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Editorial

The publication of the *European Journal of Geography (EJG)* is based on the European Association of Geographers' goal to make European Geography a worldwide reference and standard. As a result, the papers published in the EJG, including those on this issue, are focused in promoting the significance of geography as a discipline, in resolving global issues or applying geography, complementing, of course, the fundamental goals of improving the quality of research, learning and teaching of Geography. In other words with the EJG the European Association of Geographers provides a forum for geographers worldwide to communicate on all aspects of research and applications of geography with a European dimension, but not exclusive.

As a result, every issue of the EJG provides a glimpse of the important role Geography can play in helping researchers, academics, professionals as well as decision makers and politicians in resolving a wide spectrum of problems. In other words, EJG following Geography which connects the physical, human and technological sciences is aiming at enhancing teaching, research, and of interest to decision makers, problem solving. That is, in every issue of the journal a reader can find answers of how aspects of these sciences are interconnected and are forming spatial patterns and processes that impact on global issues and thus effecting present and future generations.

The goal of the editorial team, which up to now has been achieved to a great extent, is that the papers of the EJG by dealing with places, people and cultures, will explore those issues ranging from physical, urban and rural environments and their evolution to climate, pollution, development and political-economy. Thus, your contributions to the EJG are not only desirable, but necessary for Geography and Science as a whole.

Kostis C. Koutsopoulos
Editor EJG

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COMMON LAND RESOURCES, LIVELIHOOD AND SUSTAINING THE RURAL POOR IN INDIA, A GEOGRAPHICAL ANALYSIS.

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Abstract

As the name indicates the common land resources (CLR) have "common access" to all and are used for various economic gains. They include community land, community pastures, community forest, wildlife, wasteland, common dumping, threshing ground, the banks and beds of rivers regulated by social conventions and legally enforceable rules. The forests provide timber; pastures support the livestock whereas agro-forestry and social forestry is also practiced. In general, they account for a substantial share of income, socio-economic development, and livelihood of the poor households in rural India.

The present study is an attempt to analyze the spatio-temporal distribution and change in CLR of Bulandshahr district in the Indo-gangetic plain since last decade. Further, it investigates the role of common lands in providing livelihood to rural poor. The study reveals that there is a decrease in the common land resources during the last decade. The continuous decline in agricultural profits has created a situation where small landholdings are becoming non–viable for agricultural practices. Thus, the majority of the households were found to utilize these resources to supplement their income. Some of the households are even dependent upon them for their livelihood and sustenance. The income from CLR had a significant share in their total household income thereby creating an eminent need for conservation of these resources to ensure livelihood and sustenance of its users.

Keywords: *Landless, poor, livelihood, rural, common property resource, common land resources.*

1. INTRODUCTION

India is an agricultural country where a major part of its population lives in rural areas with agriculture as the main economic activity. Thus the livelihood of the people is highly dependent upon their land resource. Although the Green Revolution has brought tremendous change in production of food grains in India, still the productivity of various food grains is quite low as compared to other agrarian nations. As the maximum utilization of agricultural land has already taken place the areal extent of agricultural activities is not found to be much over the past few decades. Thus, even after the Green Revolution the dependency of Indian agriculture upon the "land resources" is quite an evident. The loss of agricultural land to the non-agricultural sector is also rapidly taking place due to urbanization. Further, natural

hazards like floods and land degradation by soil erosion also accentuate the loss of arable land (Shit P.K, 2015).

Due to continuous fragmentation of land over the past generations the landholders have very small pieces of land and very few have medium or large size of land holdings. Thus, the landless, marginal and small farmers generally constitute more than half of the total households in a most of the Indian villages. Thus, the landless people, marginal and small farmers having insignificant landholdings which are unable to fulfil their needs rely upon the "Common Property Resources" (CPR) for supplementing their income and sometimes for obtaining their livelihood also (Ostrom E., 1990). The studies of common property resources (CPR's) have been undertaken by various scholars at the national and international level since the publication of Hardin's (1968) paper *"The Tragedy of Commons".* The importance of commons lays both in rural and urban space. In urban areas the common public spaces can make people gather and make the surrounding of the place more successful. Furthermore, public common spaces can be useful in applied urban development too, as with using the elaborated methods it might be easier to plan, prepare and effectuate public space developments (Vedredi K., 2016). Traditionally, the rural CPR's include community land, community pastures, community forest, wildlife, wasteland, common dumping and threshing ground, watershed drainages, village ponds, rivers and rivulets and their banks and beds which are regulated by social conventions and legally enforceable rules (Burger J. and Gochfeld M.,1998).

Broadly speaking, common property resources include all such resources that are meant for the common use of the villagers. CPRs include all resources like village pastures and grazing grounds, village forest and woodlots, protected and unprotected government forests, wasteland, common threshing grounds, watershed drainage, ponds and tanks, rivers, rivulets, water reservoirs, canals and irrigation channels (Kumar A., 2013). In the pre-British India, a very large part of the country's natural resources was freely available to the rural population (Singh S., 2013). These resources were largely under the control of local communities. Gradually, with the extension of state control over these resources and the resultant decay of community management system, CPRs available to the villagers declined substantially over the years. Today, in almost all parts of the country, the villagers have a legal right of access only to some specific categories of land and water resources. Nevertheless, it is widely held that CPRs still play an important role in the life and economy of the rural population (NSSO, 1999).

The Common Land Resources (CLR) is the sub-category of CPR. The term "*Common Land Resources*" (CLR) is used to refer to property owned and defended by a community of resource users, to property owned by no one, and to property owned by a government to which the people have "common access" (Jodha N.S., 1986). It includes village pastures, common grazing grounds, bush lands, threshing grounds, waste dumping places uncultivable fields, wastelands and rangelands. The common access and free rider behaviour have led to a continuous decline in the common land over the last decades (Rodgers, C.P. et al., 2011). The CLR in Indian context have been specified into five categories of land use/land cover viz. forest, pasture and grazing land, cultivable wasteland, barren and uncultivated land and fallow lands other than current fallow (Salman M.S. and Munir A., 2013). The CLR are common to all and no one has any exclusive right upon. The forests provide timber, the pastures support the livestock of the farmers and the uncultivated and barren lands are utilize for the construction of houses, poultry farms, animal husbandry, and other uses.

Chadrashekhar A.V. et al. (2016) studied multi-temporal satellite datasets of Sonbhadra and Singrauli Region of Uttar Pradesh and Madhya Pradesh respectively over a period of more than two decades and observed significant land trajectories in various land use land cover classes. Further, most of the change was found in the forest area which converted to mining areas and settlements. A small amount of forestland transformed into scrubland,

agriculture land, and barren land also. The CLR in a village includes the land administered by the village *panchayat* or community including the land which lies within the formal boundary of the village (Jodha, N.S., 1990, Arnold, J.E.M. and Stewart, W.C., 1991). Sometimes, there is a well-defined category of land which referred to as *panchaya*t grazing/pasture land and is known as *gauchar, gochar, gairan* and *gomol* in different agro climatic regions. Apart from that generally, there are some demarcated areas in every village for various purposes and are accessible to all the villagers. They are the areas allotted for processing of agricultural produce, storing of grains, other agricultural produce, firewood, use for other household enterprise, for recreational or religious purposes and to organize village fairs and marriages. Sometimes a portion of the land is allotted for periodic markets also. These all are constituents of CLR.

The continuous fragmentation of the land and increasing cost of production has rendered small pieces of land to become uneconomical (Khan N. et al., 2009). The increasing population has resulted in immense pressure on the land resources of the country, especially the CLR (Jodha, N.S., 1985). The CLR are a source of livelihood for the rural poor (Thomson et al. 2001). Thus, landless people, marginal and small farmers generally utilize the CLR for various economic gains (Munir, et al., 2008) and are one of the important sources of poverty alleviation, sustainable regional development and livelihood to the poor households (Salman M. S., 2015, Ali, Nursadh, 2007). Runge F. (1986) has elaborated a number of reasons why "common resources" may continue to be both efficient and equitable, complementing and combining with private rights in a way consistent with the resource endowments of village economies.

The landless people and small landholders are engaged in different economic activities for their sustenance (Khan N. et al., 2012). The major occupation of the landless people is shop keeping, business, agricultural labour, rickshaw pulling, labour and other petty jobs. Due to low employment opportunities, high competition amongst them, increasing food prices and low remuneration of their work have made them the most deprived section of the villages. The present study aims to understand the role of CLR upon the level of sustenance of the user households.

2. OBJECTIVES AND RESEARCH DESIGN

The present study aims to analyze the spatial distribution, temporal change, status of income and dependence of user households upon CLR in the study area. The study is based on the primary data collected through field survey and secondary data collected from various government sources. Two villages from each 16 blocks (sub divisions) were selected for the detailed survey. Thus total 32 villages were sampled for field survey (Figure 1). They were categorized into two classes. The first class included villages having a maximum population of 2500 persons whereas the population range for second class was 2500 to 5000 persons. Within these two classes one village was selected along the main road while another within a range of 10 km from the main road.



Figure 1. Study Area and Location of Sampled Villages.

The total households covered under the survey were 1331. Stratified random sampling was undertaken in all the sampled villages and a well framed questionnaire was used to record the primary data regarding social structure, occupation, income, income through CLR and utilization modes of CLR.

3. GEOGRAPHICAL OUTLINE OF THE STUDY AREA

District Bulandshahr lying between 28.4 0° North and 28.0° north latitude and 77.0° East and 78.0° East longitude is a part of Ganga-Yamuna *doab* (interfluves) in western Uttar Pradesh. The district has a total area of 4512 Km^2 with a population of 34, 99,171 persons (Census 2011). The district is about 84 km in length and 62 km is breadth. The district is 237.44 meters above sea level. Administratively district Bulandshahr is divided into 7 *tehsils* (subdivision) comprising 16 developmental blocks which include 21 towns and 1242 villages. The district shares common boundaries with New Delhi, Meerut, Ghaziabad, Gautam Budh Nagar and Aligarh districts on various sides. A large part of the district comes in National Capital Region (NCR). The river Ganga separates it from Moradabad and Badaun districts and river Yamuna separates the district from Haryana and Delhi state.

4. ANALYSIS

Total reported area of the Bulandshahr district during 2014 was 3, 64,974 hectares. The total area under CLR during 2014 was 19,985 hectares accounting for 5.48 percent of total reported area. Figure 2 shows that the forest has the largest share among the various

categories of CLR in Bulandshahr district. It was found to be 39.00 percent. The next major share was of barren and uncultivable land (29.63 percent) followed by cultivable wasteland (21.42 percent).

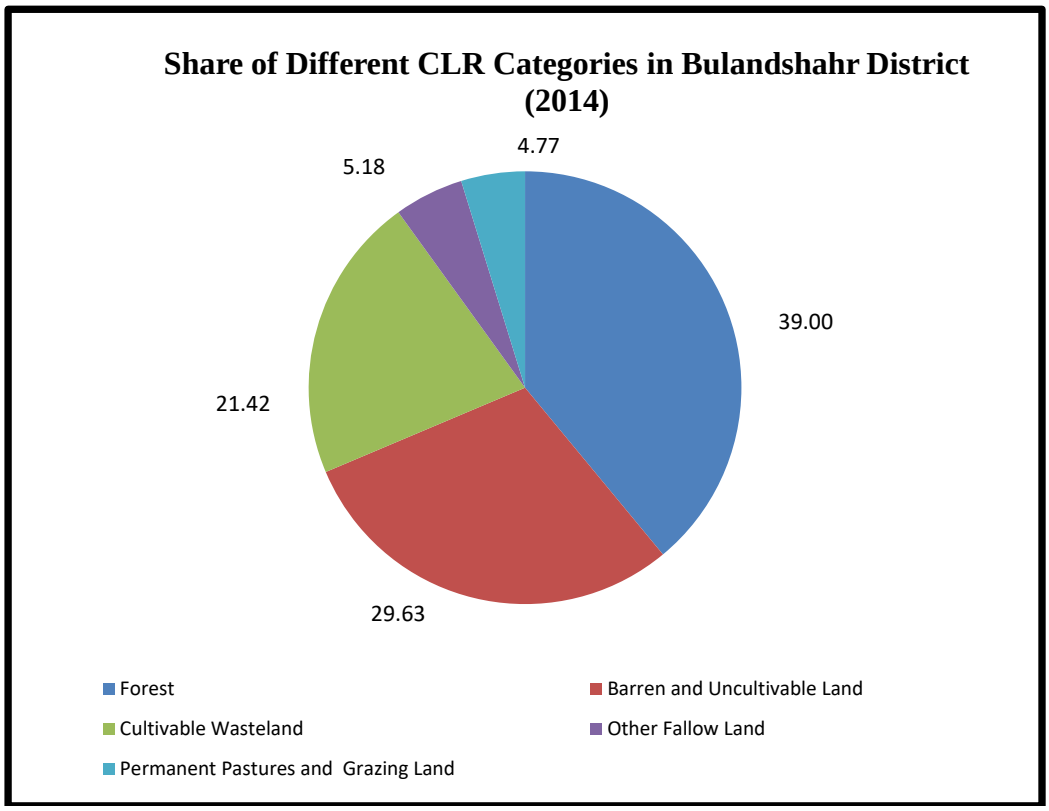


Figure 2. Share of different CLR categories in Bulandshahr District (2014).

The share of other fallow land and permanent grazing and pasture land was 5.18 and 4.77 percent respectively. Table 1 shows that there is an overall decline in CLR of Bulandshahr district during last two decades. The total area under CLR during 1994 was 29,513 hectares which declined to 19,985 hectares in 2014.Thus, there is an overall decline of 9,528 hectares (-32.28 percent) in last two decades. The block-wise analysis reveals that all the blocks have shown a declining trend in the CLR except three blocks which have shown a positive change during the same period. The increase in CLR is these block is due to increase in area under forest in all these blocks. Further, there is an increase in the wasteland, barren land and fallow land in Unchagaon, Dibai and Anupshahr blocks respectively. The decline in the CLR of other blocks was recorded maximum in Pahasu (-64.09 percent) followed by Jahangirabad (-63.23 percent) and Danpur (-56.78 percent) whereas least decline was observed in Arniya (-21.33 percent).

Table 1. Block wise Change in Common Land Resources of Bulandshahr District (1994-2014).

S. No.	Block	Area Under CLR (In Hectares)		Change in CLR (1994-2014)	
		1994	2014	Area	Percentage
1	**Pahasu**	1462	525	-937	-64.09
2	**Jahangirabad**	2456	903	-1553	-63.23
3	**Danpur**	1557	673	-884	-56.78
4	**Lakhaothi**	1682	804	-878	-52.2
5	**Bulandshahr**	1367	712	-655	-47.92
6	**Gulaothi**	559	311	-248	-44.36
7	**Khurja**	4527	2583	-1944	-42.94
8	**B.B. Nagar**	491	285	-206	-41.96
9	**Shikarpur**	2960	1719	-1241	-41.93
10	**Syana**	477	286	-191	-40.04
11	**Sikandrabad**	3828	2521	-1307	-34.14
12	**Araniya**	3181	2492	-689	-21.66
13	**Agauta**	-	475	-	0.00
14	**Dibai**	1283	1406	123	9.59
15	**Anupshahr**	2800	3189	389	13.89
16	**Unchagaon**	883	1101	218	24.69
Total		**29513**	**19985**	**-9528**	**-32.28**

Source: Statistical bulletins of Bulandshahr district (1994 and 2014)

The social structure of India is such that the ownership of land is an important indicator of an individual's socio-economic status in the society. As the land is already very scarce, it is much valued by the Indian people. Thus, land holding is an important feature to determine one's influence in the family, social issues of the village and the society. Further, the individual's decision regarding the utilization of CLR is also affected by one's land ownership. The smaller farmers are more prone to use the CLR for increasing their economic gains than the large farmers. The primary surveys of 1331 household's reveals that only 67.69 percent (901 respondents) households possess land while the rest 32.21 percent (430 households) are landless.

Table 2 reveals that among the landholders the maximum respondents (73.91 percent) have marginal land holdings. The presence of a large number of marginal landholders in a village is an indicator of poor socio-economic condition of the majority of the people in general and the village as a whole.

Table 2. Landholding Status of Sampled Households in Bulandshahr District (2014).

S. No.	Category	Number	Percentage
1	**Marginal (< 1Hect.)**	658	73.91
2	**Small (1-2 Hect.)**	112	12.33
3	**Semi Medium (2-4 Hect.)**	101	10.62
4	**Medium (4-10 Hect.)**	18	2.01
5	**Large (<10 Hect.)**	12	1.13
Total Landholders		**901**	**100.00**

Source: Field Survey (2014)

The present situation of a large number of marginal land holdings in the villages of India has arisen due to continuous fragmentation of the ancestral land into the family members. The next largest share is of small farmers (12.33 percent) followed by semi medium (10.62 percent), medium (2.01 percent) and large farmers (1.13 percent). The study reveals that there are almost one third landless people in almost every village and the marginal and small landholders constitute about 90 cents of the total landholders. Thus, the users of CLR are mostly landless people, marginal farmers and small farmers rather than the large landholders. Further, the mode of utilization is also governed by the landholding status of the user.

The sources of livelihood, income, and employment of any individual are highly influential in the mode and intensity of utilizing CLR. Therefore, it is worthwhile to analyze the sources of income of the respondents. Table 2 shows the distribution of respondents grouped into five categories according to their major sources of income. In general, the largest share of the respondents was found to be engaged in crop cultivation (37.95 percent) followed by agricultural labour (19.73 percent), animal husbandry (17.11 percent), other employments (13.44 percent) and business/ job (11.78 percent). Although, the share of people engaged in agricultural activities seems to be less than 40 percent but many farmers were practicing agriculture as their second or third occupation. Many marginal farmers have started non-agricultural activities along with the traditional agriculture on their small piece of land. Sometimes they earn more from business, animal husbandry or other occupations rather than crop cultivation. Some of the respondents are found to earn their livelihood through different sources, in different parts of the year or in different seasons as per the availability of employment. The agricultural labours generally work for some months during the sowing and harvesting period. In the other parts of the year they find employment as labour in the nearby town, Bulandshahr city or migrate to other places for few months.

A major share of respondents was found to be engaged in animal husbandry. The present-day agriculture is supplemented by the organic manure produced by the animals. Thus, people find it quite profitable to keep animals for the milk and manure. Further, the cost of feeding is not realized because most of the animals graze on the CLR or rely upon the fodder crops produced in fields of the owner. Very few respondents were found to feed their animals by purchasing the fodder for them. The high demand for milk and meat has resulted in the increase in prices of animals. Thus, people find it very useful to sell the animals when they do not give milk or when they require immediate money. They keep the animals as an asset and get the immediate money by selling them to the nearby livestock market. The high demand of milk and meat gives them good returns. Some of the respondents were found to keep the livestock for a certain period of time and then sell it when they find it difficult to feed them during their difficult times.

The people lying under other employment category are engaged in various activities like rickshaw pulling, conductor, driver, watchman, shop attendant, property dealers, contractors, shopkeepers, masons, milk collection, agricultural marketing and other petty jobs. The primary survey reveals that most of the people are engaged in more than one type of livelihood and thus they have more than one or multiple sources of income. The respondents were found to be engaged in agriculture and some of them even practiced livestock husbandry and business also. Similarly, the people engaged in business may also get some employment as agricultural labour during the harvesting season. Some of the respondents working as labour were also engaged in livestock husbandry and other petty jobs.

The field survey of 1331 household revealed that 992 households (74.53 percent) are using CLR in various ways for economic gains. The respondents were found to utilize CLR's for more than one purpose also. Among the total 992 households utilizing CLR the most common mode of utilization was grazing followed by social forestry, agro-forestry and other uses. The grazing of livestock is being undertaken at large scale among the users both in terms of a number of users engaged in grazing and the magnitude of grazing. Further, many users are able to keep their livestock only because of the access to CLR which is exploited by them without any control or fear of the other users who equally share the CLR. The other uses of CLR included the use of CLR as manure pits, cemeteries, storage grounds, playgrounds, temporary construction of sheds for animals, storage of fodder and agricultural produce etc.

The income generated from the use of CLR is additional income over the income from different sources. Table 3 gives the share of CLR income of the sampled households.

Table 3. Major Source of Income of Sampled Households in Bulandshahr District (2014).

S. No.	Major Source of Income	Number	Percentage	Avg. Annual Income (In Rs.)
1	**Crop Cultivation**	498	37.95	44580
2	**Agricultural Labour**	276	19.73	23000
3	**Animal Husbandry**	217	17.11	38750
4	**Other Employment**	184	13.44	33285
5	**Business/Job**	156	11.78	37500
Total Sampled Households		1331	100.00	36763

Source: Field Survey (2014)

It is seen that in general the households using CLR obtain 18.79 percent of their total annual income through CLR. (Table 4) The maximum share of CLR income was observed in the income of households exclusively engaged in Animal husbandry (27.72 percent) followed by agricultural labourers (24.02 percent), crop cultivation (16.36 percent), other employments (15.56 percent) and business/ job (9.53 percent).The high share of CLR income in animal husbandry is due to use of CLR for grazing the livestock by CLR users in general and the landless households in particular. Further, social forestry, agro-forestry and other uses also give substantial income to the CLR users.

Table 4. Share of CLR Income in Total Annual Income of Sampled Households in Bulandshahr District (2014).

S.No.	Category	Income of Households Using CLR (In Rs.)			Share of CLR Income (In %)
		Main Occupation	CLR	Total	
1	Crop Cultivation	44580	8720	53300	**16.36**
2	Agricultural Labour	23000	7270	30270	**24.02**
3	Animal Husbandry	38750	14860	53610	**27.72**
4	Other Employment	33285	6133	39418	**15.56**
5	Business/Job	37500	3950	41450	**9.53**
Total Sampled Households		**36763**	8504	45267	**18.79**

The role of landholding status and a major source of income of the respondents greatly determines the use, mode of utilization and intensity of utilizing the CLR.

The mode of land use is also related to the size of landholding. Similarly, the sources of income are also determined by the size of landholding of an individual. Thus, nine variables pertaining to landholding and sources of income and four variables pertaining to use of CLR, income from CLR and its share in the total income of user households (Table 5) were selected at the village level to analyze their relationship in the study area.

Table 5. Selected Variables at Village Level

Variables	Variables of Landholding and Main Source of Income
X_1	Percentage of Landless Households
X_2	Percentage of Marginal Landholders
X_3	Percentage of Small Landholders
X_4	Percentage of Large Landholders
X_5	Percentage of Households with Major Source of Income from Crop Cultivation
X_6	Percentage of Households with Major Source of Income from Business/Job
X_7	Percentage of Households with Major Source of Income from Animal Husbandry
X_8	Percentage of Households with Major Source of Income from Agricultural Labour
X_9	Percentage of Households with Other Employment
Variables	**Variables of CLR: Use and CLR Income**

Y_1	Percentage of Households Using CLR
Y_2	Percentage of Households Using CLR for Pasture/Grazing land
Y_3	Average Annual CLR Income of Household (In Rs/-)
Y_4	Percentage Share of CLR income to Total Household Income

Table 6 gives the coefficient of correlation of the selected variables.

Table 6. Correlation Values of Selected Variables in Sampled Villages of Bulandshahr District.

Variables	**Y_1**	**Y_2**	**Y_3**	**Y_4**
X_1	0.719	0.741	-0.759	0.8
X_2	0.717	0.741	0.759	-0.8
X_3	0.994	0.705	-0.532	0.573
X_4	0.412	-0.776	0.79	-0.583
X_5	0.83	-0.598	0.57	0.472
X_6	0.619	0.437	0.917	0.685
X_7	0.63	0.771	0.458	0.982
X_8	0.638	0.33	0.806	0.444
X_9	-.894*	0.642	0.604	-0.626

*Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed)

The study reveals that landholding is an important indicator for use of CLR. The landless, marginal and small landholders were correlated positively with the use of CLR. Further, landless were found to positively correlated with using CLR for grazing. It was found there was a negative relation between X_1 and Y_3 but as a strong positive relation is observed between X_1 and Y_4 thus it means although the CLR income of landless is quite low but still it contributes a significant share to their total income. This clearly shows the pathetic situation of the landless CLR users and their dependence upon these resources. The marginal and small landholders were also found to be positively associated with grazing of animals on CLR but large landholders were not associated with it. Thus, CLR is not used by large landholders for grazing their animals. The use of CLR showed a most strong positive relation with households having crop cultivation as the main source of income but there is a negative relationship between X_9 and Y_1 thus people with other employments are not using CLR. Those having the main source of income from business or job were having the positive relationship with Y_3 indicating that they are using CLR for obtaining extra income. The households engaged in animal husbandry (X_7) were positively related with Y_2 and Y_4 .Thus, they are dependent upon CLR for grazing their animals.

The share of households using CLR is 74.53 percent. The present study indicates that CLR has become an integral part of the livelihood of maximum households who obtain almost one fifth of their total income from them. Further, the landless who obtain their livelihood from animal husbandry are dependent upon CLR for grazing their animals. In fact, they are only

able to keep their livestock because of the open access to CLR upon which they feed their livestock. The milk obtained from them is one of the major sources of their daily income and is crucial to fulfil their regular financial requirements. They also use the cow dung as fuel thereby saving the cost of purchasing alternative fuel. The landless people are mainly using the CLR's for grazing their animals. They generally keep cows and buffaloes for domestic and business purposes. The declining quality and size of CLR make the landless people prone to loss of their livelihood. Therefore, the role of common land resources in the sustenance of the landless people is quite an evident. Consequently, there is a need to manage these resources for ensuring and providing a better livelihood and economic benefit for its users. The judicial management of these resources will not only lead to social change and social harmony but also lead to sustainable development over times.

The study reveals that there are many problems in managing these resources. The common land resources have an open access to all. This has led to the problem of its preservation and management. Presently, there are no laws for punishing those causing degradation or misuse of these common resources. Until the people are not punished for their undue activities and rampant use there is a meagre chance for the conservation of these resources. Although there are few programs run by the government for land reclamation but the local people do not participate in the programs of land conservation. The lack of interest of the local people has an adverse effect on many government schemes of land reclamation, afforestation and soil conservation. The common land resources are not always accessible to deprived sections of the society and often encroached upon by the wealthy, prosperous and large farmers who do not care for its proper management. The problem is enhanced due to many political issues related to the allotment, management and control of the common land resources. Everyone who has a political influence tries to get the benefit out of these common resources.

5. CONCLUSION AND SUGGESTION

The CLR are declining. The landless people obtain their livelihood from utilizing them. The increasing population is a threat to their degradation and extinction. Thus, there is an immediate need to save them from degradation and extinction. The problems faced in managing CLR are open access, ignorance, lack of suitable laws, social injustice and political problems. Therefore proper survey, suitable laws, protection from encroachment and allocation of CLR to poor and landless people is need of the time. There is a need to educate people regarding conservation of the resources and environment with the help of mass media. The local administration should be vigilant to check the encroachment upon CLR. This can be easily done by involving the local people for the protection of forests and pastures by giving some incentives. A suitable method may be a participatory approach of the locals by the village administration. In this regard, a committee may be constituted in order to govern the use of CLR and also to form suitable conventions or laws in order to protect these resources from rampant use and over exploitation. The poor and landless people should be allotted these lands for a small period of time.

The present paper has elaborated the level of accessibility of rural households to common resources. It further examines the landholding status of the users and their preference of using the common resources. The paper also includes the various sources of income of rural households and the proportionate share of CLR income of different landholding categories. Finally, the present research also analyzes the relationship of landholding and income of users with accessibility, mode of utilization and income from CLR. It was observed that judicious use of commons can only provide sustainable livelihood to rural poor.

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GIS IN ELECTRICAL ASSET MAPPING: THE CASE OF BHADOHI, INDIA.

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Abstract

With the advancement of GIS technology, electricity asset system in India is going to be much more benefited in power system planning and management. The integration of GIS with electric utilities is tremendously improving the planning and operation of the power system. This paper basically focuses on the application of emerging technologies like GIS (Geographic Information System) and GPS (Global Positioning System) which are capable of carrying out power system analysis like load flow analysis, load movement, electrical line (HT/LT) changes and electric asset management system using the ArcGIS 10.1 platform in Bhadohi city of Uttar Pradesh, India. High resolution remote sensing data is used to prepare various thematic layers i.e. settlement, transportation network map and other land base and performed survey of electrical asset data of Bhadohi, which is finally integrated into GIS platform. Number and types of electric poles, poles ID, distribution transformers (DTRs), the length of HT/LT lines etc. are collected during the field survey. The geographic location of each distribution transformer in the study area has been acquired using GPS and mapped in the hard copies of satellite data. It was that while there were 433 distribution transformers found in 2015 only 336 were recorded in 2011.

Keywords: *GIS, GPS, electrical asset, ARC GIS-10.1, DTRs, HT/LT lines.*

1. INTRODUCTION

Electricity is a vital aspect of the utility sector that is very necessary to the smooth and meaningful development of any city. It is an important part of any person living both in rural and urban region. It has brought many things that definitely have made many marvels and life would seem so hard without it (Govindaraj and Nailwal, 2013). The prime purpose of an electricity distribution system is to meet the customer's demand for energy after receiving the bulk electrical energy from transmission or sub-transmission substation (Kanmani and Suresh Babu, 2014). In India, the electric power industries have been developing power transmission system to follow up with a rapid growth of the power demand due to increasing population pressure on this sector. The electric distribution system is dedicated to delivering electrical energy to end users (Parkpoom, 2013). Electrical Utilities need an efficient way to monitor and maintain their infrastructure that enhances the operations and extend the life of their

assets-or notify-them of potential asset failure. For effective asset management, utilities need accurate information feeding of their asset inventory. Power distribution reform is widely considered today as fundamental to the improvement of the commercial and financial viability of India's power sector. The complexity of electrical distribution power system is only a reason for introducing new geospatial technologies as GIS and GPS (Global positioning system) that carries out complex power system analyses e.g. optimization of networks, load forecasting in very less time period as and when required (Parkpoom, 2013). A few utilities and distribution companies have started using GIS or geospatial technologies in order to improve their efficiency levels pertaining to the operations, as well as, customer services (USAID, 2006).

Nowadays, for developing large scale electrical network geodatabases, robust methodologies that integrate traditional data conversion techniques with sophisticated project administration mechanism to enable efficient workflow management and quality control is required. Technological advancement is taking place much faster in generation and transmission sectors. With the radical changes that the electric utility industry is facing, customer choice has become the buzzword for the entire country. Nearly every stage is implementing limited choice programs, choice pilots or at least debating choice. Nowadays, in many developing countries several power utilities are continuing with old conventional manual systems in the distribution sector. The network asset maps in many cities are not properly updated, the customer bills and related data is inaccurate and the details of network assets and facilities are unavailable and not in an appropriate format so that it's proper management are very difficult to the electrical department.

Many companies and electrical departments in India are using GIS techniques for asset mapping and consumer indexing, which explains the concept, the systems' requirements and varied application of this tool in asset management, load predicting, delivery system planning and customer care etc. Use of GIS will simplify easily updatable and manageable database to cable to the needs of monitoring and sustain reliable quality power supply, effectual MBC (Metering, billing and collections), comprehensive energy audit, theft recognition and a decrease of transmission and distribution losses. All these measures will ultimately advance the overall internal effectual and help accelerate attaining commercial feasibility.

A new period of higher implication has arrived for the global positioning system (GPS) and GIS functions at electric utilities mapping. Improved hardware, software, and networking technology have made prospects for the utility industry to form and benefit from more comprehensive and sophisticated GIS. GIS applications have changed from their foundation in map production to advanced analysis tools for planning and operations. To a degree never equaled before, utility managers are looking to their GIS programs, occupied with progressively accurate data collected by global positioning system (GPS) technology, before creating any kind of decisions in the urban and rural areas.

Many utilities have the chance to use base map data created by a local or national government organization, or in exceptional cases, by different utility helping the same area. When digital base maps are not accessible, companies are forced to depend on other sources for base mapping. Many utilities basically digitize base map planimetric features in GIS vector format from present paper facilities maps and others favor to scan the current utility or other paper base map source, and use the resulting raster image as the backdrop for the digital facilities map.

With this competence comes an expectation for GIS/GPS professional to deliver higher levels of planning and management of their data collection process (Maguluri and Lakshmi, 2006). A well-designed GIS-based transmission and distribution network may assistance minimize loss of electricity and allow pooling of supply and demand in order to maximize the efficacy of the electric power system and decrease environmental effects of power generation

(Sekhar et al., 2008). The GIS overlays single line diagrams (SLD) of the distribution network with an efficient customer, meter, and network for distribution planning, data analysis and reporting. The Transmission and Distribution losses in India are in the range of 35-40%. These can be reduced by using GIS-based spatial data and improve the energy competence (Raghav and Sinha, 2006). It is also very helpful for mapping of wide-ranging electrical network including low voltage system or high tension/low tension (HT/LT) network and customer supply points and distribution transformers (DTR) with spatial locations covered on remote sensing high resolution satellite imagery and/or survey maps (Kumar and Chandra, 2001, Lgbokwe and Emengini, 2005). GIS-based buffer zone analysis from spatial informatics can assistance in routing the high tension transmission line nearby to an urban populated area, where spatial buffer zone will keep the residents from strong electric and magnetic field effects (Wang et al., 2010).

GIS layers of information are confined in the map representations which contain a lot of information kept in layers i.e. high tension/low tension (HT/LT) network coverage, roads and buildings etc. The next layer can have useful information on the electrical equipment i.e. LT/HT poles, conductors, distribution transformers etc. (Hassan and Akhtar, 2012). Most of the electrical network/equipment have a geographical location and the full advantage of any network development can be had only if the work is carried out in the geographical context (Sekhar et al., 2008). This paper delivers an impression of how GIS is being used in the utility industry to help meet today's requirements. It begins with a brief discussion of how GIS has evolved in electrical utilities to its current technological state. The present paper describes the survey based GIS method to analyses the changes in the electrical assets network and features during 2011 and 2015.

2. STUDY AREA

The study area covers city area of the Bhadohi, a Lok Sabha constituency and a municipal board in Sant Ravidas Nagar district in Uttar Pradesh state, India. It is also known as the "Carpet City," as it is home to the largest hand-knotted carpet weaving industry hub in South Asia. It is located at 25.42°N 82.57°E. It has an average elevation of 85 metres (278 feet).

This district is situated in the plains of the Ganges River, which forms the south-western border of the district. The Ganges, Varuna and Morva are the main rivers. The district is surrounded by Jaunpur District to the north, Varanasi district to the east, Mirzapur district to the south, and Allahabad district to the west. The district has an area of 1055.99 km². Location map of the study area is shown in Figure 1.

According to the 2011 census, Sant Ravidas Nagar (Bhadohi) district has a population of 1,554,203. The district has a population density of 1,531 inhabitants per square kilometre (3,970/sq mi). Its population growth rate over the decade 2001-2011 was 14.81%.

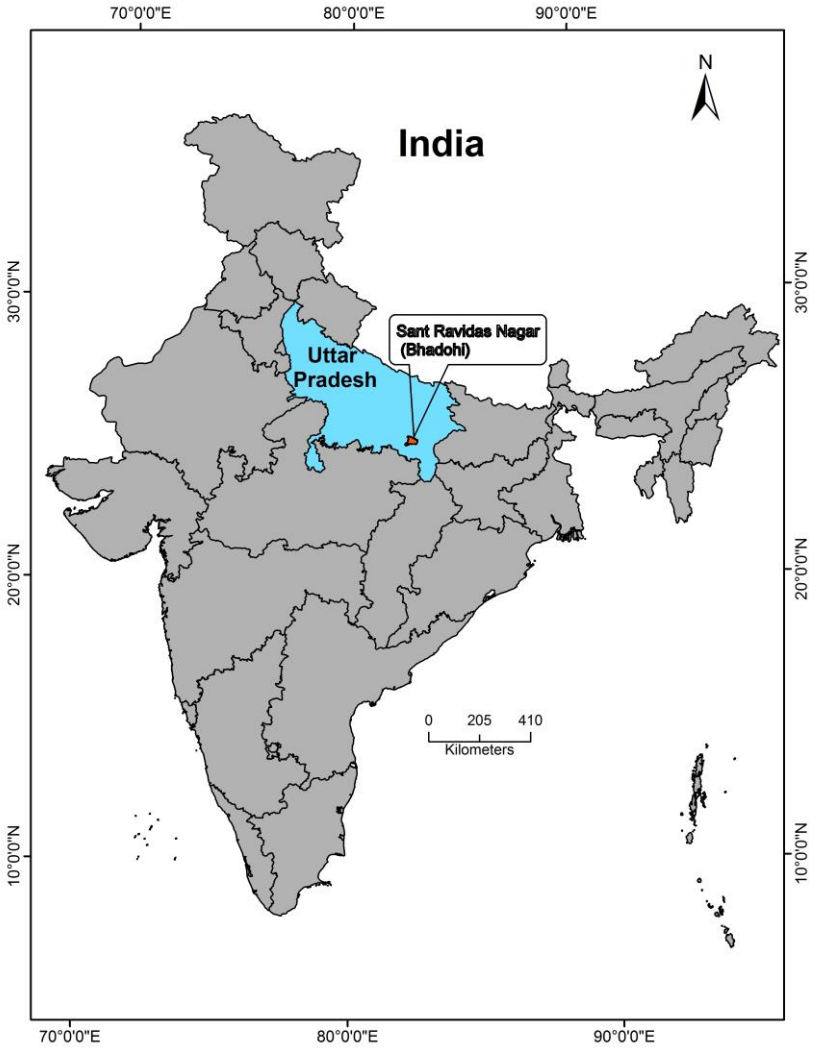


Figure 1. Location of the study area (Bhadohi) in India

Sant Ravidas Nagar has a sex ratio of 950 females for every 1000 males, and a literacy rate of 89.14%. Bhadohi has an average literacy rate of 90%, higher than the national average of 69.5%; with 94% of the males and 86% of females are literate. 18% of the population is under 6 years of age. Gyanpur is the headquarters of Bhadohi district. Carpet weaving in Bhadohi-Mirzapur region dates back to the 16th century, during the reign of Mughal Emperor, Akbar and is believed to have established when centuries ago, some Iranian master weavers stopped at Madhosingh village, near Khamaria, in Bhadohi while travelling in India, and subsequently set up looms here.

The present day Bhadohi district is biggest carpet manufacturing centres in India, most known for its hand-knotted carpet. Bhadohi is known as "Carpet City". While the Mirzapur-Bhadohi region has the largest number of weavers involved in handmade carpet weaving cluster, engaging around 3.2 million people in the industry, Bhadohi alone employs 2.2 million rural artisans in its 100 percent export-oriented industry. Bhadohi based organisations account for about 75%t of the Rs. 44 billion of total carpet exports from India.

3. OBJECTIVE

The main purpose of this paper is to develop an electric-GIS application which supports a functionality such as to create a network of electric utility. Its main objective is to analyse the changes in the electrical asset features from year 2011 to 2015 using field-based data collected through GPS integrated with GIS.

4. DATA USED AND METHODOLOGY

Electrical asset databases are very useful when connected with spatial information in the GIS platform. Spatial databases for electric poles, high tension/low tension (HT/LT) line, and distribution transformers have been created in ARC GIS-10.1, describing spatial locations of all the electrical assets. Distribution transformers database contain transformer location, its unique id., make, capacity, installation year if any, number of connections. Maximum load on the transformer recorded by transformer has also been fed in the databases. Latitude (X) and Longitude (Y) of each transformer and HT/LT line's length has also been calculated using field calculator. Poles database contains the condition of poles and type of poles

In this study, a number of GIS and remote sensing software packages are used for data processing i.e. ERDAS imagine software version-10.1 for geo-referencing of high resolution satellite data and ARC GIS-10.3 for on-screen digitizing of the electrical asset and ground base natural (water bodies and vegetation) and man-made features (transportation network and settlement) interpreted through the satellite data. High-resolution remote sensing data downloaded from Google earth. The individual data pieces are properly mosaicked and georeferenced so that the feature e. The methodology for several inputs for GIS model on power electrical planning network model is shown in Figure 2.

Following step by step process are accomplished during the study i.e.

- Survey of electrical assets to allow unique id to each asset using printed hardcopy of satellite data with a hand held global positioning system (GPS). GPS was used to get the exact latitude (X) and longitude (Y) of each electrical asset.
- Base map (building, transportation network, and water bodies) is prepared from high-resolution satellite image to overlay asset network features over it.
- Before digitizing assets network (feeders, distribution transformers and electric poles etc.), a single line diagrams (SLD) of each electrical assets network of each feeder of the Bhadohi town are also prepared on A4 size paper to check the errors if any during the field survey then after the networks are digitized in the GIS platform
- Field-based data (attribute) and spatial data of electrical assets are integrated with each other in GIS domain. All network elements are identified and their technical Attributes are recorded in ARC GIS-10.1.
- Validation through field survey (land base & electrical Network Data) through hardcopy maps.
- Spatial data of electrical assets of 2011 and 2015 are compared accordingly to calculate the overall changes in the electrical assets.

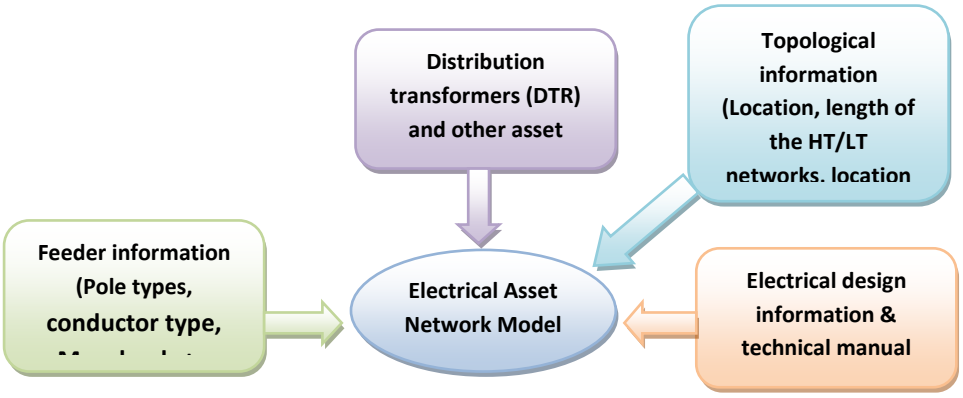


Figure 2. Inputs for GIS model on Power Electrical planning network model

5. RESULT AND DISCUSSION

The main advantage of electrical asset database is to maintain the consumer indexing record and consumer indexing is to enhance the efficiency of distribution system in terms of quality and earn increased revenues by reducing outages and T & D losses (technical and distribution loss), and to encompass the functions of different disciplines into the mainstream of operational hierarchy through wide networking. In this study a database for each asset indication the exact geographical location is created and compared during 2011 and 2015. During a survey of electrical LT and HT lines, the line length, type and type of DTR used and numbers of various types of poles existing are documented. The sub-transmission and distribution network indicating details of 33 KV feeders and 33/11 kV substation, distribution transformers and the LT/HT lines is developed and superimposed on the geographical map prepared through GIS so that the physical position of the electrical lines, substation is known and easily identified on the map. The network documentation prepared in this study provides the facility for tracing the electrical connectivity for any part of the network. That is, it is possible to find out all elements electrically connected to any particular LT/HT lines or transformer and distinguishing points are clearly marked.

During this study, transformer database is also prepared which contain transformer location, pole number, serial number, make, capacity, manufacturing year, installation year. It also shows status and condition of jumpers, etc. Maximum load recorded by transformer has also been included in the databases. Latitude (X) and Longitude of each transformer have also been calculated handheld GPS. HT/LT line's length has been calculated using field calculator in ARC GIS platform. Poles database contains the condition of poles and type of poles etc. Three types of electric poles i.e. HT pole, LT pole and composite pole are identified in the study area. In this study, it is found that the total HT and LT pole in 2011 is 1383 and 2848 respectively while it is 1797 and 3239 in 2015. The number of the composite pole is also increased from 2011 (421) to 2015 (555). Total number of pole in Bhadohi city has been increased from 4652 in 2011 to 5591 2015 respectively (Table 1).

Table 1. Changes of electrical asset in the Bhadohi city during 2011 to 2015

Type of Pole	**2011**	**2015**
HT Pole	1383	1797
LT Pole	2848	3239
Composite Pole	421	555
Total Pole	**4652**	**5591**
DTR	336	433

In this study, substation wise and feeder wise electrical asset data of Bhadohi are also collected and calculated for the analysis. It is found that the Bhadohi city has three working substation i.e. 33/11 KV Bhadohi town, 33/11 KV, Carpet city and 33/11 KV Fattupur. Presently in these substations, the details of assets e.g. cables, transformers, pillar boxes and consumer's details like consumer number, voltage, consumption, bill date etc., are obtainable in the form of tables in a database management system. The details of network routes and their description are maintained in the form of single line drawings (SLD) and updated in GIS platform. Total 234 DTR is identified in the Bhadohi substation followed by Fattupur (131) and Carpet city (68) in 2015 whereas this figure was 194 for Bhadohi substation, 100 for Fattupur and 42 for Carpet city in 2011. Bhadohi substation is the largest substation which provides electric supply to the city from 05 existing feeders. Total DTR installed in Bhadohi town has been increased from 336 (2011) to 433 (2015) and it is due to increase load and pressure of new consumers in the city. In this study, it is also identified that there are so many illegal electric connections and power theft which might be increased the power load on the transformer (DTRs) during these 4 years. It is found that maximum DTRs (16) are installed in Khushiyara industrial feeder in Bhadohi while only 1 DTR is installed in Bhadohi feeder during 4 years. In Carpet city and Fattupur substation, Jamunipur feeder (15) and Maryadpatti feeder shows maximum (16) installation of DTRs respectively. Capacity wise DTRs of each feeder of Bhadohi are also calculated and it is noticed that only one DTR of 630KVA was installed in Bhadohi city while it is now 5 in 2015. The number of 63KVA DTRs installed in Bhadohi is reduced from 92 to 85 while the number of 10 KVA, 25KVA, 63KVA, 160KVA, 250KVA and 400KVA capacity DTRs installed in the area are increased during 2011 to 2015 (Table 2 and 3).

Table 2. Capacity wise DTR in each Feeder of Bhadohi city, 2011.

Feeder	**2011**								
	DTR Capacity								
	10KVA	**25KVA**	**63KVA**	**100KVA**	**160KVA**	**250KVA**	**400KVA**	**630KVA**	**TOTAL**
Bhadohi	2	6	9	7	3	14	9	1	**51**
Carpet city (town)	1	-	-	-	-	3	1	-	**5**
Coloney	-	6	2	2	1	1	-	-	**12**
Indra mill	1	18	11	3	1	11	1	-	**46**
Jamuni pur	13	8	2	5	3	2	4	-	**37**
Khushiyara	6	19	39	11	1	9	-	-	**85**
Maryad patti	9	26	25	11	-	6	1	-	**78**
Nai bazar	-	2	4	1	-	4	2	-	**13**
Sidhvan	-	-	-	4	-	2	3	-	**9**
Grand Total	**32**	**85**	**92**	**44**	**9**	**52**	**21**	**1**	**336**

Table 3. Capacity wise DTR in each Feeder of Bhadohi city, 2015.

Feeder	2015								
	DTR Capacity								
	10KVA	25KVA	63KVA	100KVA	160KVA	250KVA	400KVA	630KVA	TOTAL
Bhadohi	-	11	6	11	2	14	8	-	**52**
Carpet city (town)	-	-	3	4	-	8	-	1	**16**
Coloney	-	5	3	4	-	3	-	-	**15**
Indra mill	4	18	9	12	-	10	7	-	**60**
Jamuni pur	21	9	7	4	-	6	4	1	**52**
Khushiyara	6	23	23	23	4	10	2	-	**91**
Khushiyara Industrial	1	-	2	7	3	2	-	1	**16**
Maryad patti	7	34	23	12	-	13	5	-	**94**
Nai bazar	-	2	3	4	-	8	2	-	**19**
Sidhvan	-	2	1	3	1	7	2	2	**18**
Grand Total	**39**	**104**	**80**	**84**	**10**	**81**	**30**	**5**	**433**

During 4 years HT and LT network length both in overhead and underground have been increased in all the three substations of the Bhadohi. It is surveyed that the total overhead HT network length in 2015 is coming 110.93 km in 2015 while it is 94.66km. in 2011 whereas the overhead LT network length in 2011 and 2015 are 118.44 and 125.72km respectively. Maximum overhead HT network is increased (approximate 8 km) in Bhadohi substation in comparison to the other two substations during 2011 to 2015 while overhead LT network is reduced (approximate 2 km) in the Bhadohi substation and it might be due to time to time changes of electrical network from one substation to the other station by electric department. Due to this Fattupur substation shows a maximum increase of overhead LT network during 2011 to 2015 (approximate 9km.). Capacity wise DTR in each feeder of Bhadohi city in 2011 and 2015 are provided in Table 2 and 3. Substation and feeder wise changes of an electrical asset in the Bhadohi city during the 2011-15 show in table 4 and 5 respectively.

Table 4. Substation wise changes of electrical asset in the Bhadohi city during 2011-15

City	Substation	Feeder	No. of DTR		HT_Underground (m)		HT_Overhead (m)		LT_Overhead (m)		LT_Underground (m)	
			2011	2015	2011	2015	2011	2015	2011	2015	2011	2015
Bhadohi	33/11 KV Bhadohi	Bhadohi	194	234	952.71	1311.62	38249.85	46270.62	64145.11	62148.06	85.58	114.25
		Coloney										
		Indra mill										
		Khushiyara										
		Khushiyara Industrial										
	33/11 KV Carpet city	Carpet city	42	68	13.67	52.83	14718.52	19297.88	23482.24	24448.71	0.00	0.00
		Jamuni pur										
	33/11 KV Fattupur	Maryad patti	100	131	383.89	646.31	41693.72	45365.33	30819.14	39126.81	0.00	0.00
		Nai bazar										
		Sidhvan										
TOTAL			336	433	1350.3	2010.8	94662.09	110933.8	118446.5	125723.6	85.58	114.25

Table 5. Feeder wise changes of electrical asset in the Bhadohi city during 2011-15

			No. of DTR		HT_underground (m)		HT_overhead (m)		HT Total (m)		LT_underground (m)	
City	**Sub Station**	**Feeder**	**2011**	**2015**	**2011**	**2015**	**2011**	**2015**	**2011**	**2015**	**2011**	**2015**
Bhadohi	**33/11 KV Bhadohi**	Bhadohi	51	52	346.14	320.80	7632.64	6714.08	7978.79	7034.88	24.63	24.41646
		Coloney	12	15	26.87	26.87	2471.59	3053.20	2498.45	3080.07	0	0
		Indra mill	46	60	363.66	449.46	8537.54	10042.19	8901.21	10491.65	0	60.9511
		Khushiyara	85	91	216.04	472.57	19608.07	20121.91	19824.11	20594.49	60.95	28.88109
		Khushiyara Industrial	0.0	16	0.0	41.92	0.0	6339.22	0.00	6381.15	0.0	0.0
	33/11 kv Carpet city	Carpet city (town)	5.0	16	6.86	46.02	2498.74	5933.01	2505.59	5979.04	0.0	0.0
		Jamuni pur	37.0	52	6.81	6.81	12219.79	13364.86	12226.60	13371.68	0.0	0.0
	33/11 kv Fattupur	Maryad patti	78.0	94	166.13	268.78	22435.31	25165.90	22601.44	25434.68	0.0	0.0
		Nai bazar	13.0	19	142.60	302.37	9501.65	9751.041	9644.25	10053.42	0.0	0.0
		Sidhvan	9.0	18	75.16	75.16	9756.76	10448.39	9831.92	10523.55	0.0	0.0
TOTAL			**336**	**433**	**1350.3**	**2010.8**	**94662.1**	**110933.84**	**96012.3**	**112944.64**	**85.58**	**114.25**

In this 4 years, HT network length in Khusiyara feeder in Bhadohi substation is also increased (0 to 6.38km) and it is because of demand for new electrical connections and installation of new DTRs in each feeder. Bhadohi feeders show a maximum reduction in HT and LT network during 2011 to 2015. During the four years, many new carpet industries have been developed in the Bhadohi town which may increase the demand for new electric connection and overburden of electric load and due to this electrical department tried to improve the electric facilities in the industrial area and installed 11 new DTRs in the Carpet city feeder. HT network length in Carpet city feeder is also increased from 25 km to 59.79km respectively while LT length is nominally increased (approximate 1.5km) in this feeder during 4 years. Naibazar feeder of Fattupur substation shown maximum increase of HT length (approximate 3.4km.) while Shidvan feeder shows maximum increased of LT network (approximate 9km) during 2011 to 2015.

In this study, it is found that due to the increasing of population and development of new carpet industries in the Bhadohi, there is an enormous demand for new connection arise while the production rate is not very much improved but electrical department is continuous trying to improve the electrical asset facilities and time to time changing the assets.

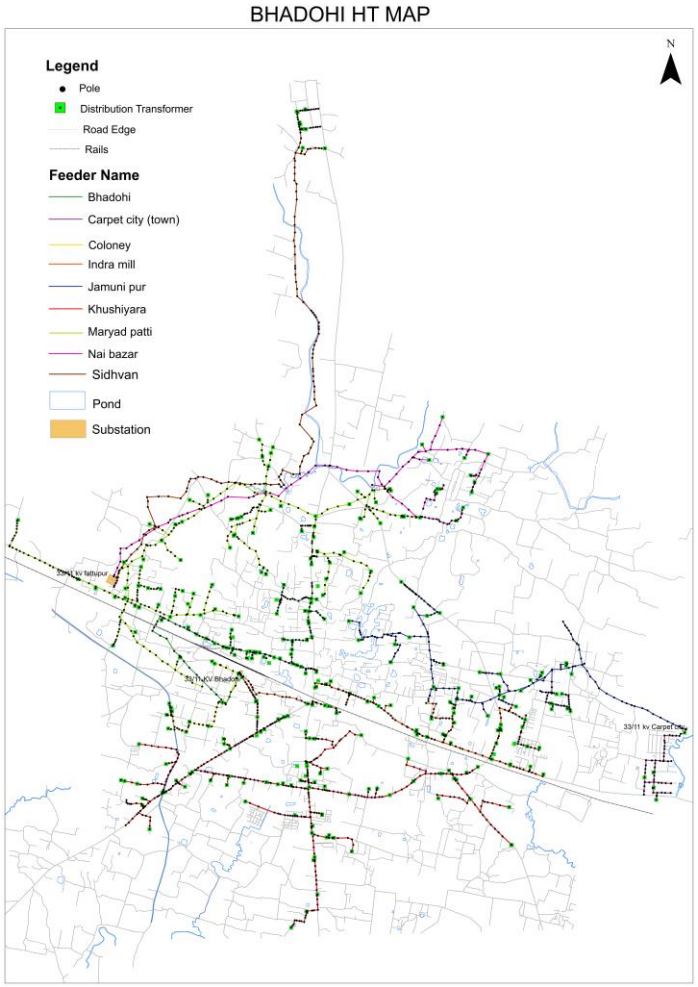


Figure 3. Electrical asset location and HT Network in each feeder in Bhadohi town in 2011.

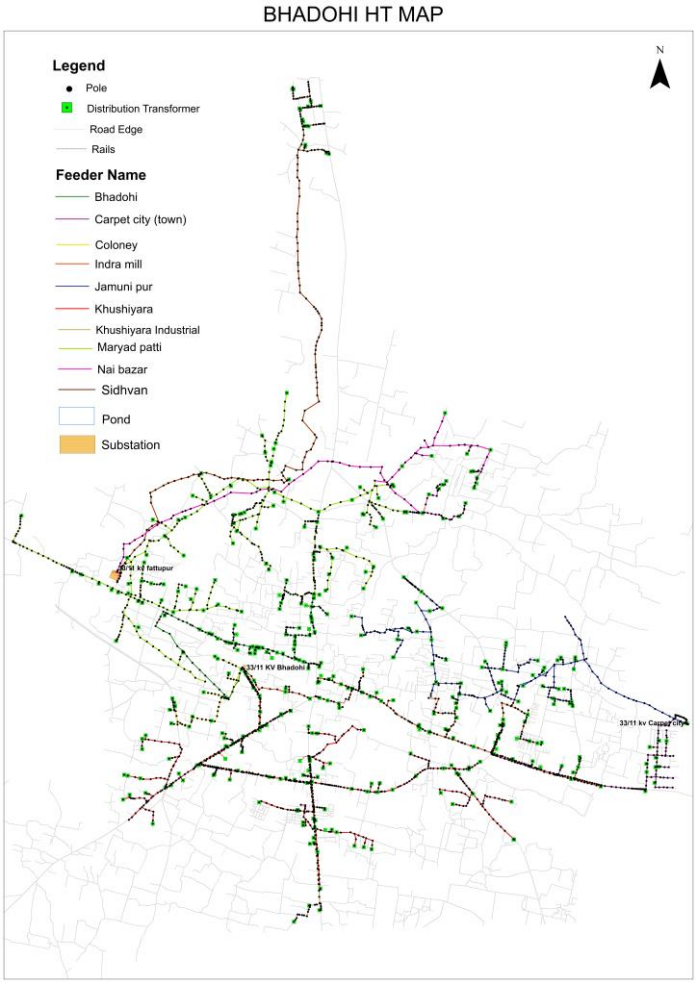


Figure 4. Electrical asset location and HT Network in each feeder in Bhadohi town in 2015.

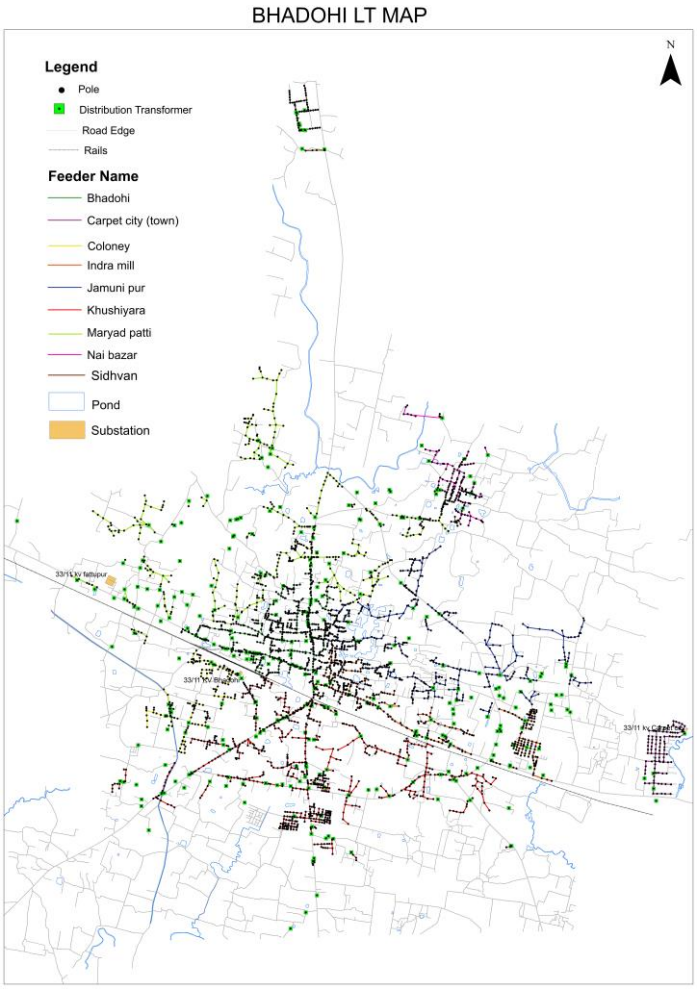


Figure 5. Electrical asset location and LT Network in each feeder in Bhadohi town in 2011.

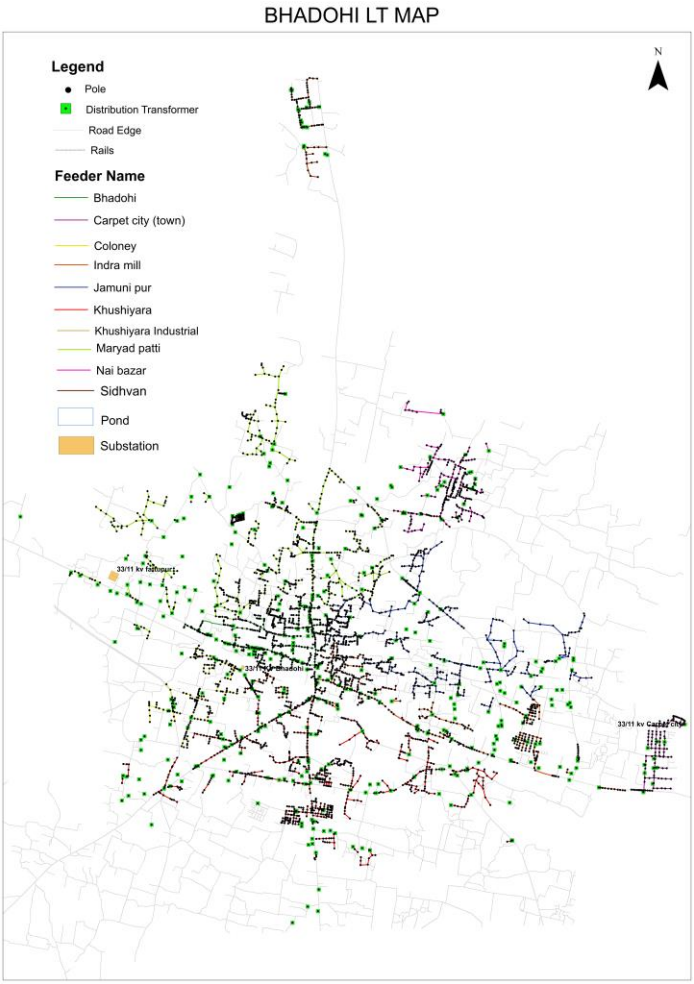


Figure 6. Electrical asset location and LT Network in each feeder in Bhadohi town in 2015.

6. CONCLUSION

In this paper, GIS plays very important role in the electrical system, which is very helpful for energy audit, electric load management, electrical network planning and analysis; determining the optimum and shortest path for power transmission lines; forecasting and predicting the amount of power needed in the coming future in the area which may help to arranging projects, identifying substation property requirements, control the demand growth of each electrical assets. This study is also very helpful to improve the customer complaints, long-standing faults brought to a minimum, to stop power theft (in local language it is called Katia practice), and to provide better facilities to the each consumer. In this study, it is very well found that the continuous growing of carpet industries leads an overload on the electrical system in Bhadohi. The main advantage of this paper is to provide operational efficiencies and customer benefits that exceed traditional GIS and mapping boundaries. This study allows officials of electrical departments to work on the latest technologies by relating the output to the location of load and feeder and providing better long term DTRs and distribution planning network etc.

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STAGING AND PERFORMING IDENTITY AT THE CROKE PARK CLASSIC: A NOTE ON SPORT, GEOGRAPHY AND NEOLIBERALISM.

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Abstract

American Football has seen limited success in international markets until recently. This paper is based on participant observations that incorporate a geographical perspective of sport and identity focusing on an American Football event played in Dublin, Ireland. The aim of this paper is to discuss observations of how a popular American sport is staged and performed in a foreign setting. Many people from the United States travelled to Dublin to follow their university team. The event was staged to allow spectators to create a distinct atmosphere that was similar to a game played in the United States. There was much emphasis on (re)creating an American sporting experience. The match resembled a spectacle and a neoliberal discussion addresses commercialization, power, and contesting spaces.

Keywords: *American Football, Neoliberalism, Sport Expansion, Dublin.*

1. INTRODUCTION

American Football is trying to exert pressure on consumer markets where they feel they have the greatest chance to attract followers, establish new media contacts, sell merchandise, or spread American sports culture abroad (Maguire, 2011; Wise, 2011). Since American Football represents something different in Europe, showcasing elite amateur talent represents an opportunity to sell the sport in new markets. In 2014 the University of Central Florida (UCF) and Penn State University (PSU) played a regular season match in Dublin, but in front of a majority American crowd. Previous American Football games played in Dublin include the Emerald Isle Classic in 1988 (the first college level game), then again in 1989. An event in 2012 went by the same name. In 1996 there was the Shamrock Classic and in 2016 Boston College will play Georgia Tech in the Aer Lingus College Football Classic. 2014 was unique because the event was staged in Croke Park, a venue associated with Irish sporting identity and nationalism (Bairner, 2001). The 1996 game between Notre Dame and Navy was also played at Croke Park. By introducing a new sport to a venue such as Croke Park, organizers are commercializing the space by introducing a new atmosphere, transcending traditional experiences and semblances of a sporting culture that would normally be consumed in this space.

This paper is based on participant observations of American Football in Dublin and addresses how the sport is staged and performed abroad. Critical interpretations used in this paper align with neoliberal thought pertinent to generating capital, branding, and creating sporting spectacles (Giardina, 2005; Smith, 2012). This addressed, some scholars view the

domestic form of football in the United States as an expression of American exceptionalism, where being different from the wider, and more accepted status quo, allows for the branding and marketing of 'American' football as something different in the global consumer marketplace (Maguire, 2011). The purpose of this paper is to reflect on observations made at the 2014 Croke Park Classic Dublin and offer a geographical analysis that discusses the staging and performing sports identity and contributes observational perspective on cultural and commercial expansion.

Participant observations allow researchers to become a part of the study (Kearns, 2010). Researchers engage and interact while also looking at a case critically and conceptually. Reflecting on experiences from participant observations by focusing on a sport is an area that is still an under-investigated. Over the years sports ethnographies have focused on, for example, surfing (Sands, 2002), marathon running (Sugden, 2007), and soccer and sense of place in local communities (Wise, 2014). Each of these studies attempted to achieve similar goals of qualitative analysis by reflecting on the critical situations to produce knowledge through immersion. Such an approach positions experience alongside critical observations of their surrounding and ongoing interactions, and being in a sporting venue and attending an event has much social and cultural geographical significance. Points of reflection from observations are discussed in two analysis sections below, discussed around staging and performing of identities. The staging and performing of sports culture and identity help guide understandings of an American Football event in Dublin. The city was changed to accept tourists from the United States to assume an atmosphere, by creating a spectacle that was much different from an ordinary sporting event in Ireland.

2. CRITICAL DIRECTIONS IN SPORTS GEOGRAPHY

Sports studies are developed in sociology; however, sport offers much geographical insight. Geographers have offered perspective on spatial understandings pertinent to collective identities, nationalism, communities, power, and place (Koch, 2013; Wise, 2015). There has been a recent academic tern in sports geography, with increased interest in the last several years (e.g. Conner, 2014; Koch, 2013; Lawrence, 2015; Wise, 2014, 2015), but more work considering sports experiences and place identity is needed. Participatory and observational approaches allow researchers to offer critique and understanding based on how sports are staged and performed when an event is held in a foreign setting—this paper aims to initiate a discussion on American Football's international endeavours.

In terms of accepted conceptualizations widely recognized in sports geography, scholars have adopted Anderson's (1991) notion of nations as imagined communities (e.g. Conner, 2014; Shobe, 2008; Wise, 2015). Anderson (1991, p. 7) suggests people are bound together vis-á-vis "horizontal comradeship." While it is beyond the scope of this paper to look at nationalism, per se, this notion of imagined communities represents collective inclusion and association with a particular team—as observed (especially) among PSU fans in this study. Furthermore, cultural influences of sport involve staging representations of identity (Edensor, 2002; Harris, 2008). While identities can be staged, they are also performed in different settings to increase exposure and influence (Giardina, 2005; Lai, 1999).

When we consider the staging and/or performing of identities in another locale, Wise (2014) suggests this is a form of layering identities. The layering of identities results when a different sport is introduced to space where another (sport) is usually regarded as ordinary or familiar. Moreover, while this perspective offers insight into spatial contestations and multiple meanings, Wise's (2014) work does not address power relations and new market expansions. This paper attempts to build on this notion of by incorporating a discussion of neoliberalism to fulfill this conceptual void. Since American products are consumed around

the world and the country has had a significant impact on globalization, expanding American sports has either been met with resistance, or they have been adapted locally (Kelly, 2007).

With increased pressures to expand to new markets and extend the reach of American Football, the National Football League (NFL) has organized regular season games in London's Wembley Stadium since 2007, known as the International Series (Maguire, 2011). From a neoliberal perspective, Smith (2012, p. 28) notes that "neoliberalism is supposed to encourage innovation and progress through a healthy competition." However, a sport such as American Football does not compete in international competitions like soccer, rugby, or even baseball—making it difficult to attract wider audiences from outside the United States. American Football is a sport rooted in American popular culture/identity from youths to professionals (Paolantonio, 2008), and the NFL wants to expand commercial exposure to international markets. International events assist with production, promotion, and marketing sports abroad (Van Der Merwe, 2007). This focus on expansion, influence, and promotion of sporting culture, alongside intentions to market sports as a consumer product, links to neoliberal agendas in sports studies (see Andrews and Silk, 2012; Giardina, 2005).

2.1. Staging Identity

The presence of UCF and PSU was overwhelming in Dublin. For instance, 'Penn State Global' was advertised across Dublin from the airport to the city and in the stadium to advertise the universities online degrees. While this is a form of staging, this paper is concerned with experiences and observations of activities and those who followed UCF and PSU to Dublin. This was a unique opportunity for Americans to see their current university team or alma mater play abroad. In Dublin, a fanzone was located in the Temple Bar district (which is the city's main tourism area located just over two miles from Croke Park). Given all the American accents, this took away from the experience of an event being hosted in another location, and suggests that this match was not necessarily aimed at attracting Dubliners, Irish, or Europeans. Locals who were interested in American Football did attend, but were a minority among the crowd in the fanzone and at Croke Park. The fanzone included throwing targets, and those successful were awarded with a branded PSU flashlight keychain. Locals foreign to the sport attempted hitting the target, but it was the Americans who were out showcasing their skills and teaching those local fans of the sport how to throw a football.

Although activities were concentrated to the Temple Bar area, known as a tourist consumption area that attracts tourists year-round to experience 'authentic' Irish pubs and food, American Football fans were widely scattered across the city. Fans wore UCF or PSU jerseys, shirts, and sweatshirts to show their purpose for visiting Dublin. Given Temple Bar is an established area of mass-visitor consumption, many of the bars/restaurants welcomed UCF and PSU fans by advertising university logos and hanging banners to mark the occasion. Given more PSU fans were across, the Temple Bar area in the morning before the event saw a sea of navy and white. For those attending the event, the experience would have replicated gatherings in State College, Pennsylvania, except for the location commodified Irish culture which had been adapted to (re)create an American Football atmosphere opposed to more traditional 'tailgating' before the game. Overall, the atmosphere staged in Dublin resembled a home match for PSU, although they were technically the visiting team for this event.

Dublin catered to the American crowd for this event, so advertisements for American Football represented a sense of welcoming UCF and PSU to the city—although Ireland is already a popular destination for Americans. In this case, marketing was adjusted to focus specifically on American Football fans. The same approach is common in London where the NFL hosts a series of international matches each year (see Wise, 2011). In Croke Park the use of the space for American Football transformed, or transcended, the stadium for only a short

time, but the national/cultural meanings linked to the stadium clearly stating this is Ireland's national stadium for Gaelic sport. Controversially, a Gaelic sporting match had to be moved to another city because of the American Football event. For the supporters of the Irish club teams, they were not happy with the decision to stage a spectacle event over a local competition. This shows how commercial rights, and particularly the power to host a one-off event, can remove those who would typically use a particular space. American Football played at Croke Park allowed for the layering of meaning, but was contested on the premises that this was consumer driven to stage a different identity in such a significant national sports space in Ireland. With Dublin temporarily transformed into an American university town, it was not surprising that the city's central tourism area and the country's national stadium were the primary stages. With the ubiquity of American accents, the feeling of being in Ireland was lost, but the American experience was brought to life, or performed, in Dublin.

2.2. Performing Identity

"Heeeeey... Penn State football in Ireland" was shouted over and over by a PSU fan at Croke Park. Attending the event in Dublin felt more like a PSU experience than watching American Football in an international setting. UCF fans were present but the crowd was dominated by PSU fans, students, and alumni. Because so many made the journey to Dublin, the performance of identity composed by the crowd simulated a domestic game in the United States. Just as people follow their college team around the United States, and the most dedicated followed their team to Dublin. Despite the similarities and performances of identity among the crowd, based on observations of those in attendance, the setting and the atmosphere was actually greatly reduced by the fact that only 53,304 people were in attendance with large gaps of open seats in the 82,300 seat venue. Large sections of the stadium left vacant took away from the full college football game experience. In fact, PSU normally plays in front of much larger crowds in a stadium with a full capacity of 107,282. Nevertheless, the American attendees who travelled to Dublin created an experience of attending a game in State College, Pennsylvania or in the suburbs of Orlando, Florida. The cost of travelling to Dublin would have been high to fill Croke Park to full capacity. However, with around 29,000 empty seats in the venue, this suggests local interest was not there, suggesting and this experience was targeted to those from the United States who wanted to see American Football played in Ireland—an opportunity to be part of the spectacle.

Contributing more geographical analysis beyond performing identity, Anderson's (1991) notion of imagined communities, as used by Hobsbawm (1990), suggests athletes represent their nation. However, national identity in an American Football context does not always refer to nationalism because of the regional and local importance of teams. The sport in not widely played outside the United States, but for fans residing in Ireland or Europe, this represented an opportunity to see elite amateurs American Football live. The visiting PSU community showed their support through presence alone—following the team overseas to extending their imaginary overseas. (Re) creating a PSU home game provided a unique opportunity for any Irish or Europeans in attendance to consume PSU culture and atmosphere. The imagined PSU community both relocated and performed their sense of fandom in Croke Park throughout the event—players on the field may not have had the sense they were even competing abroad. Reflecting on PSU Nation's forged presence in the stadium, during the game PSU fans consistently chanted: *'We are…PENN STATE…We are…PENN STATE…We are…PENN STATE…Thank You…You're Welcome'* and *'P...S...U, let's go PSU'*. Additionally, the Nittany Lion mascot and cheerleaders also led the crowd in support of PSU. UCF also had cheerleaders at their end of the stadium to lead their fans. One

PSU fan was interviewed on the field during the match and he mentioned '*Penn State is about family*' and that '*Penn State fans travel well and this is the ultimate away game.*'

To entertain the largely American crowd, the halftime show was an attempt by the host city and the Gaelic Athletic Association (GAA) to showcase Irish sporting culture/identity. This was something that was quite different to a typical halftime show in the United States, where the visiting team's marching band would typically perform. This was one performance of identity that attempted to educate the American fans about the significance of Irish sporting heritage/identity in Croke Park. In the past, Croke Park did not allow non-GAA sports to be played in the venue because it was meant to be a sports space that symbolized Irish nationalism (Bairner, 2001). An amateur hurling match was performed at halftime and the large-display screen was used to explain this popular Gaelic sport to the majority American crowd. These were armature hurling players—college level athletes are also amateur. A GAA announcer noted before the match that this was a '*special day in the sporting calendar, American and Irish cultures coming together*'—although noted above there was a clash in the schedule. There is much Irish influence in the United States, and while most would not recognize GAA sports on a daily bases, there exist over 150 GAA clubs in North America (noted by the announcer at halftime). While Croke Park was not crowded for American Football, the stadium is normally at full capacity during hurling matches. In North America the GAA took their national sports to the University of Notre Dame in South Bend, Indiana given the institution's Irish connection/heritage—Notre Dame also played at Croke Park in 2012. The performance of identity is this case was paralleled by American fans creating an atmosphere and having the opportunity to sample Gaelic sport at halftime, performing and layering Irish and American sporting identity in one space.

3. DISCUSSION AND DIRECTIONS FOR RESEARCH

Smith (2012, p. 27) notes, "in the contemporary era, major events are more commercial and more aligned to corporate interests than ever before." Andrews and Silk (2012) argue that there is a need to look at different trajectories framed around the context of sport to understand how neoliberal practices are at play. Observations and experiences reflected on above refer to the forging of staged identities in a different geographical and consumer market. Cultural sporting motives linked to expansion seek to make the sport available to those who want to learn about and experience first-hand a sport (Giardina, 2005), in this case American sporting culture/identity. However, in Dublin, with a considerable number of people traveling from the United States to follow UCF of PSU, for many it was a chance to see their team in another country. For others it was an opportunity to visit Ireland, learn about d to Irish sporting culture, and attend activities held in Temple Bar.

Corporations continually seek to expand private operations in new markets to widen their consumer base (Van Der Merwe, 2007); however, American Football is years behind and rapidly seeking ways to expand to new markets by offering a different version of 'football.' This most recent expansion of American Football is aimed now at specific markets to test the efficacy of broadening the sport's reach. Relating neoliberal understandings to sport and expansion from a geographical perspective, Harvey (2005) argues power is exerted by the dominant culture in an attempt to influence and force those to accept and conform to new practices and ideals. Giardina (2005) would argue this is a way of reinstating the dominant discourses of culture and identity based using staged events to expand to new consumer markets. American sport expansion is a form of creative capital influenced by a flow of free market exchanges of ideas, but such exchanges have been exploited in various sectors (Maguire, 2011). In this case, identities were commercialized and culture reproduced. Getting PSU fans to travel to Dublin and perform their identity commodifies the experience and

attempts to place American sporting culture before a different audience. This did not seem all that successful, but Irish and Europeans present were offered a different experience. When identities are staged, arguably they are commodified, and such attempts are exploiting culture in new markets conforms to neoliberal practices as seen through the forging of American consumerism—all with the intention of promoting their brands to new markets.

To conclude, geographical notions of staging identity and performing identity offered an interpretation of an American Football event held in Dublin. An atmosphere was (re)created in Dublin and the event was a spectacle. Future work at similar events is needed to study the extent and impact of American Football events outside the United States. Further research is also needed to assess the role of the media in producing and (re)producing the image of American Football as an 'international sport.' There is also a need to incorporate a neoliberal approach that evaluates the impacts of commercialization, marketing, and semblances of power involved with operations and media contracts concerning the NFL's international series in London. The aim of this paper was to reflect on participant observations and offer some critical reflection of the 2014 Croke Park Classic from Dublin.

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DETERMINATION OF A TOPOGRAPHIC WETNESS INDEX USING HIGH RESOLUTION DIGITAL ELEVATION MODELS.

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Abstract

Topographic wetness indices (TWIs) computed from digital elevation models (DEMs) are means to forecast the amount of moisture in the soil. In this study, using sub-pixel/pixel attraction the spatial resolution of digital elevation models (DEM) was increased. In the attraction, model scale factors of (2,3,4) with two neighboring methods of touching and quadrant are applied to DEMs in Matlab software for the study area. The algorithm is evaluated using 1 4 8 sample points that were measured by the researchers. As a result, it was shown that a spatial attraction model with a scale factor of (S=2) gives better results compared to the scale factors greater than 2 and also touching neighboring are more accurate then quadrant. The results showed that waterway obtaining from DEM with high spatial resolution is more accurate than DEM 90m. So according to the results, it is suggested that the same model for increasing spatial resolution of DEM in the studies must be used. Furthermore, the results of TWI map with the new DEM extracting of attraction model as input data showed that TWI has more details from the moisture of soil than the TWI map prepared with DEM 90m.

Keywords: *Sup-pixel, Digital elevation model (DEM), Spatial resolution, Attraction models, topographic wetness index (TWI), GIS.*

1. INTRODUCTION

Soil moisture is a key variable controlling hydrological and biogeochemical processes (Buchanan et al., 2014). Since its introduction, the TWI concept has been integrated into many popular hydrologic models (e.g., Schneiderman et al., 2007; SWAT-VSA, Easton et al., 2008) and pollution risk indices (Agnew et al., 2006; Sørensen et al., 2006; Reaney et al., 2011; Marjerison et al., 2011; Buchanan et al., 2013; Buchanan et al., 2014).

The accuracy of the TWI, as for any hydrological model, is depended on the surface topography. The existence of a DEM with high spatial resolution enables to the implementation of a detailed spatial hydrological model for an urban catchment. Therefore, a hydrologically sound DEM is needed to develop an appropriate TWI and delineation of a flood-prone (wet) area (Pourali et al., 2014).

Recently, advances in Geographic Information Systems (GIS) and an increase in the availability of high spatial resolution led to the increase of information about surface

topography, which is the primary data used to calculate a TWI. One of the important properties of DEM is a spatial resolution that represents the accuracy of DEM (Takagi, 1996). DEM as input data for the determination of TWI with variations in the spatial resolution can lead to different outputs. It can affect the attributes derived from them and influence models associated with them (Gallant and Hutchinson, 1997; Haile and Rientjes, 2005; Omer et al., 2003). There are many studies for the extraction of information of case study from different resolution DEM (Wolock and McCabe, 2000; Jenson, 1991; Hutchinson and Dowling, 1991, Mokarram and Sathyamoorthy, 2015). The results showed that this method can solve DEM associated problems efficiently and simulate flooding processes with a better accuracy. Buchanan et al. (2014) used different digital elevation model (DEM) resolutions for the determination of TWI. The results showed that fine-scale (3 m) LiDAR-derived DEMs worked better than USGS 10 m DEMs and, in general, including soil properties improves correlations

There are many methods for increasing the spatial resolution of DEM. For example, Shen et al. (2011) used Integration of the 2-D hydraulic model and high-resolution LiDAR-derived DEM for floodplain flow modeling. One of the models for increasing the spatial resolution is attraction model that is based on sub-pixel. Sub-pixel algorithm puts several classifications in the most plausible positions inside the pixel. This is made by assuming spatial dependence (Atkinson 1997). A linear optimization technique for sub- pixel mapping algorithm was created by Atkinson (1997) inspired of Verhoeye and De Wulf (2002).

The attraction model algorithm spatially depends on the neighborhoods of the central pixel which is attracting surrounding sub-pixels. Another possibility is the hypothesis of sub-pixel interaction as introduced by Mertens et al. (2003b) and Atkinson (2005). There are several methods for increasing sup-pixel by neighboring such as genetic algorithms (Mertens et al., 2003b) and pixel swapping (Atkinson, 2005) that use the initial pixel fraction values as a constraint.

This paper focuses on topographic wetness index (TWI) building with attraction model analysis of DEMs. In order to determine the TWI, the preparation of DEM with high resolution as input analysis is important. The generated TWI maps via DEM from attraction model and the primary DEM (Shuttle Radar Topography Mission (SRTM)) are compared. The methodology employed in this study is summarized in Figure 1.

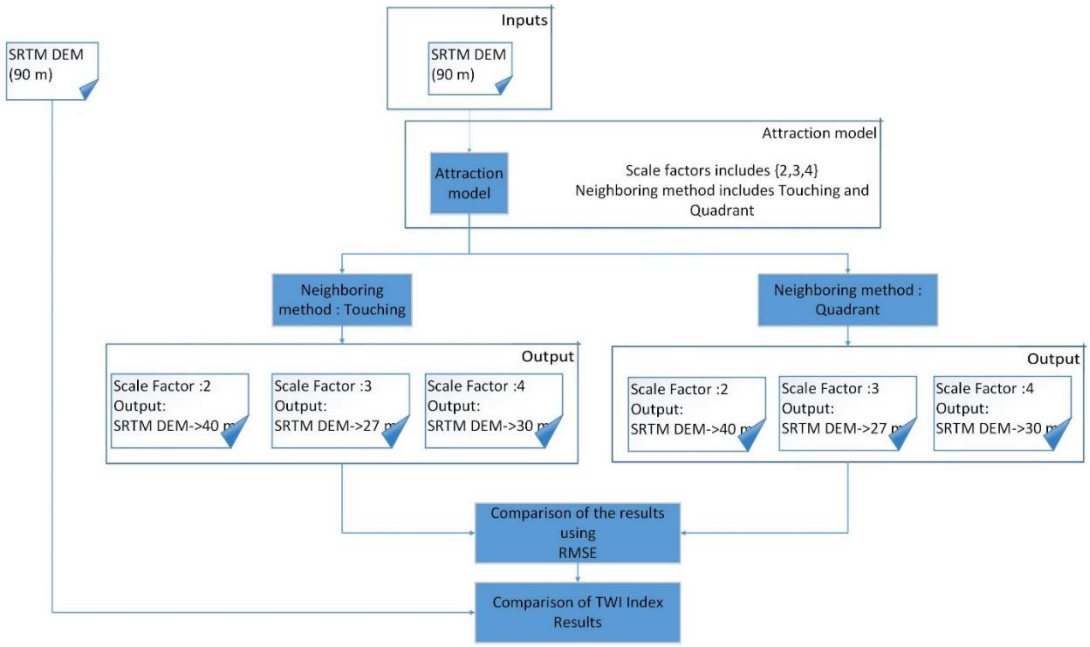


Figure 1: Flowchart for the methodology of TWI used in this study.

The steps of the flowchart in Figure 1 are as follow:

1. At the first step, the attraction model is run on SRTM DEM with a spatial resolution of 90m.
2. In attraction model both quadrant and touching methods and 3 scale factors of 2, 3 and 4 are tested for each neighboring method.
3. Then an RMSE index is calculated for each output of attraction model and the DEM with lowest RMSE is selected.
4. In the last step, the TWI model is applied on the original SRTM DEM and also the extracted DEM from attraction model and the result are compared.

2. MATERIALS AND METHODS

2.1. Data preparation

Shuttle Radar Topography Mission (SRTM) DEM data were downloaded from (http://srtm.usgs.gov) for free. We call it DEM 90m in this study. SRTM is one of the most comprehensive maps of elevation, NASA's Shuttle Radar Topography Mission (SRTM) (Werner, 2001; 48 Farr et al., 2007), covering mostly 80% of the Earth's surface, with a global resolution of 90 meters. The Shuttle Radar Topography Mission (SRTM) collected elevation data over 80% of earth's land area during an 11-day Space Shuttle mission. Ground station points were gathered from surveys done by National Cartographic Center of Iran (NCC). All needed preprocessing of points and DEMs were performed using ArcMAP version 10.3.

2.2. Attraction sub-pixel model

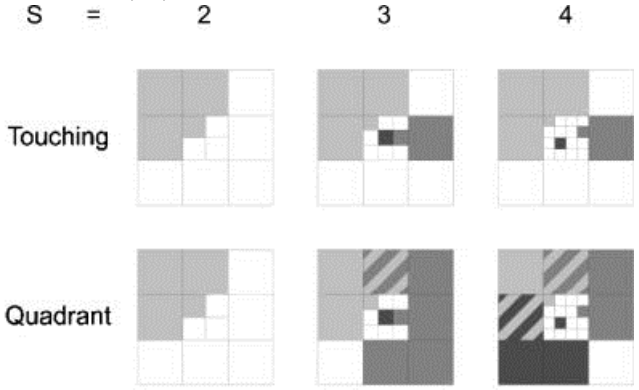
To obtain more details in a pixel, sub-pixel mapping was first introduced by Atkinson (Atkinson, 1997). Sub-pixel mapping is a technique designed to obtain the spatial distribution of different classes in mixed pixels at the sub-pixel scale by transforming fraction images into a classification map (XU et al., 2014). This is accomplished by assuming spatial dependence (Atkinson, 1997).

Attraction models are closely related to the field of geostatistics **(**Mertens, 2008**).** Sub-pixel mapping locates the different class fractions in the most plausible positions inside the pixel.

Sub-pixel methods are always used in satellite images but for the first time they were used for Digital elevation models. In this study, a sub-pixel spatial attraction model is used as a new method for increasing spatial resolution of digital elevation model (DEM). The sub-pixel attraction model is based on the fraction values in neighboring pixels acting towards sub-pixels inside a central pixel. The quadrant neighborhood and touching neighborhood are two different neighboring models which are used in attraction model. In the quadrant neighborhood a neighbor pixel is the only pixel in the same quadrant. While in touching neighborhood a neighbor pixel is the pixel which physically touches a sub-pixel. The illustration of two neighborhoods with different scale factors are shown in Figure 2 (Mertens et al., 2014).

A scale factor (S) shows the number of sub-pixels per pixel. According to Figure 2, all the pixels attracting a sub-pixel are explained in the same shade as the sub-pixel. For example, for the quadrant neighborhood and S=3 and touching method, the darkest shaded sub-pixel inside the center pixel is attracted only by the right middle pixel and the gray sub-pixel is attracted by the left top, top middle and left middle pixel. Shaded sub-pixels without corresponding pixels refer to the sub-pixels that are not attracted by any of the pixels, as is the case for the center

sub-pixels with S=3 for the touching and quadrant neighborhood. In this paper, two neighborhood methods with S=2, 3, 4 are examined.



Source: Mertens et al., 2014.

Figure 2: Graphic of sub-pixel attraction model for different neighborhoods and scale factors.

The neighborhoods previously defined (figure 2) can now be mathematically formulated as (Mertens et al., 2014):

N Touching neighborhood:

$$N_1[p_{a,b}] = \{p_{i,j} \mid d(p_{a,b}, p_{i,j}) \leq \frac{1}{\sqrt{2}}(S+1)\} \quad (1)$$

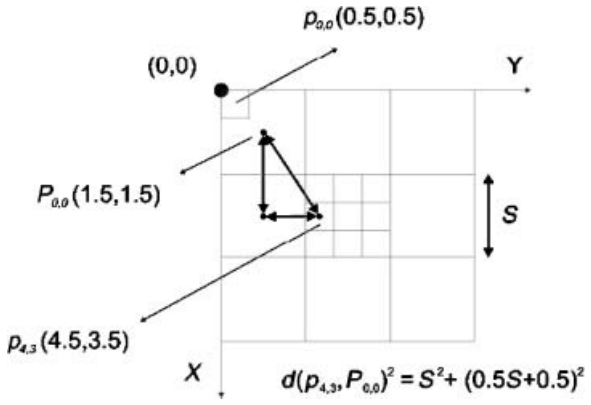
N Quadrant neighborhoods:

$$N_2[p_{a,b}] = \{p_{i,j} \mid d(p_{a,b}, p_{i,j}) \leq \frac{1}{\sqrt{2}}(2S-1)\} \quad (2)$$

With the distance defined as:

$$d(p_{a,b}, p_{i,j}) = \sqrt{[a+0.5-S(i+0.5)]^2 + [b+0.5-S(j+0.5)]^2} \quad (3)$$

The coordinate system which the distance for pixel and sub-pixels are calculated based on is shown in Figure 3 (Mertens et al., 2014):



Source: Mertens et al., 2014).

Figure 3: The coordinate system and the distance calculation between pixels and sub-pixels.

In fact, for different neighborhoods, attraction values can be computed for all sub-pixels inside a pixel. After choosing each pixel set for each sub-pixel the attraction value for each pixel is calculated using Eq.4.

$$p_{a;b}\ (c) = Avg\{\frac{P_{i;j}\ (c)}{d(p_{a;b},P_{i;j})}\ |P_{i;j} \in\ N_t[p_{a;b}]\} \quad (4)$$

- $P_{a;b(c)}$ is the attraction value for sub-pixel $p_{a;b}$ and class c.
- $P_{i;j(c)}$ is the fraction value for pixel $P_{i;j}$ and class c.
- S is the scale factor
- $N_t[p_{a;b}]$ is the neighborhood of type t of sub-pixel $p_{a;b}$.
- $d(p_{a;b}; P_{i;j})$ is the distance for sub-pixel $p_{a;b}$ and pixel $P_{i;j}$.

After this stage, then raw attraction values can be computed. These values can then be used to attach the proper class to each sub-pixel: Classes with highest attractions are attached first.

2.3. Topographic Wetness Index (WTI)

The topographic wetness index (WTI), extends the purely topography-based TWI by accounting for spatial variation in hydrologically relevant soil properties (Beven, 1986 and Beven and Kirkby 1979). The standard TI takes the form:

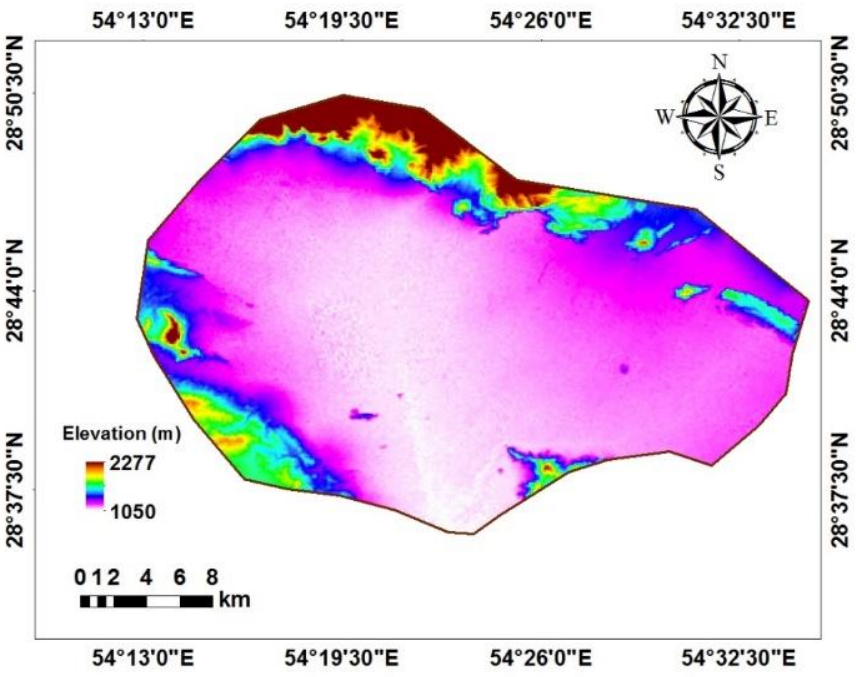
$$TWI\ =\ \ln(\frac{a}{\tan(\beta)}) \quad (5)$$

Where a is the specific catchment area [a=A/L, catchment area (A) divided by contour length (L)] and tanB is the slope.

The TWI index characterizes the impact parameters of slope on the hydrological processes. In terms of a specific watershed, TWI explains the water trend accumulating at a given point and the local slope indicates the effect of gravitational forces on water movement (Pourali et al., 2014). The base form is known as the steady-state TWI, which has various limitations. Many authors have modified the base form of the TWI (Eq. 5). Yong et al. (2012), Qin et al. (2011), Kopecký and Cížková, (2010), and Hjerdt et al. (2004) proposed improvements (discussed below) and Sörensen et al. (2006), Kopecký and Cížková, (2010), Ma et al. (2010), Ruhoff et al. (2011), Lewis and Holden (2012), Pei et al. (2010), Nguyen and Wilson (2010), Grabs et al. (2009) and Pourali et al. (2014) tested different flow path determination algorithms to realize the effect of a chosen method on the resultant TWI model.

2.4. Study Area

The study area has an area of about 630 km^2 and is located at longitude of N 28° 36′to 28° 50′and latitude of E 54° 12′ to 54° 34′. Figure 4 shows a Shuttle Radar Topography Mission (SRTM) DEM data of the study area. The altitude of the study area ranges from the lowest of 1,050 m to the highest of 2,277 m. The Major study area products are wheat, citrus, cotton, maize and palm. Average of yearly rainfall in the study area is 300 mm. The study area has warm days in summer with 38-46°C and moderate winters (15-25°C) (Oryan and Sadeghi, 1997; Rezaei and Shakoor, 2011; Moein et al., 2015).



Source: http://earthexplorer.usgs.gov

Figure 4: Location of the study area (digital elevation model (DEM) with spatial resolution of 90 m) ().

3. ANALYSIS

In this study, in order to investigate the increasing of spatial resolution of DEM 90m., the attraction model was used. Also, for founding the best model and for increasing spatial resolution, three scales (2, 3, 4) with two neighborhood methods of touching and quadrant have been used. So, this can result that the increase of the scale case leads to the increase of the spatial resolution. As Figure 5 shows, with an increase in the value of scale factor, the number of sub-pixels were increased.

Also, the neighborhood of touching (T1) showed a better result than quadrant (T2) method, as the sum of the RMSE values for the touching method is lower than quadrant method. There is also a change in RMSE value of two DEMs which for DEM 90m it is around 0.32 m (6.0-6.39) which shows a slight improvement is the accuracy of DEMs with a better spatial resolution. After the production of output images for each neighborhood method, there are 3 scale factors of 2, 3 and 4. Each image is compared with ground station points using RMSE and the results then are compared.

To make a quantitative evaluation of the generated DEMs with touching and Quadrant neighborhood methods, 148 points were selected from the ground station (Points are measured by National Cartographic Center of Iran (NCC)) (Figure 5). The Root Mean Square Error (RMSE) for these points in each method for DEM 90 was calculated and is presented in Table 1. The accuracy measures for two methods are shown in Figure 6. DEM 90m generation with touching and Quadrant neighborhood for different scale factors (2, 3 and 4) are shown in Tables 2, the lowest RMSE value showed the best accuracy for increasing spatial resolution.

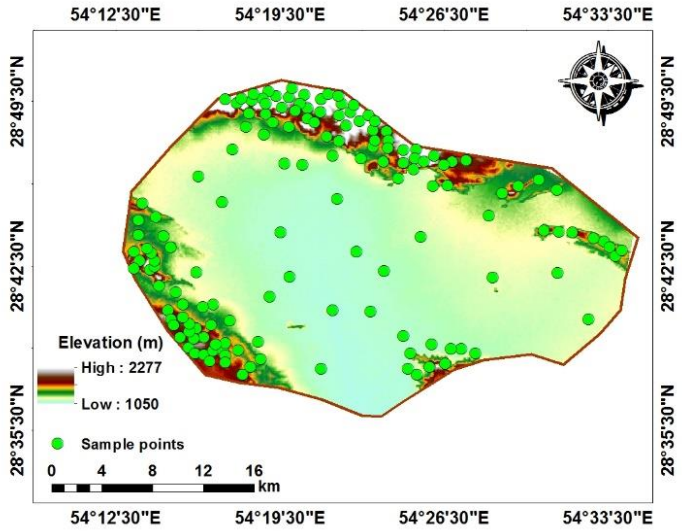
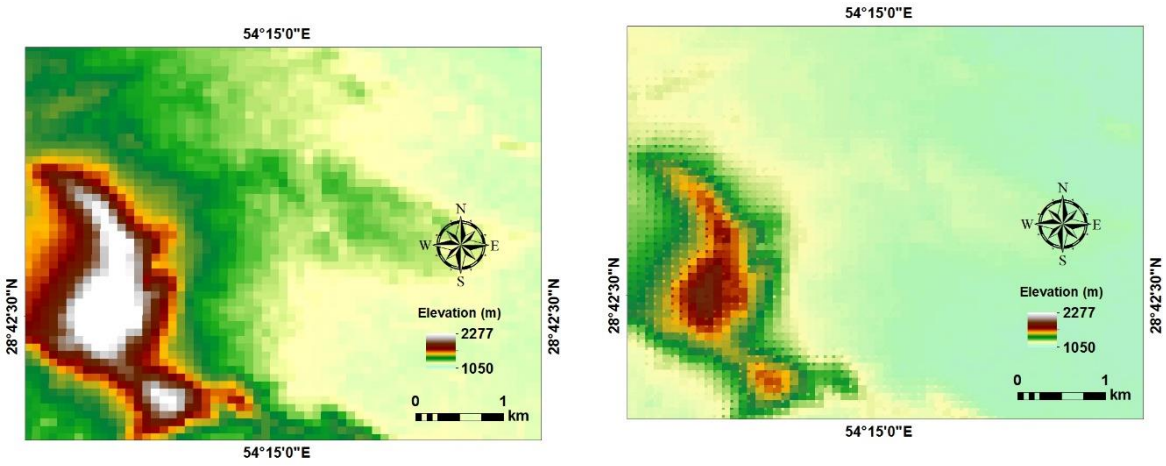


Figure 5: The location of ground sample points by National Cartographic Center of Iran (NCC).

Table 1: Output DEMs RMSE values (S=Scale factor, T1=Touching method, T2=Quadrant method).

DEM	RMSE
S=2, T1	6.06
S=3, T1	8.09
S=4, T1	7.76
S=2, T2	**6.06**
S=3, T2	8.23
S=4, T2	8.89



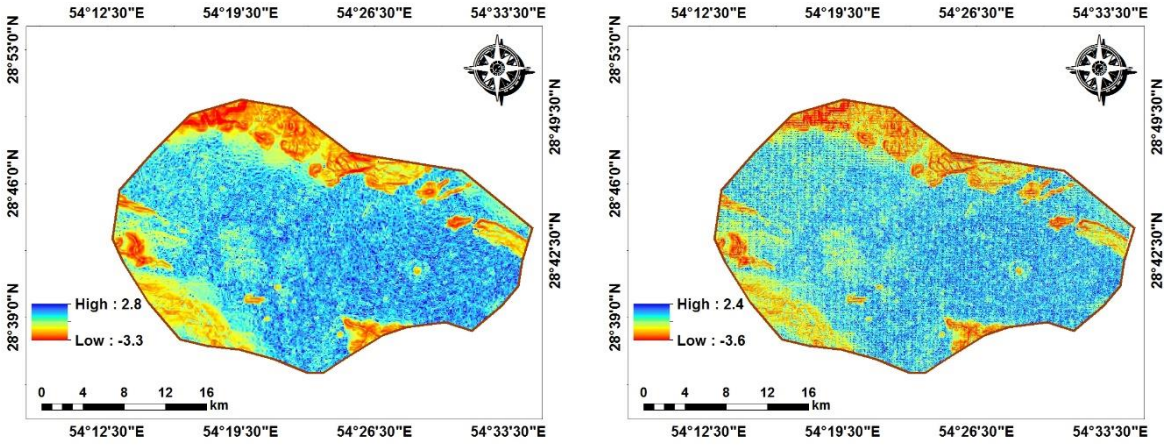
DEM 90 S3T2

Figure 6: DEMs generated using touching and Quadrant neighborhood with different scale factors.

As the empirical perspective increases in scale factor, the accuracy of models decreases and it is because of the way that the sub-pixel model gathers information from surrounding pixels. Because each sub-pixel should get a value from surroundings so when the scale factor increases the number of sub-pixels in a pixel increases and then the way to set a value to each sub-pixel faces some inaccuracy. For example Figure 2 with different scale factors in Quadrant method

when scale factor increases to find value of sub-pixel in position of (1,1) three of surrounding pixels are used but to calculate value of sub- pixel (2,3) in scale factor 2, all five surrounding pixels are used and because here only one class (only elevation) is used so the information in lower scale factors is more accurate than higher ones. In general, here with an increase of resolution because sub-pixel values are divided spatially and then recalculated it makes them more accurate when we use ground station points to calculate RMSE but when scale factor increases to more than 2 the accuracy in sub- pixels starts to decrease.

After the determination of the best model for extracting TWI was prepared it was used in GIS software for the study area (Figure 7).



DEM 90 S=3 , T=2

Figure 7: TWI map using attraction model (right) and DEM 90m (left).

According to Figure 7, it was determined that TWI using attraction model (S=3, T=2) has more details than TWI extraction from DEM 90m. According to the results, it was determined that the attraction model algorithm has a few simple basic rules. The assignment of pixels is performed during a one-step process, always yielding the same output, resulting in another advantage: the absence of iterations. There is no need for calibration/training as is the case with machine learning methods. This limits computation time, resulting in a relatively fast algorithm (less than 3 minutes with scale factor 2 for a 3601*3601-pixel image on an Intel core I 7+, 1.60 GHz processor).

Another advantage is its ability to deal with soft classifications with more than two classes, as there are 8 neighboring's around each pixel this algorithm can deal with maximum 8 different classes. An extensive comparison of different sub-pixel mapping algorithms is the subject of another research. The sub-pixel attraction model was used by many researches, for increasing the spatial resolution of land cover, land use and satellite image that all showed using the methods of increasing the spatial resolution can lead to archive the image with high spatial resolution and high information of region area (Schneider, 1993; Foody, 1998; Aplin and Atkinson, 2001; Verhoeye and De Wulf, 2002; Mertens et al. 2014). Mertens et al. (2014) used them in satellite image. The algorithm was evaluated both visually and quantitatively using RMSE accuracy index.

The resulting images showed increased accuracy when using a scale factor of 2 and slightly decrease in accuracy in higher scale factors. Using sub-pixel methods, we can achieve more accuracy in some cases. It also shows that we can apply these methods on Aster DEM and the output of 15m DEMs could be used with acceptable accuracy.

4. CONCLUSIONS

In this paper, prepared TWI from different spatial resolutions of DEMs was performed for attraction model and DEM 90m. Based on the results obtained, it was determined that the attraction model (S3, T2) produced higher accuracy than DEM 90m for extraction rivers. In fact the algorithm was evaluated both visually and quantitatively using RMSE accuracy index. The basic assumption is the spatial dependence as adopted by Mertens et al. (2014).

However, spatial dependence in this study is acting across different scale levels resulting in a sub-pixel interaction. The results showed that using the method the spatial resolution of DEM with lower time and cost, could be increased. To sum up using sub-pixel model both the accuracy and spatial resolution of input DEMs are increased and it gives more opportunity to use higher resolution DEMs in the study of environment models.

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ASSESSING ECOTOURISM POTENTIAL FOR SUSTAINABLE DEVELOPMENT OF COASTAL TOURISM IN QESHM ISLAND, IRAN.

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Abstract

Ecotourism is visiting nature-based attractions, with an emphasis on learning, education, environmental protection and sustainability. Qeshm Island with its unique nature, geological and geomorphological features, and also, ecological-cultural diversity can be regarded as an influential factor in the development of the region's ecotourism. The current descriptive-analytical study applies the Pralong's method to assess the scientific, economic, cultural and aesthetic value of ecotourism attractions of Qeshm Island. Then, by identifying the attractions of the island and estimating their quantity and quality as the productivity scale, and grading each of these values, a comparison is made in terms of tourism attractions and productivity scale. The results showed that Star valleys scored 0.75 in aesthetic attractiveness, 0.55 in economic and 0.67 in tourism, Hara Marine Forests scored 0.7 in science and 0.52 in tourism, Portuguese Castle scored 0.67 in culture and 0.5 in tourism, and Gold Wells scored 0.41 in tourism.

Keywords: *Ecotourism, sustainable development, tourism proof, productivity proof, Qeshm Island.*

1. INTRODUCTION

The ecotourism industry is one of the sectors that is highly attended by tourists. Ecotourism is a concept that has evolved with the rapid growth of tourism during the past 20 years among the bodies responsible for the protection of the environment and the people living around protected areas. Ecotourism makes stability through following the philosophy of living life and based on intrinsic and inner values; through the protection of natural areas, benefiting local communities, strengthening properties of local and small cultures, providing training and learning opportunities, enhancing job creation and preventing immigration, saving non-renewable resources, providing opportunities for local partnerships, environmental education and in other words proper development and protection of the environment and cultural heritage. Its development, also, can benefit the region's residents especially the natives, through providing various job opportunities.

In 1993, the World Tourism Organization (WTO) estimated that nature-based tourism costs 7 cents for international travel per person and in sum, the global revenue from tourism was estimated to be nearly three trillion resulting in the employment of approximately 212 million persons. Given the importance of this issue, the United Nations declared 2002 as the International Year of Ecotourism (IYE) (Eagle, 1997). UNESCO announced natural features (caves, valleys, faults, waterfalls, fountains, volcanoes, etc.) and human features (features associated with geomorphological factors such as inscriptions formed on steep walls, etc.) as

the most important tourism potentials of the earth. In ecotourism**,** there are three important criteria of nature-based attractions, tourists' mutual relationship focused on learning and education, environmental management according to the principles of socio – cultural, economic and ecological sustainability (Weaver and Lawton, 2007). By the late 1970s, tourism was introduced as a golden activity with no contamination and there was a focus on its favorable outcomes, especially on the economic benefits (Choi, 2003). In the 1990s, in line with the sustainable development paradigm, traditional approaches to tourism were challenged and with the simultaneous emphasis on the desired and undesired effects of tourism, there was a movement from mass tourism toward a sustainable approach to tourism (Jurowski, U. and Williams, 1997).

2. REVIEW OF LITERATURE

Ecotourism has been defined differently by different experts and several concepts are presented. The definition provided by World Tourism Organization includes any type of travel that includes at least one night, but no more than one year, away from usual place of residence (Swarbrook, 1999).

Ecotourism is a combination of eco and tourism or ecological tourism. Though there is no exact definition for ecotourism, the following definition can be provided: it "is a form of tourism inspired primarily by the natural history of an area, including its indigenous cultures" (Ziffer, 1989, p. 6). Ziffer also points to a number of characteristics of ecotourism which include visiting undeveloped areas in the spirit of appreciation, participation, and sensitivity, practicing a non-consumptive use of wildlife and natural resources and contributing to the visited area through labor or financial means.

According to Boo (1991), "Ecotourism is a nature tourism that contributes to conservation, through generating funds for protected areas, creating employment opportunities for local communities, and offering environmental education." (p.4). Figgis (1993) considers it as traveling to distant natural areas with the aim of flourishing awareness and appreciation of the natural environment and cultural heritage; while avoiding damage or deterioration of the environment and the experience for others (Figgis, 1993, p. 8). Another good definition was provided by Boyd and Butler (1996) who considered it as " A responsible nature travel experience, that contributes to the conservation of the ecosystem while respecting the integrity of host communities and, where possible, ensuring that activities are complementary, or at least compatible, with existing re-source-based uses present at the ecosystem." (Boyd and Butler, 1996, p. 386)

Recently there has been a surge of interest in studying ecotourism and the attempts that have been made gained noticeable results. Jalani (2012) investigated the effects of ecotourism on livelihood generation and influx of people, and examined the views of the local community on the impact of ecotourism and importance of natural resource to the tourism industry in the Puerto Princesa Subterranean River National Park (PPSRNP) which has been recently renowned as one of the new seven wonders of nature. The author found that undoubtedly the tourism industry in the area has been a source of income for most of the householders and the development of the ecotourism industry in Sabang led to the change of livelihood among local people due to higher compensation offered by the tourism industry. In addition, it had caused a high influx of people because of the work opportunities.

Ólafsdóttir and Dowling (2013) in their investigative attempt emphasized the importance of sustainable management in geotourism development. The authors aimed to assess the compatibility of geoconservation and rural development within geotourism by exploring the challenges and potential outcomes of the geotourism development in Iceland; by identifying and analyzing the various potential outcomes of geopark development; and by proposing a

strategic planning approach for sustainable geotourism planning and management in vulnerable environments. The results of their study pointed to nine distinctive sites for geopark development, each of which presented the major challenge of using geological heritage as a basis for informing the area's 'ABC' components such that both visitors and locals are given a holistic appreciation of the area based on an understanding of its geology.

Chiu, Lee and Chen (2014) studied the environmentally responsible behavior of tourists engaged in ecotourism and they investigated whether its level can change as a result of the eco-travel experience. In their article, Chiu et al. proposed a behavioral model in which perceived value, satisfaction and activity involvement with respect to the eco-travel experience shape the tourist's environmentally responsible behavior. The results of analyzing 328 questionnaires showed that perceived value, satisfaction, and activity involvement could promote environmentally responsible behavior of tourists. The authors concluded that enhancing tourist's value perception about the eco-travel activity was a priority in a sequence of steps that would strengthen environmentally responsible behavior via increasing the ecotourism's activity involvement and satisfaction levels.

Tran and Walter (2014) in a quite recent research about ecotourism, gender and development in northern Vietnam investigated women's participation in a community-based ecotourism project. Applying Longwe's empowerment framework, the authors found a more equitable division of labor, increased income, self-confidence and community involvement, and new leadership roles for women. Nevertheless, they found inequities of social class, childcare, and violence against women. Ahmad (2014) in another study in Brunei Darussalam in Southeast Asia attempted to identify the prospect as well as challenges of sustainable tourism from the perspective of the business organizations or enterprises in the tourism industry, based on data that were collected from a survey conducted among travel, transport, hospitality and visitor attraction sectors in the country.

2.1. Methodology

In this study, the required data were gathered through questionnaire and field study and applying Pralong's method, ecotourism potentials of the island were evaluated. Then, identifying the attractions of the island in terms of attractiveness as a tourism scale (scientific, aesthetic, economic and cultural attractiveness) and productivity scale (estimates of quantity and quality of attractions) and scoring each of these values, a comparison was made in terms of tourism attractions and productivity scale and consequently the level of the use of potentialities in terms of space and time were determined.

2.2. Discussion

2.2.1. The studied area

Qeshm Island is situated in the south of Iran and considering its strategically important location (wide view toward South, North and East, view toward Strait of Hormuz and being close to Bandar Abbas) and considering trade and industrial free area of Qeshm, this region has been very important. The distance between Qeshm Island and Bandar Abbas is 20 km, Bandar Hormuz 18 km, Larak Island 9 km, Abu Misa Island 163 km and greater Tunb Island is 114 km.

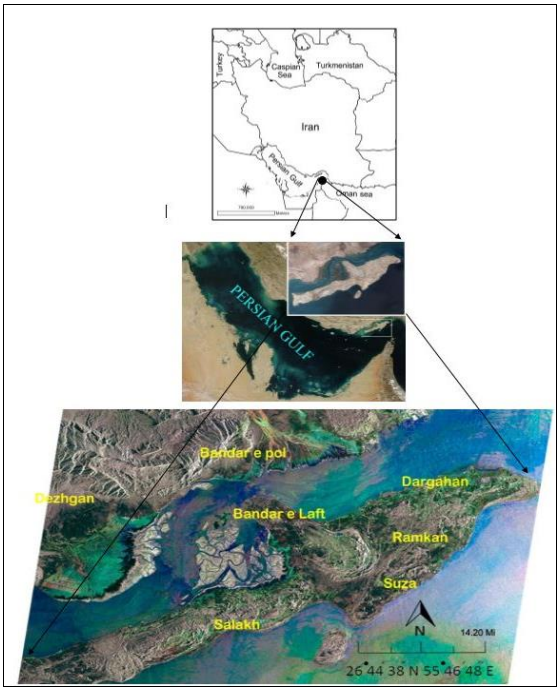


Figure 1. Geographical situation of Qeshm island

3. FINDINGS

3.1. Introducing ecotourism attractions of the area

Stars Valley

Stars Valley is a geomorphological perspective which is situated at the distance of 5 kilometers from the southern coast of the island and is formed by surface water erosion, seasonal showers, and storms. Northern part of the valley is more or less intact and is situated at a height between 7 to 15 meters from the valley base and it is made of sandstone and loose lime cement and filled with fossil shells. Sharp cones, eroded pillars and columns, arcs and blades and strip walls, are the segments that are observed in the valley (Figure 2).



Figure 2. Stars Valley by Fatemeh Nematollahi

Mangroves forests

Mangroves forests are natural and unique ecosystems which grow at the interface of land and sea in tropical and subtropical regions of the world (Kathiresan and Bingham, 2001). They are distributed in 112 countries and have many benefits. Among the direct benefits of these forests, one can refer to forestry products (firewood, charcoal, timber, honey *etc*.) and fishery products (fish, prawn, crab, mollusk *etc*.). Also among the indirect products (ecological functions) of these forests, we can refer to (stabilization of heavy metals, controlling erosion, absorbing carbon dioxide and producing oxygen, facilitating the transport of water and providing habitat for fish and shrimp). Mangroves forests appeared scattered on the southern coast of Iran, from the Strait of Hormuz toward the East and the Indian Ocean, off the coast of Oman. These forests are more seen on the Persian Gulf coast, near Bandar Loft, north of Qeshm Island, Bandar Khamir and in dense centers and it consists of a tape with the width of 50 to 500 km, with a range of 150 km and an area of about 8236 hectares (Figure 3). Currently, these ecosystems are strongly influenced by human activities and are threatened (Pons and Fiselier, 1991; Fouda and AL. Muharrami, 1995; Farnsworth and Ellison, 1997**).** Experience has shown that the best tourism activity in mangrove forests is recreational boating with a low speed and no wave creation (Majnoonian and Mirabzadeh, 2002) and other recreation activities can cause damage to this fragile ecosystem.



Figure 3. Mangroves forests by Fatemeh Nematollahi.

Portuguese castle

The Portuguese castle is situated on the northern side of the island and at the coast of the Persian Gulf. The castle was built on the island in 1507 AD, with the order of Portuguese navigator "Alfonso Albuquerque". Albuquerque seized the islands situated at the mouth of

the Persian Gulf and accordingly could dominate maritime trade routes between India and Europe. Therefore, Portuguese dominance over this major waterway lasted 110 years. At this time they began to build castles and stabilizers, among which are the fortresses of Hormuz, Qeshm and Larak. Qeshm Castle, with an area of over two thousand square meters, is made of limestone and gypsum with a local concrete mortar and has been restored several times over a century. The castle is rectangular. There are four towers at the four corners and long arms with the catapults which are based on its width. The castle was used to store ammunition and weapons.



Figure 4. Portuguese Castle

Gold wells

Wells drilled in Bandar Loft in Stone Mountain and in a deep place which act as artesian wells. Their water was supplied from rain and overflow of upstream rock and hills and so they were first called "Tal Av" ("tal" means "mound" in Persian) and later were known as talla wells ("Talla" means gold). The number of wells is over 50 to 60 rings which are generally filled with water, unless mud is accumulated which necessarily requires removal.



Figure 5. Gold wells.

3.2. Analysis of Results

3.2.1. Evaluation of Tourism Scale

Evaluation of tourism scale is carried out by four criteria: Aesthetic value, scientific value, cultural and economic values of the place, which is expressed in the following equation:

Tourism Scale = (Aesthetic value + scientific value + cultural value + economic value)/4
In the above equation, the weight of none of tourism scale criteria is more or less than any of the other criteria, as there is no special reason for increasing or decreasing the importance of any criterion in comparison to other criteria (Mokhtari, 2010).

Evaluation of apparent aesthetic value

The apparent aesthetic value depends on inherent and spectacular aspects of an ecotourism place (Table 1). In estimating aesthetic value, there is no special weighting method; as there is no acceptable reason that a particular criterion is less important than the other criteria. This criterion is calculated by the following equation:
Apparent aesthetic value = (Score of clause 1 + Score of clause 2 + Score of clause 3 + Score of clause 4) / 4

Table 1. Criteria and scores for evaluating apparent aesthetic

Criteria / Scores	0	0.25	0.5	0.75	1
1- Number of landmarks	-	1	2 or 3	4, 5 or 6	More than 6
The number of near places. The distance of each of these places from ecotourism location should be less than 1 km.					
2- the average distance from the sight (in meter)	-	Less than 50	50-200	200-500	Over 500
The shortest distance between each of the sights and ecotourism location divided by the number of sights mentioned in clause 1.					
3- Area	-	Small	Average	Large	Extremely large
The whole area of ecotourism location is considered. For each location (glacier, cave, etc.), a small-scale measure (in kilometer) of area compared to all locations in the studied area is determined.					
4- Height	Zero	Low	Average	High	Extremely high
The height of the whole place is considered. For each location (glacier, cave, etc.), a small-scale measure (in meter) of the height compared to all locations in the studied area is determined.					

Evaluation of Scientific value

Scientific value is assessed by some factors such as natural scarcity, the charm of ancient geography, location status in terms of conservation level and ecological value of an ecotourism place (Table 2). Weighting is decreased in this section.
Scientific value = (Score of clause 1 + (Score of clause 2 * 0.5) + Score of clause 3 + Score of clause 4) / 3.5

Table 2. Criteria and scores for evaluating scientific value of an ecotourism place

Criteria / Scores	0	0.25	0.5	0.75	1
1- The attractiveness of ancient geography	Zero	Low	Average	High	Extremely high
This criterion is determined based on the attraction of ecotourism location in the view of ancient geography. So that this location is an evidence of the evolution of morphoclimatic regeneration in the studied area. Historical study of the location is a greater charm.					
2- Rarity	More than 7	5-7	3-4	1-2	unique
The number of significant locations in the study area. For instance, a unique location may be regarded as a different sample of a morphoclimatic area of the past.					
3- Location status	destroyed	Completely destroyed	Moderately destroyed	Weakly destroyed	Not destroyed
The score of this clause is calculated based on the natural and human hazards. Factors such as human and natural changes and changes in levels of protection of ecotourism sites are considered in the calculation of this					

clause.					
4- Ecological attractions	Zero	Low	Average	High	Extremely high
The score of this clause is calculated based on factors such as attractiveness due to their rarity, diversity of species, natural dynamic processes (the ability of nature in area development), and special and unique plant and animal species in an ecotourism location.					

Evaluation of Cultural Value

Cultural value is assessed by some factors as occurrence of artistic and cultural events related to an ecotourism site (Table 3).
Cultural Value = (Score of clause 1 + Score of clause 2 + Score of clause 3 + Score of clause 4) / 4

Table 3. Criteria and scores for evaluating cultural value of an ecotourism place

Criteria / Scores	0	0.25	0.5	0.75	1
1- Historical and cultural correlation	No relation	Weak relation	Average correlation	Strong relation	Highly strong relation
Fixation rate and historical and symbolic significance of the location for society. The measure is calculated by historical and cultural aspects of ecotourism sites, regardless of the physical works and buildings.					
2- Historical evidence	Lack of evidence	Weak evidence	Average evidence	Strong evidence	Highly strong evidence
The existence of monuments and archaeological remains of historic buildings in ecotourism locations. The quality of these monuments positively affects the score obtained.					
3- religious and spiritual evidence	Zero	Weak evidence	Average evidence	Strong evidence	Highly strong evidence
The existence of religious and spiritual evidence related to the ecotourism location. This criterion also applies to public opinion.					
4- Cultural- art events	Never	-	Sometimes	-	At least once a year
In this section, the cultural-art events are considered. This event may occur in the same place or elsewhere in the study area. Short term events are awarded medium rating.					

Evaluating Economic Value

Economic value is assessed by such factors as applicability and exploitability of the ecotourism location in tourism field (Table 4).
Economic Value = (Score of clause 1 + Score of clause 2 + Score of clause 3 + Score of clause 4 + Score of clause 5) / 5

Table 4. Criteria and scores for evaluating economic value of an ecotourism place.

Criteria / Scores	0	0.25	0.5	0.75	1
1-Accessibility	More than 1 km	Less than 1 km	Through local road	Through regional road	Through national road
The accessibility rate depends on the distance of ecotourism locations from the main routes of communication and transportation. If the access is via cable car or the train, the scale should be adjusted accordingly.					
2-Natural hazards	Uncontrollable	Uncontrolled	Incomplete Control	Optional control	No Risk
This calculation depends on the level of the risk threatening ecotourism sites and management policies applied (increasing awareness, security infrastructure, etc). In this section, the dangers of human performance are not directly considered.					
3-The number of	Less than	10000-100000	100000-	500000-	More than

annual visitors to the region	10000		500000	1000000	1000000
The calculation of this part depends on the potentiality of an ecotourism site to attract visitors considering the annual number of visitors of the sights of the region. Points taken are the same for the same places in the area.					
4-Level of protection schemes	Complete	Limited	-	Unlimited	Lack of protection
This section is calculated based on the conservation level of ecotourism sites. The economic efficiency is conversely related to reducing the level of protection.					
5- Level of tourist attraction	-	Local	Regional	National	International
This section is related to clause 4, as the lack of protection might create economic and tourist losses for location productivity in relation to attracting tourists from different areas.					

3.2.2. Evaluation of the productivity scale

The method applied for tourism scale, i.e. the way that criteria and scoring measures were determined, will be used for the productivity scale. Productivity scale consists of two major parts: the productivity quantity which is shown by X index, and the productivity quality which is shown by Y index. The relationship between these two scales, i.e. productivity quantity and quality, will determine the productivity degree (low, average, high) in geomorphological places. The productivity quantity represents the extent of spatial and temporal application of a geomorphosite (Table 5). While productivity quality is assessed by the four parts which formed tourism scale (Table 6). Assessing productivity quantity and quality of ecotourism locations will ultimately determine the application level of the potentialities of the place in terms of space and time (Pralong, 2005). In this section, again, there is no special weighting method; as there is no acceptable reason that a particular criterion is less important than the other criteria. Thus various criteria with special scoring measure will be applied to the major components of productivity scale.

Productivity Quality = (Score of clause 1 + Score of clause 2 + Score of clause 3 + Score of clause 4) / 4

Productivity Quantity: (Score of clause 1 + Score of clause 2) / 2

Productivity Scale: (Productivity Quality+ Productivity Quantity)/2

Table 5. Criteria and scores for evaluating productivity quantity.

Criteria / Scores	0	0.25	0.5	0.75	1
1-The area used in Hectare	Zero	Less than 1	1-5	5-10	More than 10
The score of this section is calculated based on area used for economic and tourist efficiency. The area may include the total site area or a part of the space.					
2-Number of infrastructure	Zero	1	2-5	6-10	More than 10
To assess this point, the entire information, accommodation, souvenirs and transportation infrastructure are considered in the whole area used by ecotourism sites. Pedestrian paths are not considered in this section.					

Table 6. Criteria and scores for evaluating productivity quality.

Criteria / Scores	0	0.25	0.5	0.75	1
1-Use of aesthetic aspect	With no advertisement	A protective action and introducing a product	A protective action and introducing multiple products	Multiple protective actions and introducing a product	Multiple protective actions and introducing multiple products
Applying aesthetic attractiveness of the ecotourism location is assessed by training facilities or multiple training and supportive actions (Exhibitions, guide tours, educational notices) and the introduction of products available in that location.					

2-Use of scientific aspect	With no training facilities	A protective action and introducing a product	A protective action and introducing multiple products	Multiple protective actions and introducing a product	Multiple protective actions and introducing multiple products
Applying scientific attractiveness of the ecotourism location is assessed by training facilities or multiple training and supportive actions (Exhibitions, guide tours, educational notices) and the introduction of products available in that location.					
3-Use of cultural aspect	With no training facilities	A protective action and introducing a product	A protective action and introducing multiple products	Multiple protective actions and introducing a product	Multiple protective actions and introducing multiple products
Applying cultural attractiveness of the ecotourism location is assessed by training facilities or multiple training and supportive actions (Exhibitions, guide tours, educational notices) and the introduction of products available in that location.					
4-Use of economic aspect	No visitor	Less than 5000	5000-20000	20000-100000	More than 100000
Use of the economic potential of the place, which is calculated by the number of annual visitors. Obtained scores do not indicate the profitability of the place.					

4. RESULTS

This study applied the Pralong's method to make a comparison between tourism attractions and productivity scale of ecotourism attractions of Qeshm Island and to classify them based on ecotourism value (Table 7). The scores obtained from evaluating tourism scale and productivity scale made such comparison possible. Through such comparison, certain potentialities of each area will be recognized and planning priorities will be adjusted accordingly.

The comparison achieved from tourism scale showed that Stars Valley is the most visited site of the island and scored 0.61. Hara Marine Forests with the score of 0.52 and Gold wells with the score of 0.41 got the second and third rank in tourism scale respectively. In addition, investigating the components of tourism scale shows that in terms of aesthetic value attractiveness, Stars valley got the highest rank with the score of 0.75, Hara Marine Forests scored the highest in science which was 0.7, Portuguese Castle scored 0.67 in culture and Star valleys scored 0.55 in economic (Table 6). A considerable point is the relationship between aesthetic scale and economic scale of the region. Despite the high attractiveness of these places to attract tourists, they show low economic scale which refers to the fact that despite the existence of a novel and unique perspectives on the island, there are no organized plans by authorities in order to attract tourists with economic objectives (Table 7). Evaluating quantity and quality of productivity of ecotourism locations can ultimately determine the extent of applying the potentialities of the island in terms of time and space. As can be seen in Table 7, there is no acceptable coordination between tourism scale and productivity scale and despite the high tourism potentialities of the island, the productivity ratio is very low and insignificant. Stars valley got the highest rank in productivity scale compared to other attractiveness (Table 7) and (Figure 6-8).

Table 7. Results of evaluating tourism and productivity scale of ecotourism attractions of Qeshm Island

Ecotourism attractions / Scale	Stars valley	Portuguese castle	Mangrove forests	Gold wells
Aesthetic value	0.75	0.45	0.4	0.38
Scientific value	0.69	0.55	0.75	0.3

Cultural value	0.45	0.67	0.5	0.59
Economic value	0.55	0.35	0.45	0.3
Tourism value	0.61	0.5	0.52	0.41
Productivity Quality	0.21	0.1	0.15	0.05
Productivity Quantity	0.11	0.04	0.08	0.0
Productivity Scale	Low0.16	Low 0.07	Low 0.11	Low 0.02

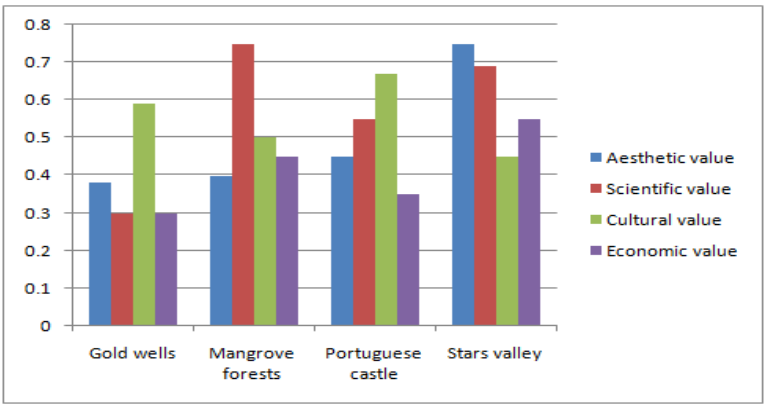


Figure 6. The comparative chart of studied scales in ecotourism areas of Qeshm.

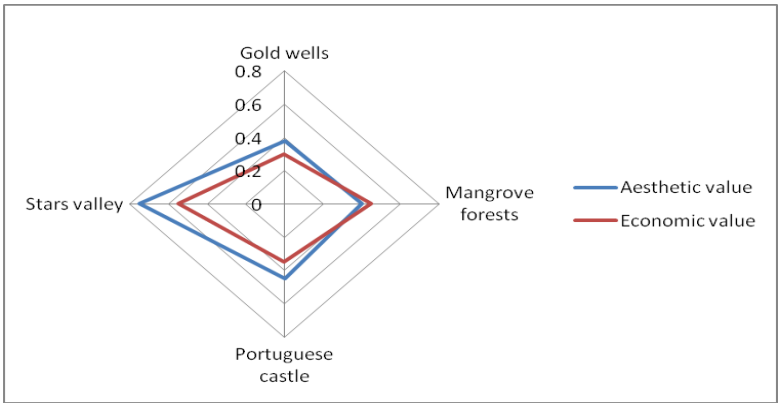


Figure 7. The comparative chart of attractiveness scale and economic scale in ecotourism areas of Qeshm.

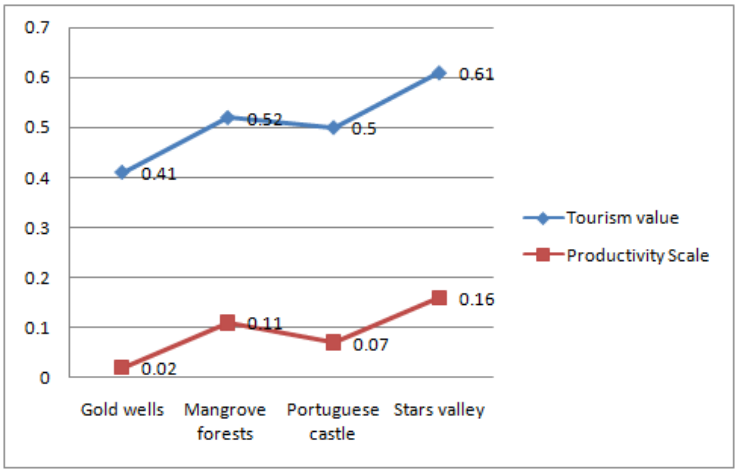


Figure 8. The comparative chart of tourism scale and productivity scale in ecotourism areas of Qeshm.

5. CONCLUSION

Currently exploiting natural and ecological potentialities in the form of ecotourism play a significant role in the development of ecotourism industry in every country. In the current

attempt, by discussing only an excerpt of natural and tourist attractions of Qeshm Island, we showed only a part of its potentialities in developing ecotourism of the island. Ecotourism perspectives of the island have such geological and geomorphologic features that can be investigated in the form of ecotourism locations and identify such attractions can give a new perspective towards the economic prosperity of these areas. The results of the studied area showed that the highest scores go for Star valleys which scored 0.75 in aesthetic value attractiveness, Hara Marine Forests which scored 0.7 in science, Portuguese Castle which scored 0.67 in culture, Star valleys which scored 0.55 in economic and in terms of ranks in tourism scale, Star valleys scored 0.61, Hara Marine Forests scored 0.52, Portuguese Castle scored 0.5 and Gold Wells scored 0.41. However, despite the high points of the tourism scale of island's ecotourism attractions, there were no satisfactory results in productivity scale of the region which was assessed by the quantity and quality of productivity. In the way that Stars valley with the score of 0.16, Hara Marine Forests with the score of 0.11, Portuguese Castle with the score of 0.07 and Gold Wells with the score of 0.02 do not have the appropriate condition. This situation emphasizes the need to plan and invest in this sector (especially the private sector). It is necessary to pay attention to the great ecotourism potentialities, diversity of flora, fauna, diversity of geological and geomorphological landscapes, and other ecological features of Qeshm Island through proper management practices. Considering these features, by increasing local community awareness regarding environmental activities and establishing an appropriate management framework, these resources can be used in line with the sustainable development of ecotourism industry.

To achieve sustainable development of ecotourism in Qeshm Island, the following suggestions can be given:

- Designing a space compatible with the environment with predetermined goals in places with tourism purpose to attract more tourists.
- Lighting and designing ecotourism space compatible with tourists' tastes using modern methods.
- Applying guide boards in ecotourism locations in at least a few languages.
- Using furniture compatible with the space to increase the natural beauty of the region.
- Preparing catalogues to introduce region's attractions to the people considering the region's potentialities in different tourism and ecotourism sectors.
- Holding scientific, cultural and sports meetings and seminars in the island for better absorption of tourists.
- Increasing managerial capacity and planning for sustainability in tourism and ecotourism of the island and reducing the damage caused by the increase of tourists in the area.

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THE ROLE OF TOURISM IN THE DEVELOPMENT OF COASTAL VILLAGES. A CASE STUDY IN NOOR TOWN, IRAN.

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Abstract

In this article we attempted to investigate the role of tourism in the development of the coastal villages in Noor town, Iran focusing on their economic, sociocultural and physical-environmental capabilities. Moreover, this study identified that planning for growth and development of tourism in this area should be managed by deliberating and analyzing all existing structures. Furthermore, tourism development and growth has a significant effect on land use changes on coastal villages. Thus results of this study indicate that this technique (Chi-square) is effective for tourism development on coastal villages. The required data for this study were collected through various questionnaires as well as documentary and research studies of 24 coastal villages that located in Noor town in Iran. To analyze tourism growth rate in the coastal villages a chi-square analysis test was conducted. The results showed significant growth rate in different dimensions of tourism including physical, economic and sociocultural perspective.

Keywords: *Tourism development, rural development, coastal villages, planning socio-economic growth.*

1. INTRODUCTION

Coastal lines are one of the tourist attractions all over the world. Considering the environmental conditions of coastal areas in the world leads us to the fact that tourism is one of the most compatible economic activities with these regions Northern coast regions of Iran especially in Mazandaran province have attracted many tourists for a very long time due to possessing beautiful landscapes and scenery. It is worth noting that major portion of resorts is located in the coastal area of Mazandaran. Out of 216 residential units in this province, 135 are located in coastal areas (Rahmani, 2007) and the other 90 units are located in areas far from the sea shore. Mazandaran coastal line is approximately 338 km. Location of the residential facilities in coastal villages is only on 248 km of Mazandaran coastal line. In other words, construction has covered 74% of the coastal line most of which is on the urban coastal line (Shid Far, 2003). This fact has made the tourists move along the road and therefore the

surrounding villages can benefit from the revenue sources and other advantages which lay the foundation for stable development. Thus, locations and villages around this line can take advantage of these beneficial features for a better operation in economic, social, cultural and environmental dimensions of tourism. Noor town has 2 central districts called Chamanestan and Baladeh. These towns have been able to obtain its real status in coastal tourism due to possessing some required potentials such as narrow sea shore, short distance to Tehran, the capital city of Iran, and other heavily populated cities as well as historical and social features. Moreover, aggregation of these facilities around the bordering road has attracted most of the tourists to some specific areas of Noor town and its surrounding coastal settlements and resorts. These activities have played important roles in the development of coastal and deprived villages of this town. However, some problems such as environmental pollution, land speculation, unemployment, and economic pressure on rural families, destroying fundamental activities such as farming, migration of youths to big cities due to unemployment, centralizing activities and services in urban areas, dispersion and unbalanced distribution of population over the town are also noticeable. Based on the introduction and considering importance of tourism development in coastal villages, it seems that such studies can be regarded as a promising step to explore a suitable solution to develop tourism in the area under study.

2. THEORETICAL FRAMEWORK

Based on the official predictions of world Tourism Organization, a number of tourists all over the world will reach 1.5 billion (Tayebi et al. 2008). Accordingly, tourism is a widespread activity which has noticeable economic, social, cultural and environmental effects (zarabi, 2011). Social and cultural effects of tourism are among the most important considerations of tourism development in any area. Tourism is about to change into one of the fastest-growing industries and it is considered an instrument to raise national revenue, one of the major economic element in the world and a concept in sustainable development (Rattanasuwongcha, 1998). Job creation, raising income for local residents, reducing poverty, investment growth and development of economic infrastructures as well as less migration are among the positive economic effects tourism development.

However, researchers have also pointed out some negative effects of tourism from the viewpoint of the host society such as a rise in the price of commodities, land and living cost. Alavi & Yasin (2000) believe that there is a direct relationship between the level of tourism development and negative attitudes of the host society towards economic, social and environmental effects.Tourism development has the following positive social and cultural effects:

1. Familiarization with lifestyle of other nations
2. Rise in level of welfare and quality of life to the members of society.
3. Enrichment of cultural business of members of the society
4. Making opportunities to introduce and transfer cultural values to the world
5. Protecting historical and cultural heritage of the country
6. Making opportunities for people of the society to use recreational and cultural facilities
7. Increasing public places mutual respect among people of different cultures (Zarrabi, 2011).

Tourism is a multipurpose activity happening in a place out of the tourist's usual and typical environment. The tourist's journey does not take longer than a year and can be

planned to achieve recreational, business goals or other ones (WTO*, 1997). Major consequences of tourism to coastal environment fall into 4 categories:

- Consequences to physical environment
- Consequences to ecological environment
- Consequences to resources used by human being
- Consequences to values of life quality

Negative environmental effects of tourism can include air and soil pollution, water contamination, traffic jam, damaging the historical monuments, destroying the plants and nature, destroying the wildlife (Altina & Hussain, 2005). Currently and in the wake of out break of environmental crises, destroying resources and to reach sustainable development, it is essential to plan based on the evaluated capabilities of the environment so that operation is done continuously and suitable to the environment and also the natural value of the environment is preserved (Zarrabi, 2011).

During the last decades, various studies have been done on surveying views and perceptions of the residents toward tourism effects on the host society. (Binns & Nel, 2002; Butler, 2001; Cohen, 2002; Dwyer & Faux, 2010; Knowd, 2001; Lukissas, 1982; Reid, 2001; Ratz, 2002). Likewise, some studies are related to the rural areas. (Monshizadeh, 2001; Sharpley, 2002; Weaver, 1986; Tepelus, 2010; Ritchie, 2003; Richards, 2000; Lntryre, 1993; Bontron, 1997; Carmichael, 2008). Henning (1996) has pointed out in a research on the rural area of Louisiana that the frequent entrance of tourists has had good and positive effects on big rural areas. In this research, it was also clarified that in most of the rural areas regional and local markets have been established to supply a various range of local commodities. Surely, tourism is regarded as an essential element in rural development and management plans. He also infers that rural tourism is considered an important force for the development of low-grown and least-developed villages.

Particularly, the villages with limited choices of development can consider tourism an elixir for their growth and development (Javan & Saghayi, 2004). Tayebi & Jaberi and babaki (2008) have shown in their researches that strategy of rural tourism should be compatible with local goals, manners, customs and traditions of that area and conform to local rules and regulations. Results of Weaver's researches also showed that not only can rural tourism increase job opportunities, increase revenue, solidify domestic economic foundations, but also it can raise cultural opportunities for local residents (Weaver, 1986).

Rahmai (2007) also mentions that a well- planned and managed rural tourism can lead to rising and preservation of environmental and local resources. Ashley et al. (1997) point out a wide range of impact of tourism on rural livelihoods in different areas and regions in Namibia in her research titled "The impact of tourism on rural livelihoods". Unwin (1996) has also investigated effective themes in the development of tourism in Estonia since independence in 1991 in his article titled "Tourist development in Estonia, images, sustainability, and integrated rural development". Shid far et al. (2003) could to a large extent designate concept of rural tourism and realm of it as well as how to plan tourism in rural areas in their book "Rural tourism: an introduction". Moreover, Javan & Saghayi (2004) could also show in their research that local tourism impacts varies greatly among rural regions and depends on a host of factors including workforce characteristics and seasonality issues.

It was also noted that Local support, however, is usually a necessary component of a successful tourism strategy in rural areas. However, Hening, (1996) considered tourism a threat to agriculture and believes that urbanism in rural areas results in numerous residential areas and difficult coexistence between agriculture and other activities. Land demand for construction sometimes leads to the staggering rise in land price and then creating

inappropriate situations to keep agricultural activities. Sharifzadeh et al. (2001) analyzed sustainable dimensions of tourism in their article titled "Sustainable development and rural tourism". Rahmani (2007) researched development of Barkhar district in Isfahan province through rural tourism development. Ghaderi (2003) investigate the role of tourism in rural areas in his Ph.D. dissertation titled "Tourism and sustainable rural development".

Table 1. The results of positive and negative effects of tourism development

Dimension	Positive results	Negative results
Economic	Income Increasing To establish occupation opportunity Motivation of stock To acquire of foreign investigation Development of infrastructure foundations Using of national present capability Regional planning Generation& Revenue	Inflation, increasing of prices Seasonal occupation unemployment Increasing of the price of lands Unbalancing of the regions Decreasing of public services Rural-Urban drift
Socio-Education	Increasing of people's life quality Increasing of recreation possibilities Increasing of the quality of common services To become familiar with the other counties' culture Cultural communication development To honour of own cultural Social interaction	Increasing of prostitution Increasing of alcoholism Establish a wrong local culture Inspire a sense of undeveloped cultural and financial to residents cause high crime rate
Bio-Environmental	Conservation of environment Conservation of natural protected areas Conservation of natural landscape Increasing of knowledge of people with respect to worth of natural resources More built-up areas	Natural resources destruction Land cover and wild life destruction Air pollution and sound pollution Ancient destruction Cause over crowding

Source: Rahmani, 2010 & WTO= World Tourism Organization*

3. CASE STUDY AND METHODS

Noor town is located at northern part of Iran and west of Mazandaran province. This town has been surrounded by two natural physical features: Alborz Mountains on the South and Caspian Sea on the north (Figure 1). This town is situated between latitudes 36° 45' and 36° 50' N and longitudes 51° 20' and 52° 10' E and it has 2675 square kilometers. Topographically, Noor town has both flat land and mountains and it is 15 meters below sea level. Average rainfall and temperature in this area is 1609.8 ml. and -0.4 to 33.4 degrees Centigrade respectively (Weather center in Mazandaran, 2011). The samples employed in this study are obtained from various parts the research areas as stated below:

Shahr kala, Gandyab bala,Gandyab payin, Abasa, Hendumarz, Tashku sofla, Tashku olya, Form abad, Gaskar mahalleh, Afrasyab kala, Amirabad, Rostamrud, Kordmahalleh, Zarrin mahalleh, Tirkadeh sofla, Tirkadeh olya, Sihkala, Hosseinabad, Kolachuran, Teska, Tamishan, Darya shahr located on the coastal bank of Noor town between mountain and sea. According to the census conducted in 2006, the above villages have the population of 18422 (health center, 2012). The required data for this study were collected through field investigation and by visiting the head of every household. Sampling for this study was done by Cochran sampling techniques to choose from among 300 households. Questionnaires were distributed to the sample households.

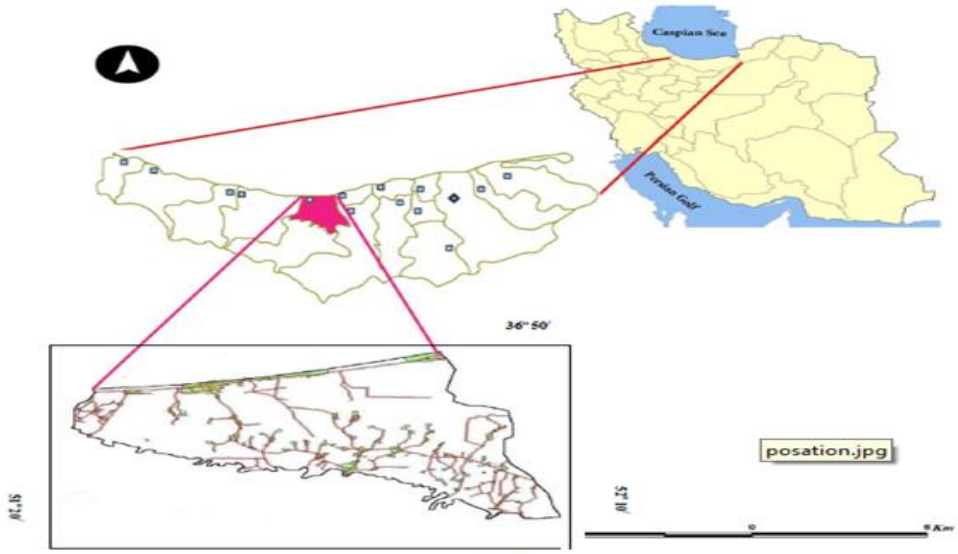
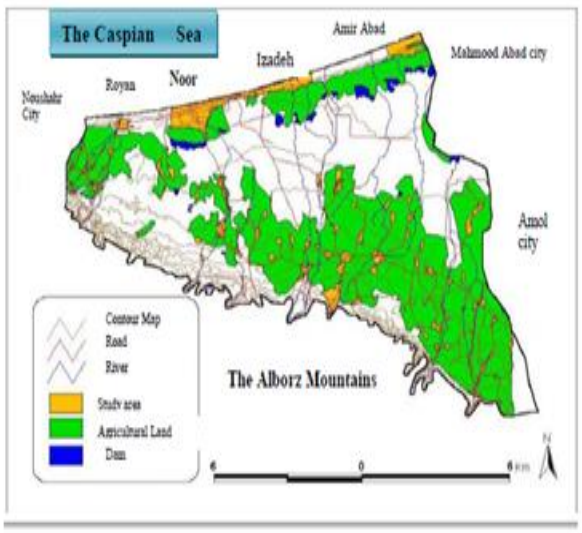


Figure 1 study area: Noor Town, Iran

As for the methodology, this study benefits from descriptive as well as inferential methods focusing on correlation. The data needed for this study are economic, social, cultural, environmental physical and institutional. The questionnaire, observation, and review of the existing documents in organizations and libraries have been conducted with a recent instrument (Figures 2 and 3).

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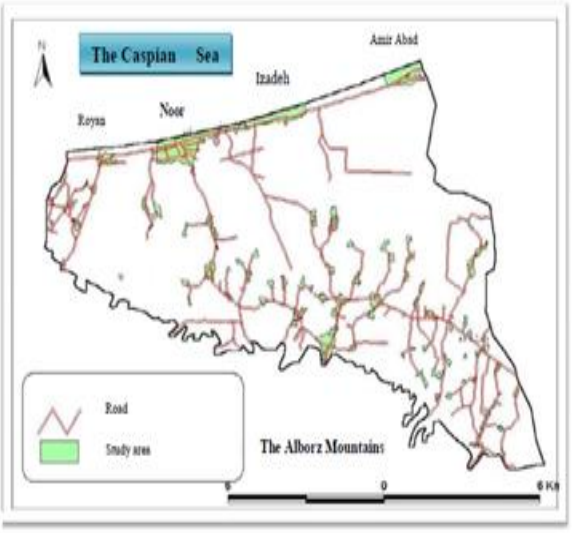


Figure 2. Urban and Rural regions in Noor Town

Figure 3. Noor Town Topology

Data analysis in this study was conducted through descriptive and inferential statistical analyses and the collected data were analyzed by using GIS software (ArcGIS 9.3) and SPSS in which rate of tourism growth was determined through Chi-square model. From the viewpoint of validity, this study examined content validity and face validity. To measure the reliability of the questionnaire, Alpha Cronbach was used for each variable separately through SPSS.

4. RESULTS

4.1. Hypothesis 1

In recent years, tourism growth has shown a significant economic effect on coastal villages of Noor town. To investigate tourism growth as well as its role in economic growth of Noor town, the chi-square test was conducted between two variables of tourism development and economic development in which the following dimensions have been taken into consideration: employment (employment of women and youths, rise in employment in service jobs, recruiting workforce surplus of agricultural sector, increasing vacancies in construction sector), income (rise in income, narrowing social gaps, increasing purchasing power) and land price.

Table 2 shows results of chi-square test conducted to test hypothesis 1 and analyze the 3 independent variables at the significance level of 0.5. As mentioned above, the 3 economic independent variables are employment, income and land price. Based on the results shown in table 2 it is inferred that from viewpoint of the residents (head of household), tourism growth has significant effect on employment of women and youths, rise in employment in service jobs, recruiting workforce surplus of agricultural section, increasing vacancies in construction section, rise in income, narrowing social gaps, increasing purchasing power and land price.

Table 2. Analysis of chi-square (X2), the impact of tourism development to economic elements.

Dimension	Independent variable	Dependent variable	Very high	high	Moderate	Little	Very little	Total	Chi-square			Result
									Statistic rate	Degree of freedom	Significance level	
Economic	occupation	Women occupation	8	10	63	80	139	300	197	4	0	S.R*
		Youth occupation	16	39	90	77	78	300	64.8	4	0	S.R
		Increasing occupation on services	54	60	16	57	65	300	31.0	4	0	S.R
		Employment of additional forces on agriculture and animal husbandry	19	28	84	77	92	300	76.5	4	0	S.R
		Increasing of occupation opportunity on various section	6	52	71	98	63	300	59.5	4	0	S.R
	Income	Income increasing	30	50	81	65	74	300	27.7	4	0	S.R
		Narrowing social gaps	26	44	92	68	70	300	43.3	4	0	S.R
		Increasing purchasing power	22	63	94	57	64	300	43.9	4	0	S.R
	Land worth	Lands price	52	86	87	40	3	300	41.5	4	0	S.R

S.R = Significance Relation Source: Information derived from the 2013 questionnaire.*

Table 3. Correlation between development and growth of tourism and employment, income and change in price of land in coastal villages of Noor town from view points of the residents (head of household).

Dimension	Dependent variable	Very high	high	Moderate	Little	Very little	Total	Chi-square			Result
								Statistic rate	Degree of freedom	Significance level	
Economic	employment	36	32	63	45	124	300	94.8	4	0	S.R*
	income	30	350	80	66	74	300	27.2	4	**0**	S.R
	Land price	52	86	87	40	35	300	41.5	4	**0**	S.R

S.R= Significance Relation* *Source: Information derived from the 2013 questionnaire.*

According to the results of the variables employment, income, land price and environmental issues it is inferred that tourism development shows a significant effect on employment, income, land price and environmental issues at the significance level of 0.5. By analyzing the variables employment, income, land price and economic dimensions at the significance level of 0.5, it was inferred that, tourism growth has had a significant economic effect on coastal villages of Noor town in the recent years.

Table 4. Correlation between tourism growth and effect of its dimensions on economic dimensions in coastal villages of Noor town from view points of the residents (head of household)

Spectrum	Observed	Expected	Difference
Very high	52	60	-8
High	28	60	-32
Moderate	77	60	17
Little	66	60	16
Very little	77	60	17

Chi-square		Result
Statistic rate	28	H0 is rejected
Degree of freedom	4	
Significance level	0	

Source: Information derived from the 2013 questionnaire.

4.2. Hypothesis 2

In recent years, tourism growth has shown a significant social and cultural effect on coastal villages of Noor town. In order to test the second hypothesis, 13 dependent variables were taken into consideration to be rated through a 13-item questionnaire. The variables were analyzed considering and focusing on three points of view: changing lifestyle, more motivation to stay and not to migrate and as well as cultural and dynamic interactions of the population. The following 13 independent variables were analyzed at the significance level of 0.5: inclination to consuming long-lasting products and appliances, change of attitude towards lifestyle, preventing from migration of workforce surplus in agricultural section, motivating the youths to reside and work in the villages, increasing sense of belonging to hometown, motivating the villagers to stay in their hometowns, decreasing the villagers' migration to cities, raising public knowledge and awareness to the environment, introducing the unique customs and traditions, the villagers' amenability to tourism improvement, improving level of services such as sanitation and housing etc., supporting dynamicity and expansion of culture of village-dwelling, higher contribution of the villagers in performing tourism plans.As shown in table 5, the results were indicative of the fact that the 13 variables were approved.

Table 5. Chi-square analysis (the impact of tourism development on socio- educational)

Dimension	Independent variable	Dependent variable	Very high	high	Moderate	Little	Very little	Total	Chi-square			Result
									Statistic rate	Degree of freedo	Significance level	
Socio-educational	Life style changing	Tendency to using ofcommodity and consistent equipments	50	104	76	40	30	300	59.8	4	0	S.R*
		Changing on people's tendency with respect to life style	54	108	79	14	45	300	84.03	4	0	S.R
	Increasing stay hometowns, decreasing the villagers' migration	preventing from migration of workforce surplus in agricultural section	20	50	101	60	69	300	57.7	4	0	S.R
		motivating the youths to reside and work in the villages	27	55	109	5	44	300	59.6	4	0	S.R
		increasing sense of belonging to hometown	44	72	86	62	36	300	27.6	4	0	S.R
		motivating the villagers to stay in their hometowns	28	82	98	42	50	300	92.3	4	0	S.R
		decreasing the villagers' migration to cities	46	65	73	7	60	300	54.1	4	0	S.R
	Cultural reaction and population motivating	raising public knowledge and awareness	49	81	111	32	27	300	83.9	4	0	S.R
		the villagers' amenability to tourism improvement	57	95	77	46	25	300	49.0	4	0	S.R
		introducing the unique customs and traditions	19	45	121	68	47	300	97.6	4	0	S.R
		improving level of services such as sanitation	29	75	88	41	67	300	39.6	4	0	S.R
		supporting dynamicity and expansion of culture of village-dwelling	21	50	102	70	57	300	58.2	4	0	S.R
		Higher contribution of the villagers in performing tourism plans.	14	39	75	80	92	300	70	4	0	S.R

S.R*= Significance Relation *Source: Information derived from the 2013 questionnaire.*

Table 6. Correlation between tourism growth and development with environment, increasing infrastructural and structural services and land-use change in coastal villages of Noor town from view points of the residents (head of household).

Dimension	Dependent variable	Very high	high	Moderate	Little	Very little	Total	Chi-square			Result
								Statistic rate	Degree of freedom	Significance level	
Socio-educational	Changing life style	54	158	79	29	30	300	76.0	4	0	Significant Relation
	Increasing motivation to stay and decreasing emigration	44	66	75	46	69	300	13.2	4	0	Significant Relation
	cultural and dynamic interactions of the population	53	77	99	54	17	300	62.4	4	0	Significant Relation

Source: Information derived from the 2013 questionnaire.

Based on the results of the dependent variables changing lifestyle, more motivation to stay and not to migrate and as well as cultural and dynamic interactions of the population at the significance level of 0.5 it was inferred that tourism growth has shown a significant social and cultural effect. Analyzing the dependent variables changing lifestyle, more motivation to stay and not to migrate and as well as cultural and dynamic interactions of the population at the significance level of 0.5 resulted in illustrating the fact that tourism growth has shown a significant social and cultural effect on coastal villages of Noor town in recent years.

Table 7. Correlation between tourism development and growth with social and cultural variables in coastal villages of Noor town from view points of people (head of household)

Spectrum	**Observed**	**Expected**	**Difference**
Very high	54	60	-6
High	108	60	48
Moderate	79	60	19
Little	29	60	-32
Very little	30	60	-30
total	300		

Chi-square		Result
Statistic rate	53.73	H0 is rejected
Degree of freedom	4	
Significance level	0	

Source: Information derived from the 2013 questionnaire.

4.3. Hypothesis 3

Tourism development has shown a significant environmental- physical effect on coastal villages of Noor town.

To test the hypothesis, 7 independent variables were taken into consideration. The 7 independent variables comprised the 7 items of the questionnaire and they were analyzed from 3 viewpoints as shown in table 8. Table 8 also shows the test and its total results regarding hypothesis 3.

As it is inferred from the table 8, significance test of indices shows that environmental-physical indices of hypothesis 3 show that tourism has a significant effect on the 7 indices from viewpoints of the residents at a significance level of 0.5. The 7 indices are: establishing residences, reduction in land under cultivation, reduction in plant species, increasing recreational and sports resorts, environmental pollution, garbage collection, and beautification of villages.

Table 8. Chi-square analysis (the impact of tourism development on environmental and physical parameters)

Dimension	Independent variable	Dependent variable	Very high	high	Moderate	Little	Very little	Total	Chi-square			Result
									Statistic rate	Degree of freedom	Significance level	
Physical-environment	Land –use change in village	Reduction in land under cultivation	56	55	95	56	38	300	29.4	4	0	S.R*
		Reduction and change in plant species	17	37	113	77	56	300	91.5	4	0	S.R
	Increasing infrastructural and structural services and environment	Establishing residences (hotel etc)	31	52	83	63	71	300	88.0	4	0	S.R
		increasing recreational and sports resorts	26	69	79	44	82	300	38.9	4	0	S.R
		environmental pollution	76	74	71	50	29	300	27.3	4	0	S.R
		garbage collection	60	46	110	35	49	300	57.3	4	0	S.R
		beautification of villages	43	54	72	48	83	300	19.0	4	0	S.R

S.R= significance Relation* *Source: Information derived from the 2013 questionnaire.*

Table 9. Correlation between tourism growth and the dimensions land-use change in villages, increasing infrastructural and structural services and environment in coastal villages in Noor town from view points of people (head of household).

Dimension	Dependent variable	Very high	high	Moderate	Little	Very little	Total	Chi-square			Result
								Statistic rate	Degree of freedom	Significance level	
Environmental - physical	land-use changes in villages	54	57	95	63	31	300	35.3	4	0	Significant Relation
	increasing infrastructural and structural services and environment	31	64	77	59	69	300	20.4	4	0	Significant Relation
	Bio-environmenta	76	30	108	8	78	300	108.1	4	0	Significant Relation

Source: Information that is derived from the 2013 questionnaire.

According to the results obtained from the independent variables land-use change in villages, increasing infrastructural and structural services and environment at the significance level of 0.5, it is concluded that tourism growth and development has a significant effect on land-use change in villages, increasing infrastructural and structural services and the environment. Generally, it is inferred that tourism growth and development has a significant effect on environmental-physical factors in villages.

Table 10. Correlation of tourism growth and environmental-physical factors in coastal villages in Noor town.

Spectrum	Observed	Expected	Difference
Very high	76	60	16
High	30	60	-30
Moderate	98	60	38
Little	21	60	-39
Very little	75	60	15
total	300	300	

Chi-square		Result
Statistic rate	72.43	H0 is rejected
Degree of freedom	4	
Significance level	0	

Source: Information derived from the 2013 questionnaire.

5. CONCLUSION

Due to its historical and cultural background as well as its tourist attractions Noor town, one of the most important areas of Iran, its tourism role was investigated with respect to the development of coastal villages through statistical methods and field research. Therefore, the

rate of tourism effect on the whole area was measured physically and socioculturally. The results of the data analyses help us to explore appropriate strategies for tourism development in coastal villages in Noor town. Through identifying the potentials as well as relative advantages of the villages and offering new solutions, good measures can be adopted on the way to development and growth of the villages.

Results of qualitative aspects of each factor are indicative of the facts that: Tourism priorities and advantages of rural areas can facilitate the process of tourism growth. Without perfect planning, these areas may be damaged socially and environmentally to a large extent. In this respect, the extent to which coastal villages of Noor town can be damaged far heavier due to its fragile ecosystem. Therefore, planning for growth and development of tourism should be conducted by considering and analyzing all existing dimensions which are essential for local, regional and national development. Any type of planning for tourism should have contribution and cooperation of private and state organizations focusing on capacities of the areas. Moreover, some training and research centers must be established in the selected areas focusing on sustainable development criteria to pave the way and lay the essential foundations for sustainable development in economic, social, cultural, environmental and physical dimensions.

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