

Relation Between Slope Analysis and Flood

(A Case Study of Eastern Rajasthan)

***Dr. Gopal Lal Gupta**

INTRODUCTION:

The man has been facing and fighting against the furies and ferociousness of natural commotion, calamity and cataclysm from the time immemorial. Severe droughts, excessive rainfalls and often tumultuous tempests have caused these natural catastrophes. Floods have been faced by the man from time to time. Though, Rajasthan has not generally a record of heavy rainfall, yet the eastern Rajasthan has recorded it periodically. The districts of Jaipur, Bharatpur, Alwar, Sawai Madhopur and Dholpur falling into the study region faced the furies of floods in the past.

AIM OF STUDY:

The study has the following aims:-

- (1) To demarcate the flood-affected region.
- (2) To appraise the natural and cultural man-made features, which are responsible for the tremendous flood phenomena in the study area.
- (3) To assess the physio-economic, climate-morphological and institutional measures to control floods in the flood affected areas and to find out impacts of floods on physical-cultural landscape of the study area.

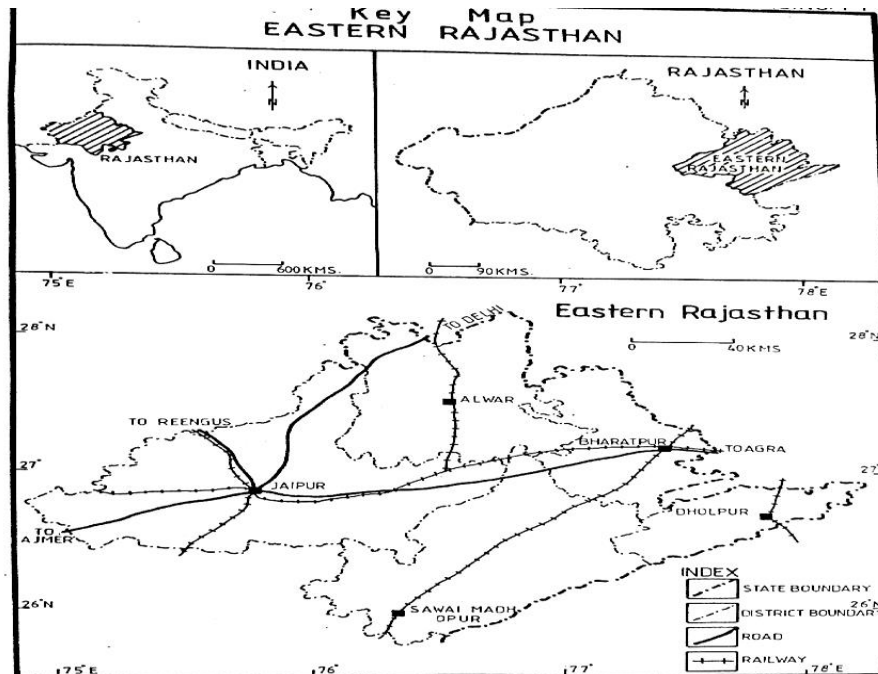
THE STUDY REGION

The study region of the Eastern Rajasthan lies between 24°45' & 28°4' North latitude and 74° 55' & 78°77' East longitude. The study region consists of Alwar, Jaipur Sawai madhopur and Bharatpur districts of the eastern Rajasthan. The region comprises the Aravalli's and the Vindhyan formations. These two types of formation are separated by great boundaries fault. Geological structures affect the development of drainage patterns.

Relation Between Slope Analysis and Flood

(A Case Study of Eastern Rajasthan)

Dr. Gopal Lal Gupta



RELIEF OF THE REGION

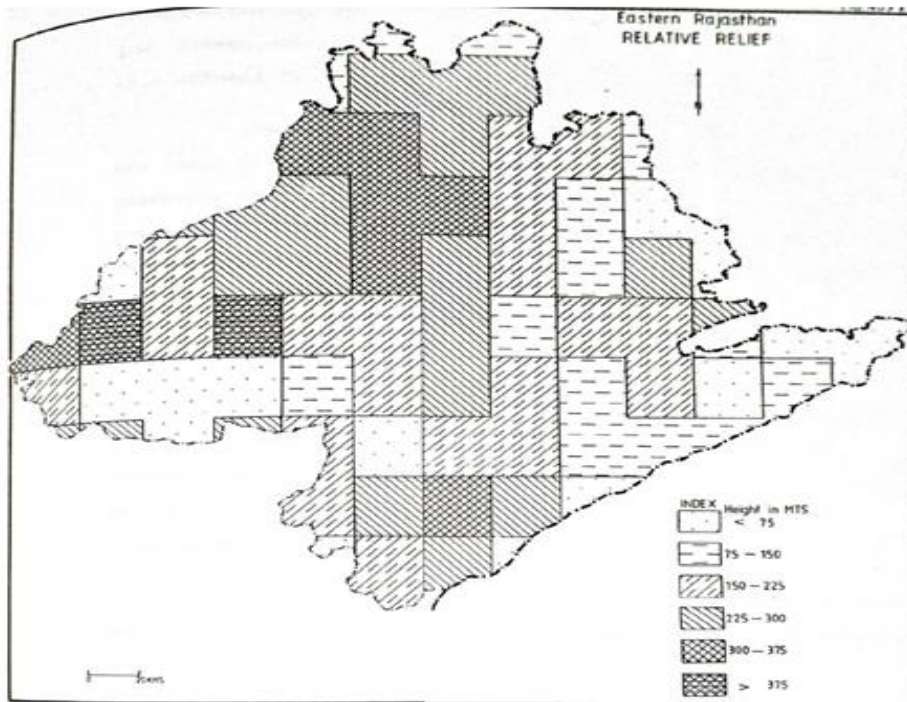
Floods are influenced by relief to a great extent. The vegetation and stream density are major determinants of flood which are determined by the relief itself. On the basis of relief, the study region may be divided into the three parts viz. hills, plateaus and plains. It has been shown in the Figure 2. The plains occupy 90% of total geographical area of the region. There are two ranges viz. the Vindhyan and the Aravalli's which are divorced from each other by the Great Boundary Fault. Most part of the region is below 150 meters above mean sea level forming the area in between the east of Aravalli's and the northern Vindhyas. Vindhyas may be seen surrounding the area over 300 meter above mean sea level and developing valleys. The Jaipur region and surround is normally 450 mt. above MSL and surrounded by Aravalli's. Proper Jaipur town is surrounded by the Jhalana hills, Amber hills and Nahargarh hills. The west of Alwar district has Aravalli Ranges which are as high as 450 meters in parts and 600 meters in other, the highest being 775 meters above mean sea level.

The plains are characterised by flowing of perennial rivers tributaries. These rivers flowing through the plains generate floods in the plains in the event of heavy rainfall.

Relation Between Slope Analysis and Flood

(A Case Study of Eastern Rajasthan)

Dr. Gopal Lal Gupta



Relative Relief and Flood

The relative relief map of the Eastern Rajasthan Fig. 2 and 3 exhibits the positive correlation between the flood intensity and relative relief.

The southern parts of the region have the highest relative relief and the rest of the parts of the region has low. Rivers courses are influenced by the relative relief and thus affects the situation of the flood in the region. Generally, the regions having relative height in 300 meters are most affected with river floods. the range of Bharatpur city is the one of the regions having experienced severe floods due to low relative relief. On the other hand, the eastern part of the Sawai Madhopur district experiences less floods due to high relative relief.

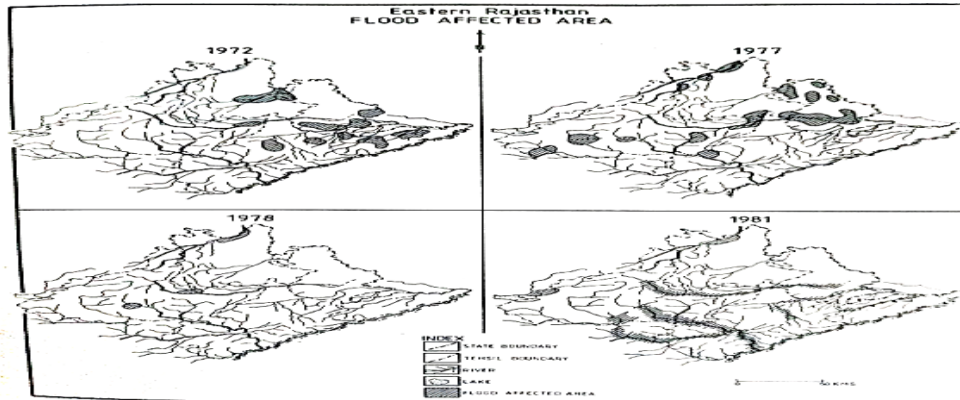
Slopes And Flood in Eastern Rajasthan

The analysis of spatial distribution of slope of region is essential in the study of floods. The speed of rivers depends on the nature of slope. There is an inverse relation between duration of flood and slopes; lower the slope, greater the duration of flood and vice versa.

Relation Between Slope Analysis and Flood

(A Case Study of Eastern Rajasthan)

Dr. Gopal Lal Gupta



The slope values of the Eastern Rajasthan have been worked out on the basis of Wentworth's method of slope analysis.

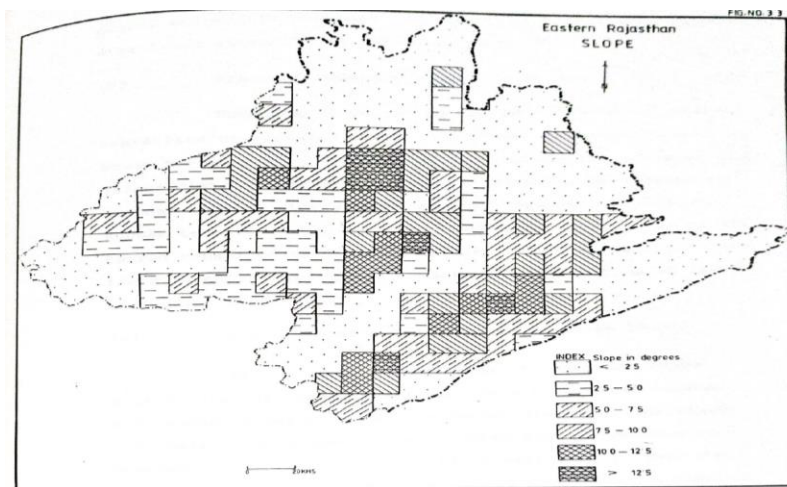
$$\tan\theta = N/L * V.I/3361$$

N = Number of contour crossings

L = Length of the grid

V, I = Vertical interval of contours

3361 = Constant value of $\sin\theta$



Relation Between Slope Analysis and Flood

(A Case Study of Eastern Rajasthan)

Dr. Gopal Lal Gupta

The Fig.4 indicates that the value of slope varies to place. The highest values from 10 deg. to from place more than 12.5 degree are found in the southern part of Alwar district: Sikrai, Lalsot, Bandikui tehsils of Jaipur district and Nadauti, Sawai Madhopur, Khandar, Karauli tehsils of Sawai Madhopur district. Spatial slopes variations may be divided into classes i.e., gentle, moderate and high.

(a) Areas of Gentle Slope: (Less Than 2.5°)

Low slope values are mainly found in most part of three regions. It comprises the whole Bharatpur, Dholpur, Jaipur, eastern Alwar, and the Central Sawai Madhopur district. On correlating flood areas with the slope map it is revealed that severe flood areas fall in the plains of gentle slops in 1981, tehsils like Chaksu, Dudu, Sikrai, Phagi, Lalsot etc. of Jaipur district, Bharatpur, rupbas, Dholpur tehsils of Bharatpur district and Bamanwas, Bonli and Gangapur tehsils of Sawai Madhopur district were flooded and these areas have gentle slope values ranging from 0° to 2.5 degrees. In this region rainfall increases from the north west to east. In the year 1981, rainfall was higher in the Morel Basin and almost whole water flowed in the rivers of this region and immediately spread away in low lying areas. Such effects of slope have also been seen in the Bharatpur city where outside of Bharatpur, gradient of slop was very steep and decreased up to Bharatpur city, so water flowed towards Bharatpur and all drains and canals. Because of this, they over flowed and created flood situation in Bharatpur town.

(b) Areas of Moderate Slope: (2.5° to 7.5°)

Moderate slope values are found along the Western Aravalli's of southern Alwar, north-west and central east of Sawai Madhopur district and central and Eastern parts of the Jaipur district; Karauli, Sapotara, Hindaun, Some parts of Khandar tehsils of the Sawai Madhopur district Bayana and Rupbas tehsils of the Bharatpur district, Rajgarh, Alwar and Behrod tehsil of the Alwar district. This area has very less flood intensity but they get flood by the bursting of local irrigation schemes.

(c) Areas of High Slope: (7.5° to above 12.5°)

It comprises a small area of southern Alwar district Lalsot tehsil in eastern Jaipur district Karauli and Sapotra tehsils of Sawai madhopur district. The river originates from higher areas of this region. Because of greater slope gradient water flows very fastly into the rivers leading to flood situation in the lower reaches.

CONCLUSION

It is typical that the region is semi-arid in the nature but beset with the recurring furry of the floods. The aforesaid analysis of floods (fig.2) and spatial distribution of slope of region indicates that there is an inverse relation between flood and slopes, lower the slope and greater the duration of flood and vice versa. The low relative relief areas having severe floods and areas of high relative relief

Relation Between Slope Analysis and Flood

(A Case Study of Eastern Rajasthan)

Dr. Gopal Lal Gupta

experiences less floods.

***Professor
Govt. College Malpura (Tonk)**

REFERENCES

1. Sharma H.S. and Padmaja. G. (1976): Quantitative Geomorphic Characteristics of Streams of Morel Basin, Geographical Review of Indian, Calcutta Vol. 39. (4), 1977 pp. 353-366.
2. Sharma, H.S. (1976): Role of Geomorphology in Human Settlement. A Case Study of Jaipur, Paper Presented at Interdisciplinary Seminar on Human Ecology Univ. of Rajasthan, Jaipur.
3. Sharma H.S. (1983): Environmental Degradation in Jaipur Urban Complex. pp. 307-316. Environmental Management (ed.) Savindra Singh.
4. Sharma, M.L. (1986): Geomorphology of Semi-arid Region. A Case Study of Gambhir River Basin Scientific Publishers, Jodhpur.

Relation Between Slope Analysis and Flood

(A Case Study of Eastern Rajasthan)

Dr. Gopal Lal Gupta