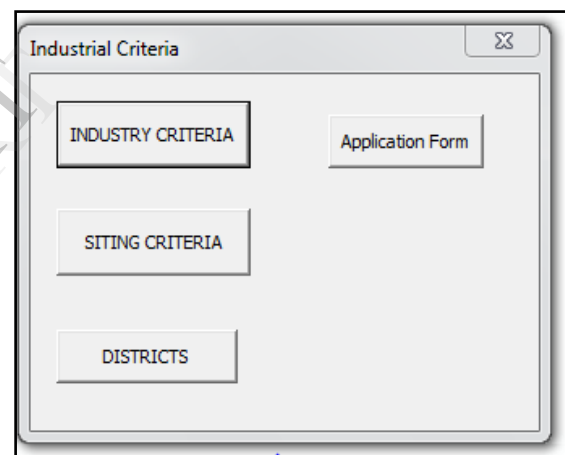


Figure 10: Criteria Shows Using VB.net Programming

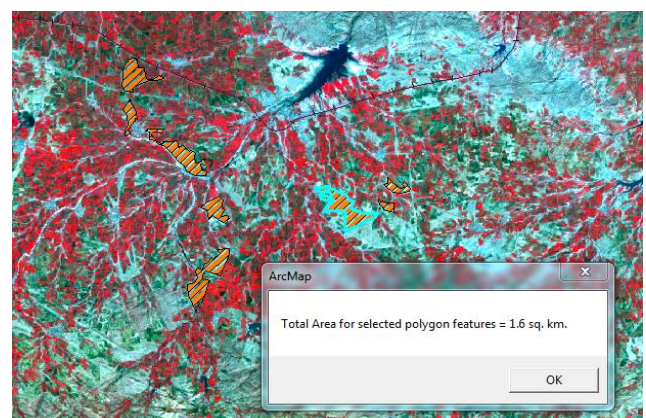


Figure-11: Area Calculating waste-Land using VBA

F. Criteria Based Location of Industries

The analysis of Land-Use, Waste-land Mapping, Location of Habbitations etc where considered in the Criteria-based Analysis in the Junagarh and Amreli Districts. Some of the Locations selected for Industries are shown in figure 12-

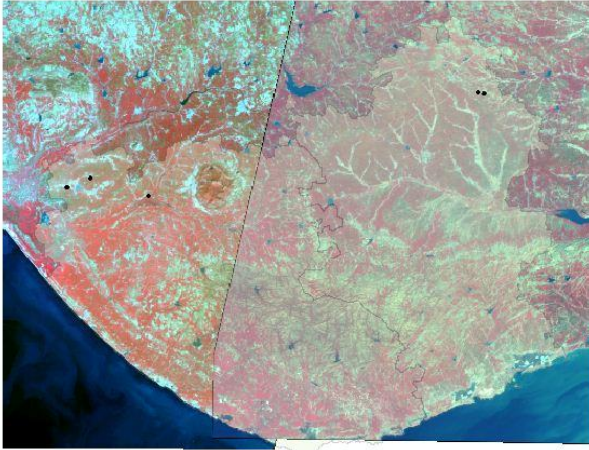


Figure 12: Black Points shows Proposed Industry in Amreli and Junagarh districts in waste-land

VII. CONCLUSIONS

The Present study on “Criteria Based Decision Support System For Environmental Clearance Using Geo-Informatics” was Carried Out in Amreli and Junagarh districts using Indian Remote Satellite data and geo-informatics technology. The waste-land availability for industries in Amreli and Junagarh Districts was computed from the data collected from Department of gujarat. Decision support system for locating industries using Concept of environmental Impact Assesment and criteria defined by Ministry of environment web formulated using the Software in VB.net. Result of this Study indicate that Indian Remote Sensing Data can be Used to map land-use and Waste-land in Amreli and Junagarh districts usind the waste-land maps and data in GIS. A Criteria Based Decision Support System was Developed for the environmental Clearance for the Proposed Industry in the Junagarh and Amreli Districts.

ACKNOWLEDGMENTS

It gives me a great pleasure to thank Mr. T.P. Singh, Director Bhaskaracharya Institute for Space Application and Geo-informatics (BISAG), Gandhinagar for encouragement. I am deeply indebted to Dr. M.B. Potdar, Project Director, BISAG for his guidance. I am thankful to Dr. Raj Kamal, Dr. Abhay Kumar and Mrs. Pratibha

M. Umale for permitting me to carry out Project in BISAG.

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