4.1.3. Springs (Only Perennial Springs)

1.0 Subject Matter: Springs – Introduction, distribution and discharge (Geo reference Map)

The details of distribution of perennial springs in the district and state on map and precipitation and discharge – basin wise and district wise are given in table 1 and 2 respectively.

Table 1: Distribution of Perennial springs in the District and State on map

Number of Springs based on discharge type, Inventory made and Numbers measured (Meizer Scale)																			
Basin	District	Type 1			Type 2			Type 3			Type 4			Type 5			Total		
		N	I	M	N	I	M	N	I	M	N	I	M	N	I	M	N	I	M

Note: N: Total number of Springs; I: No. of springs for which inventory is made; M: No. of springs for which discharge is measured.

Table 2: Precipitation and Discharge – Basin wise and District wise

Basin	*Precipitation*	*Discharge in Spring*	*% of precipitation enters into the Springs (in Volume)*	*Remarks*
District	*Precipitation*	*Discharge in Spring*	*% of precipitation enters into the Springs (in Volume)*	*Remarks*

2.0 Availability (monthly) of water & Utilizable Water from spring:

The details are given in table 3

Table 3: Availability (monthly) of Water from spring in the State in a Water Year

Month	*Available (in LPM or LPD)*	*Utilizable (in LPM or LPD)*	*Demand (in LPM or LPD)*	*Supply (in LPM or LPD)*	*Consumption (in LPM or LPD)*
June					
….					
May					

Availability of Water from springs, nallahs:

A4. *Inflow from Springs, Nallahs from upstream State/ Country or within the State: (MCM)		**REMARKS**
Basin A/ Sub-basin		
Basin B/ Sub-basin		
Basin C/ Sub-basin		
TOTAL		

** [The water availability from the springs may be assessed from the inventory available with the State Government Agencies or from the National Wetland Inventory Assessment (NWIA) available with the India-WRIS or SAC, ISRO Ahmedabad for the entire country.]*

Table B2 indicates that portion of the springs and Nallahs/small streams which is utilized or under use within the State Boundary. The glacial melts already appears in the rivers/streams & gets stored in reservoirs en-route and therefore not considered separately.

B2. Utilization from Springs, Nallahs (MCM) (From Table A4)		**REMARKS**
In Basin A/ Sub-basin		
In Basin B/ Sub-basin		
In Basin C/ Sub-basin		
TOTAL		

3.0 Issues and Challenges:

Issues:

a. Inaccessible or difficult terrain of spring source area

b. Conflict of Interest in the spring land ownership : As per table 4 given below

Table 4: Ownership of the Spring Land (Govt./Individual/Community)

Basin	District	Ownership of Springs- in numbers			
		Government	Community	Individual	Others

c. Difficulties in continuous monitoring of spring (discharge and other parameters)

d. Change in biophysical landscape and spring health

e. Role of Change in Land Use Land Cover leading to drying of spring : As per table 5 given below:

Table 5: Land Use and Land Cover change pattern in Spring-shed/ Recharge area

Basin	District	% of Catchment Area under								
		Forest		Agriculture		Grazing/ Scrub		Settlement		Observations
		CY-5	CY	CY-5	CY	CY-5	CY	CY-5	CY	

f. Role of hydro-geological setup in perennial spring along with eco-hydrological changes

g. Impact of deforestation, rainfall intensity, rise in temperature, seismicity, landslide, etc. in decline of discharges of springs.

h. Developmental activities (Road constructions, Industries, Tunneling, HEPs development, Mining etc.)

i. Demand in various Sectors, Rise in water demand/ Use*: Give details of use of spring water for consumption in Farm Sector, Industry/Infrastructure, Establishments/Institutions, Drinking/Domestic Use (Urban/Rural) and Forestry Sector.: Table 6 to 12*

Table 6: Usage of Springs Water

Basin	District	Drinking Water				Irrigation		
		No. of Springs	No. of hamlets	No. of families	Discharge Qty	No. of Springs	No. of Land holdings	Irrigated Area

Table 7: Source Wise Previous Year/ Average Annual Water Supply:

C1. Farm Sector (MCM) Within the Basin/ Sub-basin A (Chapter 4.2.2)												
Source	Sub Source	Rain-fed Crops	Agriculture Irrigated Crops					Horticulture		Animal Husbandry (Livestock, Birds and Others)	Fishery & Others	TOTAL
			Rice	Wheat	Sugarcane	Cotton	All other crops	Banana	All other crops/ plantation			
Surface Water	Springs, Nallahs											

Table 8: Drinking Water (DW) Usage

Basin	District	No. of Springs Used for usage for DW		
		DW Quality	Not fit for DW as on date	No. of Springs whose water has become unfit during the last 5 Yrs.

Table 9: Source Wise Previous Year/ Average Annual Water Supply:

C4: Drinking Water & Domestic Use: Rural (MCM) Within the Basin/ Sub-basin A (Chapter 4.2.5.1)					
Source	**Sub Source**	**District 1**	**District 2**	**District 3**	**TOTAL**
Surface Water	Springs, Nallahs				

Table 10: Source Wise Previous Year/ Average Annual Water Supply:

C5. Drinking Water & Domestic Use (Urban) (MCM) Within the Basin/ Sub-basin A (Chapter 4.2.5.2)						
Source	**Sub Source**	**City A**	**City B**	**City C**	**Towns**	**TOTAL**
Surface Water	Springs, Nallahs					

Table 11: Source Wise Previous Year/ Average Annual Water Supply:

C6. Forestry Sector (MCM) Within the Basin/ Sub-basin A (Chapter 4.2.1)					
Source	**Sub Source**	**Rain-fed Forestry**	**Irrigated Forestry**	**Wildlife**	**TOTAL**
Surface Water	Springs, Nallahs				

Table 12: Un-tapped potential

Basin	District	Total No. of Springs	No. springs tapped for DW	No. of Springs tapped for Irrigation	Springs not tapped for DW/ Irrigation	
					No.	Qty of Discharge

j. Decline in spring discharges / time series if available (with probable reasons) : Table 13 given below

Table 13: Drying of springs (amongst measured) across the Districts

Basin	*District*	*2000*	*2010*	*Cr.Yr.-5*	*Cr.Yr-1*	*Current Yr*
	District.1					
	District.2					
	District.3					

Note: Cr.Yr-1= Current Year-1 i.e., Previous Year; Cr.Yr-5 = Five Year back data

k. Pollution from domestic, sewage and industrial waste: Table 14 given below

Table 14: Pollution details

Basin	District	Pollution Sources			
		Domestic	Industrial	Farm Fertilizers and Pesticides	Others

l. Lack of sewage disposal system or mining activity or disposal of solid waste could be cause of pollution

m. Role of negligence or lack of interest in spring conservation

Challenges:

a. Mapping of all spring area/recharge areas for conservation and management (Data base creation for background information). Primary and secondary data field creation on springs in the region.

b. How to rejuvenate the dried springs: Table 15 as given below

Table 15: Recharge zone characteristics
Basin/ Sub-basin:

Physiography and structures	
Rock types	
Land Use	
Land Cover	
Slope	
Aspect	
Altitude (meters)	
Soil depth (cm)	
Spring type	

c. Management of water distribution from springs: Table 16 and 17 respectively given below

Table 16: Conservation

Basin	*District*	*Name of Scheme for conserving Springs*			
		RD	*Panchayat*	*Others*	

Basin	*District*	*Total No. of Springs*	*Total Investment under various Scheme*	*Conservation measures are taken up*		*Springs that have shown increase in discharge*	
				Number	*%*	*Number*	*%*

Table 17: Vulnerability assessment (Basin-wise and District-wise)

Basin	***District***	***Components***	***Sector***	***Indicators***
		Climatic Exposure	Rainfall	Mean annual rainfall
			Temperature	Annual mean temperature
		Sensitivity	Water sources	Other types of water sources
			Irrigation	% Rain-fed farming
			Livelihoods	% Farming populations
			Human Health	Population
		Adaptive Capacity	Economic capacity	Poverty rate
			Environmental capacity	Population density
			Physical/Developmental connectivity	Rural connectivity and Industrial development
		Social Awareness	Human capacity	Education level & corresponding % in population
			Water literacy / capacity	Socially aware population w. r. t. spring conservation & rejuvenation

d. Reducing pollution and enhance permeability of infiltration of spring recharge zones

4.0 Problem / Root Cause Analysis

5.0 Constraints in Measurement, Monitoring and Data Management: These may include:

i. Accessibility to spring source is difficult due to distance and terrain conditions, etc.
ii. No manpower deputed for discharge or water quality measurement due to lack of sufficient manpower.
iii. Lack of trained manpower (Para Hydro-geologists)
iv. Lack of potable water quality measuring kit, discharge measuring equipments and standard infrastructure.
v. No centralized data base and analytical support etc.

6.0 Governance / Management of springs:

a. Institutions governing / managing / monitoring the resources and Institutional structure.
b. Areas of Peoples/Private Participation/NGO if any:
This may include people's or community participation in maintenance of water distribution system from springs and creation of re-charge structure, water storage structure and water conservation structures in the spring catchment.
c. Water (Springs) Financing and Economics *(for springs development, construction and maintenance, recharge etc.):* [Relevant tables on Water Financing and Economics may be looked into Chapter 7 and filled up with appropriate data/information] Spring tapping schemes in numbers and their financing may be given here. (This may be supported by tables giving name of scheme, no. of beneficiaries, cost and source of finance (Govt. / Public Private Partnership (PPP)/ Community participation/driven etc.)
d. Best practices/ Success stories in measurable terms.

7.0 Performance Indicators: for comparison across district/basin/state

a. Bench Marks/ Norms/ Standards and deviation from the norms/bench marks/standards currently. If not available, it should be listed as a constraint/ limitation in data management.
b. Performance Indicators

District/State/Basin	Units	District.1	District.2	District.3	Dist.4
I. Measurement					
• Total No. of Springs	Number				
• % Springs whose inventory is completed	%				
• % of Springs whose discharge is measured	%				
II. Quantity					
• Number and % of Springs got dried in/during last 5 years					
• Number and % of Springs got seasonal from perennial (% decline or dry period)					
III. Usage					
• No of Springs not tapped for DW/Irrigation					
IV. Water budget					
• % of precipitation enters into the Springs in Volume in identified recharge zone	mm or cum				
• Discharge trend over the last 5 Years against total no. of springs where discharge is measured. (Annual as well as seasonal discharge variation)	% increase				
	% decrease				
• % Springs not tapped for DW / Irrigation					
V. Threat					
• No. of Sheds affected by deforestation					
• No. of Sheds affected by seismicity					
• No. of Sheds affected by landslides					
• No. of Sheds affected by rise in temperature					
VI. Quality					
• % of Springs for Water Quality parameters are measured					
• Number and % of Springs not fit for DW					
• Number of Springs whose water has become unfit for DW during the last 5 Years					
VII. Conservation					
• % Springs Sheds having conservation management plans	%				

• % of Spring shed where Conservation has been undertaken (Please specify conservation techniques (Engineering/Vegetative/ Social measures) in separate annexure)	%				
• % Spring sheds where conservation has undertaken but discharge has not increased. (Please specify the probable causes in separate annexure)	%				
• % Springs where Forest catchment area has declined					
• % Springs where settlement in catchment area has increased					
VIII. Peoples participation					
• % of Springs for which campaign has been undertaken					
IX. Financing					
• Amount invested per spring development during the previous year					

8.0 Reforms undertaken/ being undertaken/ proposed if any

9.0 Road map of activities / tasks proposed for better governance with timelines and agencies responsible for each task/activity.