

Changing Settlement Pattern: A Case Study of Beawar, Ajmer

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ABSTRACT: The world is undergoing the largest wave of urban growth in history. More than half of the world's population now lives in towns and cities, and by future this number will swell to about 5 billion. 'Urbanization has the potential to usher in a new era of wellbeing, resource efficiency and economic growth. But due to increased population the pressure of demand also increases in urban areas'. The loss of agricultural land to other land uses occasioned by urban growth is an issue of growing concern worldwide, particularly in the developing countries like India. This paper is an attempt to assess the impact of urbanization on land use and land cover patterns in Beawar, Ajmer city. Recent trends indicate that the rural urban migration and religious significance of the place attracting thousands of tourists every year, have immensely contributed in the increasing population of city and is causing change in land use patterns. This accelerating urban sprawl has led to shrinking of the agricultural land and land holdings. Due to increased rate of urbanization, the agricultural areas have been transformed into residential and industrial areas. There are several key factors which cause increase in population here such as Smart City Projects, potential for employment, higher education, more comfortable and quality housing, better health facilities, high living standard etc. Population pressure not only directly increases the demand for food, but also indirectly reduces its supply through building development, environmental degradation and marginalization of food production. Also, there are several issues which are associated with continuous increase in population i.e. land degradation, pollution, poverty, slums, unaffordable housing etc. Pollution, formulation of slums, transportation congestion, environmental hazards, land degradation and crime are some of the major impacts of urbanization on Beawar, Ajmer city. This study involves mapping of land use patterns by analyzing data and satellite imagery taken at different time periods. The satellite images are used. The change detection techniques are used with the help of Geographical Information System software like ERDAS and ArcGIS. The supervised classification of all the three satellite images is done by ERDAS software to demarcate and analyze land use change.

KEYWORDS: settlement pattern, Beawar, Ajmer, population, employment, economic, migration, industrial

I.INTRODUCTION

The nature of research in this paper, which describes and explores changes in land use pattern in the context of urbanization in one of the divisions of Beawar, Ajmer district, favors the case study strategy – an empirical inquiry at first place that examines a contemporary phenomenon within the real-life context beyond researchers' control as well as the use of modern techniques by using GIS software like Arc GIS and ERDAS. This study illustrates the spatio-temporal dynamics of urban growth and land use changes in Beawar, Ajmer city of Rajasthan to Landsat satellite imageries of two different time periods [1,2] were used to know the changes in land use pattern. Supervised classification methodology has been employed using maximum likelihood technique (change detection) in ArcGIS 10.2 software. By applying classification methods to the satellite images, five main types of land use were extracted; built-up area, agricultural area, forest, wasteland and water body. Then the area coverage of all the land use type at different points in time were measured. The Public Works Department (PWD) National Highway (NH) division, under Ministry of Road Transport & Highways, MORT&H intends to develop and maintain National Highway 158 (declared as National Highway in year 2013) connecting Ras-Beawar-Asind-Mandal in the State of Rajasthan as part of the proposed Green National Highways Corridor Project. The objective of the project is to rehabilitate and upgrade the existing road to two lanes/four lanes with paved shoulders.[3,4]

The project road Ras-Beawar-Asind-Mandal, part of National Highway 158 is currently a two-lane configuration with hard shoulders.

The major constraints or challenges of utilizing the current facility are:

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- Poor Geometry
- Right of Way Constraints
- Existence of Dense Built-up and Settlements along the road
- Poor Condition of the Existing Pavement
- Deficient and feeble condition of existing Cross Drainage Structures
- Issues pertaining to safety of Road Users

The presence of these settlement affects the flow of traffic due to reduction in speed. The traffic passing through these sections also creates potential hazard for pedestrians. There is a constraint of improving or upgrading the current road on account of unavailability of land in the built-up sections. Rehabilitation and Resettlement will be more if existing road is widened to Four lane or Two lane with paved shoulder. Therefore, realignments and Bypasses are proposed are below mentioned locations in order to provide a safe and congestion free passage to road users. The existing alignment predominantly passes through barren land and traverses through patches of dense urban built up sections. Alignment comprises of 96 nos. sharp horizontal curves and blind spots. The following table provides the location of deficient geometry along the project road. There are 4 major and 97 minor junctions on existing alignment. The deficient/substandard horizontal curves are improved by providing the required radius as per the codal provision for the design speed of 80kmph/100kmph. The curves are improved for maximum possible radius. The existing alignment predominantly passes through barren land and traverses through patches of dense urban built up sections. Alignment comprises of 16 nos. of deficient vertical curves and blind spots. In view of above constraints, there is imperative needs of improvement and upgradation of the road from Ras-Beawar-Asind-Mandal, part of NH 158.[5,6]

The major mandi on the project road is located at Beawar. The CWC warehouse is located on the Beawar Bypass portion of NH-8. This warehouse is well connected with NH-8 by an access road of two lane with paved shoulder configuration. Also, there is no restriction of heavy loaded trucks in the city. So, the goods will be transported directly using multi axle vehicles which in turn will reduce the fuel consumption leading to reduction of pollution and overall transportation cost. The project road will provide improved connectivity to these warehouses and mandis.

The project road will be upgraded based on the Green Highway Concept by adopting the following green interventions:

- After tree cutting, the green cover to be restored specifying the locations
 - Water conservation, harvesting, channelization of water, water storage
 - Less carbon consumption, low heat cement, use of Flyash etc. in pavement and structures
 - Borrow Area Redevelopment
 - Re Utilisation of excavated materials
 - Water conservation measures through drainage structures. Existing Storage ponds to be
 - Redeveloped
 - Solar Light Provision in all habituated stretches
 - Adoption of Climate Resilient measures like Hydrology, Drainage Plan and Protective works, Slope protection for High Embankments, Temperature Resilient Grade of Bitumen, Raising of Deficient Section, Surface drains[7,8]
- Direct Benefits
- Fast and Safe Connectivity
 - Decongestion of traffic on the road
 - Savings in fuel, travel time and total transportation cost of road users.
 - Reduction in road accidents.
 - Reduction in pollution due to constant flow and segregation of traffic from other roads

II.DISCUSSION

Assessment of potential impacts has been carried out based on the project design and baseline environment data as collected from primary and secondary sources. Assessment of the environmental impacts was carried out to ascertain the direct and indirect impacts likely to be induced due to proposed development. The general impacts are land acquisition, forest area diversion and allied impacts on society, dust and air pollution due to removal of structures, loss of trees and vegetation, other impacts from construction activities such as noise pollution, impacts on the local ecology and on water resources. For each impact predicted, feasible and cost-effective mitigation measures have been suggested to reduce adverse environmental impacts up to acceptable levels.[9,10]

The consultations on environmental issues with community members, institutional stakeholder and Project Affected Persons in the form of Focused Group Discussions, stakeholder meetings, etc. were carried out. Consultation process were involved both formal and non-formal discussion. The feedback generated through these meetings has been incorporated as far as possible in the design of the highway. The consultation process shall continue even during the implementation stage to gauge the general opinion.



Map showing Beawar , Ajmer

All affirmative action's not only to avoid and deter but also to capitalize on the opportunities provided by the project in order to improve the environmental conditions have been deliberated. The various mitigation and enhancement measures proposed have been included in the report. Based on their applicability, both general and case specific measures were incorporated. With improvement of existing single / intermediate lane to two lane / four lane with paved shoulder standards, safety of the commuters will be increased as this will improve the visibility and additional carriageway space. Road users will also be facilitated with different project amenities, slope protection measures, road markings and sign etc., which will improve the safety of commuters along the project road. The project road traverses through 23 nos. of major built-up / settlements. The presence of these settlements obstructs the flow of traffic due to significant reduction in speed. The traffic flowing through these sections also creates potential hazard to pedestrians. Hence, realignments and bypasses are proposed in order to provide a safe and congestion free passage to road users.[11]

The major traffic movement found on Ras – Beawar section is due to the transportation of Cement and the raw materials used in the cement industry. Shree Cement factory generates majority of the traffic plying on the section. The major commodity movement which is found on the Project road are as listed below. a) Food grains and other agricultural products (Rice, wheat, pulses, maize, chilly, sugarcane, sugar, cotton) b) Cement c) Textiles d) Fruits and Vegetables e) Mined Materials

Population growth, economic development and rural migration to urban areas have caused rapid extension of the city of Ajmer and hence it has been seen that the city has gone through a number of changes in context of its urban land use from last few years. Therefore analysis of land use pattern along has become an important aspect in this context as it would provide a sound base for sustainable management. The total area of the city was 5646.98 hectare which has increased to 75752.56 hectare in 2011. This means that the decadal increase is 1324.12 per cent because of the changing land use pattern. The total developed area of the city was 4646.60 hectare while it increased to 8575.29 hectare in 2011 with a growth of 84.55 per cent. The industrial and residential area recorded 361.47 per cent and 143.9

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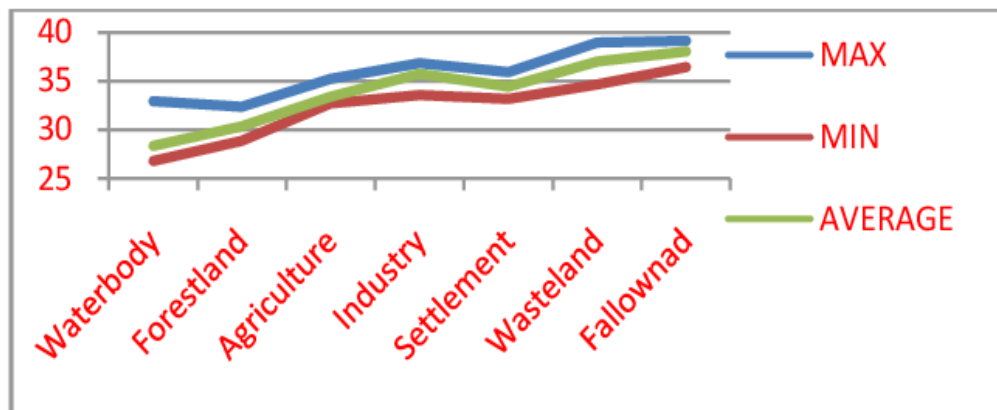
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per cent growth respectively while there is a fall of -96.90 per cent in Recreation category. Commercial land use category recorded a growth of 23.56 per cent. Green space recorded a rise of 22701.34 per cent while others along with reserved forest, water bodies recorded an increase of 9294.25 per cent. [12]

Year 1989



Remote Sensing Based Analysis of the Role of Land Use/Land Cover in Beawar, Ajmer

III.RESULTS

During 1900-2000, development of residential along with commercial plans were imitated and later extended like panchsheel nagar, vaishali nagar, transport nagar, indira complex. Development of new planned city was mainly northward and southward. Residential area constitute the highest area which is 7.82 per cent of the total urban area during 2011. Residential area comprised of 2428.11 hectare in 2001 which increased to 5922.07 hectare in 2011 resulting growth of 143.9 per cent. Residential development of the city is taking place in outskirts in horizontal manner. Commercial area comprises of 282.01 hectare during 2011 which is 0.37 per cent of the total urban area. In 2001 it was 228.24 which has increased to 282.01 in 2011 hence the total growth is 23.56 per cent. The development has taken place in walled city and new planned colonies in the form of shopping complexes. Old market of walled city, situated along narrow roads and streets which are in poor condition like langar khana gali, ghaseti bazaar, Diggi bazaar. These markets are so narrow that there is no place for proper parking. Very high buildings, old havelis, encroachment of roads, a total unplanned morphology. A process of gentrification is going on. 17 commercial centres has been identified in walled city while 46 identified in outer walled city during 2015 by the researcher. Commercial area is not that much develop in accordance with the residential area or population growth. Industrial area comprised of 1094.38 hectare in 2011 which is 1.44 per cent of total urban area which is a very less per centage. In 2001 it was 237.15 hectare which increased to 1094.38 hectare in 2011. Hence the total growth is 361.47 per cent as a result in makopura and parbatpura medium and large scale industries were developed and light manufacturing industries were developed near nasirabad road and beawar road. Nearly 60 per cent administrative offices were developed in civil lines and todarmal marg(lohakhan road) out of total urban area 95.92 hectare is confined to government and government reserved area. Maximum numbers of administrative offices are situated along kachari road. Road network was 1004.83 hectare in 2001 decrease to 30.94 hectare in 2011 which reduced to 96.90 per cent. Total urban area in 2001 was 5646.98 hectare which increased to 75752.56 hectare in 2011. There is a growth of 1324.12 per cent [13]

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4.1.4 Change Rate of LU/LC Since 1989 To 2001

Class	Year 1989	Are in Sq. Km Year 2001	Changes	Change rate in Percent
Water body	72.12	159.79	87.67	121.56
Forestland	328.63	218.75	-109.88	-33.43
Agriculture	3545.25	2053.95	-1491.3	-42.06
Fallow land	2018.58	1923.55	-95.02	-4.70
Wasteland	2481.49	4030.51	1549.02	62.42
Settlement	31.99	74.54	42.54	132.94
Industry	2.78	8.04	5.26	188.67

Table 4.1: - Change rate of Land use/ Land cover from 1989 To 2001

It has been examined that huge urban development has taken place during the last decade. From 2001 to 2011 population has grew about 12.4 per cent while the amount of total developed area grew by about 84.55 per cent, which is more than six times the rate of population growth. This implies that the land is being used for urbanization at the faster rate, which indicates that per capita consumption of land has increased. There can be seen a gentrification in the walled city. There are different kind of activities taking place in walled and outer walled city and the percentage of poorly maintained buildings makes it more demanding for redevelopment

The environment is unfortunately considered as a sink for the waste products of economic activity - A place to dispose of the unwanted by-products of production and consumption. Here we as planners have a role to play. We have to ensure that the waste (whether in solid, liquid or gaseous form) does not cause harm or inconvenience to human beings.[10,11] The environment has the physical capacity to assimilate certain quantities of waste in ways that meet these requirements.

The ecological systems that constitute the environment operate through the perpetual recycling of outputs from natural processes to produce each new generation of living organisms and each consecutive stage in the cyclical transformation of inorganic matter, such as in the nitrogen cycle or the hydrological cycle. Waste products from the human economy can be absorbed by these processes, toxic wastes can be filtered or diluted to render them harmless to human health, wastes that are slow to decay or decompose can be buried in places where they will cause little harm. Presently, the environmental aspects are not usually considered while preparing master plans or regional plans and the process is skewed towards developmental needs. For all developmental activities, a crucial input is land and depending on the activity a specific land use is decided. The environmentally related land use such as trade and industry, housing construction, mining etc. is likely to have some impact on the environment. These land uses need proper planning and integration as some of the activities have interdependencies such as industry with transport, housing etc. Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs Sustainability defines the models necessary to ensure the survival of the human race and planet Earth. This includes ways to slow or reverse pollution, conserve natural resources and protect our environment. The principle of 7R is essential strategy for achieving the sustainability. It reduces the load and over exploitation on the natural resources and is a key for resource efficiency.[8,9]

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IV.CONCLUSIONS

SWOT is a strategic planning technique used to help a person or organization to identify strengths, weakness, opportunities and threats related to project planning. This technique designed for use in the preliminary stage of decision making processes and can be used as a tool for evaluation of the strategic position of organization of many kinds including the governmental setups too. Strengths and weaknesses are internal issues and things that can be controlled easily by working patter or strategies. Opportunities and threats are external thing mainly influenced by external ever-changing environment or condition. Strengths: are things that organization does particularly well, or in a way that distinguishes from challenges. These are an integral part of organization. Weakness: It reflects the requirements which yet not mitigated. These are also inherent features of organization and mainly focus on manpower, resources, systems and procedures. Opportunities: These are openings or chances for something positive to happen and usually arise from situations outside the organization, and also considered the future conditions. Threats: These include all possible negative effects that create hurdles to achieve the strategic goals of the projects. [13] Evolving technologies are ever present threat, as well as an opportunity

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