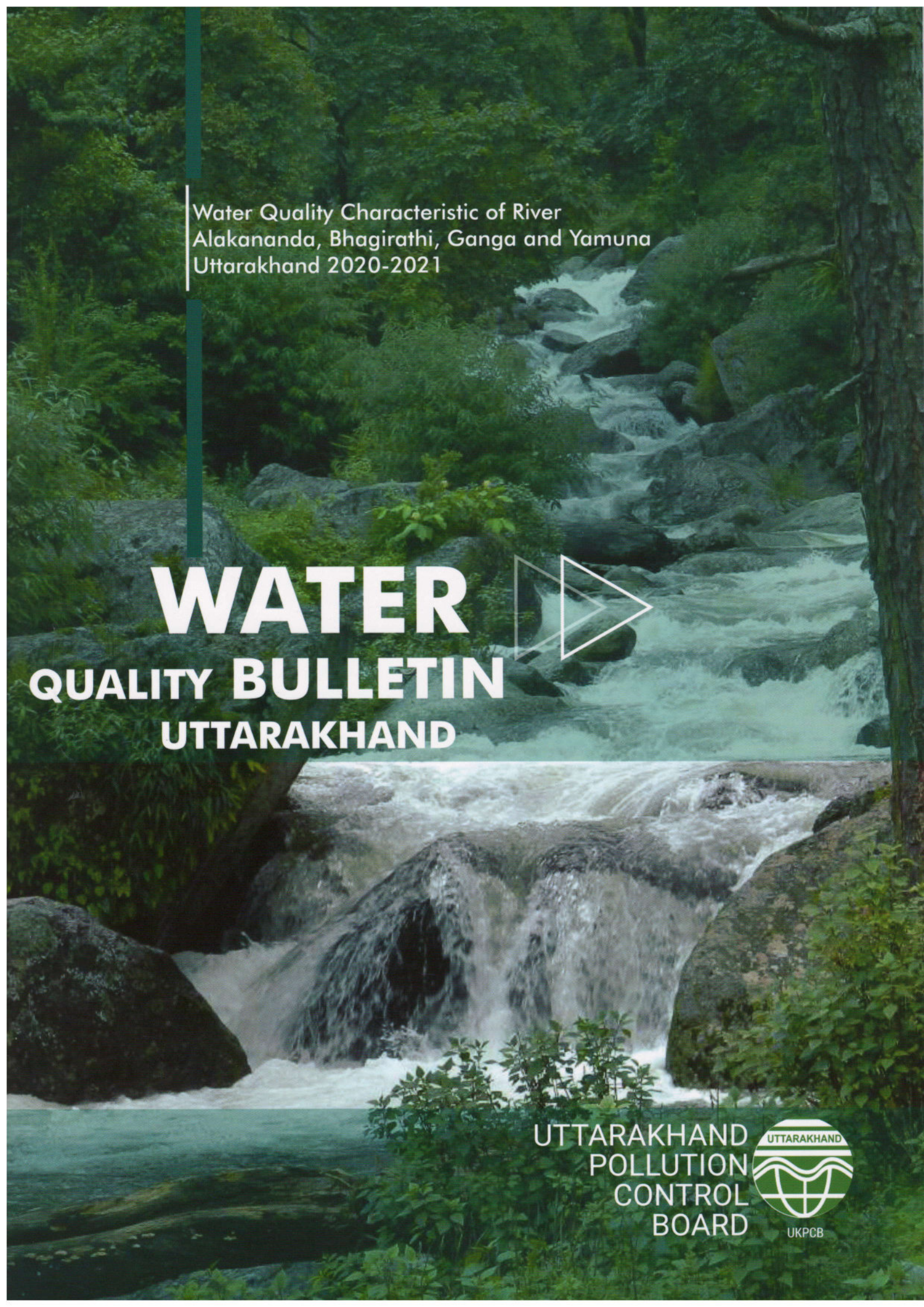
Water Quality Characteristic of River
Alakananda, Bhagirathi, Ganga and Yamuna
Uttarakhand 2020-2021

WATER QUALITY BULLETIN UTTARAKHAND



UTTARAKHAND POLLUTION CONTROL BOARD

UKPCB

WATER QUALITY BULLETIN
UTTARAKHAND 2020-2021

Table of Contents

1. Introduction

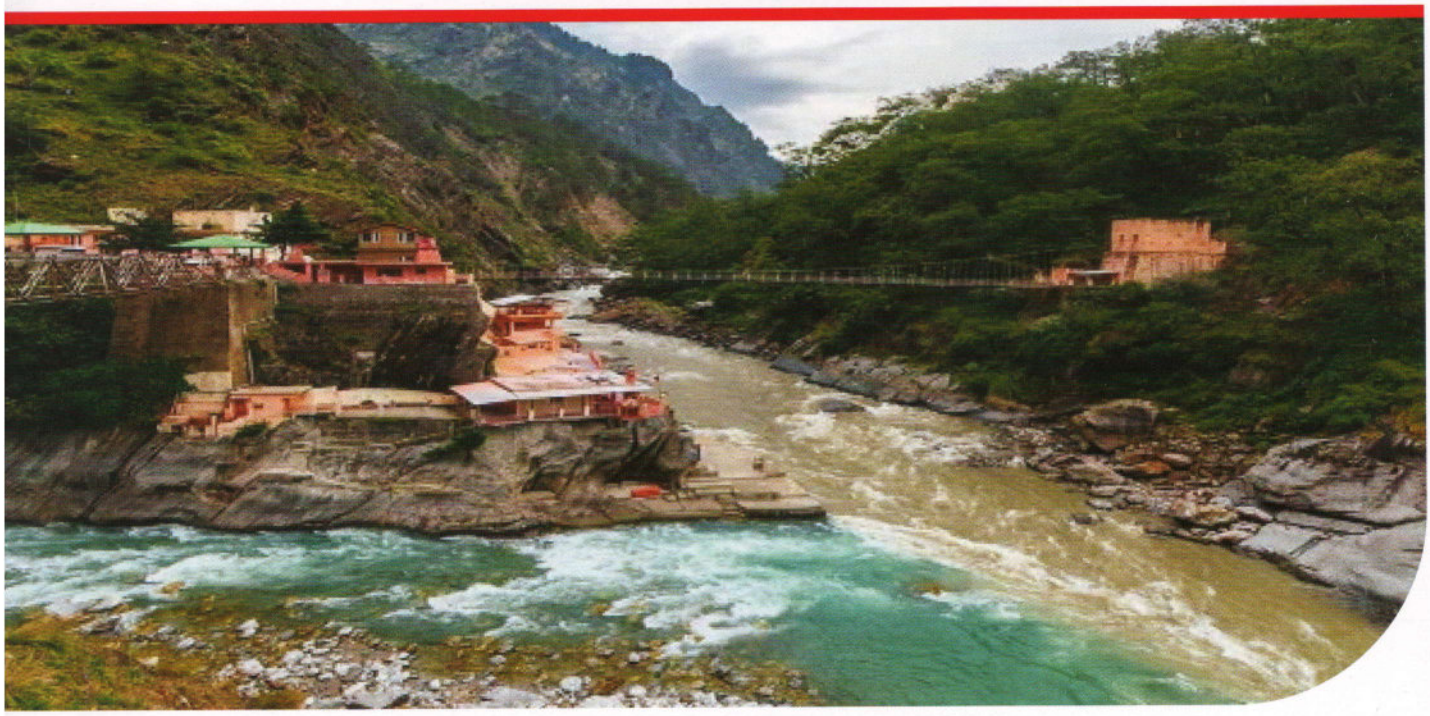
Uttarakhand Pollution Control Board (UKPCB)is Monitoring the watre quality of River Alaknanda.River Bhagrirathi, Ganga and Yamuna on monthiy basis in 12 monitoring location with 37 sampling points. The monitoring of water quality of River Alaknanda, Bhagirathi' Ganga and Yamuna and characterization of water quality is carried out under project "Strengthening of Laboratories" funded by National Mission for clean Ganga (NMCG). The Location wise sampling point are as follows:

S.N.	Monitoring Locations	District	Sampling Points
1	Vishnuprayag	Chamoli	1. River Alaknanda before joining River Dhauliganga 2. River Dhauliganag before joining to Alaknanda 3. River Alaknanda after confluence to Dhauliganga
2	Nandprayag	Chamoli	1. River Alaknanda before joining River Nandakani 2. River Nandakani before joining to Alaknanda 3. River Alaknanda after confluence to Nandakani
3	Karanprayag	Chamoli	1. River Alaknanda before joining to River Pindar 2. River Pindar before joining to Alaknanda 3. River Alaknanda after confluence to Pindar
4	Rudarprayag	Rudarprayag	1. River Alaknanda before joining River Mandakani 2. River Mandakani before joining to Alaknanda 3. River Alaknanda after confluence to Mandakani 4. River Mandakani D/s Augustmuni
5	Uttarkashi	Uttarkashi	1. River Bhagirathi D/s Uttarkashi town 2. River Bhagirathi U/s Gangotri
6	Devprayag	Tehri	1. River Alaknanda before joining River Bhagirathi 2. River Bhagirathi before joining to Alaknanda 3. River Ganga at Devprayag
7	Rishikesh	Dehradun	1. River Ganga U/s of Laxmunjula 2. River Ganga D/s Swargasharam 3. River Ganga D/s at Baraj 4. River Ganga D/s Lakarghat 5. River Ganga D/s at Raiwala 6. River Ganga D/s near Birla Guest house
8	Haridwar	Haridwar	1. River Ganga U/s at Bindughat Dudhiyavan 2. River Ganga at Harikipadi 3. River Ganga D/s Balakumari Mandir 4. River Ganga D/s Bishanpur Kundi 5. River Ganga D/s at Sultanpur 6. River Ganga canal at Lalita raw bridge 7. River Ganga canal at Damkothi 8. River Ganga canal D/s at Harikipadi Rishikul Bridge 9. Upper Ganga Canal D/s at Roorkee
9.	Yamunotri	Uttarkashi	1. River Yamuna U/s at Yamunotri
10.	Sayanchatti	Uttarkashi	2. River Yamuna U/s at Sayanchatti
11.	Lakhwar Dam	Dehradun	3. River Yamuna U/s at Lakhwar Dam
12.	Dakpathar	Dehradun	4. River Yamuna U/s at Dakpathar

This bulletin is basically prepared for assessment of water quality at different location in reference to the used based classification of surface water. The location and sampling point wise analysis data of water quality is as follows.

2. Vishnuprayag District Chamoli

The Alaknanda River, which originates from Satopanth glacier is joined by the Dhauli Ganga River near Joshimath, after merger Dhaula Ganga identity is lost and both rivers flow together by the name 'Alaknanda'.

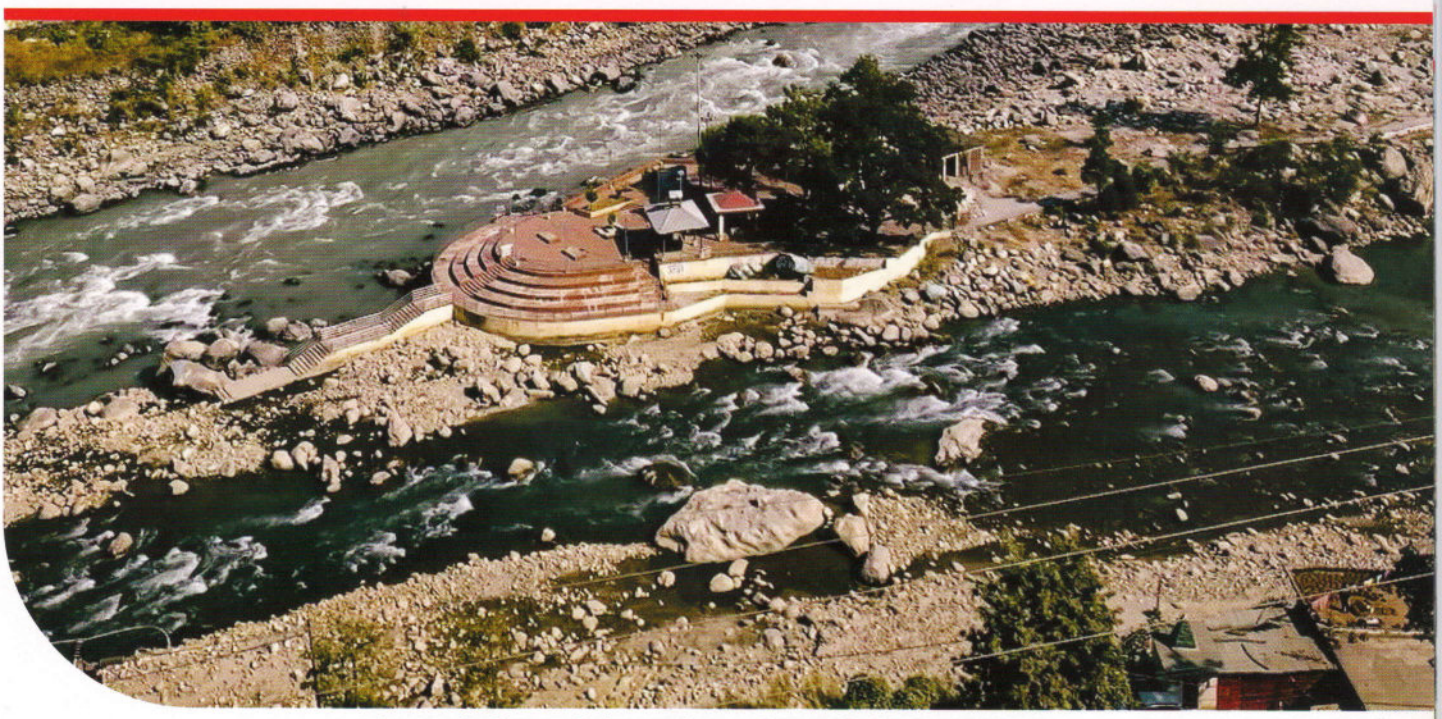


View of River Alaknanda and Dhauliganga Confluence

SN.	Location	Parameters	Min Value	Max Value	S.D	Mean Value
1	River Alaknanda before confluence to River Dhauli Ganga	pH	7.23	8.0	0.28	7.67
		Dissolved Oxygen	9.0	11	0.75	10.3
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0
2	River DhauliGanaga before confluence to Alaknanda	pH	7.62	8.08	0.31	7.62
		Dissolved Oxygen	2.0	10.4	4.16	5.31
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0
3	River Alaknanda after confluence to River Dhauli Ganga	pH	7.11	8.19	0.38	7.69
		Dissolved Oxygen	8.2	10.8	0.90	10.02
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0

3. Nandaprayag District Chamoli

In the descending sequence of the confluences, Nandakini River orginated from Nandaghuti joins the main Alaknanda River at Nandprayag, after which Nandakini loses its identity and becomes part of river Alaknanda.

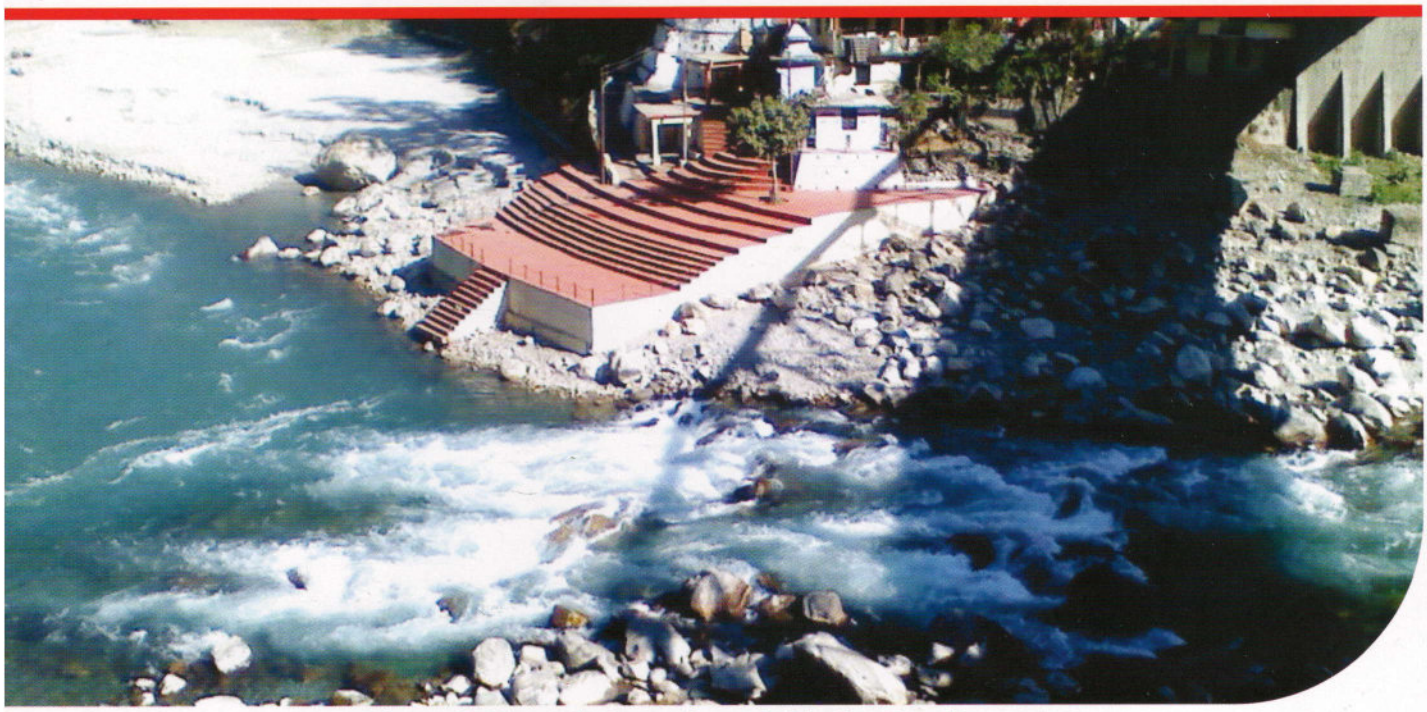


View of River Alaknanda and Nandakini Confluence

S.N.	Location	Parameters	Min Value	Max Value	S.D	Mean Value
1	River Alaknanda before confluence to River Nandakini	pH	7.72	8.29	0.19	7.93
		Dissolved Oxygen	8.8	10	0.40	9.51
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0
2	River Nandakini before confluence to River Alaknanda	pH	7.58	8.13	0.22	7.84
		Dissolved Oxygen	8.8	10.2	0.53	9.6
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	32	80	16.39	46.89
		Fecal Coliform	13	50	13.53	26
3	River Alaknanda after confluence to River Nandakini	pH	7.66	8.0	0.13	7.85
		Dissolved Oxygen	9.6	10.8	0.43	10.13
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0

4. Karanaprayag, District Chamoli

Alaknanda River confluence with Pindar River which originates from the Pindar glacier and further loses its name and becomes part of Alaknanda.

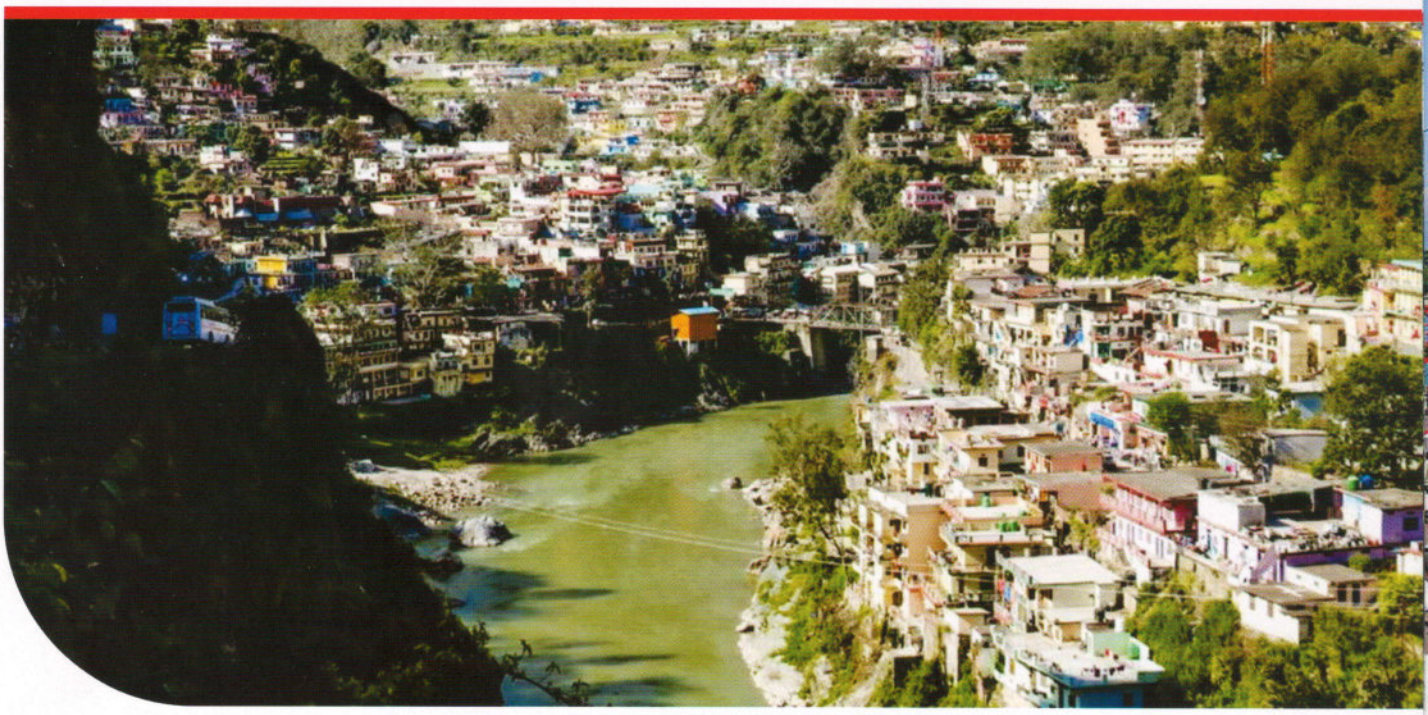


View of River Alaknanda and Pindar Confluence

S.N.	Location	Parameters	Min Value	Max Value	S.D	Mean Value
1	River Alaknanda before confluence to River Pindar	pH	7.19	8.24	0.41	7.75
		Dissolved Oxygen	9.4	10	0.25	9.71
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0
2	River Pindar before confluence to River Alaknanda	pH	7.65	8.26	0.20	7.97
		Dissolved Oxygen	8.6	9.8	0.50	9.37
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	28	70	13.20	44.2
		Fecal Coliform	11	15.2	11.36	46.7
3	River Alaknanda after confluence to River Pindar	pH	7.45	8.2	0.30	7.82
		Dissolved Oxygen	9.2	10.4	0.35	9.82
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	21	40	7.02	30.56
		Fecal Coliform	10	26	5.71	14.44

5. Rudraprayag, District Rudraprayag

Mandakini River originate from chorabari glacier and confluence with River Alaknanda and become part of River Alaknanda.

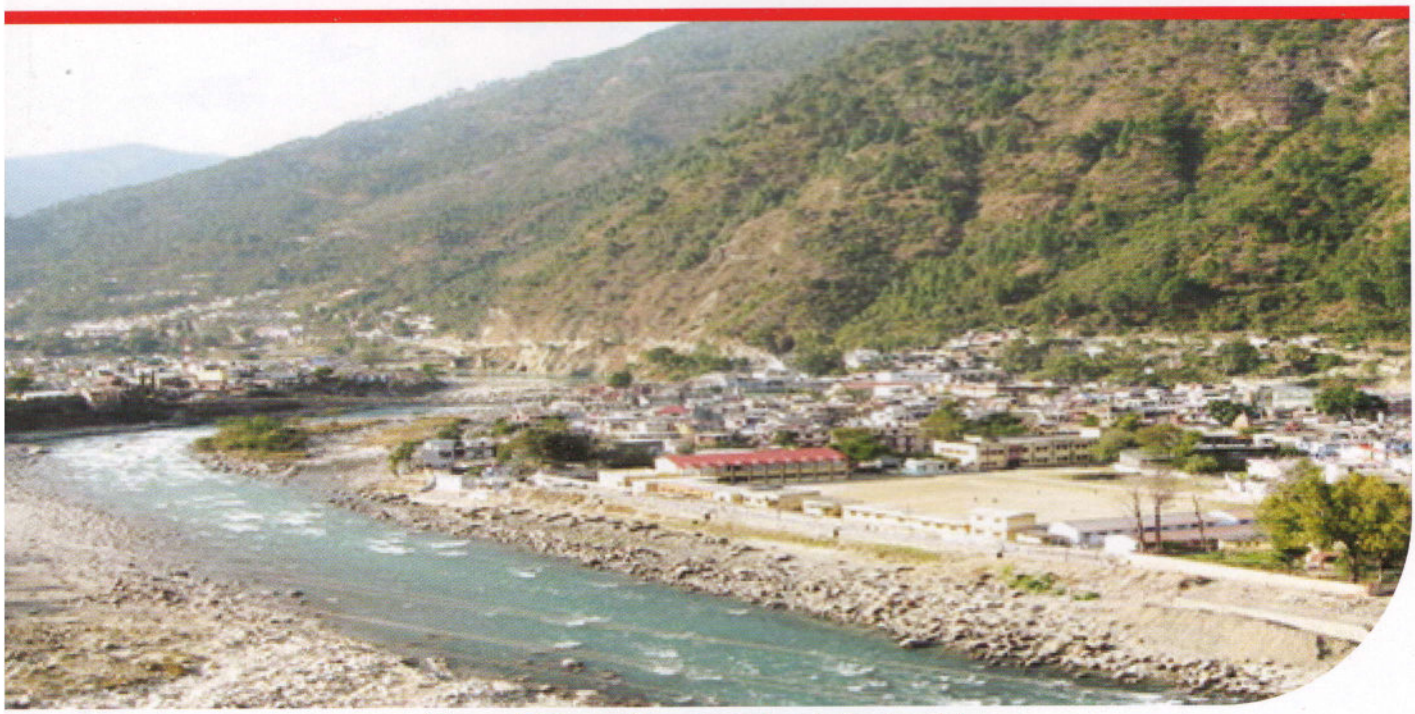


View of River Alaknanda and Mandakini Confluence

S.N.	Location	Parameters	Min Value	Max Value	S.D	Mean Value
1	River Manakini before confluence to River Alaknanda	pH	7.45	8.15	0.25	7.72
		Dissolved Oxygen	9.8	11.2	0.45	10.57
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0
2	River Alaknanda before confluence to River Mandakini	pH	7.02	8.16	0.40	7.58
		Dissolved Oxygen	9.2	10.8	0.60	9.93
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0
3	River Alaknanda after confluence to River Mandakini	pH	7.49	8.18	0.26	7.74
		Dissolved Oxygen	10	10.8	0.27	10.31
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0

6. Uttarakashi

River Bhagirathi originate from Gaumukh glacier and finds its path from district Uttarakashi, Tehari and finally merged with river Alaknanda at Devprayag.



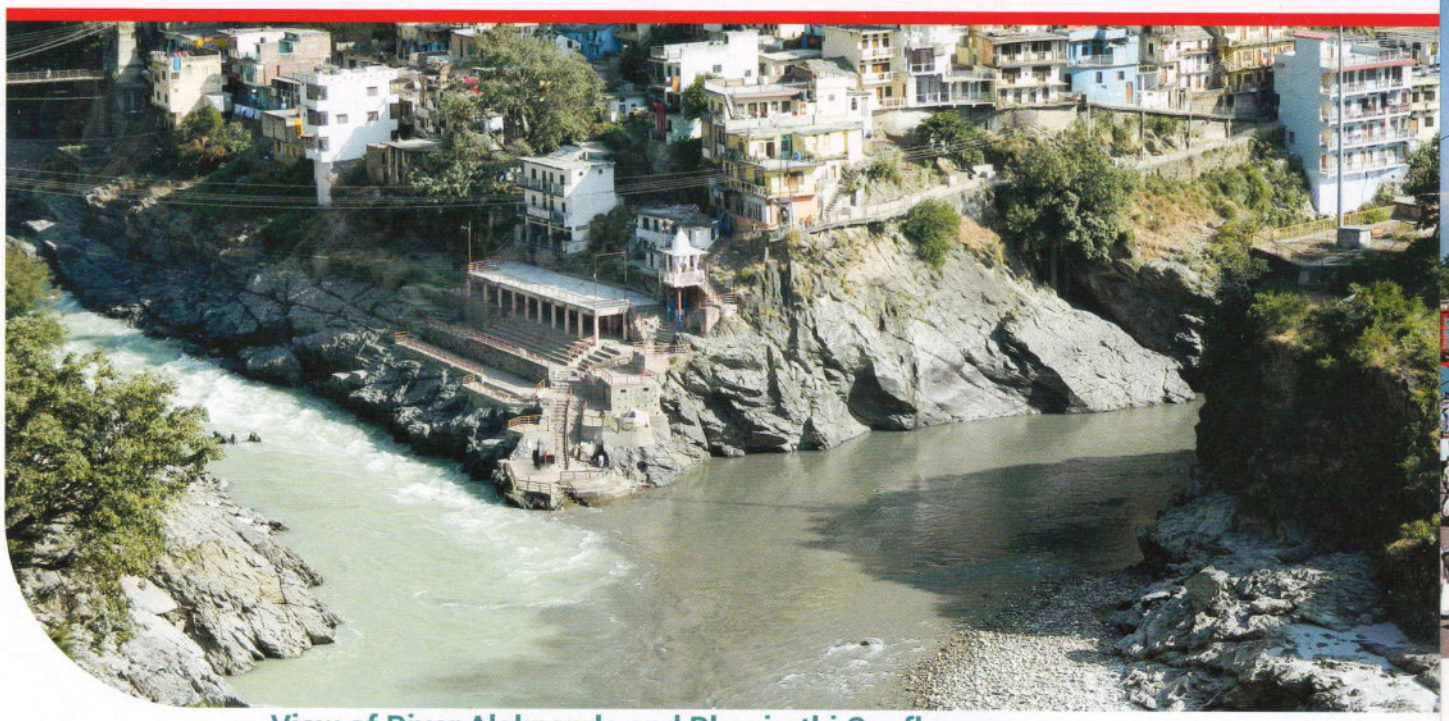
View of River Bhagirathi at Uttarkashi

S.N.	Location	Parameters	Min Value	Max Value	S.D	Mean Value
1.	River Bhagirathi D/s Uttarkashi	pH	7.0	7.81	0.28	7.44
		Dissolved Oxygen	7.8	10.6	0.89	9.32
		Biological Oxygen demand	1.0	1.0	0	1.0
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0

View of water Reservior, Tehari Dam

7. Devprayag, District Tehri Garhwal

DevPrayag is the confluence of the two holy rivers, the Bhagirathi originate from Gomukh and River Alaknanda. After confluence both the rivers lost their name and become named as Ganga.

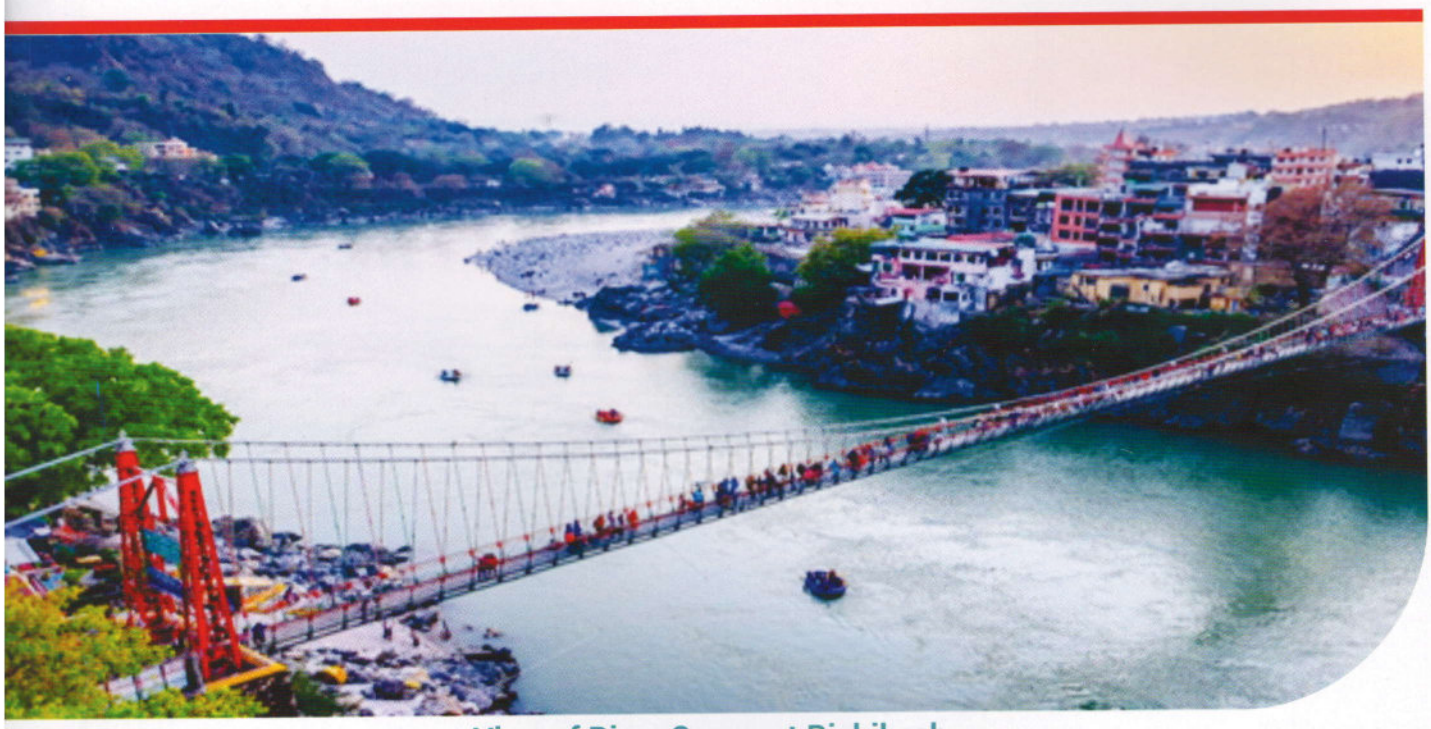


View of River Alaknanda and Bhagirathi Confluence

S.N.	Location	Parameters	Min Value	Max Value	S.D	Mean Value
1	River Bhagirathi before confluence to River Alaknanda	pH	7.23	8.1	0.30	7.58
		Dissolved Oxygen	8.8	12	0.88	14
		Biological Oxygen demand	0.4	1.0	0.17	0.91
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0
2	River Alaknanda before confluence to River Bhagirathi	pH	7.0	8.14	0.37	7.63
		Dissolved Oxygen	9.0	11.4	0.82	10.17
		Biological Oxygen demand	0.6	1.0	0.11	0.94
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0
3	River Ganga after confluence to River Bhagirathi and River Alaknanda	pH	7.3	8.28	0.26	7.71
		Dissolved Oxygen	9.0	11.8	0.65	10.30
		Biological Oxygen demand	0.8	1.0	0.5	0.97
		Total Coliform	2.0	2.0	0	2.0
		Fecal Coliform	2.0	2.0	0	2.0

8. Rishikesh, District Dehradun

Rishikesh is known as the "Gateway to the Garhwal Himalayas" and "Yoga Capital of the World".



View of River Ganga at Rishikesh

S.N	Location	Parameters	Min Value	Max Value	S.D	Mean Value
1	River Ganga up stream at Lakshmanjhula	pH	7.1	8.0	0.28	7.58
		Dissolved Oxygen	9.8	11.6	0.54	10.57
		Biological Oxygen demand	0.4	1.0	0.21	0.88
		Total Coliform	22	40	6.23	38.78
		Fecal Coliform	10	26	4.30	15.21
2	River Ganga D/S Rishikesh	pH	7.1	8.06	0.26	7.64
		Dissolved Oxygen	8.4	10	0.58	9.35
		Biological Oxygen demand	0.8	1.2	0.14	1.02
		Total Coliform	30	50	6.09	41.28
		Fecal Coliform	14	34	6.26	24

View of River Ganga at Rishikesh

9. Haridwar District Haridwar

The city is situated on the right bank of the Ganga river, at the foothills of the Shivalik ranges.

View of River Ganga at Haridwar

S.N.	Location	Parameters	Min Value	Max Value	S.D	Mean Value
1	River Ganga at Dudhiaban	pH	7.47	8.3	0.24	7.85
		Dissolved Oxygen	8.2	10.8	0.84	9.44
		Biological Oxygen demand	1.0	1.2	0	1.06
		Total Coliform	60	120	18.81	89.07
		Fecal Coliform	30	70	14.44	50.38
2	Upper Ganga Canal down stream Har Ki Pauri	pH	7.3	8.33	0.30	7.8
		Dissolved Oxygen	8.0	10.8	0.79	9.54
		Biological Oxygen demand	0.6	1.2	0.21	0.97
		Total Coliform	40	90	16.36	69.07
		Fecal Coliform	26	60	10.49	40.14
3	River Ganga downstream Bishanpur Kundi, Haridwar	pH	7.18	8.42	0.34	7.82
		Dissolved Oxygen	8.6	11.6	0.82	9.64
		Biological Oxygen demand	1.0	1.6	0.19	1.21
		Total Coliform	70	130	20.95	97.43
		Fecal Coliform	30	84	15.20	55.57

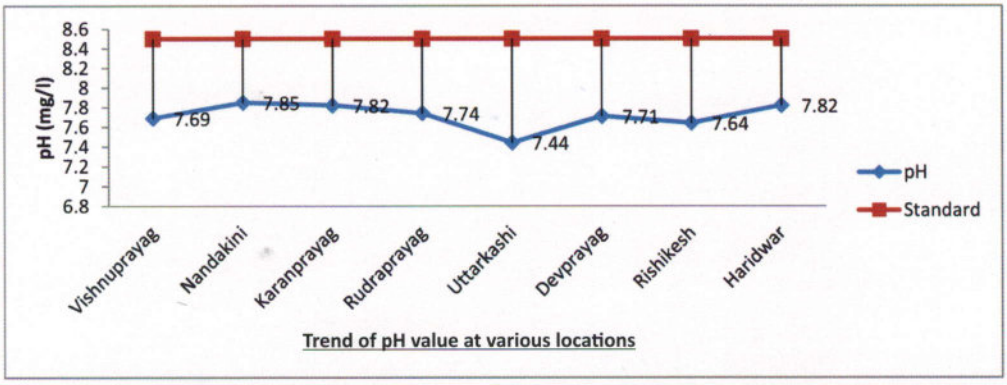
10. River Yamuna

The Yamuna River is largest tributaries of River Ganga and originated from Yamunotri Glacier near banderpooch peaks in Uttarkashi district. The combined stream Yamuna flows through shivalik range of hills of hills of Uttarakhand and enters plain of Dakpather

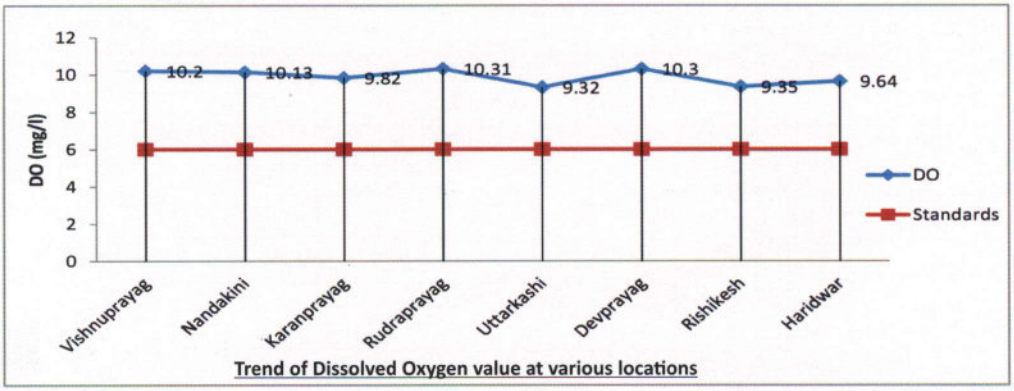
View of River Yamuna

S.N.	Location	Parameters	Min Value	Max Value	S.D	Mean Value
1	River Yamuna U/s at Yamunotri, District Uttarkashi	pH	7.44	7.44	7.44	7.44
		Dissolved Oxygen	10.8	10.8	10.8	10.8
		Biological Oxygen Demand	1.0	1.0	1.0	1.0
		Total Coliform	2.0	2.0	2.0	2.0
		Fecal Coliform	2.0	2.0	2.0	2.0
2	River Yamuna D/s at Sayanchatti, District Uttarkashi	pH	7.88	7.88	7.88	7.88
		Dissolved Oxygen	10.6	10.6	10.6	10.6
		Biological Oxygen Demand	1.0	1.0	1.0	1.0
		Total Coliform	2.0	2.0	2.0	2.0
		Fecal Coliform	2.0	2.0	2.0	2.0
3	River Yamuna U/s at Lakhwar Dam , District Dehradun	pH	7.57	7.46	0.44	8.01
		Dissolved Oxygen	8.6	10	0.61	9.15
		Biological Oxygen Demand	0.8	1.0	0.1	0.95
		Total Coliform	2.0	2.0	14	9.0
		Fecal Coliform	2.0	2.0	3.5	3.75
4	River Yamuna U/s at Dakpathar Dam , District Dehradun	pH	7.74	8.25	0.22	8.04
		Dissolved Oxygen	8.2	9.0	0.34	8.55
		Biological Oxygen Demand	1.0	1.2	0.1	1.15
		Total Coliform	2.0	2.0	14.70	59.15
		Fecal Coliform	2.0	2.0	6.55	31.75

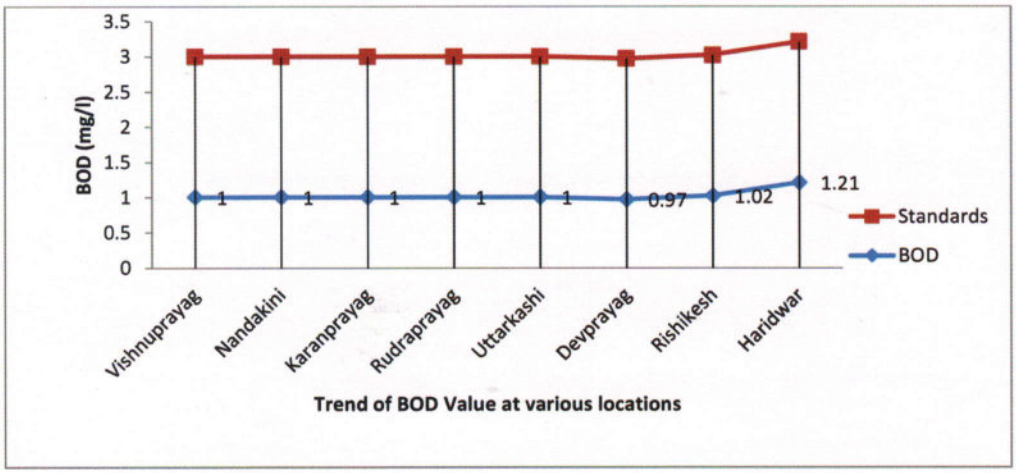
The graphical representation of trends of various parameters is shown as follows :-



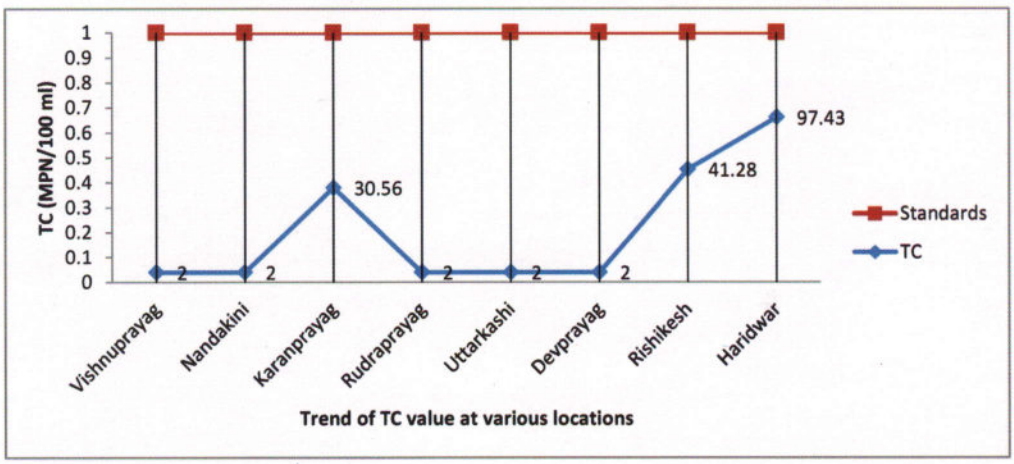
Trend of pH value at various locations



Trend of Dissolved Oxygen value at various locations

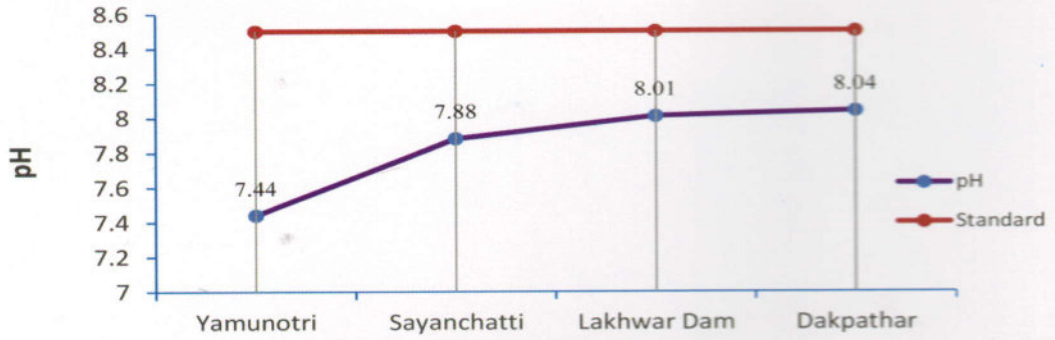


Trend of BOD Value at various locations

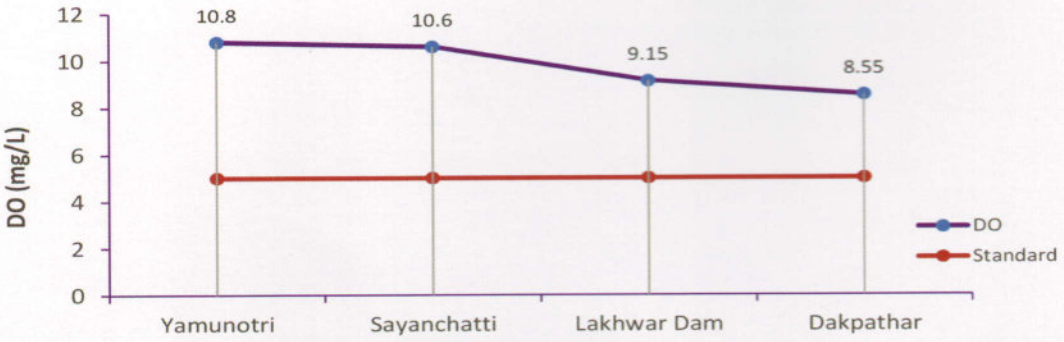


Trend of TC value at various locations

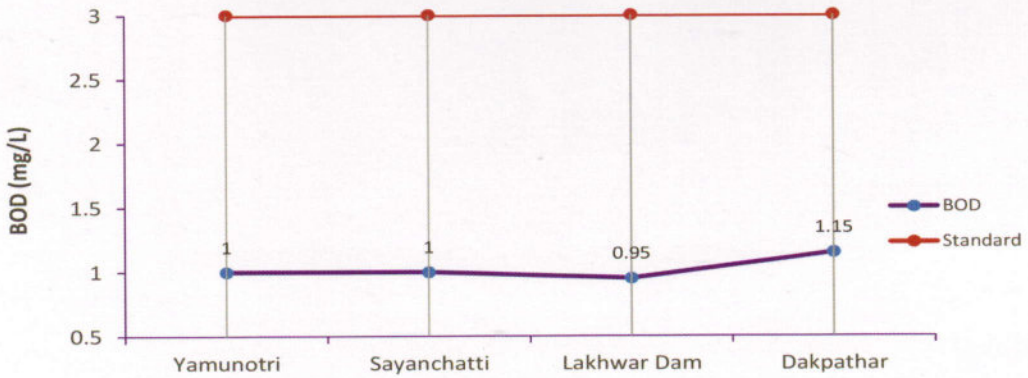
The graphical representation of trends of various parameters is shown as follows :-



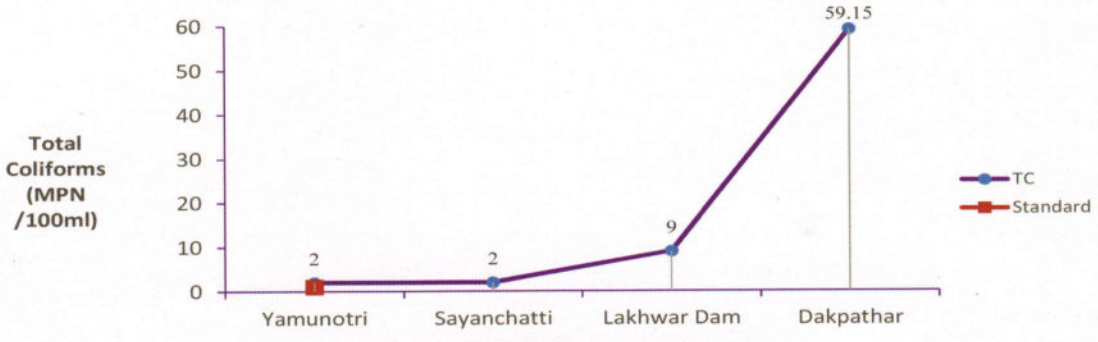
Trend of pH value at various locations



Trend of DO value at various locations



Trend of BOD value at various locations



Trend of TC value at various locations

The water quality of the river Alaknanda, Bhagirathi, Ganga and Yamuna at various monitoring locations is compared with the designated best use criteria. The designated best use quality/class of the water is as follows:-

S.N.	Monitoring Locations	Primary quality criteria				Quality/ Class	Designated best use
		pH	DO	BOD	TC		
1	River Alaknanda after confluence to River Dhauli Ganga at Vishnuprayag	7.11	8.2	1.0	2.0	A	Drinking water source without conventional treatment, but with chlorination.
2	River Alaknanda after confluence to River Nandakini at Nandaprayag	7.11	8.2	1.0	2.0	A	Drinking water source without conventional treatment, but with chlorination.
3	River Alaknanda after confluence to River Pindar at Karanaprayag	7.45	9.2	1.0	21	A	Drinking water source without conventional treatment, but with chlorination.
4	River Alaknanda after confluence to River Mandakini at Rudraprayag	7.49	10	1.0	2.0	A	Drinking water source without conventional treatment, but with chlorination.
5	Bhagirathi D/s Uttarkashi	7.0	7.8	1.0	2.0	A	Drinking water source but with chlorination. without conventional treatment,
6	River Ganga after confluence to River Bhagirathi and River Alaknanda at Devprayag	7.3	9.0	0.8	2.0	A	Drinking water source without conventional treatment, but with chlorination.
7	River Ganga D/S Rishikesh	7.1	8.4	0.8	30	A	Drinking water source without conventional treatment, but with chlorination.
8	River Ganga D/s Bisharpur Kundi at Haridwar	7.18	8.6	1.0	70	B	Outdoor bathing (organized).
9	River Yamuna U/s at Yamunotri, District Uttarkashi	7.44	10.8	1.0	2.0	A	Drinking water source without conventional treatment, but with Chlorination.
10.	River Yamuna D/s at Sayanchatti District Uttarkashi	7.88	10.6	1.0	2.0	A	Drinking water source without conventional treatment, but with chlorination
11.	River Yamuna U/s at Lakhwar Dam District Dehradun	8.01	9.15	0.95	9.0	A	Drinking water source without conventional treatment but with chlorination
12.	River Yamuna U/s at Dakpathar, District Dehradun	8.04	8.55	1.15	59.15	B	Outdoor bathing (organized)
	DBU criteria values :- "A"	**6.5-8.5**	**>6**	**<2**	**50**		
	DBU criteria values :- "B"	**6.5-8.5**	**>5**	**<3**	**500**		

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