WATER RESOURCE MANAGEMENT-SPECIAL REFERENCE TO RAJASTHAN

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Abstract: **Water is a predominant attribute for the survival of all the living organisms - thus crucial to any human activity, be it social or economic. Very aptly said, water has always been a key element in any environment - hence no exaggeration that it is always a balancing factor in any ecology. Roughly 12 percent of India's geographical area falls under arid and semi-arid regions - out of which 61% is located in Rajasthan. Other states like Gujarat, Punjab/Haryana, have 20 and 9 % respectively whereas, Andhra Pradesh, Tamil Nadu and Karnataka accounted for 10% of arid regions. India has a share of 16% of the world population but it was only 6% of the total annual run off of the world's rivers. Rajasthan in this context is most critical and the degree of water deficiency along with pollution index ratio and water resource management has been dealt in the present paper.**

1.0 INTRODUCTION

The State of Rajasthan is highly water scarce State of India; the following figures would reveal the facts by a comparative study of the following.

(a) Geographical land ratio (Rajasthan/India) = 10.4%
(b) Area under Cultivation (Rajasthan/India) = 10.1%
(c) 1991 census popular ratio (Rajasthan/India) = 5.0%
(d) Availability of Water resources (Rajasthan/India) = 1.15%

It would thus be seen that scarcity of water resources has been proved to be the greatest constraint in the overall development of the State - thus needs resource management.

2.0 WATER RESOURCE MANAGEMENT

India with a geographical area of nearly 3.3 million sq. km. experiences extremes of climate with annual rainfall varying from 100mm (in Western Rajasthan.) to over 11,000 mm (in Cherra punji, Meghalaya). Out of total precipitation, a part goes towards ground water storage, a part is in evaporation, transpiration and remaining appears as surface water, viz., rivers, lakes, impoundments, and other inland water bodies - this surface/ground water needs resource management.

2.1 MANAGEMENT BASED ON RIVER BASINS

India has well developed riverine system comprising large number of major, medium, small rivers. The average flow in river system in estimated to be 1880 KM^3. The quantum of water required for various usage is increasing with increase in population and its supporting demand in the form of Industrial, Agricultural and so on so forth which has reached to a critical point in some of the river basins.

RIVER BASINS IN RAJASTHAN

The State of Rajasthan has 4 river valleys consisting of around 59 basins, out of which following are important;

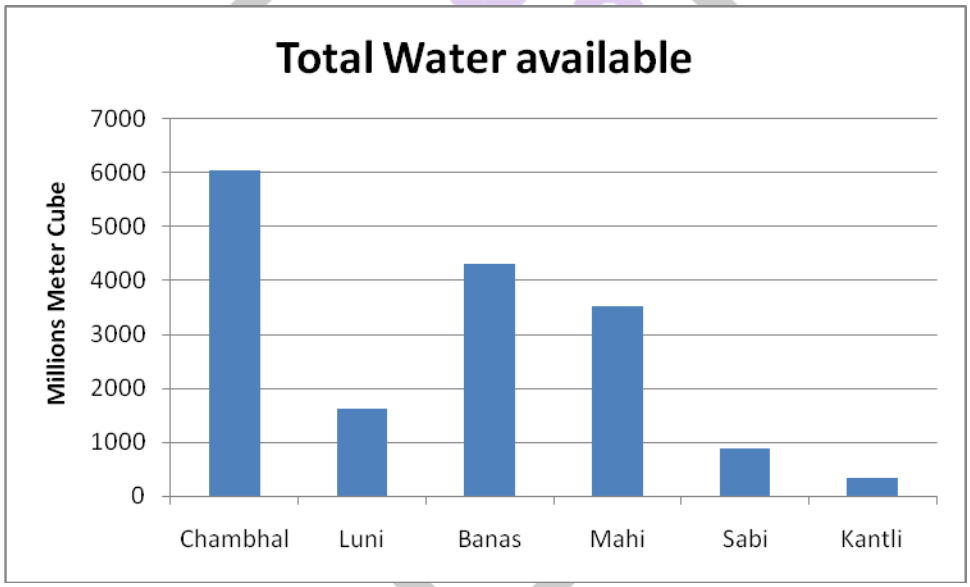
(a) Kantli
(b) Chambal
(c) Gambhiri
(d) Luni
(e) Morel
(f) Banas
(g) Mahi
(h) Kali Sindh
(i) West Banas
(j) Parwati

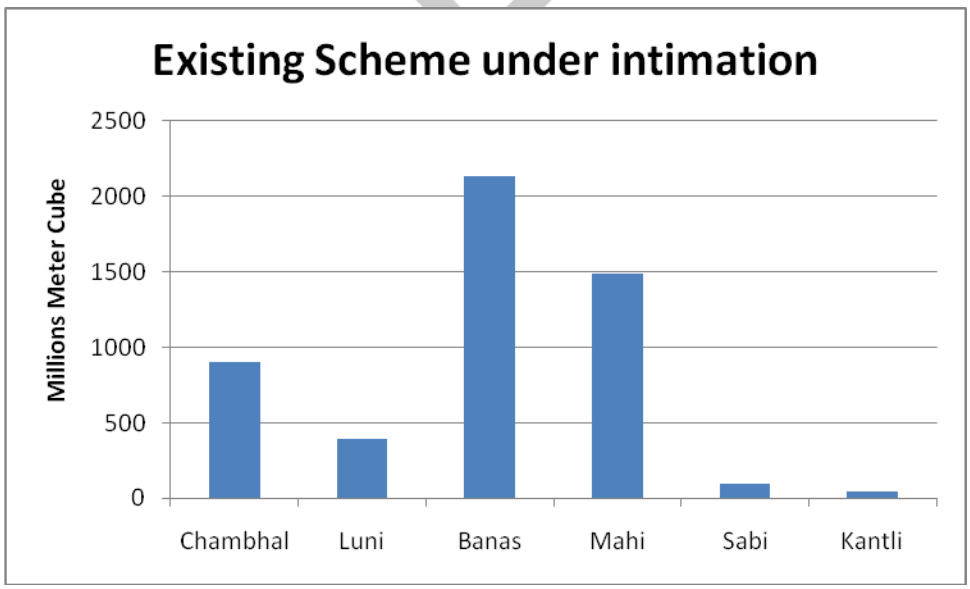
ASSIMILATIVE CAPACITY

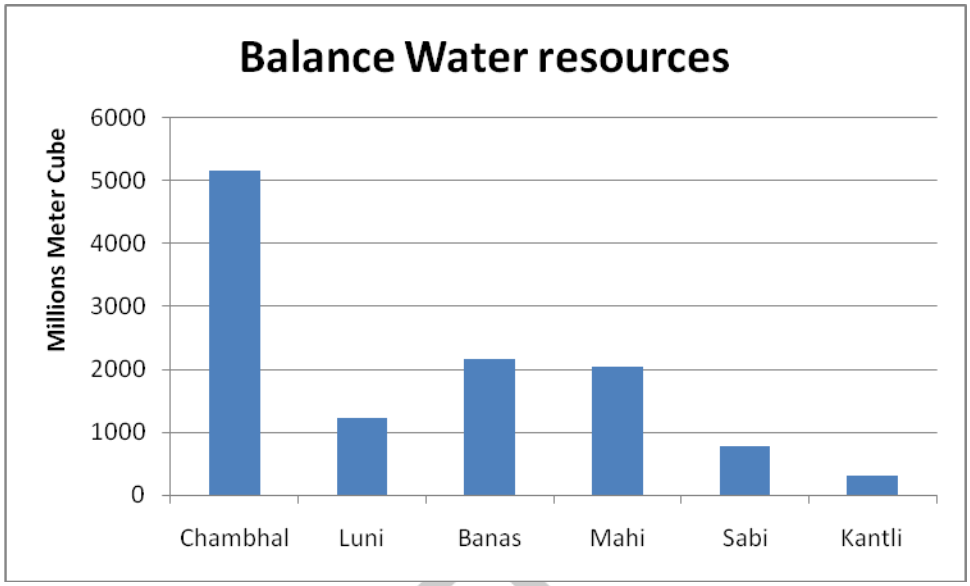
The concept of assimilative capacity should have been a governing factor for all the development activities in any river basin. This is necessary for managing the qualitative as well as quantitative aspects of the affordable water resources in a particular basin. A case study to this effect, in the present context, would reveal the over all scenario of this concept.

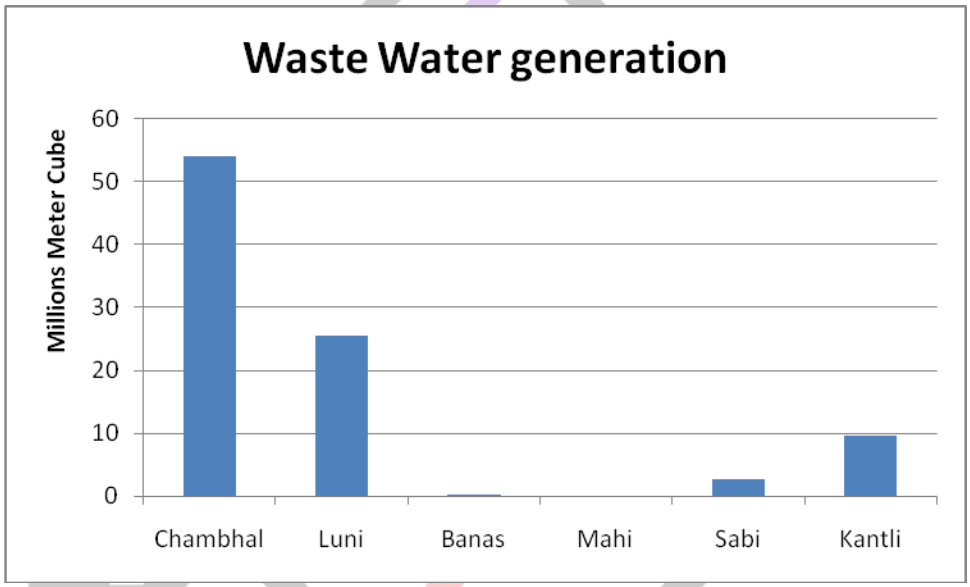
An attempt has been made in this paper to formulate approximately the ratio of available water resources to that of the waste water generation in above river basins with a view to partly conserve the quality and partly to manage the available resources of the river basins so that ecology of the basin is not disturbed or diversified. Such a ratio which can be classified as pollution index ratio is worked out in table below:

Sr. No.	Name of River	Total Water available $1x10^6 M^3$	Existing Scheme under intimation $1x10^6 M^3$	Balance Water resources $1x10^6 M^3$	Waste Water generation $1x10^6 M^3$	Ratio of 5:6
1	**2**	**3**	**4**	**5**	**6**	**7**
1.	Chambhal	6054	900	5154	54	95.5
2.	Luni	1608	389	1224	25.5	48.0
3.	Banas	4308	2135	2172	0.32	6724.5
4.	Mahi	3527	1488	2039	0.06	33983.3
5.	Sabi	878	94	784	2.8	280
6.	Kantli	341	44	297	9.6	30.9









It would be apparent from above table and figures that river basins ke Kantli, Luni and Chambal have pollution index ratio less than100. These river basins are, therefore, appears to be highly critical and needs special planning and management partly due to the fact that available dilution in these basins is not compatible to meet water quality requirement and partly with the increase water usage from these basins coupled with corresponding waste water discharges into it would further aggravate the deteriorating quality of river water or ground water. Thus the pollution index ratio as referred to above would be a policy parameter in an integrated water resource management on qualitative front having regard to ecology of such basins.

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MANAGEMENT BASED ON LEVYING WATER CESS

The Management of Water resources can also be planned - particularly in industrial sector by levying water cess on the quantity of water consumed by an industry or local authority. Government of India has already visualized this concept as early as in 1977 and enacted Water (Prevention and Control of Pollution) Cess Act of 1977. Under this act, a provision has also been made for giving rebate to the extent of 70 % in case the industry/local authority provides adequate effluent treatment facilities. The enactment of this act has to some extent resulted in the less consumption of water in industrial processes and by local authorities but still needs to be strengthened and enforced seriously.

REUSE AND RECYCLING OF WASTE WATER

The present level of technical expertise and the new technologies are being employed in the concept of reuse and recycle of waste water. This is also an important vector in the overall management of our limited water resources particularly in Industries as well as domestic sectors. Such an improvement in the optimization of technology and managerial approach would not only help in regulating our limit water resources but also reduce pollution potential thereby help in achieving quality objectives.

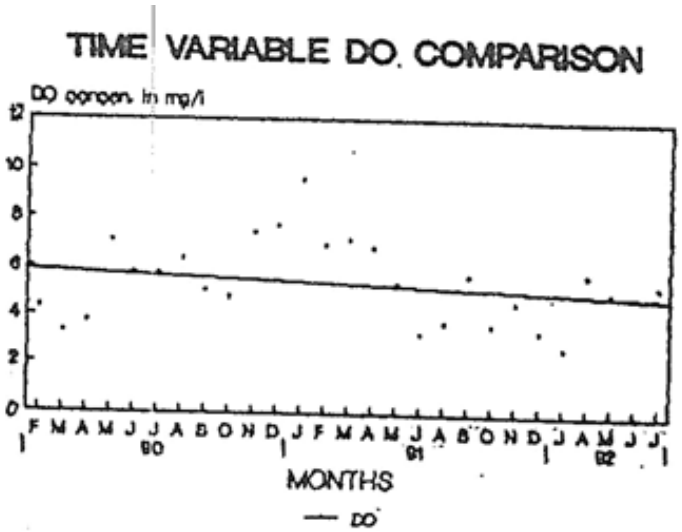
In the State of Rajasthan, where the water scarcity is in dominance, concerted efforts have been made to reuse and recycle waste waters in textile, pulp and paper, phosphatic fertilizers etc. industrial units but still needs to be regulated, strengthened and enforced seriously and effectively.

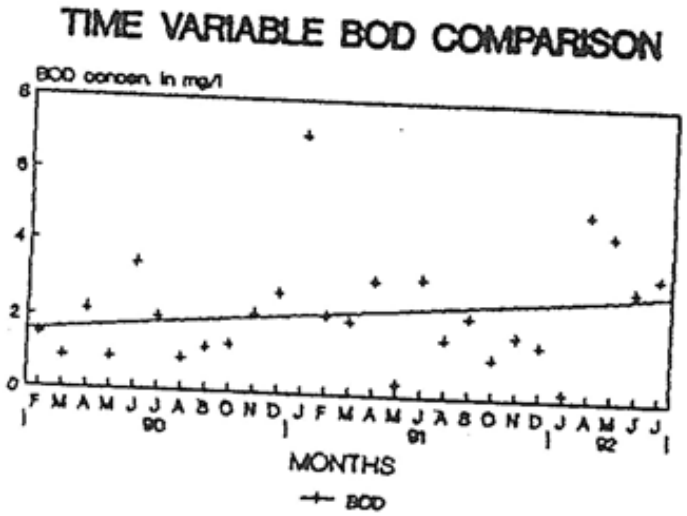
SELECTION OF MINIMAL WATER USING TECHNOLOGY

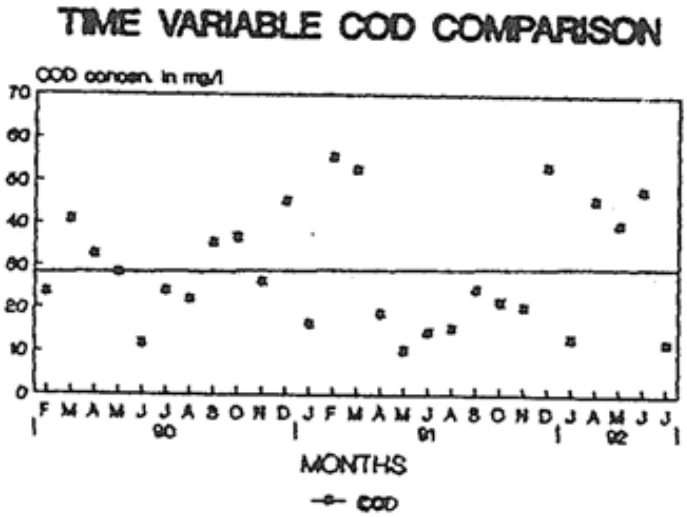
With the advancement of science & technology, all out efforts should be made in evolving minimal water consumption technologies party to take care of our limited water resources and partly to reduce pollutional loads in the generation of waste water. Similarly advance practices need to be evolved for minimum water usage in irrigation and at the same time planning and management aspects need to be strengthened in respect of overall reduction of water consumption by way of eliminating the water loss due to leakage, evaporation, seepage etc.

QUALITATIVE RESOURCE MANAGEMENT- A CASE STUDY

An attempt has also been made in the present paper to workout trend of the quality of Chambal river on the downstream side of Kota barrage -important parameters like Dissolved Oxygen (DO), Bio-chemical Oxygen Demand (BOD) and Chemical Oxygen Demand (COD) have been considered for an emerging trend1990 onwards.
The trend has been predicted with the help of Computer through "Harvard Presentation Graphics (HPG) Software Package" and is shown in the figures shown below. It would be apparent from the said figures that during 27 months starting from February, 1990; the DO levels are on decreasing whereas BOD is on an increase. COD trend can be regarded as static-though reflecting marginally Increasing trend.

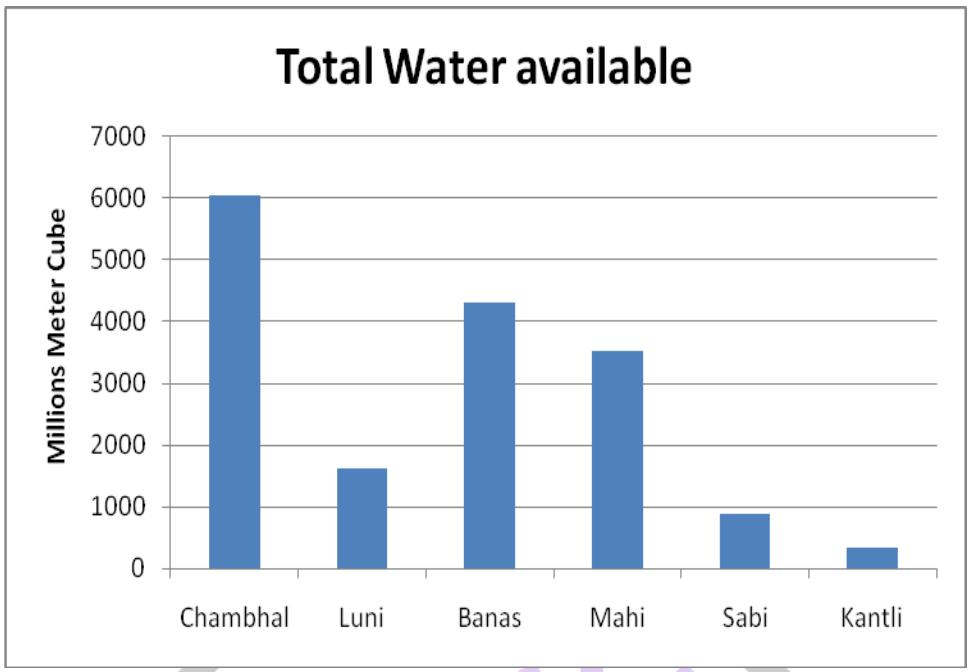

TIME VARIABLE DO. COMPARISON
DO concen. in mg/l
MONTHS
DO

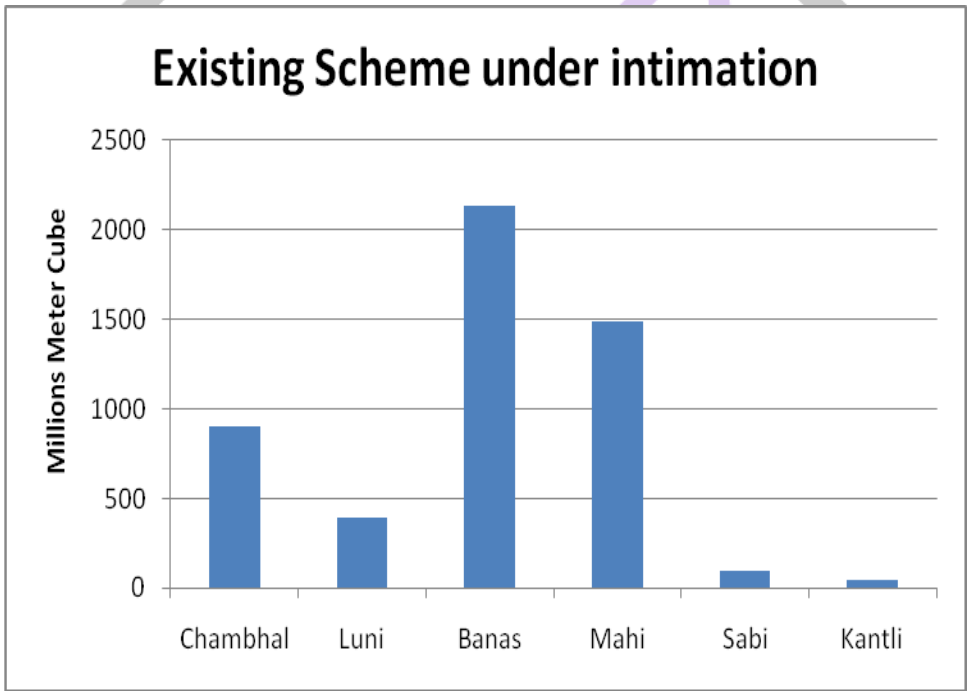

TIME VARIABLE BOD COMPARISON
BOD concen. in mg/l
MONTHS
BOD

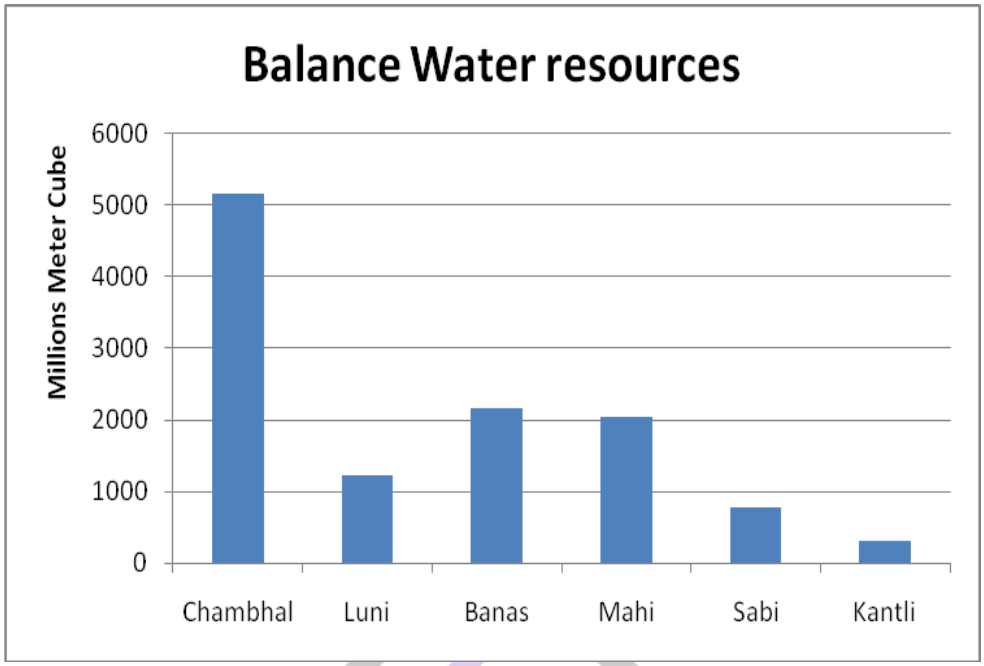

TIME VARIABLE COD COMPARISON
COD concen. in mg/l
MONTHS
COD

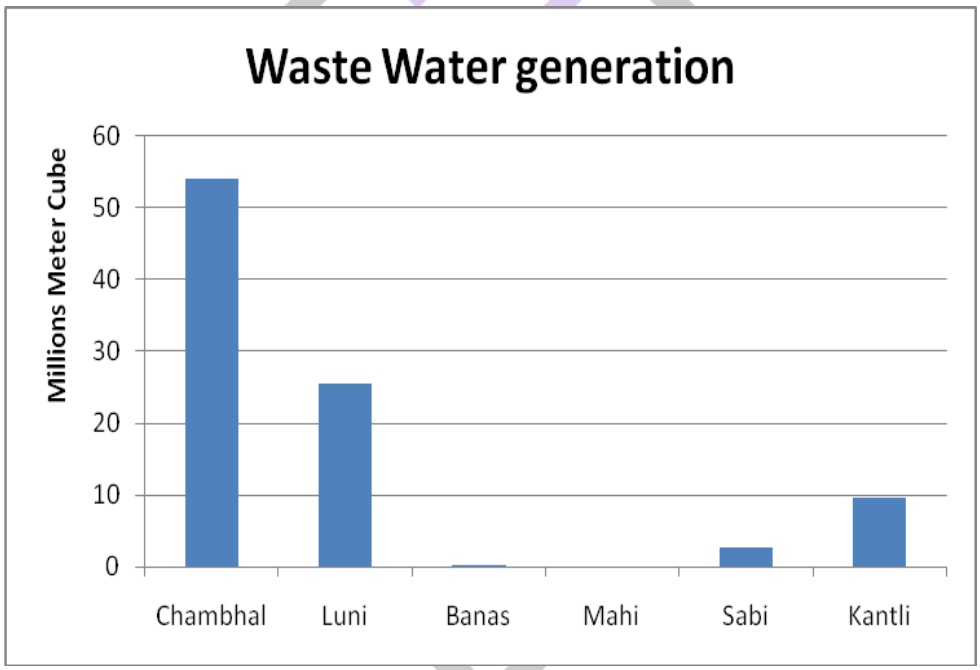
CONCLUSION

The State of Rajasthan - Where Water Scarcity is predominant factor, resource management of water on qualitative as well as quantitative front is to be tackled on a wider integrated scale.






Balance Water resources
Millions Meter Cube
6000
5000
4000
3000
2000
1000
0
Chambhal
Luni
Banas
Mahi
Sabi
Kantli


Waste Water generation
Millions Meter Cube
60
50
40
30
20
10
0
Chambhal
Luni
Banas
Mahi
Sabi
Kantli

CHAMBAL RIVER - RAJASTHAN