

Geomorphology and Land Use Planning Bharatpur District (Rajasthan)

Abstract

The present paper is an attempt to analyze the geomorphology and land use planning in Bharatpur district (Rajasthan). The attempt has been made here to analyze the existing land use pattern and changes over a period of time with the aim of creation data base for the process of planning at micro level. Major findings of the analysis have been discussed in detail.

Keywords: RS Data, GIS, Land Use and Geomorphology.

Introduction

Planning of land development requires in the first instance collection of available information on land use and trends of its variation with time. In the state of Rajasthan, because of vast arid tracts the resources have not as yet been fully assessed and whatever information is available has not been rationally utilized to upgrade production. The paper deals with the land use planning in Bharatpur district. The main object is to find out the land use in different categories and the trends of variations so that the characteristics of land utilization may be analyzed of future planning.

The study of land use and agricultural land use changes is studied in detail by considering the concept of land, land use, land cover and land use changes.

Land is the basic, fixed and limited natural resource. Land plays the key role in the determination of man's economic activities as well as social and cultural progress. All agricultural, animal and forestry productions depend on the quality and productivity of land. The term 'Land Use' is used to describe the use of an area of land of a certain time is put to. It is related to human activity associated with a specific piece of land. The general land use of region is the end result of physical, economic and social factors. These factors play a significant role in shaping the general land use. The geographic aspects mainly physiography, climate, soil and the socio-economic aspects such as population, irrigation, urbanization, industrialization, transportation etc. play a significant role in shaping the general land use.

Aim of The Study

In general notion that geomorphology is the science of landforms but the studies of A.N. Strahler (1952) and R.J. Small (1970) demonstrate that it is the study of quantification in the present time and giving rise to the branch of modern geomorphology known as Morphometry. The studies of H.S. Sharma (1979, 1982) also show the geomorphic factors combine together have played very important role in the processes and social systems of agricultural activities in shaping their taxonomic characteristics in one side, and the agricultural enterprise system including cropping pattern associated with the natural factors on the other, which have conditioned the definite enterprise systems in a much more complex way. Considering this hypothesis the efforts were made during the study that upto what extent geomorphic parameters affect the distribution of agriculture in the Bharatpur district.

Thus agriculture is seen with a complex phenomena and function of their closely but widely associated geographic control in different parts of the district. It would be quite in sequence to see the different levels of agricultural setup in contrast to the physiography, soil and water resources embodying geomorphic control in the district. This has great relevance for an agricultural area such as present study area where cultivation has been carried out since times immemorial and in which a high portion of rural population is dependent on primary vocation. The objectives of sustained production can only be achieved through an analysis of morphological character of the region. As geomorphological analysis or approach attempts to express the integration of all elements of the land complex,



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recognized the casual links between them through an understanding of the genesis of landform themselves.

Review of Literature

The present status of geomorphology is the result of the gradual but successive development of the geomorphic thoughts postulated in different periods by innumerable philosophers, experts and geoscientists in the subject and outside the subject. In comparison with American and European countries the progress of the research in geomorphology in India is as follows:

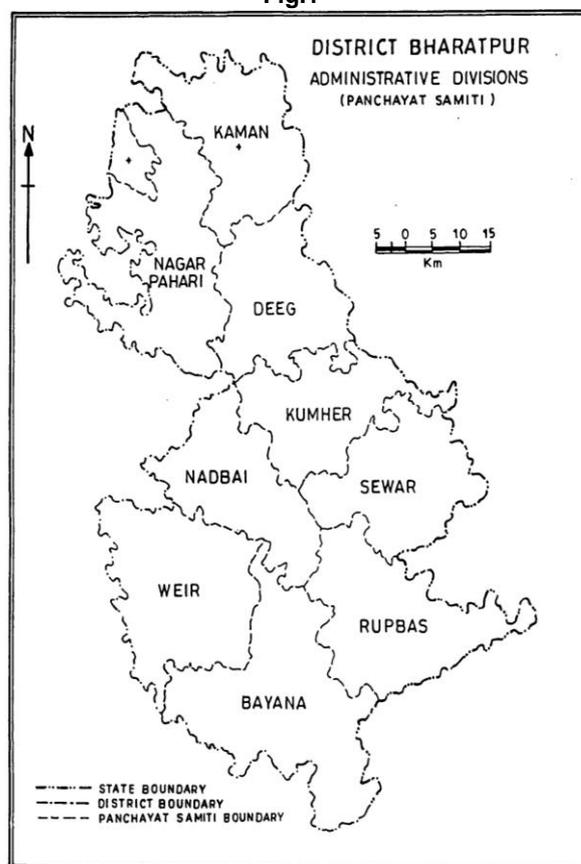
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Study Area

Bharatpur district of the state of Rajasthan in India, located between 26 degree 04 minutes to 27 degree 50 minutes North latitudes and 76 degree 50

minutes to 77 degree 50 minutes East longitudes. The total area of the district is around 5085 sq. km. The district is divided into eight tehsils viz. Kaman, Nagar, Nadbai, Deeg, Weir, Bharatpur, Rupbas and Bayana (Fig. 1). Bharatpur town is the district headquarters which is well connected by Rail and Road network with Jaipur, Mathura and Delhi. Major part of the district has a good drainage system and forms part of "Ruparel River Basin" in the northern part, "Banganga River Basin" in the central Part, "Gambhir River Basin" in the southern part. Geologically the rocks of the Bharatpur district belong to Delhi Vindhyan Super group. Almost the entire district is covered by alluvium, with few isolated hills where rocks of schist quartzite's Delhi Super Group are exposed. The influence of geomorphic features on agricultural land use has been discussed in this paper.

Fig.1



Data Base and Methodology

The present study is based on primary and secondary data from 1995 to 2015 duration. Primary data were collected by the field survey and secondary data are collected by the published reports by various departments. Survey of India Toposheets on 1:50,000 and 1:2, 50,000 scales, census of India reports and cadastral maps were also used in the study. The multi-date remote sensing data has been used for the study.

Land Use of Bharatpur District

The total area for land utilization purposes of the district is 507,448 hectares, whereas the total geographical area of district 810,010 hectares. The figure shows the land use pattern of the district.

Fig. 2

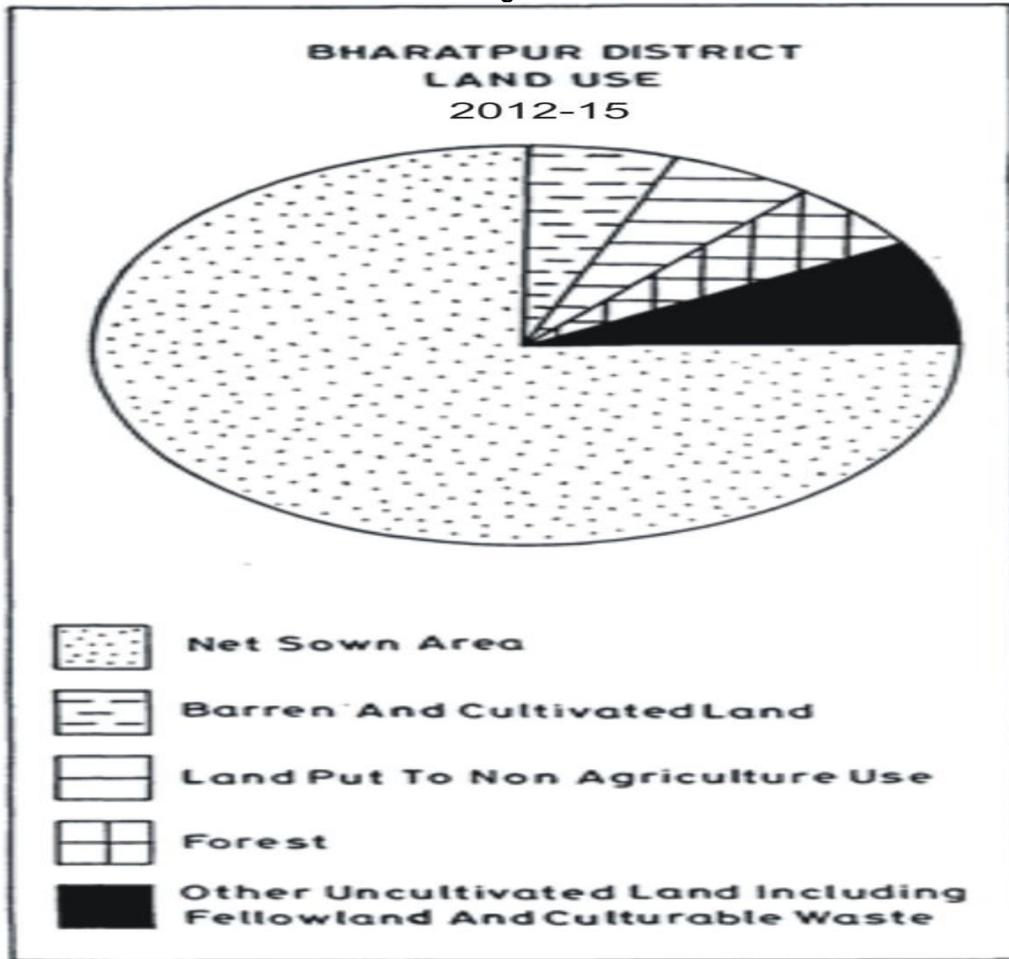
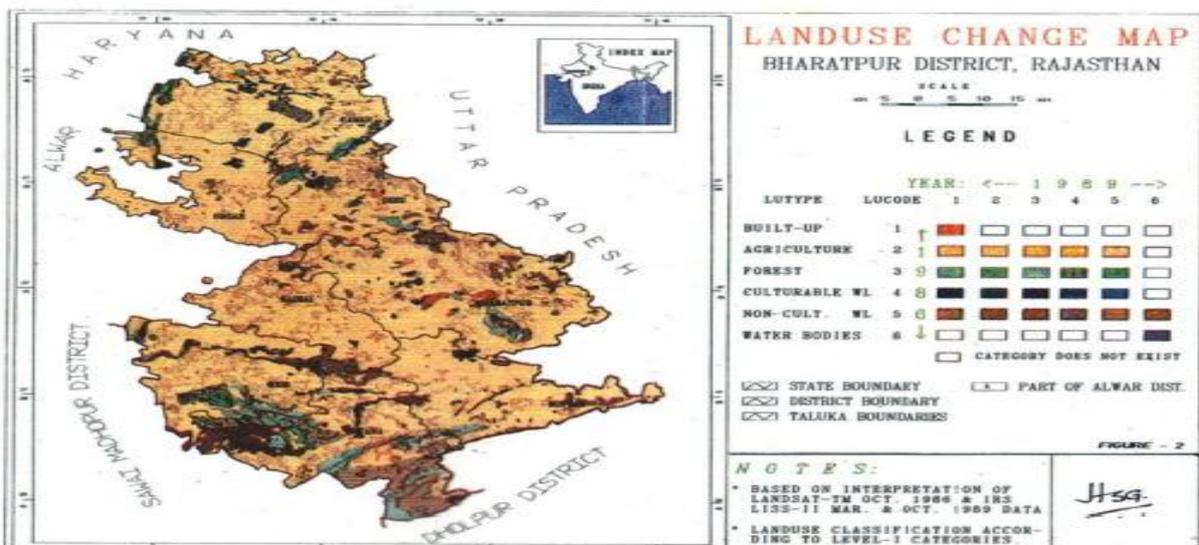


Fig. 3



Bharatpur District, Project Report, p209

Changes in Land Use

In order to analyze the changes in land use we pattern at regional and area level, time series data for a longer period would be desirable. Changes in

land use pattern have been studied during 2012-2015 on the basis of remote sensing data which may be taken as indicatives of the trends in the emerging land use pattern. From table 1

Table -1. Change Matrix of Landuse classes between 2012-15

(Based on RS Data, All figures are in sq.km.)

S N.	SLT		2012-2015		B	Total	B	D	F	DF	MF	SF	ER	UN	WL	SA
			ROC	WB												
1.	-	Built up land	-	--	B	37.76	37.76	3313..40	-	-	-	-	-	-	-	-
2	--	Crop land	-	4.87	C	33.93.30	2.25	92.80	72.73	-	-	-	-	-	-	-
3	-	Fallow land	-	3.07	F	667.52	3.23	-	568.05	-	-	-	-	0.37	-	-
4	-	Dense forest	-	-	DF	44.90	-	-	-	10.52	23.16	11.30	-	-	-	-
5	-	Medium forest	-	-	MF	72.67	-	-	-	-	20.84	39.58	-	12.25	-	-
6	-	Sparse forest	14.26	-	SF	167.94	-	-	-	-	-	50.91	-	102.67	-	-
7	-	Eroded land	-	3.32	ER	28.46	-	-	-	-	-	-	25.14	-	-	-
8	-	Undulating land	95.72	-	UN	221.92	-	-	62.88	-	-	-	-	63.32	-	-
9	-	Water-logged	-	-	WL	64.44	-	37.53	-	-	-	-	-	-	26.91	-
10	46.39	Sandy Area	-	-	SA	-	-	164.95	-	-	-	-	-	15.44	-	-
11	-3.18	Salt Affected	26.89	-	SLT	-	-	7.06	15.71	-	-	-	-	-	-	-
12	-	Rock out-crop	13.31	-	ROC	71.93	-	-	-	-	-	-	-	58.62	-	-
13	-	Water bodies	-	31.77	WB	31.77	-	-	-	-	-	-	-	-	-	-
Total	26.89		123.29	43.03	0043 508517	0043.24		719.38		10.52	44.00	101.80	40.58	237.23	26.91	52.57

It is observed that the district has registered an increase in cropped land from 3393 sq. km. to 3615 sq. km. during 2012-2015 which might have been facilitated by the reclaiming measures taken by the government. The sandy area, water locked area and salt affected land amounting to about 164.95 sq. km., 37.53sq. km. and 7.06 sq. km. respectively have been converted to agricultural use in 1995. Increase in cropped land may also be partly due to the improvement of irrigation facilities during 1995-2015. With the increase of cropped land there should have been decrease in fallow lands but on the contrary it has also recorded a marginal increase particularly in the tehsils of Kaman, Bharatpur etc. Decrease in forest area indicates unhealthy trends of land use pattern almost in all the tehsils even area under dense forest cover has decreased from 44.98 sq. km. in 2012 in the district. The reduction of high and medium density forest cover has resulted an increase in the spares forest cover and scrub land of area under rock outcrops and wastelands. On the other hand, reduction of original spares forest cover 2012-2015 has resulted in increase of area under rock out crops and waste lands. The reduction in forest cover may be

due to the constant felling to trees for fuel and fodder in the hilly tehsils of Bayana, Rupbas and Weir. There is some increase in the area under water bodies which may be because of the normal rainfall in the year 2012. The area under water bodies has increased especially in and around Baretha reservoir. The area under salt affected land and waterlogged area has decrease during 2012-2015. Mainly due to the reclaiming measures taken by the government, It is striking to note that eroded lands have been increase by 12 sq. km. during the three years period pointing to the degradation of forest cover resulting in erosion at foot hills and low lands. With the growth of settlement and non-agricultural activities, buildup area has also increase particularly around the town of Bharatpur. Obviously such growth in buildup land has been at the cost of agricultural land. Based on the above analysis, the following observations are noteworthy:

Land under Agriculture

The cropped land and fallow land together constitute the extent of land under agriculture. As may be seen from the statistical data and figures computed from the remote sensing data in table -2

TABLE - 2 COMPARISION OF LAND USE CATEGORIES FROM STATISTICAL AND REMOTE SENSING DATA
(All figures are in Sq.km, Figures in brackets indicate percentage)

SN TEHSIL	TOTAL AREA		AGRI. LAND		FOREST LAND		OCT. LAND		NOCT LAND	
	CENSUS	RS	CENSUS	RS	CENSUS	RS	CENSUS	RS	CENSUS	RS
1. KAMAN	734.1	742.3	597.0	615.2	---	24.8	28.5	48.5	108.5	53.7
2. NAGAR	471.0	472.3	416.9	435.8	---	4.6	6.3	17.0	47.8	15.0
3. DEEG	500.9	507.1	432.8	413.3	9.5	28.4	9.3	48.4	49.3	17.0
4. NADBAI	446.7	443.4	419.8	428.8	---	---	3.0	10.9	23.9	2.6
5. BHARATPUR	954.8	949.7	826.8	821.0	75.8	20.7	16.8	56.8	82.9	57.1
6. WEIR	614.0	603.0	460.0	465.6	64.8	61.5	34.9	41.7	54.1	34.3
7. BAYANA	803.9	808.4	442.3	383.0	151.4	133.6	51.3	113.6	158.9	178.8
8. RUPBAS	549.1	559.0	469.9	498.1	6.5	12.1	14.7	24.4	58.1	24.4
TOTAL	5074.5	5085.1	4065.7	4060.8	308.0	285.5	164.8	361.0	583.5	382.9
	---	---	(80.1)	(79.9)	(6.1)	(5.6)	(3.3)	(7.1)	(11.5)	(7.5)

Proportion and extend of total agricultural land in 2012 was comparable (about 80%) in the district. The distribution of cropped area was highly uneven ranging from 46% in Bayana tehsil to about 96% in Nadbai tehsil. In Bharatpur, Deeg and tehsils cropped land was more than 80% and in the remaining three tehsils of Kaman, Weir and Rupbas, it was between 60 to 80 percent.

Land under Forest

Forest Area interpreted from satellite imagery relate to actual forest cover and is generally less than the forest area given in the statistical year book which, by and large indicates total area under the control of forest department. Interestingly, however there is not much different in Bharatpur district the forest area in both sets of figures which works out to about 6% of the reporting area. However, at tehsil level, some differences a noticed between two sources i.e. statistical data show about 8% in Bharatpur tehsil as against 2% of the reporting area in the RS data. Revenue figures do not record area under forest in Nagar and Kaman tehsils where as interpretation of RS data indicates about 1% and 3.3% of the reporting area under forest cover in these tehsil, respectively. Bayana and Weir tehsils had the highest and dense forest cover spread over in patches along the nalas, roads, railways and on isolated hillocks. Area under forest cover gradually decreases as one move from south west to north east part of the district.

Other Uncultivated Land

This category included cultivable wasteland permanent pastures and land under miscellaneous tree crops and groves. As far as land under this class is concerned there is vast different between the two data sources. Statistical figures reported 3.25% of the reported area under this category against 7.1% in the RS data. This difference may be attributed to the categories of land included under this category. This category was reported to some extent in each of the tehsils, where Bayana tehsil has One third of the reporting area. Weir, Kaman and Deeg were the other

tehsils having concentration of such lands. Cultivable waste lands in these tehsils are not presently under cultivation but the same can be reclaimed for agriculture and fodder crops through suitable measures. Area under permanent pastures and tree crops was also higher proportion of cultivated wasteland, which may be ascribed to low fertility of land concentration of livestock population. By adopting suitable measures these areas may be turned into rich grazing grounds as well as for rising of fodder crops.

Land Not Available for Cultivation

This category consists of land put to non-agricultural use i.e. undulating terrain with or without scrubs, rock out-crops, built up land in water bodies. Comparison of two sets of datasources portrays of deceptive picture in this regard. According to statistical figures 11.5% of the reporting area was classified as land not available for cultivation against 7.5% in RS data which appears to be on the lower side in view of the larger number of human settlements and other non- agricultural activities existing in the district. This is further substantiated by the facts that in all the tehsils, statistical figures recorded higher percentage of land under this category in all the tehsils against the RS data. Barrenlands are more in Bayana tehsil accounting for about 15% of the total reporting area. Land under non- agricultural uses including build up land, water bodies, transport network etc. was concentrated more in Bharatpur Tehsil because of location of big urban settlements and other non- agricultural activities.

Conclusion

1. It is observed that the land use pattern in Bharatpur District is not similar to that of general and land use pattern prevalent in Rajasthan State as a whole.
2. Agricultural land is widely distributed throughout the district. Its concentrations however relatively lower in Southern tehsils particularly in Bayana and relatively higher in the north- eastern parts of

the district comparison Kaman, Deeg, Bharatpur and Nagar tehsils.

3. Forest cover is mainly in the south western parts of the district in tehsil of Bharatpur around Ghana Bird Sanctuary Area.
4. Area under pastures is mainly confined to Kaman, Bayana and Weir tehsils while plantation and tree crops are more pronounced in the Weir tehsil.
5. The Cultivable wasteland is relatively more concentrated in Bharatpur, Kaman and Bayana tehsils and interestingly the barren lands are also comparatively more in the latter two tehsils because of rocky terrain and poor soil conditions.

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