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Research Paper

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Spatial Variation of Rainfall for Upper Cauvery Karnataka

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Abstract- An attempt has been made to study the variability of seasonal and annual rainfall for a period of 25 years (1991-2015) for the upper Cauvery portion which has five districts. It can be observed that the average annual rainfall for every five years considered range from 800 to 1200mm for more than 45 percent of the area upto 2010 and from 2011-2015 it has been reduced to less than 35 percent and the percentage of area for which the rainfall range was less than 800mm was increased to 28.39 percent which was less than 14 percent from 1991-2010. The maximum portion of the area had average post monsoon rainfall between 100mm to 200mm has been from 1991 to 2010. And from 2011-2016 the maximum portion of the area has a average post monsoon rainfall less than 150mm. Some parts of Hassan, kodagu and chikkamangalore districts portions in the study area has average annual rainfall above 2000mm where as mandya district portion in the study area has annual rainfall less than 800mm and in mysore district average annual rainfall ranges from 800mm to 1500mm.

Keywords- Average annual, Monsoon, Postmonsoon, Premonsoon, Rainfall variability and Raingauge.

I. INTRODUCTION

Water scarcity appears to be a future problem for Karnataka. Rainfall is one of the most important natural input resources to the crop production and its occurrence and distribution is erratic, temporal and spatial variations in nature. The knowledge of rainfall in any particular region is very helpful in sound crop planning. It is natural to imagine that total agricultural production depends, not only on the total rainfall in a season, but also on its pattern of occurrence. The amount and temporal distribution of rainfall are generally the most important determinant of inter-annual fluctuations in national crop production levels. In the extreme case of droughts, with very low total seasonal amounts of rainfall, crop production suffers the most. Many times intra-seasonal variations in rainfall distribution during crop growing periods, without a change in total seasonal amount, can also cause substantial reduction in yield. This means that the number of rainy days during the growing period is as important, if not more, as that of the seasonal total rainfall. The amount and distribution of rainfall in any particular area is very helpful in sound crop planning. The proper understanding and efficient utilization of the natural resources especially rainfall is therefore, of great concern for the improvement and sustainability of agriculture in rainfed areas. Keeping in view, the present study was conducted to analyze the variability and trends of rainfall data which is expected to be useful for suitable crop planning. This problem is an existential threat which can potentially hurt economic growth as well as agricultural growth. Water is expensive and inexpensive depending on its availability according to law of demand and supply. Rainfall as an environmental phenomenon is of immense importance to mankind. Hence the significance of studies to understand the rainfall process cannot be overemphasized. Floods, droughts, rainstorms, and high winds are extreme environmental events which have severe consequences on human society. Planning for these weather-related emergencies, design of engineering structures, reservoir management, pollution control, and insurance risk calculations, all rely on knowledge of the frequency of these extreme events.

II. STUDY AREA

The study area geographically lies between 75^0 29' 19" E and 76^0 37' 40" E longitude and 11^0 55' 54" N and 13^0 23' 12.8" N latitude, as shown in Figure 1, the study area has an area of 10874.65 Sq km. The maximum length and width of the study area is approximately equal to 143.73 km and 96.75 km respectively. The maximum and minimum elevation of the basin is 1867 m and 714 m above MSL, respectively [Parvez et al 2019]. The study area consists of five districts namely mandya, mysore, chikkamangalore, hassan and kodagu as shown in Figure 2 [Parvez et al 2019].

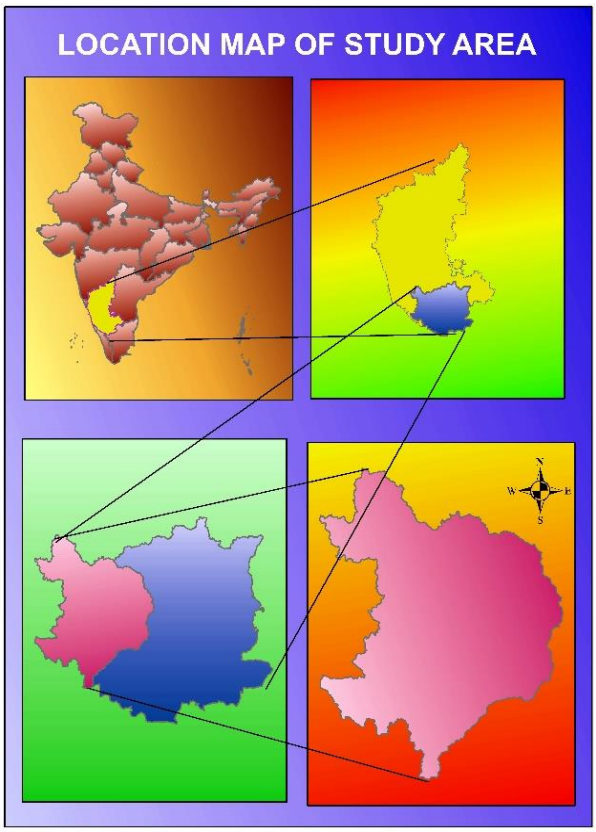


Figure 1 Location Map of Study Area

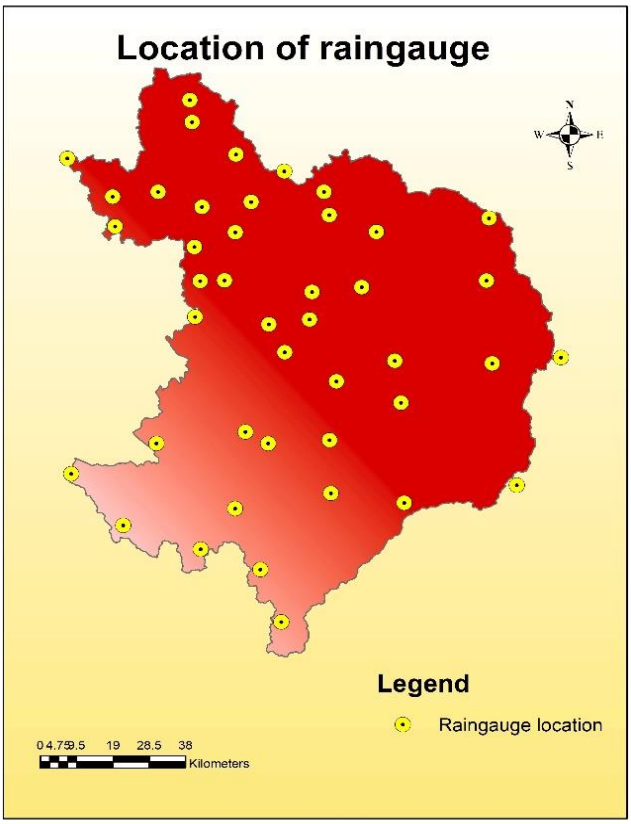


Figure 3 Location of raingauge stations

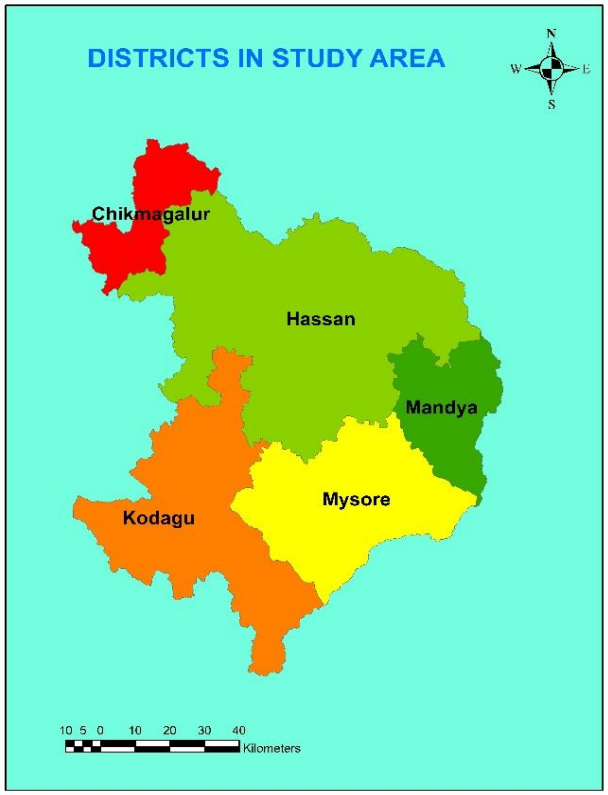


Figure 2 District Map in Study area

III. MATERIALS AND METHODOLOGY

Daily Rainfall data from year 1990 to 2015 was collected for Fourthy Four raingauge stations namely kushalnagar, malalur, mallipatna, nuggehalli, periyapatna, ponnampet, sakaleshpur, salagame, shantigrama, arehalli, arkalgud, attigundi, basavapatna, bettadapura, bilur, channenahally, chikkamagalur, doddabemmatti, galibidu, gonibeedu, gorur, hagare,halllibailu, hallimysore, harangi, hassan, hosakere, hunsur, kechamanna hosakote, naladi, shantebachahalli, belur, belagodu, javali, talakavery, shravanabelagola, siddapura, srimangala, sukravarsanthe, krishnarajpet, virajpet and yelawala. Seasonal wise data was tabulated for each station for every year i.e Presmonsoon season (Mar to may), Monsoon season (Jun –Sep), Post-monsoon season (Oct – Dec) and Annual rainfall. Average seasonal and Annual rainfall for every five years 1991-1995, 1996-2000, 2001-2005, 2006-2010 and 2011-2015 was calculated for all the stations. IDW analysis was done and

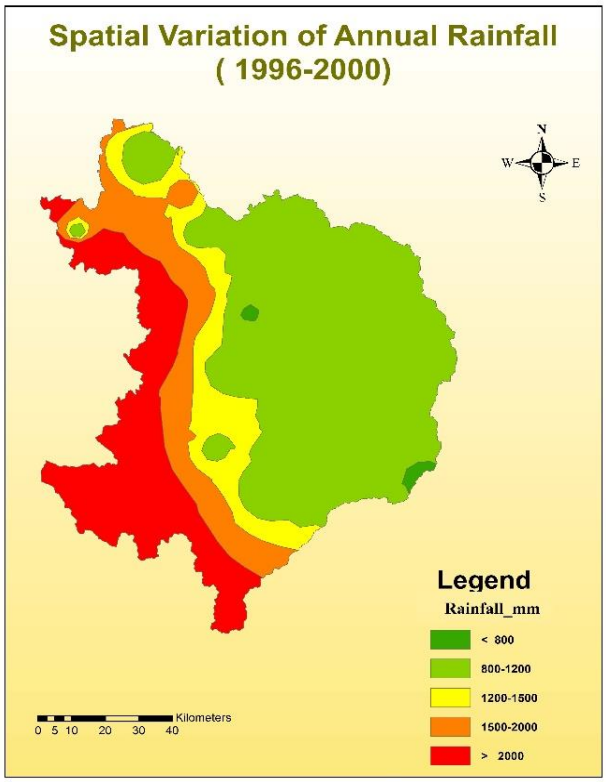
IV. RESULTS

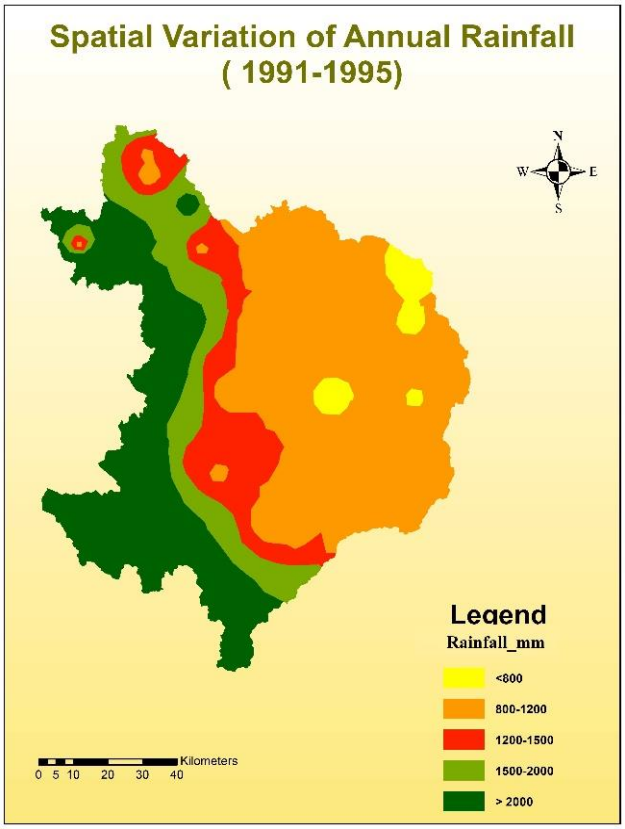
The minimum average rainfall for the year 1991-1995 is 743.6mm in the study area and was occurred at nuggehalli raingauge station, in the year 1996-2000 is 725.02mm and was occurred at gorur raingauge station, in the year 2001-2005 is 543.22mm and occurred at shantigrama raingauge

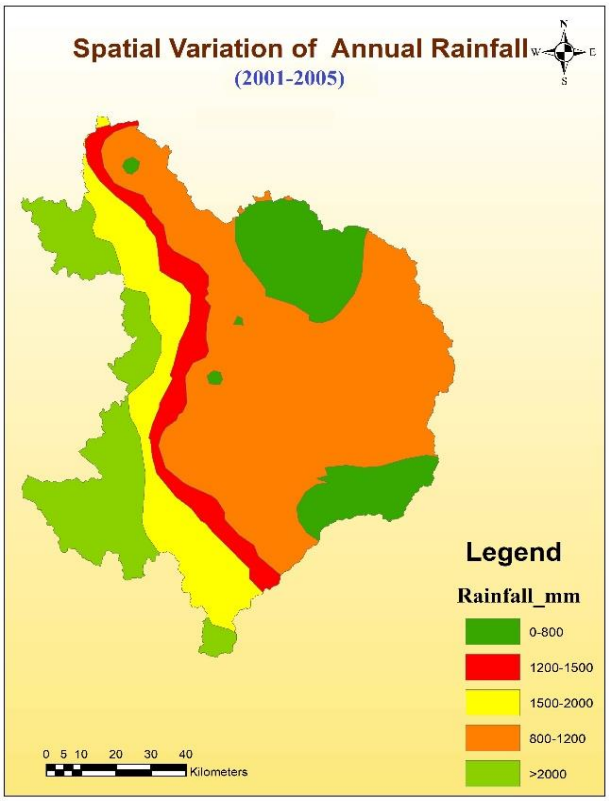
station, in year 2006-2010 is 607.5mm was occurred at shantigrama raingauge station and from 2011 to 2015 is 630mm was occurred at hunsur raingauge station. The maximum average rainfall for the year 1991-1995 is 6546.5mm, 1996-2000 is 5409mm, 2001-2005 is 5650.68mm, 2006-2010 is 6943.42mm and 2011-2015 is 6877.74mm. These average annual rainfall is divided into five classes as less than 800, 800 to 1200, 1200 to 1500, 1500 to 2000 and greater than 2000mm as shown in the figure 4 and Table1 .Similarly the average Pre monsoon, Monsoon and Post monsoon maps were prepared for different ranges as shown in figure 5 , figure 6 and figure 7 respectively.

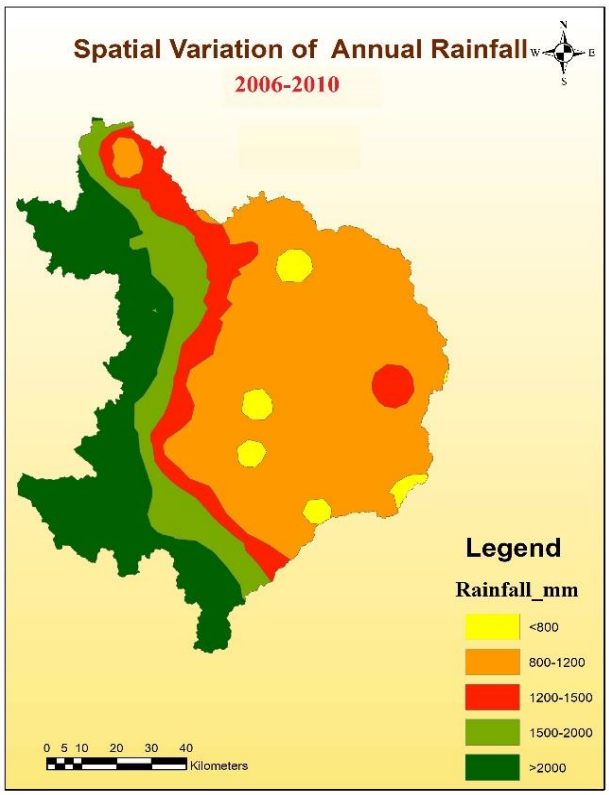
Table 1: Rainfall distribution

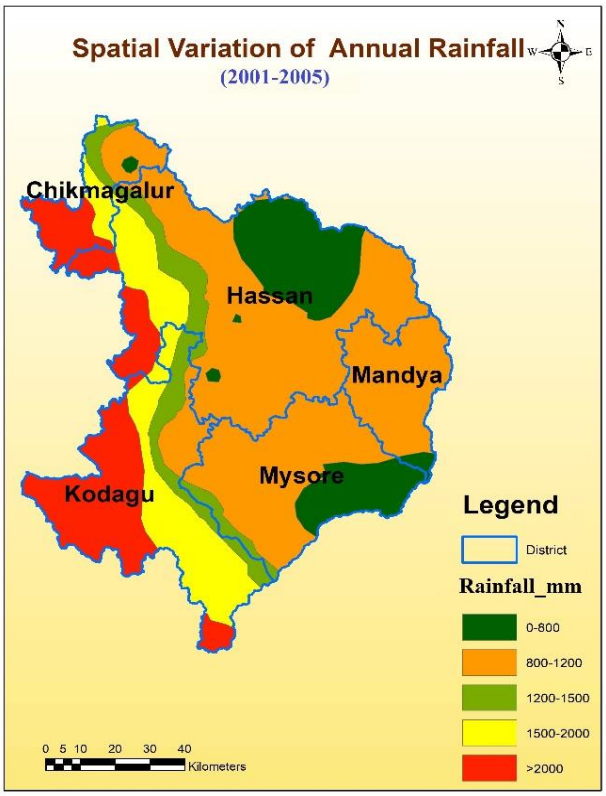
Rainfall (mm)	Percentage Area				
	1991-1995	1996-2000	2001-2005	2006-2010	2011-2015
< 800	3.09	0.57	13.97	2.76	28.39
800-1200	45.47	53.36	48.76	49.19	31.49
1200-1500	12.42	11.1	7.79	11.09	8.15
1500-2000	12.44	13.52	13.67	11.96	11.71
>2000	26.57	21.44	15.8	24.99	20.25

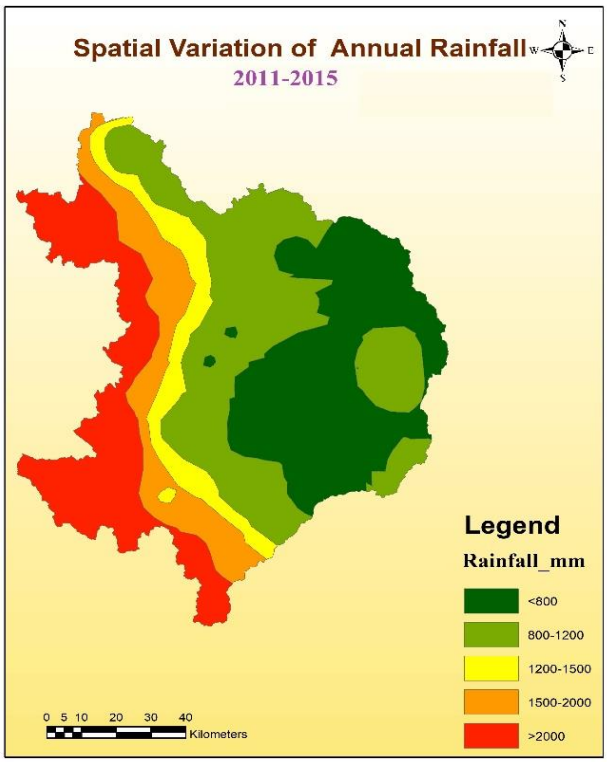


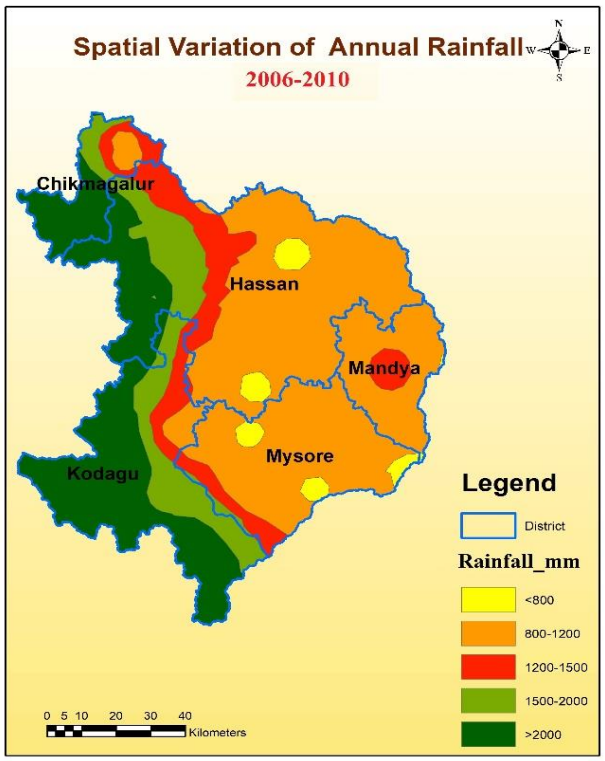


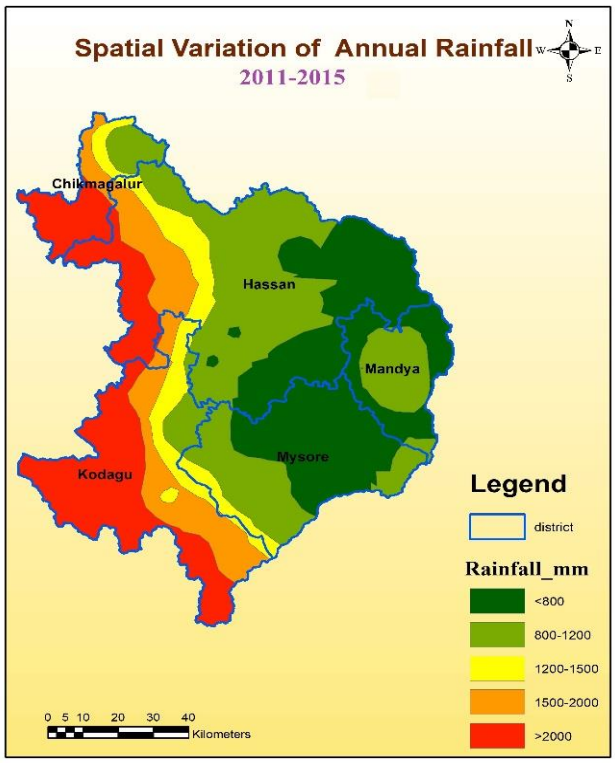












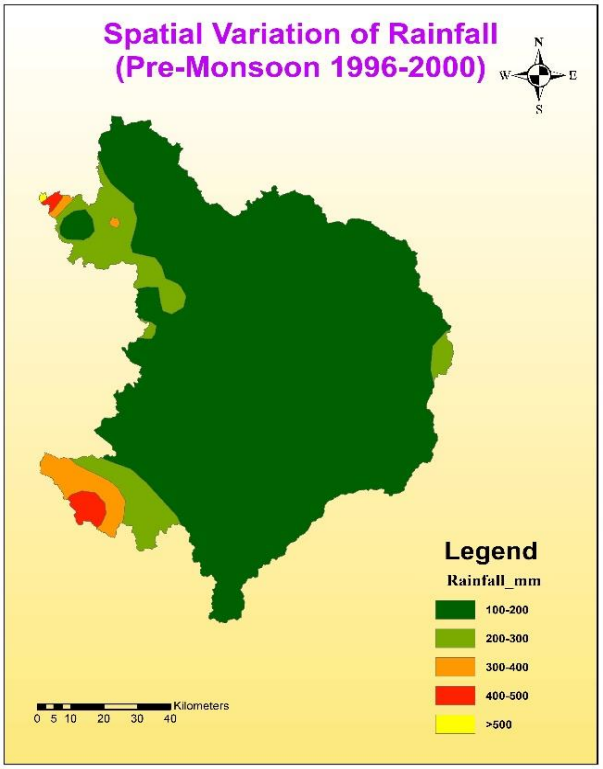
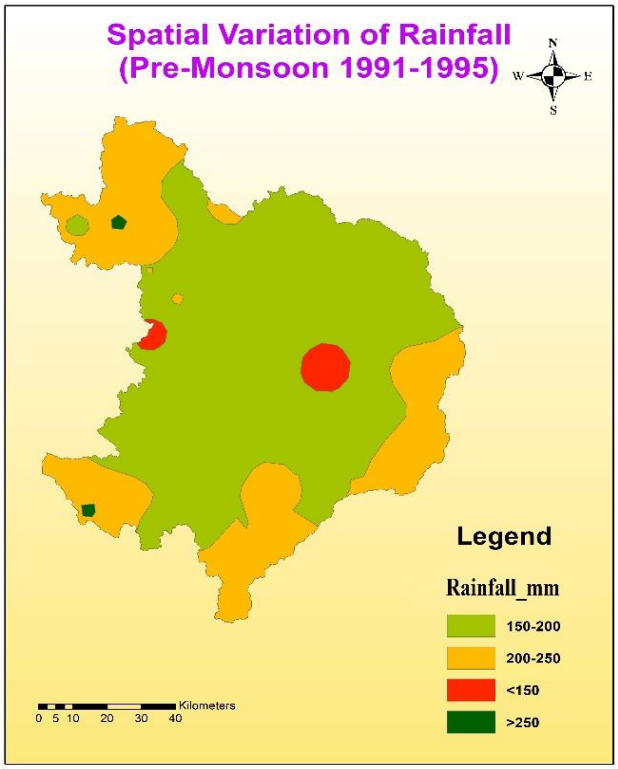
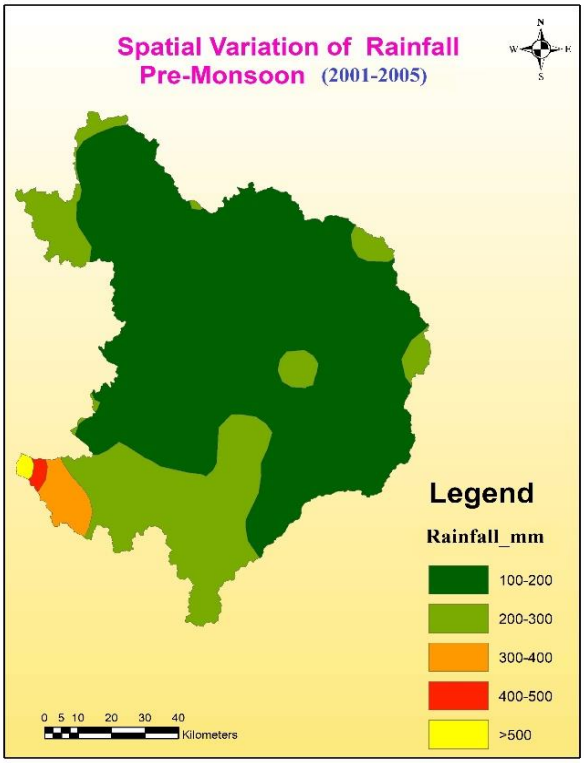
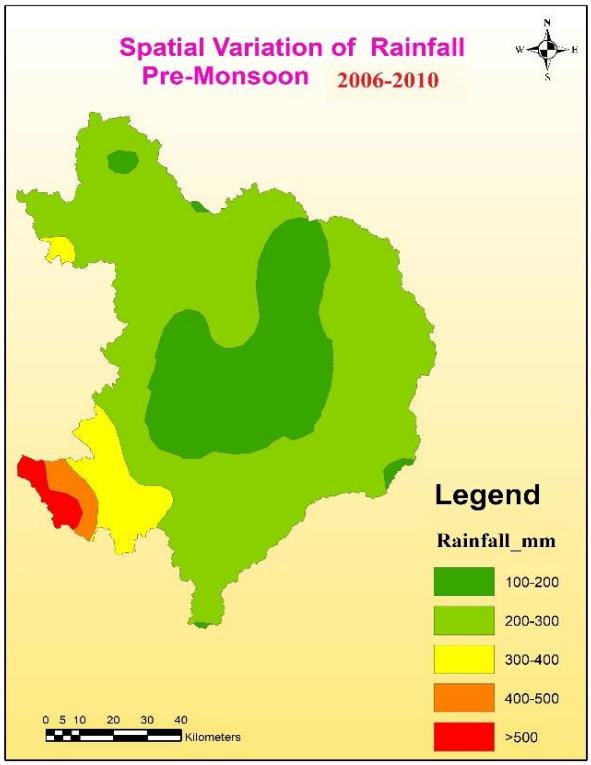
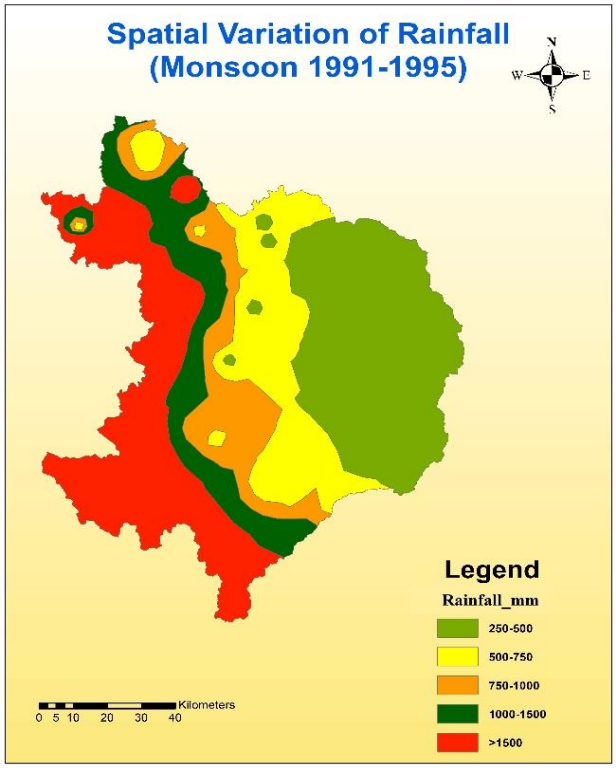


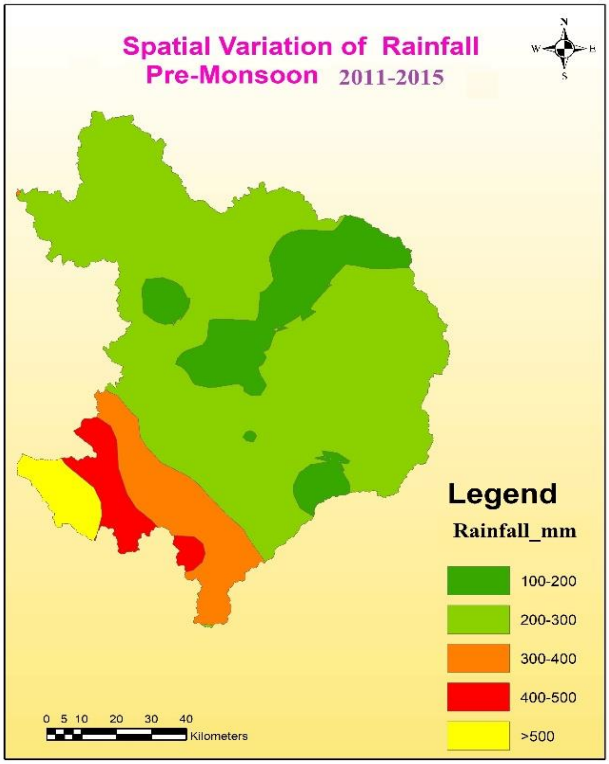
Figure 4 Spatial variation of average annual rainfall











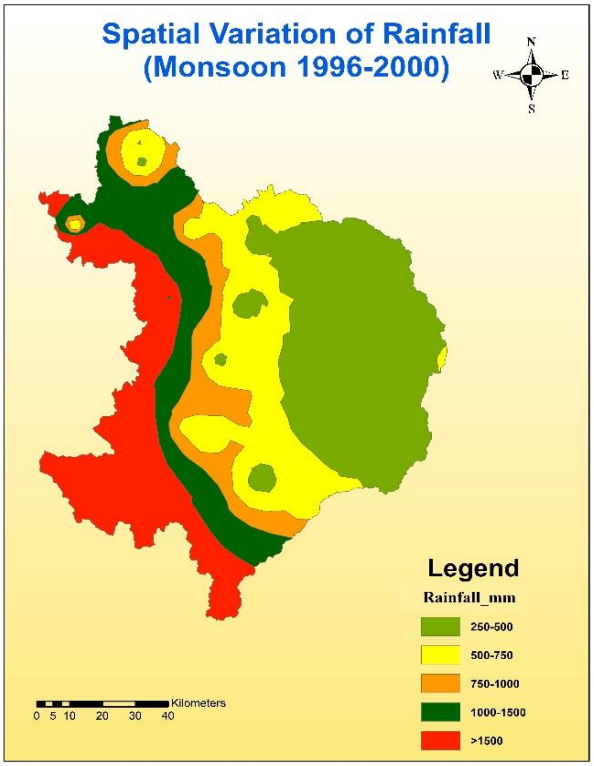
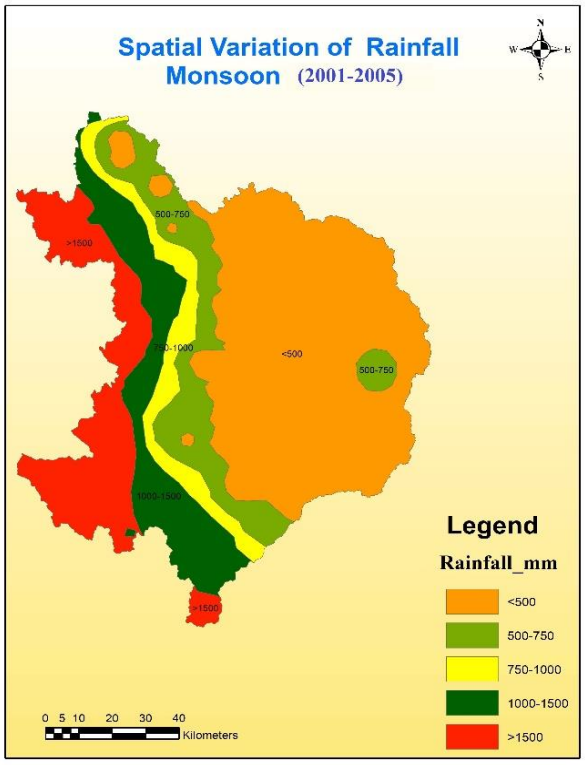


Figure 5 Spatial variation of average Pre-Monsoon rainfall



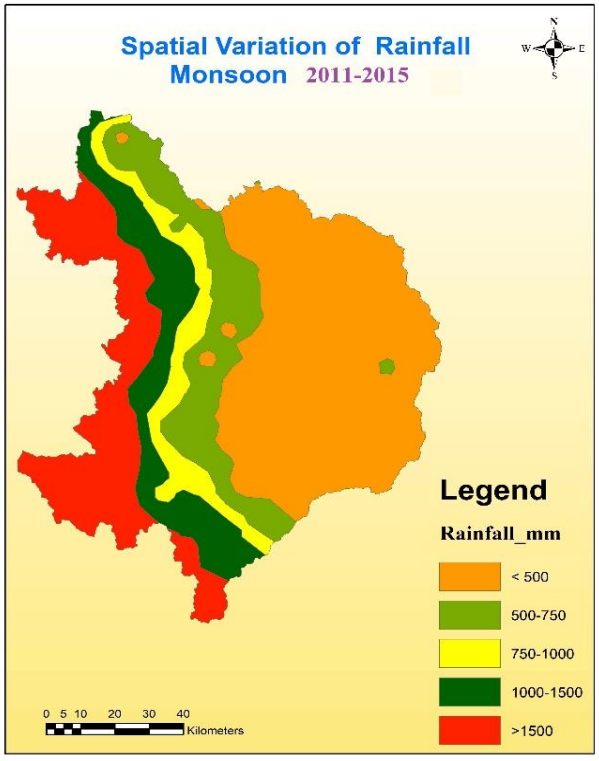
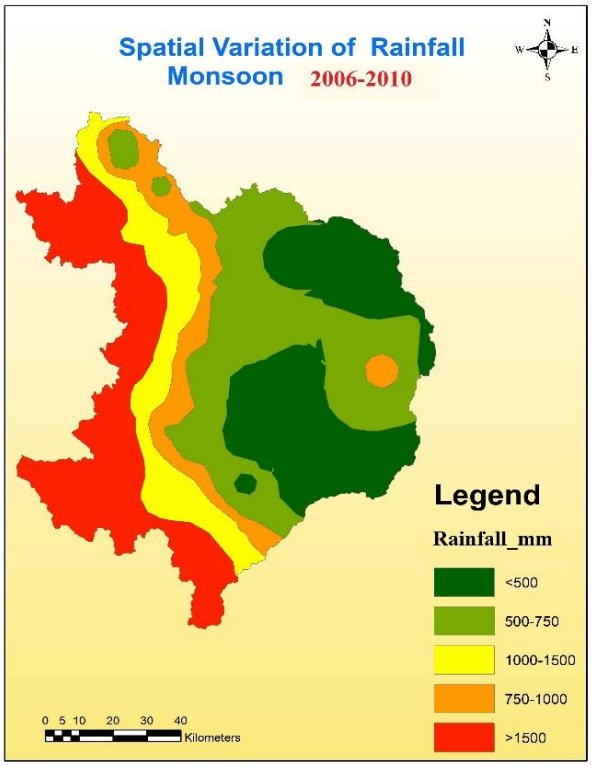
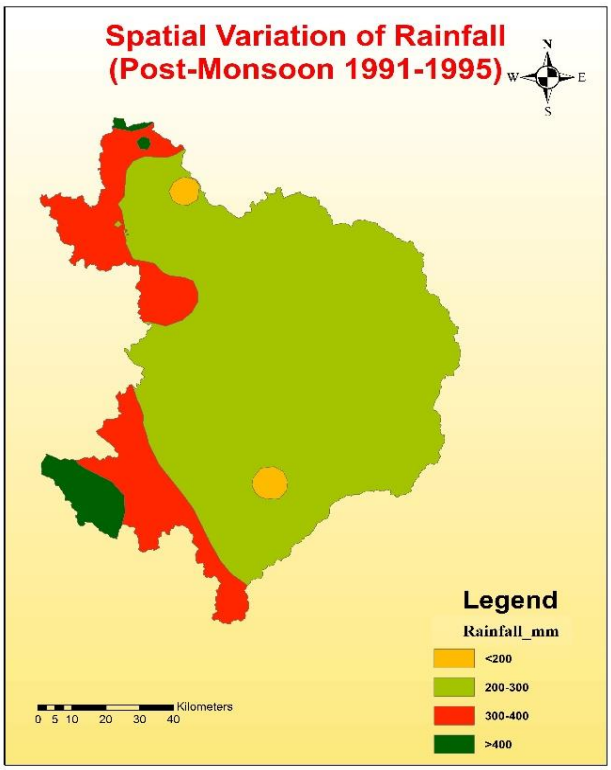
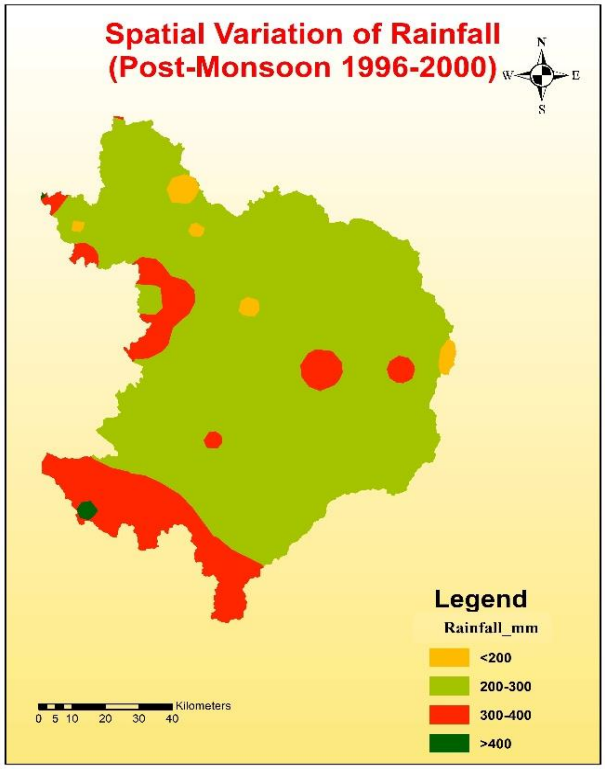
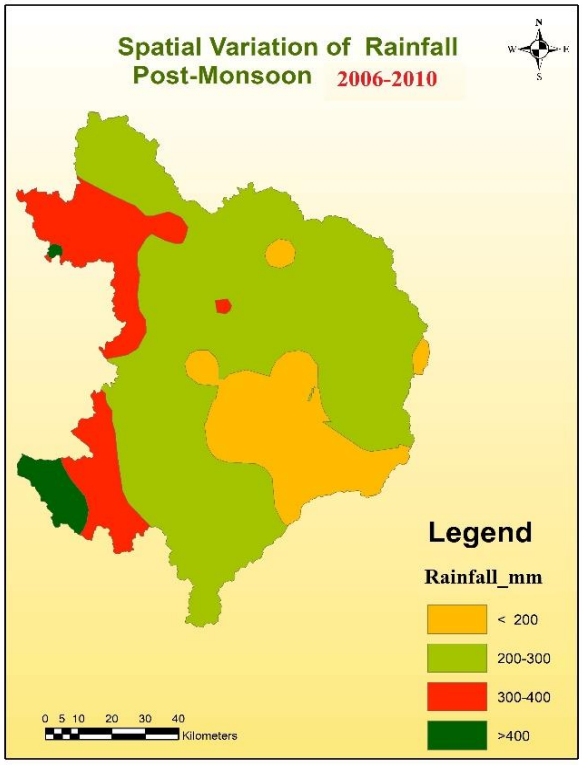


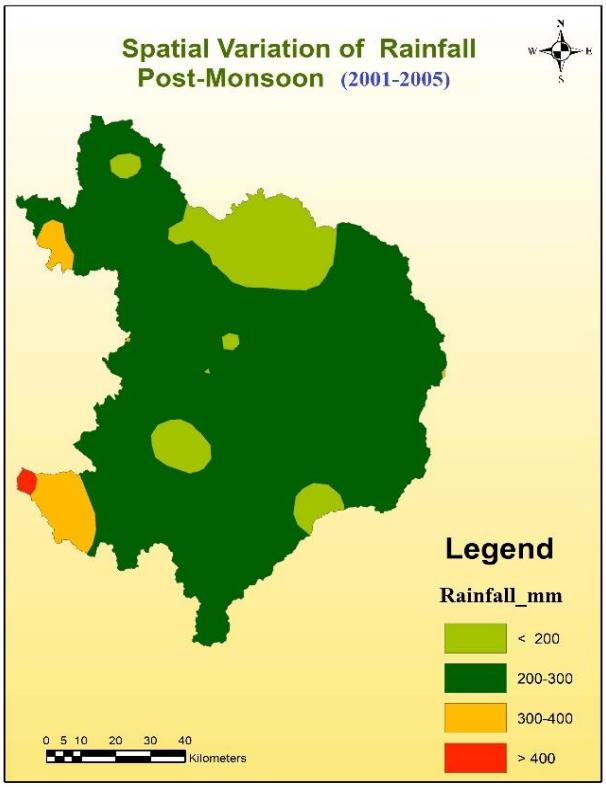
Figure 6 Spatial variation of average Monsoon rainfall











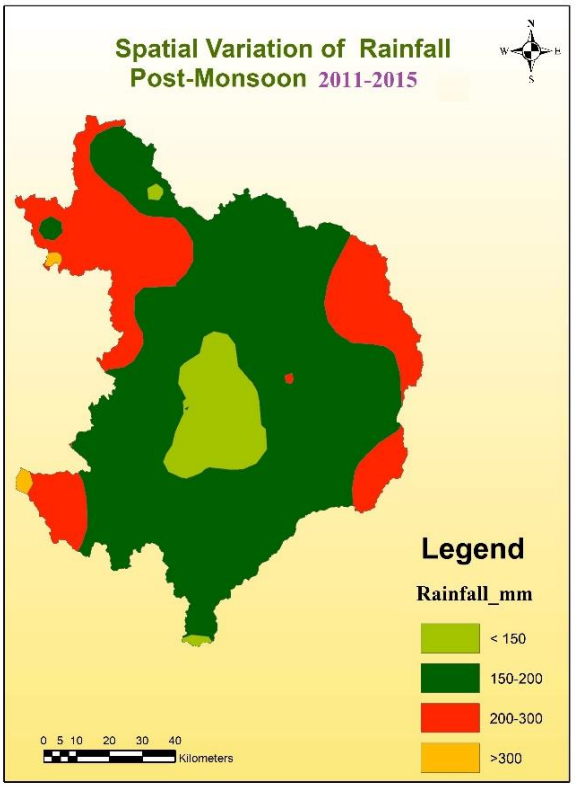


Figure 7 Spatial variation of average Post- Monsoon rainfall

V. CONCLUSIONS

From the above study it can be observed that the average annual rainfall from 1991 to 2015 varies from 800mm to 1200mm for most of the portion as shown in Table 1. The area getting rainfall less than 800mm has been increased to 28.39 percent for the years 2011-2015 which was 3.09 percent between 1991-1995.And from 2011-2016 the maximum portion of the area has an average post monsoon rainfall less than 150mm.

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