

4- Water Resources Management of Bundelkhand

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1. Background

Bundelkhand region of Uttar Pradesh comprises of 7 districts, Lalitpur, Jhansi, Jalaun, Hamirpur, Mahoba, Banda and Chitrakoot. The region is bounded by Betwa River on west, Yamuna on north and Ken River on east.

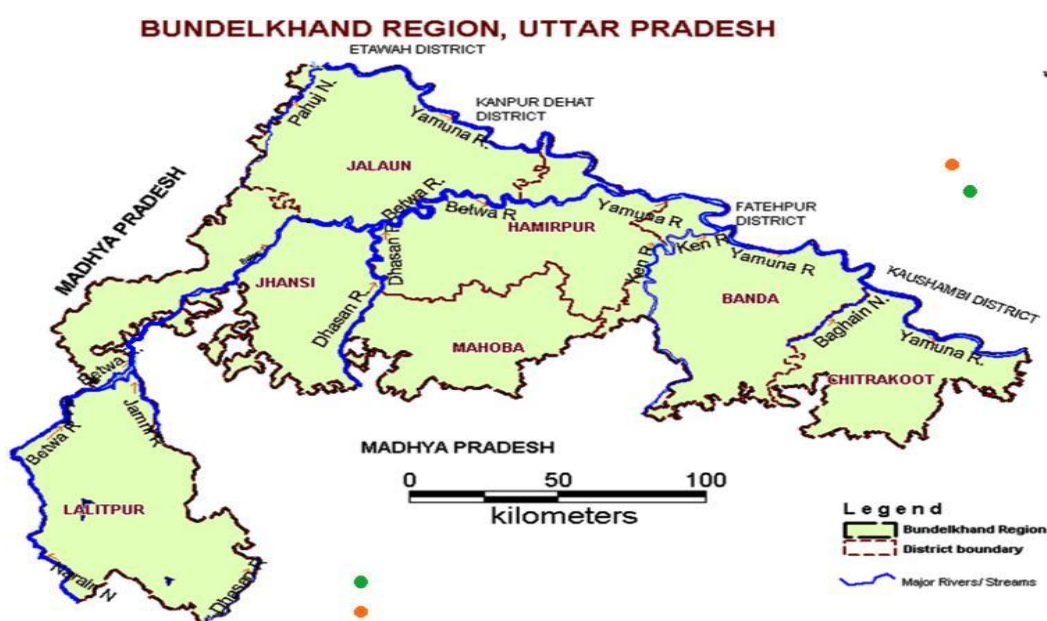


Figure -1: Bundelkhand region of Uttar Pradesh

Bundelkhand lies between the Indo-Gangetic Plain to the north and the Vindhya Range to the south. It is a gently sloping upland, distinguished by barren hilly terrain with sparse vegetation, although it was historically forested. The plains of Bundelkhand are intersected by three mountain ranges, the Vindhya, Fauna and Bander chains, the highest elevation not exceeding 600 meters above sea-level. Beyond these ranges the country is further diversified by isolated hills rising abruptly from a common level. The general slope of the country is towards the northeast, as indicated by the course of the rivers which traverse or bound the territory, and finally discharge themselves into the Yamuna River. Geographical area of 7 districts of Bundelkhand in square km is as below:-

Lalitpur	Jhansi	Jalaun	Hamirpur	Mahoba	Banda	Chitrakoot
5039	5024	4565	4282	2884	4460	3164

1.1 Temperature: Bundelkhand is a hot and semi-humid region. Minimum temperature varies from around 6 °C to 12 °C. maximum temperature varies from 38 °C to 48 °C. Banda is one of the hottest places in India.

1.2 Rainfall: Bundelkhand gets moderate annual rainfall, ranging from around 750 mm in the northwest, to 1250 mm in the southeast. But precipitation is erratic; a deluge is followed by

long stretches of no rain. Pre-monsoon showers with lightning and hail are witnessed. Over 95% of the rainfall falls between June and September, with maximum rain generally in July-August. However, the small amount of rainfall between November to May is also very important for agriculture in the region. Rainwater has little time to penetrate the soil. The problem of poor groundwater recharge is aggravated by the substratum of impermeable rock.

1.3 Natural Challenges: Due to its geology and topography and the pattern of rainfall received, Bundelkhand is prone to both drought and flood. In most parts of the entire region, an impermeable rocky layer is found at fairly shallow depths. Hence runoff of both rainwater and soil is high. The problem is aggravated by erratic rainfall and thin forest cover in many districts. Hence, drought or flood hits some or other part of Bundelkhand every few years.

1.4 Occupation: Agriculture is the predominant occupation in Bundelkhand because large chunk of population lives in rural areas. The land available and used for cultivation in the region is considerably lower than in other agriculture zones of the country. However the mainstay of Bundelkhand is agriculture and agro-based industries. Secondary agricultural activities viz. animal husbandry and dairying, poultry, fisheries, bee-keeping and sericulture is also being taken up by large number of people. Keeping in view the topographic and climatic condition of Bundelkhand, horticulture has also been adopted since recent past by a number of farmers.

2. Rivers of Bundelkhand

Major River entering through Bundelkhand area are Ken, Betwa, Yamuna and Dhasan.

2.1 Yamuna River: The Yamuna River is the largest tributary of River Ganga. It originates from Yamunotri glacier of Himalayas, after traversing 1376 km joins Ganga at Prayagraj. The Drainage Area of Yamuna basin is 36620 Sq km, out of this only 20.4%, 70437 sq km of Uttar Pradesh and remaining in others states. The river Yamuna passes through district of Hamirpur and Banda.

2.2 Betwa River: The Betwa is one of the important rivers of northern India and is tributary of the Yamuna River. It originates from Vindhya Range of district Raisen (M.P.) and enters UP at Lalitpur district. The river Betwa passes through Lalitpur, Jhansi & joins Yamuna at Hamirpur district of Uttar Pradesh. The total length of the river from its origin to its confluence with Yamuna is 590 kilometres, out of which 195 kilometres lies in Madhya Pradesh, 321 kilometres in Uttar Pradesh and 74 kilometer on the boundary of both the states. The drainage area of Betwa River is 44335 sq km. out of which 30238 km lies in Madhya Pradesh and remaining 14097 sq km lies in Uttar Pradesh. 68% drainage area lies on Madhya Pradesh and 32% drainage area lies in Uttar Pradesh.

2.3 Ken River: The Ken River is one of the important rivers of Bundelkhand Region. It is the largest tributary of River Yamuna. It originates from District Katni in M.P. After traversing 427 km it joins river Yamuna in District Banda at Village Chilla. Out of its total length of 427 km it flows 292 km in M.P., 84 km in U.P. and 51 km on the boundary of both the States. Drainage Area of Ken basin 28058 Sq km, out of this only 3586 sq km i.e. 14% of total drainage area lies in Uttar Pradesh and rest in Madhya Pradesh.

2.4 Dhasan River: The Dhasan river is another important River of Bundelkhand Region and tributary of Betwa river. It originates from district Raisen of Madhya Pradesh and enters in Jhansi District of U.P. It traverses 365 km, out of which 240 km is in M.P. and 54 Km as common boundary of U.P. & M.P. and remaining 71 km in U.P. before joining to Betwa at Kotra in District Jalaun. Table 1 below summarises the major rivers entering and flowing through Uttar Pradesh part of Bundelkhand:-

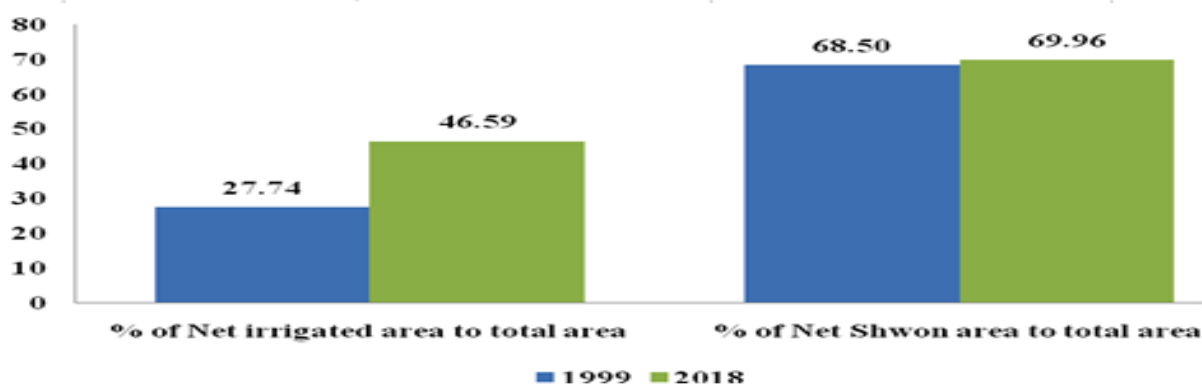
Table 1: Rivers of Bundelkhand

S. N.	River	Traverse length in Km.			Drainage Area in sq. km.		Passing form District of U.P.	Confluence
		U.P.	M.P.	UP & MP in common boundary	U.P.	M.P.		
1	2	3	4	5	6	7	8	9
1	Ken	84	292	51	3856 (14%)	24472 (86%)	Banda	Yamuna at Village Chilla, District Banda
2	Betwa	321	195	74	14097 (32%)	30238 (68%)	Lalitpur, Jhansi, Hamirpur	Yamuna at Hamirpur
3	Dhasan	71	240	54	3517 (30%)	11808 (70%)	Jhansi & Jalaun	Betwa at Kotra, Jalaun
4	Yamuna	1376			70437 in UP and 295783 in other state		Jalaun, Hamirpur, Banda, Chitrakoot	Ganga at Pryagraj

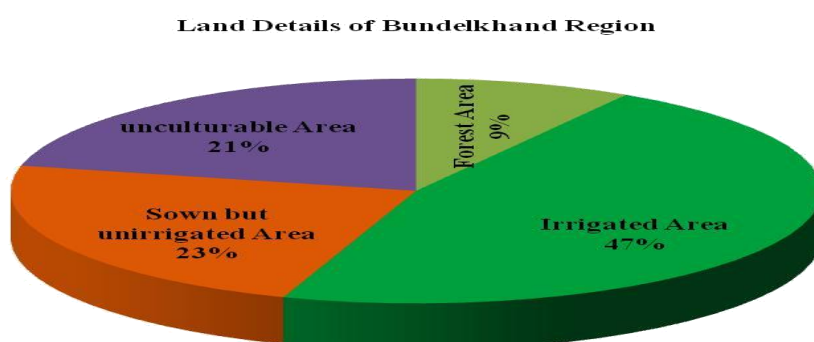
3. Current Status Of Irrigated And Sown Area: Data of year 1999 for net irrigated and net sown area is compared with data of year 2018. Net irrigated area is increased from 27.74% to 46.59% i.e. approximately 5.5 lakh hectare additional land is covered under Irrigation in last 20 years. Net sown area remains almost constant.

Table 2: Status of Irrigated and Net Sown Area

Year	% of Net Irrigated area to total area	% of Net Sown area to total area	Net Irrigated Area	Net Sown Area	Total Geographical Area
1999	27.74	68.50	816000	2015000	2941800
2018	46.59	69.96	1370662	2057967	2941800
Increase			554662	42967	-



Pi chart for total geographical area is drawn below. Out of total area, 47% is irrigated and 23% is sown but unirrigated.



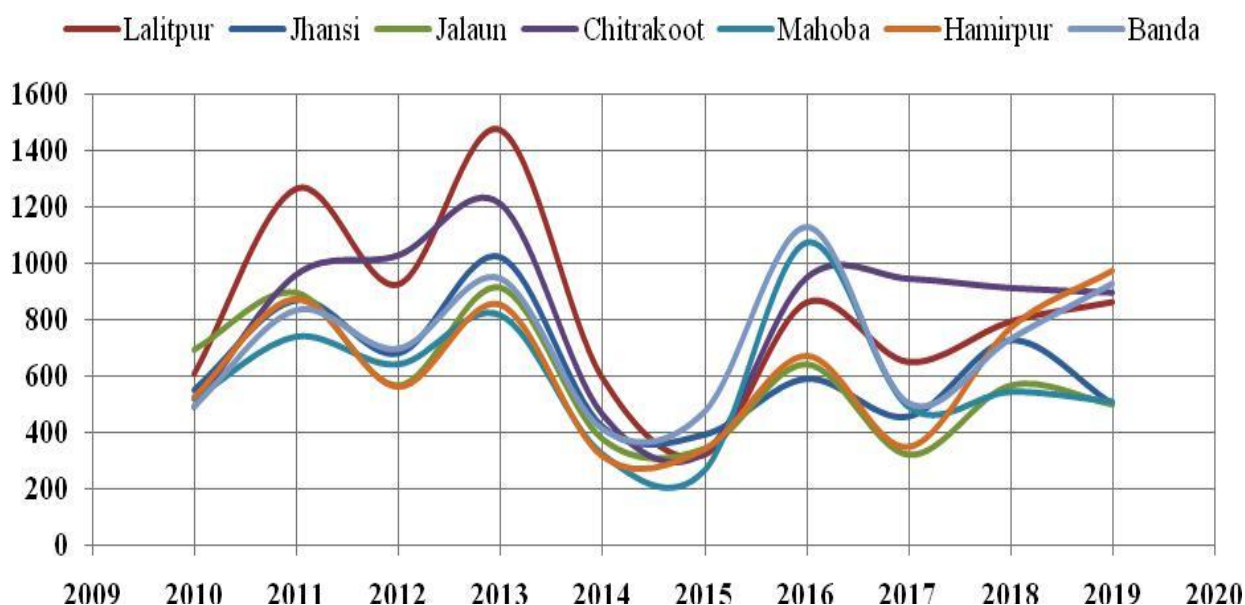
4. Availability of water–Major source of fresh water is available in the form of surface runoff and ground water. In the following analysis, volume availability of surface water and ground water will be made and then summed up to calculate total water available.

4.1 Surface water: Surface water available in different districts of Bundelkhand is in the form of rainfall generated runoff which is stored in stored in dams, tanks and other water bodies. Water in Bundelkhand is also available from Betwa, Yamuna, Dhasan, Ken and Baghain Rivers. Following section will quantify available surface water. Table 3 below shows 10 years rainfall data of 7 districts of Bundelkhand. It can be seen from the table that average rainfall in Bundelkhand is below national normal rainfall which is 1187 mm.

Table 3: Rainfall (in mm)

Year/ District	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	Average
1	2	3	4	5	6	7	8	9	10	11	12
Lalitpur	607.84	1264.9	925.97	1473.43	594.94	321.50	861.20	651.00	794.00	862.90	835.77
Jhansi	548.28	869.08	678.86	1022.62	418.52	388.70	588.20	453.40	725.80	498.60	619.21
Jalaun	691.50	895.10	564.27	913.06	374.35	339.10	639.80	317.70	564.20	497.50	579.66
Chitra koot	489.05	958.75	1027.5	1210.85	463.50	327.00	947.25	945.00	911.75	895.50	817.62
Mahoba	518.87	739.43	641.64	816.31	323.27	263.60	1073.4	490.97	543.97	509.07	592.06
Hamir pur	523.79	873.10	559.86	852.90	312.93	337.33	670.33	344.99	769.33	974.00	621.86
Banda	489.05	833.92	696.08	947.13	409.43	470.25	1130.5	502.08	730.88	928.73	713.81

Erratic precipitation can be observed from figure below. This figure also shows that within the same year district Lalitpur receives maximum rainfall and district Mahoba receives minimum. The rainfall at Mahoba is approximately half of Lalitpur. Trend of rainfall is same in all the 7 districts.



To convert rainfall, falling over the geographical area of Bundelkhand, into runoff a factor of 0.4 has been adopted. Runoff thus obtained has been further reduced by 25% to account for E-flows into the river. Summary calculation of surface water is shown below in Table 4. Available surface water calculation is based on water transfer through Ken River, storage used from Rajghat and Matatila dam on Betwa River, water transfer from Lachura dam (Arjun Sahayak Project) on Dhasan river and lift canal systems on Yamuna River. In this way total available surface water (Storage+Runoff) in Uttar Pradesh region of Bundelkhand comes out to be **9013.78 MCM**.

Table 4: Summary of surface water in Bundelkhand region

District	Geographical Area in sq km.	Run of Factor	Rainfall in mm	Generation of Runoff (MCM)	Extra from Ken River	Extra from Betwa River (Rajghat Dam)	Extra from Yamuna River (pump canals)	Extra from Dhasan River (Arjun Sahayak)	25% For E-flow	Net Available run off in MCM
1	2	3	4	5	6	7	8	9	10	11
Lalitpur	5039	0.4	835.767	1684.57	0.00	285.00	0.00	0.00	421.14	1548.43
Jhansi	5024	0.4	619.206	1244.36	0.00	255.00	0.00	0.00	311.09	1188.27
Jalaun	4565	0.4	579.658	1058.46	0.00	300.00	0.00	0.00	264.61	1093.84
Chitrakoot	3164	0.4	817.615	1034.77	0.00	0.00	54.00	0.00	258.69	830.08
Mahoba	2884	0.4	592.056	683.00	235.00	0.00	0.00	204.00	170.75	951.25
Hamirpur	4282	0.4	621.856	1065.11	0.00	108.00	0.00	62.50	266.28	969.34
Banda	4460	0.4	713.808	1273.43	1465.00	0.00	0.00	12.50	318.36	2432.58
Total				8043.70	1700.00	948.00	54.00	279.00	2010.93	9013.78

4.2 Ground water: Annual replenishable ground water data of the year 2012-13 in MCM has been taken from Central Ground Water Board for different districts of Bundelkhand and is tabulated below. Ground water availability ranges from 3.00 to 30.00 meter below ground level and is available up to 200 meter in Bundelkhand region.

Lalitpur	Jhansi	Jalaun	Chitrakoot	Mahoba	Hamirpur	Banda	Total
678.13	709.14	1210.62	239.83	470.46	490.01	880.94	4679.13

4.3 Total available surface plus ground water: Total surface and ground water available in Bundelkhand is 9013.78 MCM and 4679.13 MCM respectively. Hence, total water available in Bundelkhand is 13692.91MCM and district wise total availability is tabulated below. It is seen from the table that Chitrakoot, Mahoba and Hamirpur district have far less water than that available at Jhansi, Lalitpur, Jalaun and Banda.

Table 5: Availability of water in Bundelkhand (m)

District	Lalitpur	Jhansi	Jalaun	Chitrakoot	Mahoba	Hamirpur	Banda	Total
Ground water	678.13	709.14	1210.62	239.83	470.46	490.01	880.94	4679
Surface water	1548.43	1188.27	1093.84	830.08	951.25	969.34	2432.58	9013
Total	2226.56	1897.4	2304.46	1069.91	1421.7	1459.35	3313.5	1369

5. Requirement of water- Available water is required for irrigation, drinking, water for live stock and for industries. In the following section, water required for irrigating total sown area 20.58 Lakh Hectare (6.9lakh hectare in excess of present irrigated area), drinking water requirement, water required for livestock and industrial water requirement up to year 2050 is quantified.

Total geographical area of Bundelkhand is 29.41 lakh hectares. Area irrigated in Bundelkhand region by various sources is analysed for the year 2018 and district wise irrigated area is tabulated in table 4 below. **Total irrigated area of Bundelkhand region is 13.7 lakh hectares which is approximately 66% of total sown area.** District wise irrigation by various sources is tabulated in Table 6 below.

Table 6: Irrigated Area (Ha)

Irrigation	Lalitpur	Jhansi	Jalaun	Chitrakoot	Mahoba	Hamirpur	Banda	Total
Canal	96099	121078	156772	4700	24960	26743	46023	476375
Govt. Tubewell	0	3506	20064	0	263	19090	16361	59284
Private Tubewell	74035	33188	58600	58541	5298	78798	82528	390988
Wells	81561	113491	16195	4655	68956	20101	15323	320282
Ponds	26909	35249	2895	6948	23212	2930	3818	101961
Other sources	12451	2988	527	69	2731	2728	278	21772
Total	291055	309500	255053	74913	125420	150390	164331	1370662

Net sown area is also digitised for 7 districts of Bundelkhand region and is tabulated below. **Total sown area of Bundelkhand region is 20.57 lakh hectares which is approximately 70% of total geographical area.** Data for 7 districts of Bundelkhand is shown below:-

	Lalitpur	Jhansi	Jaulan	Chitrakoot	Mahoba	Hamirpur	Banda	Total
Sown area	303978	342099	351900	173183	237217	294816	354774	2057967

For further analysis of irrigation water requirement, total sown area will be taken into consideration. It means, approximately 6.9 lakh hectare area, which is unirrigated, is assumed to be irrigated by available water resources in Bundelkhand. Assessment of irrigation water requirement is made on the assumption of 50 cm of water depth for an average crop of rabi season on this region.

In the analysis for water requirement for future population growth, projected demand up to year 2050 is taken. Population growth of 1.1% per year and 80 liters per capita per day has been adopted. The available district-wise census data for the year 2011 are used for human population forecasting. This population was projected for the year 2050 AD on the basis of medium variant growth rate as given in U.N. Publication 'World Population Prospects – 2004 revision.' Water requirement is tabulated in table 7 below:-

Table 7: Projected human population and water requirement by the year 2050 AD

S. N.	District	Human Population		Water Demand in 2050 (MCM)
		2011	2050	
1	Lalitpur	1221000	1831500	53.4798
2	Jhansi	1998000	2997000	87.5124
3	Jalaun	1689000	2533500	73.9782
4	Chitrakoot	991000	1486500	43.4058
5	Mahoba	875000	1312500	38.325
6	Hamirpur	1104000	1656000	48.3552
7	Banda	1799000	2698500	78.7962
	Bundelkhand		9677000	

The livestock population is calculated considering a growth rate of 1% as considered by NWDA. The live stock populations for the year 2011 as estimated by Directorate of Economics And Statistics, Government of Uttar Pradesh is used for live stock population forecasting for the year 2050 AD. The livestock population and water demand in the year 2050 AD is estimated as 91,18,400 and 164.13 MCM, respectively, as detailed in Table 8:-

Table 8: Projected livestock population and water requirement by the year 2050 AD

S. N.	District	Livestock Population		Water Demand in 2050 AD (MCM)
		2011	2050	
1	Lalitpur	886000	1417600	25.8712
2	Jhansi	953000	1524800	27.8276
3	Jalaun	803000	1284800	23.4476
4	Chitrakoot	761000	1217600	22.2212
5	Mahoba	563000	900800	16.4396
6	Hamirpur	793000	1268800	23.1556
7	Banda	940000	1504000	27.448
	Bundelkhand	5699000	9118400	164.131

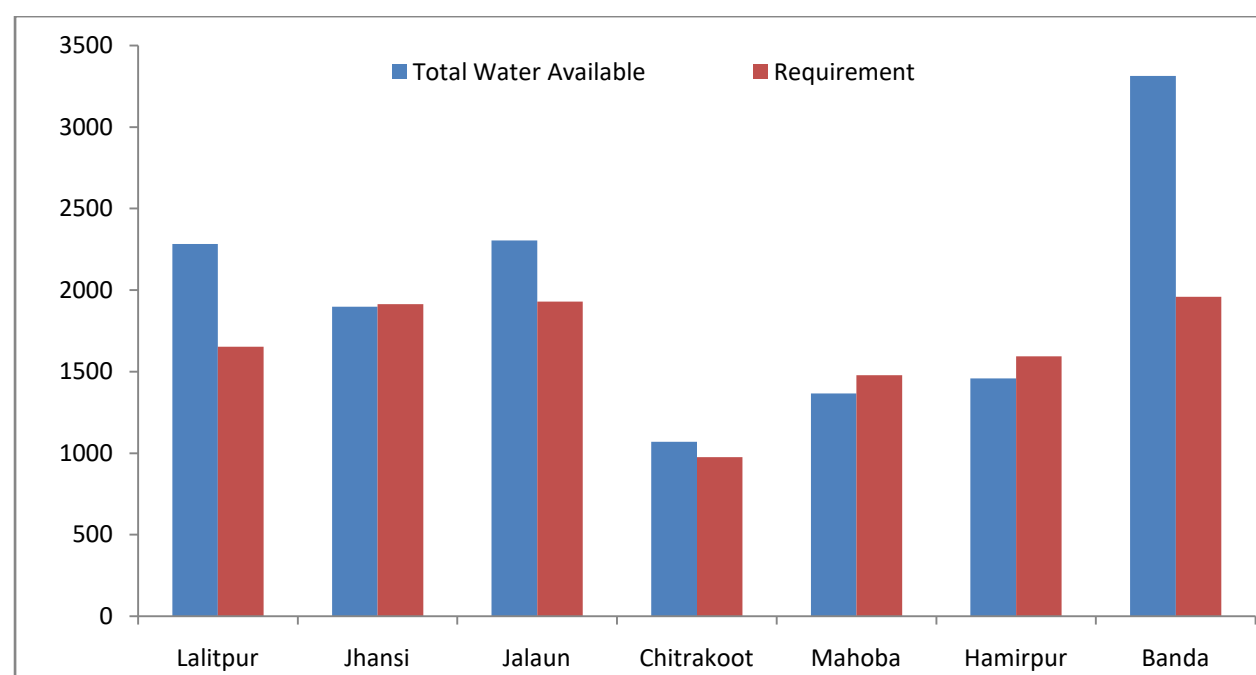
Information regarding existing, ongoing and proposed industries in the Bundelkhand region is not readily available. In the absence of relevant information, the water requirement for industrial use has been assumed to be of the same order as that for domestic uses i.e. 423.85 MCM.

Total water available and required in 2050 is summarised in table 9 below. Total available water is shown in column 5 and total water requirement is shown in column 10. It can be seen from the table that total water available in the districts of Lalitpur, Jalaun, Chitrakoot, Mahoba and Banda is more than that of water required in these districts.

Table 9: Water requirement for Bundelkhand

S. N.	District	Surface Water (MCM)	Ground Water (MCM)	Total Water available (3+4)	Irrigation (MCM) total sown area*0.54	Drinking (MCM)	Live Stock (MCM)	Industrial (MCM)	Total Water requirement
1	2	3	4	5	6	7	8	9	10
1	Lalitpur	1604.43	678.13	2282.56	1519.89	53.48	25.52	53.48	1652.37
2	Jhansi	1188.27	709.14	1897.41	1710.49	87.51	27.45	87.51	1912.96
3	Jalaun	1093.84	1210.62	2304.46	1759.50	73.98	23.13	73.98	1930.59
4	Chitrakoot	830.08	239.83	1069.91	865.92	43.40	21.92	43.40	974.64
5	Mahoba	895.25	470.46	1365.71	1186.09	38.33	16.22	38.33	1278.97
6	Hamirpur	969.34	490.01	1459.35	1474.08	48.35	22.84	48.35	1593.62
7	Banda	2432.58	880.95	3313.53	1773.87	78.80	27.07	78.80	1958.54
	Total	9013.7	4679.14	13692.92	10289.84	423.85	164.15	423.85	11301.69

Bar chart below shows comparison of total water available and required. It can be seen that district Banda has huge surplus water available.



Only districts Jhansi and Hamirpur have water requirement more than that of available. **It is important to note that total water available is 13692.92MCM and total water required up to 2050 is 11301.69 MCM. This means there is enough water present in the Bundelkhand region to cater the projected water demand up to year 2050.**

6. Water demand: In this section district wise water balance study is done to assess the future requirement of Bundelkhand.

Table:10 District wise status of water storage

District	Dam storage	From Rajghat	Matatila	Yamuna	Arjun sahayak	Tanks	Total
Lalitpur	1032.52	285.00	-589.00	0.00	0.00	89.00	817.52
Jhansi	314.53	300.00	0.00	0.00	0.00	117.50	732.03
Jalaun	0.00	363.00	348.00	0.00	0.00	9.65	720.65
Chitrakoot	98.63	0.00	0.00	54.00	0.00	23.16	175.79
Mahoba	240.67	0.00	0.00	0.00	204.00	77.37	522.04
Hamirpur	179.00	0.00	6.00	0.00	62.60	9.77	257.37
Banda	224.25	0.00	0.00	0.00	12.50	12.73	249.48
Total -	2089.60	948.00	-235.00	54.00	279.10	339.18	3474.88

*Negative value of 235MCM indicates share of Madhya Pradesh

District wise water demand has been calculated after accounting for existing storages in reservoirs.

Table :11 Future Water Demand

(in mcm)

District	Total water requirement	Use of stored water	Avail able surface water	Unstored surface water	Avail able ground used water	Currently used ground water	Unused ground water	Current use of water	Future water demand
							(6-7)	(3+7)	(2-9)
1	2	3	4	5	6	7	8	9	10
Lalitpur	1652.37	817.52	1604.43	482.21	678.13	458.42	219.71	1275.94	376.43
Jhansi	1912.96	732.03	1188.27	756.24	709.14	479.38	229.76	1211.41	701.55
Jalaun	1930.59	785.65	1093.84	1084.19	1210.62	818.38	392.24	1604.03	326.56
Chitrakoot	974.64	175.79	830.08	654.29	239.83	162.13	77.70	337.92	636.72
Mahoba	1278.97	522.04	895.25	452.21	470.46	318.03	152.43	840.07	438.90
Hamirpur	1593.62	257.37	969.34	780.57	490.01	331.25	158.76	588.62	1005.00
Banda	1958.54	249.48	2432.58	1260.60	880.95	595.52	285.43	845.00	1113.54
Total	11301.69	3474.88	9013.78	5470.29	4679.1	3163.10	1516.0	6637.98	4663.7

It can be seen that total water available is 13692.92 MCM, future water requirement is 11301.69MCM (col 2), current uses of water is 6637.98MCM (col 9). Therefore, net future demand is 4663.71MCM.

7. Way out- Following section deals with the way to meet future water demand of 4598.71MCM. District wise water management plan will be proposed. In the proposed plan to fulfil the demand, it is endeavoured to avoid construction of costly dams and emphasis is given on consumptive use and micro irrigation techniques. It is also suggested to use existing traditional ponds, in seven districts of Bundelkhand, to store water without any new construction. Traditional storage will also help in recharging ground water. Irrigation from these small ponds will bear minimum infrastructure cost as irrigation can be done in localised area where these are located. Traditional method of irrigation in Bundelkhand will also make people of Bundelkhand aware about importance of water conservation.

1. **District Lalitpur** 376.43 mcm. This demand can be met as follows:-

- a. From Ken betwa link – 56 mcm
- b. From on going new dams (Jamrar, Bhaoni, Bandai and Bhaurat dam) – 82.89 mcm
- c. Storing in existing ponds – 18 mcm
- d. Using under ground water – 219.71 mcm

2. **District Jhansi** 701.55 mcm. This demand can be met as follows:-

- a. Sahzad dam – 100 mcm
- b. From on going new dams (Eirach Dam) – 56.25 mcm
- c. 80% Sprinkler and 20% drip irrigation: Proposed for 256600 instead of existing flow irrigation – 385 mcm
- d. Using under ground water – 173.51 mcm

3. **District Jalaun** 391.56 mcm. This demand can be met as follow:-

- a. From existing ponds – 27 mcm
- b. Using under ground water – 365.00 mcm

4. **District Chitrakoot** 636.72 mcm. This demand can be met as follows:-

- a. From existing ponds – 75 mcm
- b. Using under ground water – 77.70 mcm
- c. 80% Sprinkler and 20% drip irrigation: proposed for 112370 instead of existing flow irrigation – 112 mcm
- d. By creating new storage – 380 mcm

5. **District Mahoba** 438.90 mcm. This demand can be met as follows:-

- a. From Ken betwa link – 74 mcm
- b. From existing ponds – 74 mcm
- c. 80% Sprinkler and 20% drip irrigation: proposed for 95000 instead of existing flow irrigation – 142 mcm

d. Using under ground water – 152.43 mcm

6. **District Hamirpur** 1005.00 mcm. This demand can be met as follows:-

- From Ken betwa link – 300 mcm
- From existing ponds – 48 mcm
- 80% Sprinkler and 20% drip irrigation: proposed for 225585 instead of existing flow irrigation – 338 mcm
- Using under ground water – 158.76 mcm
- By creating new storage – 165 mcm

7. **District Banda** 1113.54 mcm. This demand can be met as follows:-

- From Ken betwa link – 505 mcm
- Using under ground water – 267 mcm
- 80% Sprinkler and 20% drip irrigation: proposed for 200000 instead of existing flow irrigation – 300 mcm
- From existing ponds – 41.8 mcm

Proposed water management plan to meet extra water demand is shown in below Table:-

Table :12 Proposed water management plan to meet extra water demand

Distric t	Extra water demand	Ground water	New distrib ution of Ken Betwa	New dams	Shazad dam	Sprinkle r/ drip 80/20%	Proposed area for micro irrigation (ha)	Surface water to be stored	Storing in existing ponds	Total from proposed plan
		← Proposed plan →								
1	2	3	4	5	6	7	8	9	10	11
Lalitpur	376.43	219.71	56	82.89	0	0	0	0	18	376.60
Jhansi	701.55	173.51	0	56.25	100	385	256600	0	0	714.76
Jalaun	391.56	365.00	0	0	0	0	0	0	27	392.00
Chitra koot	636.72	77.70	0	0	0	112	112370	380	75	644.70
Mahoba	438.90	152.43	74	0	0	142	95000	0	74	442.43
Hamir pur	1005.00	158.76	300/0*	0	0	338	225585	165	48	1009.76
Banda	1113.54	267.00	505/805*	0	0	300	200000	0	41.8	1113.80
Total	4663.7	1414.12	935	139.14	100	1277	889555	545	283.8	4694.06

*existing distribution

Districts which required surface water storage are only Chitrakoot and Hamirpur. To reduce the cost of storage, emphases should be given to store surface water in abandoned mines, lift irrigation from rivers and recharging ground water. Consultation from CGWB could be useful in exploring ground water recharge sites and aquifers.

8. Conclusion: Water resources management study for Uttar Pradesh Part of Bundelkhand has been done. Total sown area of Bundelkhand is 20.57 Lakh Hectare. It is seen from the study that total water available in Bundelkhand is 13692.92MCM, future water

requirement is 11301.69MCM, and current uses of water is 6637.98MCM. Net future demand is 4663.71MCM. Unused water resources are 6986.33MCM. A plan for water resources management is presented in the study with mixture of traditional and modern ingredients. Emphasising is given to consumptive, micro-irrigation and traditional method of irrigation by use of existing traditional small water bodies. Creation of new storage is only limited to Chitrakoot and Hamirpur districts.