RESEARCH PAPER | Engineering | Volume : 3 | Issue : 10 | Oct 2013 | ISSN - 2249-555X

Analysis of Rainfall Pattern for Talaja and Sanaliya Rain Gauge Stations in Shetrunji Basin

KEYWORDS: Basin, Rainfall, Tributary, Time Series, Trend, Rain gauge Station, Variations in Rainfall.

Harsh N Patel	Prince M Patel	Dr. N. J. Shrimali
Student, B.E.(Civil), Faculty of Technology and Engineering, The M.S. University of Baroda, Vadodara, Gujarat, India	Student, B.E. (Civil), Faculty of Technology and Engineering, The M.S. University of Baroda, Vadodara, Gujarat , India	Associate Professor, Faculty of Technology and Engineering, The M.S. University of Baroda, Vadodara, Gujarat, India

ABSTRACT *From all the natural resources, Water is a vital natural resource which forms the basis of all life. By design it is perfect - The most essential element of life. As water is becoming scarce commodity, its preservation and conservation has become the most important aspect in relation to the water resources development planning. Rainfall is basic input to the hydrologic cycle. Its variation and distribution plays important role in hydrologi Water is a vital natural resource which forms the basis of all life. It is very important tool for human development, a key resource in all economic activities ranging from agriculture to industry. Hydrologic phenomena are extremely complex. Rainfall is usually the main input to the hydrological system. Its magnitude, variation and distribution plays important role in hydrological response of the area. Rainfall studies are of utmost utility for understanding nature & hence the behaviour of climate changes.*

In the present study of rainfall variation pattern at Sanaliya and Talaja rain gauge stations in Shetrunji River Basin have been carried out. For long term analysis 30 years data have been used and its decade wise time series is also studied.

INTRODUTION:

River Shetrunji is one of the major rivers of Saurastra. It originates at Chchai hills and flows towards East and confluence with Gulf of Khambhat near Santhrampur port. The Shetrunji basin is located between 21°00′ to 21°47′ North latitude and 70°50′ to 72°10′ East longitude. Gagadio and Talaja are two tributaries in downstream end of it on the right bank of Shetrunji.

Sanaliya and Talaja are two rain gauge station sites where rainfall is measured. For studying the rainfall pattern of the area rainfall data of these two stations have been taken and analysed graphically for tracing pattern of variation and to know trend of variation.

Following Table gives details of two stations considered for analysis and Figure shows Shetrunji river catchment.

Station	District	Tahsil / Taluka	Latitude	Longitude	River	Tributary	
Talaji	Bhavnagar	Talaja	21°20′47″	72°01′44″	Shetrunji	Talaji	Shetrunji
Sanaliya	Amreli	Liliya	21°30′52″	71°26′39″	Shetrunji	Gagadio	Gagadio

TABLE: Details of Rain gauge Stations

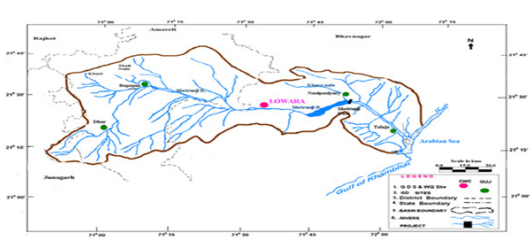


FIGURE: Map of Shetrunji Basin

RELATED THEORETICAL BACKGROUND:

Hydrology is a complex science. Range of hydrologic information is too large; hydrologic cycle largely represents movement of water in which various processes like evaporation, infiltration, runoff etc are involved.

It also has influence of climatic and topographical features of the area. Rainfall is the main (and the only) input to the hydrologic cycle. Generated runoff reveals hydrological response of the area to the input precipitation/rainfall.

Rainfall-runoff analysis is one of the basic steps in design of hydraulic structures and to carry out various hydrological studies. As the parameters involved are natural and may have great degree of heterogeneous behaviour statistics is many times used to evaluate these parameters.

The variation and trend depicts many behavioural characteristics of rainfall and runoff. Here pattern and characteristics of rainfall is analysed graphically and also it is checked how it is correlated with runoff.

RESEARCH SCOPE OF WORKS:

As analysis of rainfall and runoff is basic initial step in most of the hydrologic studies, scope of this kind of analysis is quite large. This analysis not only gives idea about hydrological characteristic of the area but it also serves as guideline to carry out further analysis.

Main Scope: Reviewing and searching literature on rainfall-runoff modelling and characteristics to establish a reliable rainfall-runoff relationship for the catchment of Talaji Tributary of Shetrunji River Basin.

ANALYSIS:

(Analysis Attachments along with Shetrunji Reservoir Project Data-Tables and its Graphical Representation)

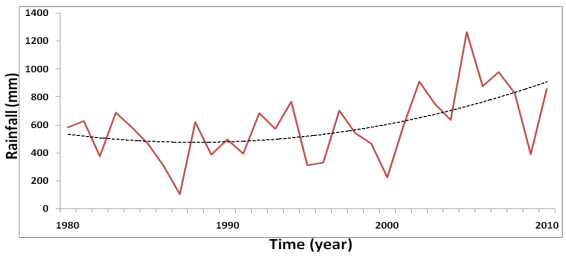
NOTE: Catchment area of these tributaries is very small so we have considered data of two Rain-gauge stations in the basin.

Rainfall Variation for Talaja from year 1980 to 2010:

YEAR	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990
RAINFALL	583	630	378.8	689.5	583	467	304.8	106.5	622	388.5	499
YEAR	-	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
RAINFALL	-	394	685	574	767.5	315	331	705.5	544	466	227

Volume : 3 | Issue : 10 | Oct 2013 | ISSN - 2249-555X

YEAR	-	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
RAINFALL	-	591.95	909.5	754	637	1264	876	977	828	392	860

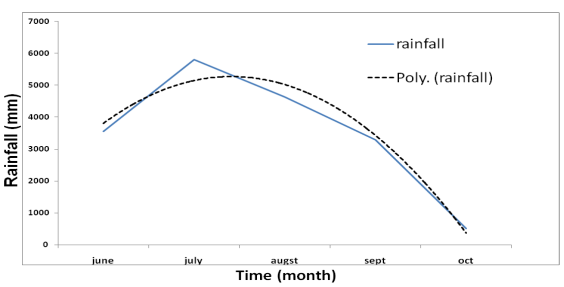


GRAPH-1 Annual Rainfall Variation for Talaja from year 1980 to 2010

Here, in this Graphical representation, the Trend Line shows that the Rainfall (in mm) is increasing from 1980 to 2010, for these 30 Year Time Period We analysed the Rainfall Runoff analysis for Talaja and Sanaliya Rain gauge Stations in Shetrunji Basin

Average monthly rainfall variation at Talaja for 1980-2010:

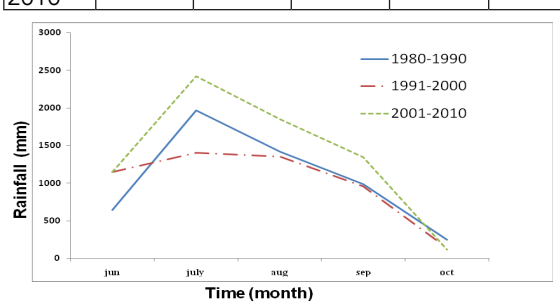
MONTH	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
RAIFALL (mm)	3541.5	5796.1	4630	3288.5	502.5



GRAPH-2 Average Monthly Rainfall for Talaja from year 1980 to 2010

Decade wise rainfall variation at Talaja (1980-2010):

YEAR/ MONTH	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER
1980-1990	641.5	1964.6	1417	982	247
1991-2000	1147	1406.5	1357	959	139.5
2001-2010	1147	2425	1856	1347.5	116

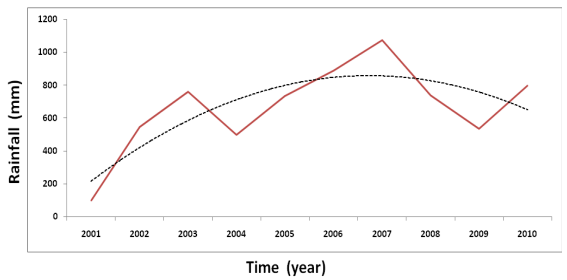


GRAPH-3 Decade wise rainfall variation at Talaja for (1980-1990), for (1991-2000) and for (2001-2010)

Here for the Graphs 2 and Graph 3, The Graphical Representations show that the Rainfall (in mm) is Maximum For month of July AND it also show the similar behaviour of Rainfall analysis for all three Decades.

Annual Rainfall Variation for Sanaliya from year 1980-2010:

YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
RAINFALL (mm)	100.5	546.5	t762	498	733	889	1074	740	536.5	796.5

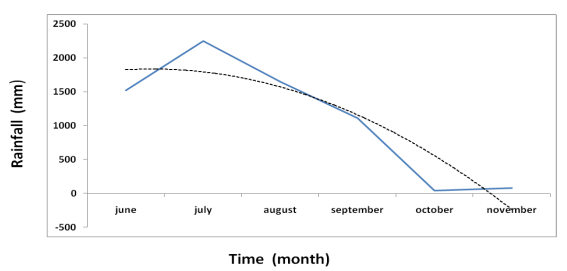


GRAPH-4 Annual Rainfall Variation for Sanaliya from year 1980-2010

Here for the Graphical Representation of Annual Rainfall (in mm) for Sanaliya Rain gauge Station, The Rainfall is increasing year by year from 2001 to 2010,for these 10 years of Data We analysed the Rainfall behaviour.

Average Monthly Rainfall for Sanaliya from year 1980-2010:

MONTH	JUNE	JULY	AUGUST	SEPTEMBER	OCTOMBER	NOVENBER
RAINFALL (mm)	1528	2253	1656	1115	44	80



GRAPH-5 Average Monthly Rainfall for Sanaliya from year 1980-2010

Here as shown in this Graphical Representation, as Having Rainfall Data for November Month, we have also considered for Plotting Average Monthly Rainfall Graph the Rainfall Data for November Month which seems very anomalous.

CONCLUSION AND DISCUSION:

Long term data analysis for 30 year annual data suggests that over three decades annual rainfall has increased. However annual rainfall is highly erratic with wide range of variation from value 1264 mm maximum to as 106.5 mm minimum in Talaja and value 1074 mm maximum to as 100.5 mm minimum in Sanaliya. Average monthly rainfall analysis indicates there is maximum rainfall in month of July with decrease trend from July to October. The same fact is revealed from the decade wise rainfall analysis. These graphs also suggest that rainfall variation pattern is similar for two decades whereas it differs for third decade because of change in magnitude however the overall trend is similar.

ACKNOWLEDGEMENT:
Authors are thankful to Mr. Manish Gujarati, Asst. Engineer (G.S.E.-II), Narmada Water Resources, Water Supply & Kalpasar Department for providing data for this study.

REFERENCE

1. Gujarati, Manish, "Forecasting Reservoir Water Level & Release Decision by Artificial Neural Network - A case Study of Shetrunji Reservoir" (March 2012),M.E. Dissertation submitted to GTU (Gujarat Technological University). | 2. Kebila Bakoh S., (January 2008), "Analysis of the rainfall-runoff pattern of a catchment with limited data to Estimate the runoff potential", Division of Water Resources Engineering, Dept. of Building &Environment Technology, Lund University, Sweden. | 3. Subramanya K., "Engineering Hydrology" (3rd addition: 2008), ISBN13: 9780070648555, ISBN10: 0070648557, Published by: The McGraw Hill Education Pvt. Ltd. | 4. Raghunath H.M., Leslie Kenton, Carlos Fraenkel, "Hydrology" (2nd addition: 2006), ISBN13: 9788122418255, ISBN10: 8122418252, Published by: New Age International. |