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Assessing the State of Landuse Impacts in the EIA Process: Case of Highway Projects

Nanduri Prashanti[1], Subhrangsu Goswami[2]
[1](Student, Faculty of Planning, CEPT University, Ahmedabad, Gujarat, India)
[2](Professor, Faculty of Planning, CEPT University, Ahmedabad, Gujarat, India)
Corresponding Author: Nanduri Prashanti[1]

Abstract: In developing countries like India, the land is a means of subsistence. There is a burden of growing population creating stress on the economic development inducing changes in the land use pattern. To promote urbanization, large-scale development projects are being fabricated for a prosperous economy. The erection of these large-scale projects are to be assessed through EIA process to understand the environmental consequences of that project and to go ahead with the proposed plan. In the EIA process, the impact prediction and assessment do not analyse the socio-economic impacts of the proposed project. This limited the performance of the EIA. In the case of the widening of highway projects, they induce greater changes in landuse pattern, which contribute to the adverse environmental impacts attributed to the land use.
This paper addresses the importance to evaluate the state of the landuse impacts that are to be a part of the EIA process of the highway projects, which leads to the potential performance of the highways by eliminating the unlikely effects of the project on the settlement patterns. This paper even tries to provide the sustainability indicators to assess the landuse changes caused due to the widening of the highways. This paper also attempts to suggest an integrated approach to EIA and Development Plan to advocate the impacts of the projects on the landuse.

Keywords: EIA, Landuse impacts, Widening of highway projects.

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I. INTRODUCTION

As per the 2011 census of India, the country's population is about 1.21 billion among which 377.1 million people (31.16%) are the urban dwellers and 833.1 million people (68.84%) are rural dwellers. This shows that about 2/3rd population stays in rural areas. Moreover, there is an observed rural-urban migration, which assures a rapid urbanising change over the years and is estimated that the nation's urban population is going to increase to 900 million by 2050. The transport sector holds 6 percent of the country's GDP and 70 percent share of it is the road sector. The urban areas act as the centre of attraction for the Government to earn revenue, as the country gets more than 50 percent of the GNP through these urban centres. The mode of transport that facilitates this growth is the highway as it acts as a medium of progress between the rural and urban centres. [1] India has the second largest road network of about 4.7 million km in the world. In the coming 5 years, among the US$ one trillion infrastructural investments, 20 percent share of investments were reserved for the roads during the 12th five-year plan (2012-2017). [2] Among the road networks, the National highways carry about 40 percent of the total road traffic occupying only 2 percent of the total road network. [3] Under National Highway Development Project (NHDP), the state is accommodating the four-lane national highways and converting few four lanes to six lanes.

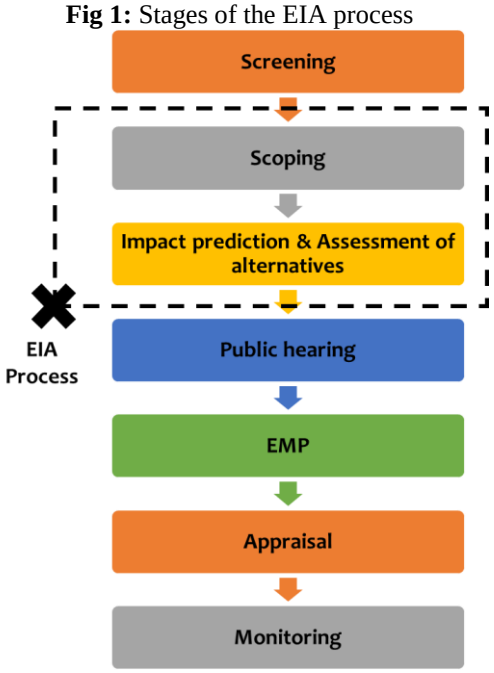
The road network is a major component of development, which enhances the intensity of the human activities across the cities, and other regions hosting the environmental and socio-economic implications of the land use planning. [4] If we look into the highway networks, the upgradation of the highways stimulates the sprawl, transit development, increasing the pavement area leading to a smart growth. These highways affect the landuse largely. [5] The level and pace of the environmental and socio-economic implications and their effects are applied to the environmental management. [6] The environmental management in the developing countries is addressed through environmental legislation, early stages of environmental policies and Environmental Impact Assessment (EIA) with respect to development projects. [7]

II. BRIEF OF THE LITERATURE REVIEW

2.1 EIA

EIA is a tool, which can coordinate developmental activities with the environmental concerns and integrate mitigation measures in project development. The present EIA process in India is restricted to the projects, which has its own strengths and weaknesses and the process is merely considered as the administrative procedure. This acts as an ad-hoc exercise. [8] It is observed that the environmental clearances are approved based on the impact assessment carried out for the project which is submitted by the project proponent. The land uses are constrained by the biophysical factors of the environment that hold socio-economic characters in it. The increase in population and requisite of new housing, industry and transportation go along. [9] All these are insufficiently captured in the impact prediction & assessment of alternatives in the EIA process. The stages of the EIA process are shown in Fig 1.

Fig 1: Stages of the EIA process



Initially, the Indian Road Congress (IRC) prepared the EIA guidelines of the highway projects in 1988 under MoEF. These guidelines were proved ineffective because of their generalised approach and lack of understanding towards the cumulative impact. Especially, for the linear projects like highways with its expansion more than 30km of threshold limit under Category-A of EIA projects, the amount of the land use changes occur are high and the impacts caused due to these changes play a prominent role in the state of the environment and settlement pattern.

2.2 NATIONAL HIGHWAYS

According to the National Highway Authority of India (NHAI), the roads carry 80 percent of passenger traffic and 65 percent of freight traffic. [10] In the impact assessment process, the landuse impacts are considered as the induced[1] impacts and the assessment structure of them is incomplete and inefficient. Induced landuse impacts are the responses of the highway improvements. At present, the urban centres are on the cutting edge of the socio-economic development of the nation. [11] Especially, for the projects like highways where the induced impacts of the project are equally effective as the direct impact, the scoping[2] of the EIA process has to be examined properly [12]

2.3 WIDENING OF THE HIGHWAYS

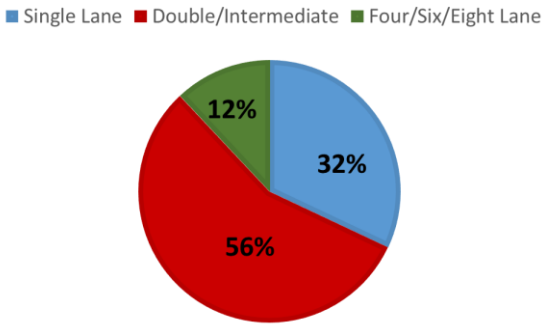
Widening projects leave remarkable impacts on the socio-economic state of the people, which in turn affects the state of landuse changes. The effects of these impacts vary based on the settlement structure of the

According to Council of Environmental Quality (CEQ), the induced impacts are caused due to action but later in time or farther removed in distance,

[2] Refers to the process of categorizing the projects or activities, determining and detailing the comprehensive TOR, which addresses the various environmental concerns of the potential impacts to prepare EIA report prior EC process.

area – like, the urban areas experience different impacts than the rural areas. [13] In the case of urban areas, the impacts of the highway widening are augmented by the densities of the landuse activities and the traffic densities. The types of lanes in India and their linear coverage are shown in Fig 2.

Fig 2: Types of lanes and their linear coverage



2.4 LANDUSE CRITERIA IN THE EIA PROCESS

It is noted that there is a need to evaluate the applicability of the landuse criteria in the EIA process of the highway projects. There is a difficulty to analyse the induced growth of the highway projects as there is no specific boundary or pre-defined state of change happening; it is multi-dimensional and continuous. The spatial structure of the landuse can be better understood by comprehending the drivers of the landuse changes, which determine the landuse impacts of a particular area. It enables to assess the impacts of future development on the environment. [14] The drivers of the landuse change are population, employment and travel demand**.** In the EIA reports, these drivers are not critically analysed, as the economic status is dominated by the environmental conditions of the projects.

III. RESEARCH QUESTION

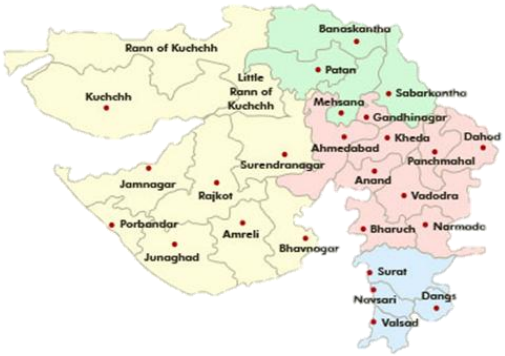
Hence, the research question in this study is – To what extent the impacts of the landuse can be perceived in the EIA process. To analyse, the hypothesis of the study is taken as the induced landuse impacts are potentially associated with the highway projects and are insufficiently captured in the EIA process. The research focuses on the assessment approach of the landuse impacts and limits the study to analyse the demographic and socio-economic indicators of a highway project.

IV. DESCRIPTION OF THE STUDY AREA

In India, the number of Environmental clearances (EC) by MoEF is observed that, the state of Gujarat consists of the highest number of projects (30) under clearances where the infrastructure projects hold comparatively larger domain. [15]

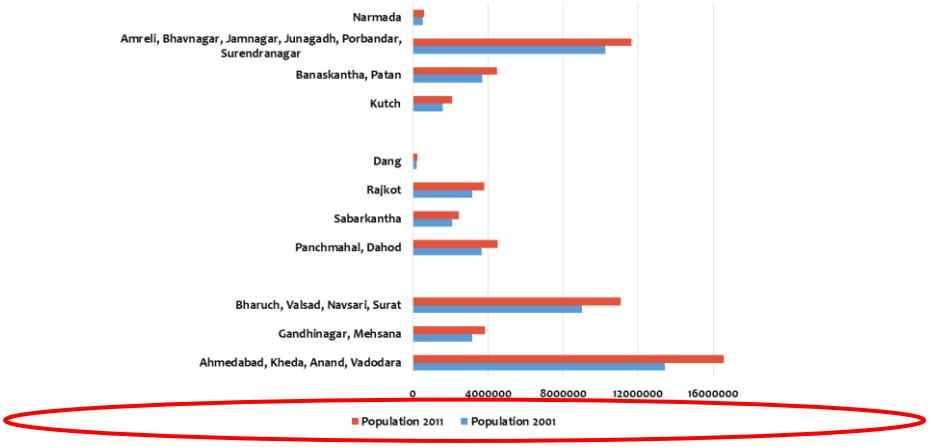
The state of Gujarat is in the front row of economic development of the country. Despite the major contributions, the state has larger regional disparities in the level of socio-economic development. It is one of the states, which is considered the pacemaker of economic development. It contributes to about 6.42 percent of the national GDP along with 21 percent of the country's export and 11 percent of the industrial production. Below Fig 3, is the map of the Gujarat state. [16]

Fig 3: Map of the Gujarat state



As shown below in Fig 4, the population growth in the section from Ahmedabad to Vadodara section has seen a predominant growth over a decade compared to the other sections of the state.

Fig 4: Population growth from Ahmedabad to Vadodara section (2001-2011)



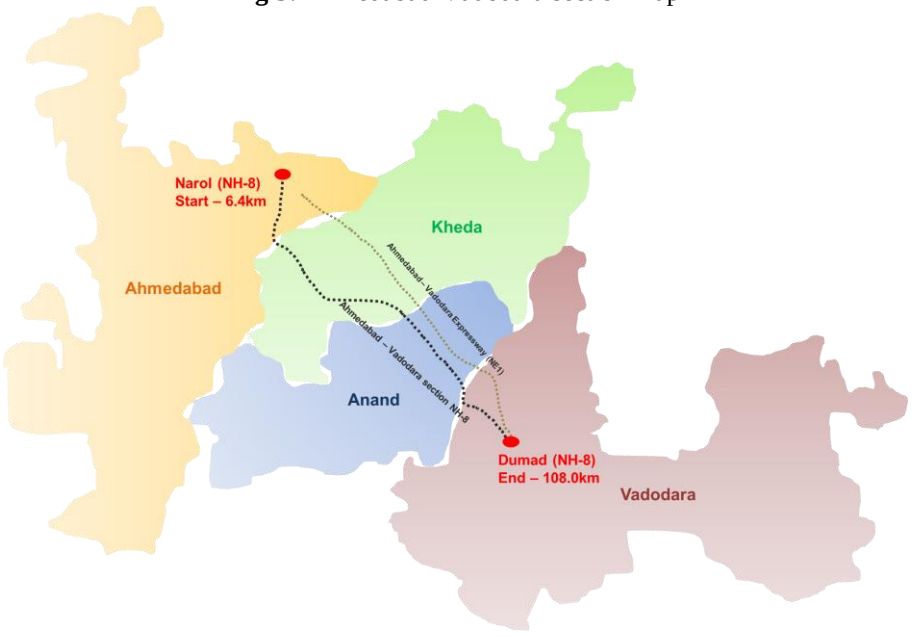
The section of the Ahmedabad-Vadodara NH-8 passes through four major districts of Gujarat state- Ahmedabad, Kheda, Anand and Vadodara and acquires a total length of 102.3km. The NH-8 corridor consists of major industrial and commercial activities, which increase the traffic intensity leading to the need of upgrading the four-lane to six-lane with suitable improvement options. The corridor carries the highest traffic volume and is considered the busiest road. The project road falls under Category-A. The project is actually a two-lane carriageway for 60km length with paved shoulders on either side and four-lane carriageways for about 33.80km length based on its traffic level and availability of funds and now it is upgraded to six laning.

The National Highway Authority of India (NHAI) under National Highway Development Project (NHDP) Phase-V, has invested six laning of Ahmedabad-Vadodara Section NH-8, the section is parallel to the Ahmedabad-Vadodara Expressway (NE-1). It is a part of the Delhi-Mumbai leg of the Golden Quadrilateral corridor. Six laning of Ahmedabad-Vadodara section NH-8 passes through 48 villages in these four districts.

The Ahmedabad-Vadodara section map is shown in Fig 5 below.

1. Ahmedabad – 05
2. Kheda – 21
3. Anand – 14
4. Vadodara – 08

Fig 5: Ahmedabad-Vadodara section map



The proposed project is the widening of existing four-lane to the six-lane road. The highway was widened to improve riding quality and journey speed and to reduce the traffic congestion on the existing highway and to improve the existing ROW with possibilities of concentric, right and left side widening to reduce the acquisition of land along the road.

V. DATA AND METHODOLOGY

The research involves a study to understand the importance of what are the indicators that are leading to the landuse changes. The data is utilised to analyse the indicators for development zones of the corridor and non-corridor villages to evaluate the landuse impacts. Here, the non-corridor villages are also considered to provide with the understanding of how the development scenario takes place with and without the infrastructure development. It brings an effective assessment framework for the EIA process of the highway projects to study and provide required sub-components of indicators to analyse. They are -

a. Sustainability indicators of the highway-widening project – Environmental, Social and Economical.
b. Landuse indicators of the highway-widening project – Demographics, Social, Economic and Market values.

The present study involves the secondary census data of the project area from the Census of India, along with the secondary data from the EIA reports of the project and jantri rates of the villages in the corridor and non-corridor villages. As per the EIA reports, the causes of the impacts due to highway project is shown below in Table 1 and the direct and indirect impacts of the highway project are shown below in Table 2.

Table 1: Causes of the impacts due to the highway project

Subject	Potential impact	Mitigation measures
Loss of productivity	The conversation of agricultural land to non-agricultural land.	Compensation.
Induced development	Insignificant landuse changes	Plan & guide the development.
Social environment	Displacement of people. Demolition of structures. Acquisition of agricultural land. Construction worker's influx.	Resettlement of people. Compensation for loss of structures, land under agriculture. Ensure employment. Setting up migrant workers at least 1km from the settlement.

Table 2: Direct and Indirect impacts of the highway project

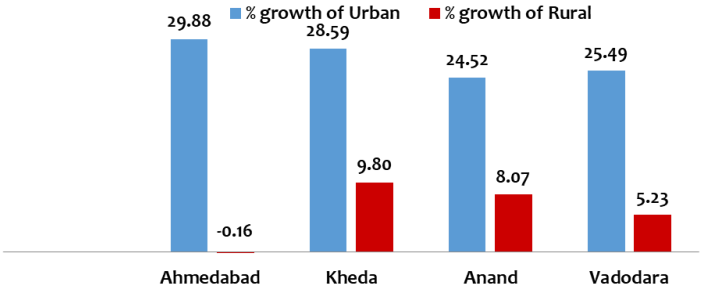
Subject	Direct impacts	Indirect impacts
Economic development	Attract new business with good access to improved traffic efficiencies.	Changes in landuse pattern (settlements, agricultural landuse etc.) Land values. Improved productivity, employment and economic growth. Modes of transportation improvements.
Employment Opportunities	During the construction period, provide employment to local workers.	
Reductions in accidents	Better crossings and local traffic circulation.	
Vehicle operating cost (VOC)	Lowers transportation cost. VOC reduced. Fuel consumption reduced.	
Environmental	Reduced emissions and noise levels.	

To perform a better assessment of the state of landuse impacts caused by the widening of the highway projects, it is important to compare the highway corridor villages with the non-corridor villages.

5.1 IDENTIFY THE DEVELOPMENT ZONES OF THE CORRIDOR AND NON-CORRIDOR VILLAGES OF THE PROJECT

Identifying the development zones of the corridor and non-corridor villages helps to understand the difference in the development and settlement pattern of the villages and the influence of an infrastructure project. The highest and least influenced zones of the Ahmedabad-Vadodara section NH-8 are analysed based on the percentage growth of the population in the last census decade shown below in Fig 6.

Fig 6: The population in the last census decade



The chart above shows a greater decline in the rural areas over the urban areas in these districts. In order to perform the assessment, the selection of the highest and lowest influential 10 villages each of the 48 villages of the corridor was based on the population growth of the villages where, the highest influential villages were mostly the census towns and the outgrowth villages, whereas the least influential villages were the rural villages.

The selection of the highest and lowest influential 10 villages each of the 48 villages of the non-corridor was based on the villages within the 15km aerial distance of the corridor, highest influential villages were mostly the census towns and the outgrowth villages, whereas the least influential villages were the rural villages. Fig 7 provides the growth percentages of the least and highest influential villages of the corridor and non-corridor zones of the highway.

Fig 7: The growth percentages of the least and highest influential villages of the corridor and non-corridor zones of the highway.

Corridor		Non-corridor	
Village	% growth	Village	% growth
Piplag	-10.4	Dhathal	-5.92
Uttarsanda	0.2	Bajwa(CT)	4.56
Dumad(WG)	1.9	Thaledi	5.09
Davda	4.2	Dharoda	6.07
Pij	4.3	Meghva gana	8.08
Vadala	4.8	Kanjoda	9.05
Kheda(M)	6.0	Hathaj	10.24
Ranoli(CT)	6.1	Samadara	10.25
Dabhan	6.3	kasor	11.05
Padmala	6.5	Sisva	11.83
Poicha	20.0	Bamroli	12.00
Jetalpur	21.2	Khandhali	14.42
Goblaj	21.5	Virod	15.65
Bedva	25.5	Chosar	17.64
Bareja	27.6	Mitral	18.34
Vaghasi	31.1	Sandesar	26.07
Aslali	33.2	Ankhodia	29.18
Bhalej	35.2	Kaloli	41.56
Nadiad (M)	39.6	Hadgood	59.58
Dumral	42.6	Jakhariya	60.77

VI. RESULTS & DISCUSSION

The assessment process of the indicators listed above is carried out in two phases. The assessment of:

1. Sustainability indicators for the highway-widening project through Z-Score analysis.
2. Landuse indicators of the Highway widening project through Pearson Coefficient analysis.

6.1 SUSTAINABILITY INDICATORS OF THE HIGHWAY WIDENING PROJECT

To perform the assessment, the three major sustainability indicators (i.e.) social, economic and environmental impacts are selected and various parameters that indicate the changes are identified. These parameters of each indicator are analysed using Z-score technique.

6.1.1 Z-Score

It is a data calculated to get the relationship to the mean. The score can be positive or negative near to the mean value 0.

- The positive score indicates the above mean to the standard deviation.
- The negative score indicates the below mean the standard deviation.

This statistical analysis can provide the quantitative assessment of the indicator and their range of sustainability impacts on the landuse. This model analyses sustainability impacts and their interrelationship with the settlement and development pattern along the corridor and non-corridor villages of the project. The sustainability indicators are Social, Economic and Environmental impacts of the project. Through Delphi technique, few experts were consulted to list down the famous environmental impacts caused due to the widening of the project. These impacts were given scores individually by each expert and cumulative scoring is done.

Fig 8 provides the weightage of the sustainability indicator in the corridor villages of the highway project.
Fig 9 provides the weightage of the sustainability indicator in the non-corridor villages of the highway project.

Fig 8: Assessment of the sustainability indicator in the corridor villages

Indicators	Weightage	Environmental Impacts	Cumulative Score	Net Value (score*weightage/ 100)	Out of (weightage/number of impacts)
Economic	28	Poverty	6	1.68	9.3
		Change in energy demand	4	1.12	9.3
		Hike in land prices	9	2.52	9.3
Social	37	Adverse impact on health	7	2.59	7.4
		Rehabilitation and resettlement	7	2.59	7.4
		Construction & development waste generation	7	2.59	7.4
		Divergence of traffic	7	2.59	7.4
		Change in comfort levels	6	2.22	7.4
Environment	35	Reduction in recharge	6	2.10	4.4
		Extraction of ground water	7	2.45	4.4
		Altered Drainage	6	2.10	4.4
		Soil erosion	4	1.40	4.4
		Impact on flora and fauna	6	2.10	4.4
		Change in thermal pollution levels	6	2.10	4.4
		Change in air pollution levels	6	2.10	4.4
		Change in noise pollution levels	6	2.10	4.4
Total			100	34.4	100

Fig 9: Assessment of the sustainability indicator in the non-corridor villages

Indicators	Weightage	Environmental Impacts	Cumulative Score	Net Value (score*weightage/ 100)	Out of (weightage/number of impacts)
Economic	28	Poverty	5	1.40	9.3
		Change in energy demand	0	0.00	9.3
		Hike in land prices	4	1.12	9.3
Social	35	Adverse impact on health	5	1.75	7
		Rehabilitation and resettlement	0	0.00	7
		Construction & development waste generation	6	2.10	7
		Divergence of traffic	8	2.80	7
		Change in comfort levels	7	2.45	7
Environment	37	Reduction in recharge	7	2.59	4.6
		Extraction of ground water	7	2.59	4.6
		Altered Drainage	7	2.59	4.6
		Soil erosion	7	2.59	4.6
		Impact on flora and fauna	6	2.22	4.6
		Change in thermal pollution levels	6	2.22	4.6
		Change in air pollution levels	6	2.22	4.6
		Change in noise pollution levels	6	2.22	4.6
Total			87	30.9	100

Here, in the above Fig 8 and Fig 9, among the weightages provided to the three sustainability indicators, the social impacts were given the highest weight compared to environmental impact for the corridor villages. The weightages provided in the non-corridor villages prove that the social and environmental impacts of the projects are higher and almost equally impacted due to the widening of highway projects than that of the economic impacts for both corridor and non-corridor villages, without any variation irrespective to the adjacent and distant villages located.

6.2 LANDUSE INDICATORS OF THE HIGHWAY WIDENING PROJECT

To perform the assessment, the two major indicators of impacts of the landuse are selected. As the project is linear, the stretch holds a large amount of land parcel; the land values are also taken as a range to calculate the extent of impacts on the project. These parameters of each indicator are analysed using Pearson correlation technique.

6.2.1 Pearson Correlation

It is the linear dependence between the two variables, dependent and independent as x, y with a range between -1 to +1.

- +1 indicates a perfect relationship and denotes that if x increases, y increases as well.
- -1 indicates an imperfect relationship and denotes that if x increases, y decreases.
- 0 indicates no linear correlation.

Based on the analysis conducted, the correlation coefficient analysis of the highway indicates a perfect relationship between the market values and the population along with the economic indicators. Whereas, the analysis indicates an imperfect correlation between the market value and the sex ratio. Also, the correlation coefficient analysis indicates an imperfect relationship between the market values and the population in the non-corridor villages. The results shown below in Fig 10 provides the cumulative assessment of the landuse impacts with indicators like-demographics, social, economic and market values of both the corridor and non-corridor villages.

Fig 10: The cumulative assessment of the landuse impacts of the corridor and non-corridor villages

Corridor Villages	Demographic	Social	Economic	Market	Total (D+S+E*M)
Aslali	0.3088	2.15488	13.5391	-0.89592	-14.33724055
Jetalpur	1.14594	-0.9613	2.87344	0.10993	0.336171607
Bareja	-0.86723	9.11091	5.25724	-0.8684	-11.72419639
Goblaj	1.01196	7.25845	10.9107	1.81045	34.72651547
Vadala	-0.42212	8.17094	6.1378	-0.63442	-8.809949924
Kheda	-7.66316	1.89139	4.13855	0.21296	-0.347810048
Davda	-0.83674	4.05802	-4.9074	-0.6946	1.171152083
Dabhan	-0.00396	-11.006	-11.582	-0.43542	9.837192426
Pij	-0.73905	8.54102	-5.5324	-0.13037	-0.295879608
Dumral	-0.18464	2.38785	-2.5432	3.98224	-1.354076352
Nadiad (M)	-1.25496	1.94594	2.48987	1.84528	5.869559313
Piplag	0.96384	2.60166	-22.001	-0.15062	2.77677638
Uttarsanda	0.75421	27.0154	-12.74	0.37039	5.566875805
Bhalej	2.13498	36.2018	1.06574	-0.75973	-29.93530126
Vaghasi	0.89756	-0.3438	-7.3452	-0.84725	5.754009588
Bedva	0.49487	0.25709	-3.0324	0.84355	-1.923637205
Poicha	1.38999	-2.0727	-4.7888	-0.30615	1.675076507
Padmala	0.53267	-0.6756	1.39221	-0.77514	-0.968402156
Ranoli(CT)	0.62794	-39.196	13.5547	-0.80403	20.11140317
Dumad	0.36404	6.45793	9.99494	-0.90674	-15.24856232
Non-corridor Villages	Demographic	Social	Economic	Market	Total (D+S+E+M)
Chosar	6.26427	-1.21973	2.171183	-0.78207	6.433651808
Samadara	447.50808	-8.91458	4.347942	-0.79915	442.1422941
Mitral	76.12867	-0.59393	10.59193	-0.55633	85.57033675
Bamroli	6.94307	0.320008	2.479137	0.54929	10.29150531
Kanjoda	1.38523	151.3679	6.508105	-0.31834	158.9429197
Dhathal	8.99101	-7.54031	8.658591	-0.66577	9.44352232
Dharoda	33.4952	-14.4499	3.688753	-0.60828	22.12576787
Kaloli	16.61309	1.009581	8.023235	0.98087	26.62677641
Hathaj	5.10008	0.479392	22.10031	0.71162	28.39140353
Thaledi	-0.62832	16.04682	-0.4594	-0.4069	14.55219502
Jakhariya	26.78008	71.71061	-3.81044	-0.30153	94.37872334
Meghva gana	0.69613	-0.69756	-13.479	-0.7861	-14.26650842
kasor	15.20433	3.462484	-6.77348	1.63565	13.52898302
Khandhali	0.74126	-0.65585	-6.07316	0.2127	-5.775043609
Sandesar	24.15035	3.491785	1.570014	0.7985	30.01064881
Hadgood	506.10128	-13.8339	-18.1109	0.41562	474.5720856
Virod	1007.16877	-1.12257	-1.06304	-0.68992	1004.293238
Bajwa(CT)	686.07968	-0.73334	2.045798	0.25186	687.6440012
Ankhodia	555.90329	0.886066	-16.5266	-0.46124	539.8015596
Sisva	126.98726	2.991175	3.87405	-0.14649	133.7059946

Hence, the cumulative impacts shown in the above table for the corridor and non-corridor villages prove the hypothesis. This shows that there is a perfect relationship between the landuse impacts and the highway project. As the results denote, all the corridor villages are experiencing the development and settlement pattern whereas the non-corridor villages are not. The above assessment model has proved that the highways affect the landuse largely and it is significant that the independent variable of a highway is dependent with the landuse impacts (socio-economic impacts) of a development zone, which changes the settlement pattern. These results clearly indicate that the landuse impacts of the corridor highways are significantly higher than the non-corridor villages.

VII. CONCLUSION

In this study, the focus was to evaluate the state of landuse impacts addressed in the EIA process due to the widening of the highway projects. The results have shown that the induced landuse impacts are predominantly caused due to the widening of the highway projects. However, they are not addressed clearly in the EIA process. The hypothesis proved that, even though the sustainability impacts of the corridor and non-corridor villages are similar, the landuse impacts at the villages towards the corridor were higher than the non-

corridor villages. Based on these conclusions, few generic issues were identified from the EIA process and suggestions were provided to involve the landuse impacts assessment into the procedure.

a. The availability and reliability of the baseline data:

The lack of data on the existing environment is one of the major impediments to the quality of EIA studies. The accuracy of the anticipated impacts depends on the amount of data available along with a proper selection of methods and techniques for predicting the impacts owing to the proposed developmental activities.

b. Lack of institutional capacity:

Undefined roles, responsibilities, and lack of effective implementation of EMP lead to the lack of political will and poor infrastructure at low levels making the implementation difficult. The assessment of the social components was neglected leaving to the SIA, where SIA is lacking integration to EIA. Therefore, integration of EIA and SIA is must for the better assessment approach.

c. Tokenism of Public participation:

Just to clear the EC, a tokenism of public participation is carried out and involvement of the stakeholders is minimum. The social impacts of the project are ignored. EIA is considered a project appraisal for sustainability. The integration of the EIA and SIA helps the participatory planning procedures; which are one of the main policy tools and methods that have been developed in concern of the environmental and social interests of the planning.

d. Threshold limit of EIA and its irrelevance to the project activity:

The threshold limit of the project restricts to the new and expansion highways to look into the impact areas in the surroundings. In India, EIA is considered as end-of-pipe where EIA is intervened at the end of all the major project decisions. EIA is more a project clearance but not a problem solver. Scoping is just done to meet pollution control measures and public consultation is just for namesake. The details, baseline data are to be taken at the initial stage and the appraisal stage has to be fixed. There is a gap in the EIA process with the project life cycle. EIA should be integrated with the project cycle for the performance benefits.

e. Co-relation between the land values and socio-economic parameters of the highway-widening project:

As highways are linear projects, the analysis proves that the correlation of the land value is perfectly related to the socio-economic parameters and the relationship between the land value and the amount of land acquired for the ROW. The threshold limit has to incorporate the buffer zones too.

7.1 GENERIC RECOMMENDATIONS

a. The NHAI acts and rules can also be integrated with the EC process for more effective results of the EIA process.
b. The carrying capacity along with the zoning atlas can be used with the EC process to incorporate the environmental aspects into the physical development.
c. The time required to obtain the EC is already long, it can be broken into various subgroups with the extra workforce to reduce the lag in the time for EC.

7.2 RECOMMENDATION-INTEGRATING THE EIA AND DP

EIA identifies critical decision factors and ascertains its condition giving priorities for development. Integration can eliminate duplication of activities to some extent. Cumulative impact assessment becomes dynamic, as critical decision factors are predefined. Each EIA can be judged by looking at its cumulative effect as well. DP is an appropriate tool at the city level for integrating EIA with the planning process. Ensuring the projects go through EIA integrated DP. Monitoring critical decision factors can be part of EMP, which will keep the baseline update for cumulative assessments.

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