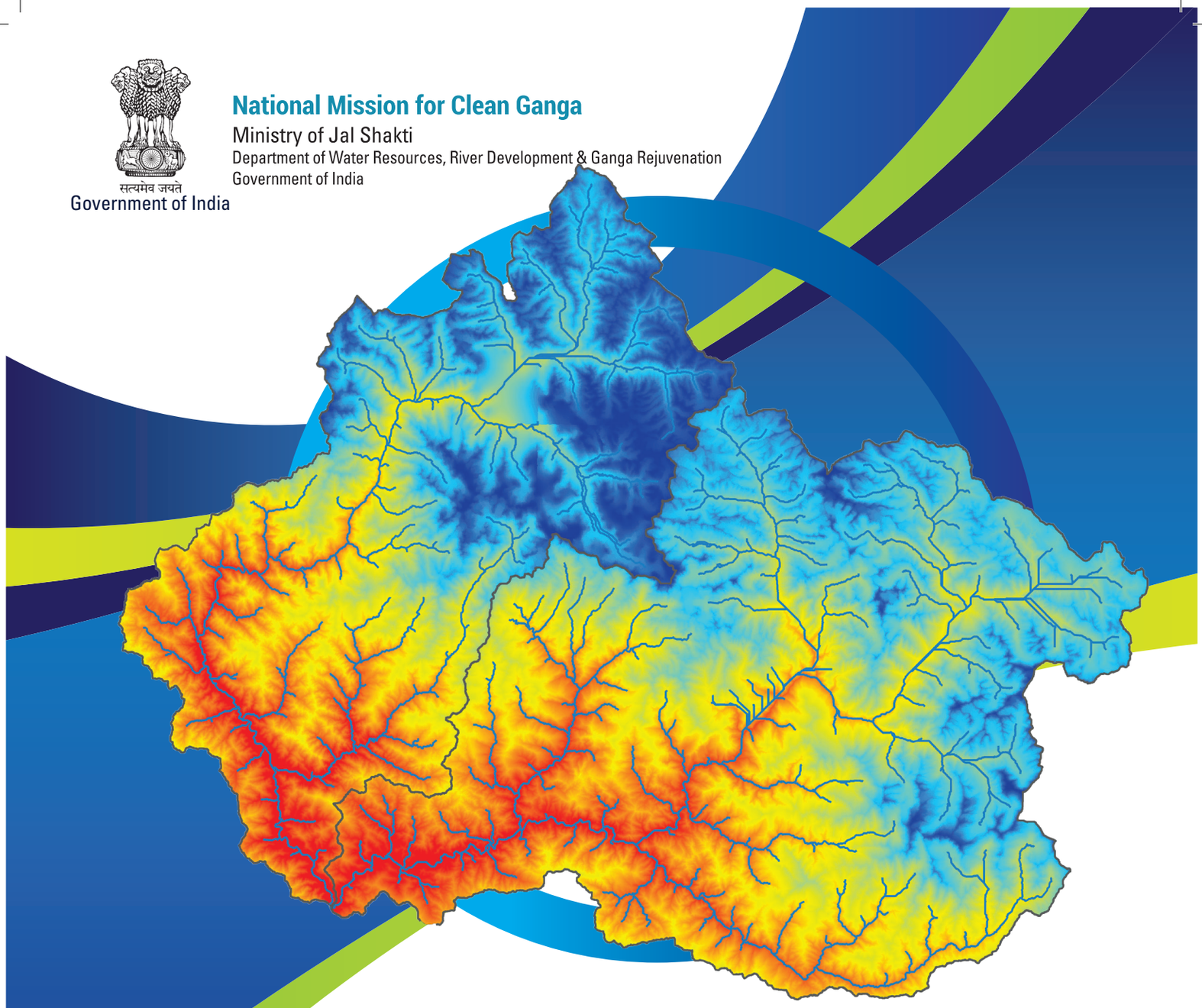
सत्यमेव जयते
Government of India

National Mission for Clean Ganga
Ministry of Jal Shakti
Department of Water Resources, River Development & Ganga Rejuvenation
Government of India



ALAKNANDA AND BHAGIRATHI
RIVER BASINS ATLAS

December 2021

cGanga
Centre for Ganga River Basin Management and Studies

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National Mission for Clean Ganga (NMCG)

NMCG is the implementation wing of National Ganga Council which was setup in October 2016 under the River Ganga Authority order 2016. Initially NMCG was registered as a society on 12th August 2011 under the Societies Registration Act 1860. It acted as implementation arm of National Ganga River Basin Authority (NGRBA) which was constituted under the provisions of the Environment (Protection) Act (EPA) 1986. NGRBA has since been dissolved with effect from the 7th October 2016, consequent to constitution of National Council for Rejuvenation, Protection and Management of River Ganga (referred to as National Ganga Council).

www.nmcg.in

Centre for Ganga River Basin Management and Studies (cGanga)

cGanga is a think tank formed under the aegis of NMCG, and one of its stated objectives is to make India a world leader in river and water science. The Centre is headquartered at IIT Kanpur and has representation from most leading science and technological institutes of the country. cGanga's mandate is to serve as think-tank in implementation and dynamic evolution of Ganga River Basin Management Plan (GRBMP) prepared by the Consortium of 7 IITs. In addition to this, it is also responsible for introducing new technologies, innovations, and solutions into India.

www.cganga.org

Acknowledgment

This river atlas document is a collective effort of a number of experts, institutions and organisations, some who had been associated with preparing the Ganga River Basin Management Plan (GRBMP) submitted to the Government of India in 2015, and others who joined later with their own independent expertise and enthusiasm. Contributions to the photographs and images for this document by individuals are gratefully acknowledged.

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PREFACE

The Centre for Ganga River Basin Management and Studies ("cGanga") was established in the year 2016 as a comprehensive think-tank for river restoration and to assist the National Mission for Clean Ganga (NMCG), Jal Shakti Ministry, GoI, for "continual scientific support in the implementation and dynamic evolution of the Ganga River Basin Management Plan" for conservation of National River Ganga. In keeping with this goal, cGanga has been actively developing detailed knowledge capsules, tools and procedures to enable comprehensive and early rejuvenation of the Ganga River network across the whole basin. While a river basin approach is essential for analyzing and comprehending the Ganga river's status and needs to regain her wholesomeness, the implementation strategies of the required interventions must keep in mind the role and individuality of each State. Thus, it is necessary to focus on state-level sub-strategies of natural resource management for holistic revival of River Ganga.

The present document attempts to provide a comprehensive picture of the Alaknanda and Bhagirathi river basins in the State of Uttarakhand. This Atlas for the selected basins were created entirely by cGanga, with original mapping of all identifiable rivers, and with selective additional information culled from different sources for completeness. Many of the rivers and maps given here are not readily available elsewhere, and we expect them to prove useful to the many Central, State and other organisations engaged in river, water or natural resource management in the Alaknanda and Bhagirathi basins.

In preparing this document dedicated members of cGanga spent a lot of time in diligently studying, analysing, acquiring and compiling diverse information from diverse sources. Many people and organisations outside cGanga also helped in its preparation, which aided in its comprehensiveness. We are grateful to one and all of them.

VINOD TARE
Professor & Founding Head, cGanga
IIT Kanpur

CONTENTS

ACRONYMS AND ABBREVIATIONS

BCM	:	Billion Cubic Meter
cGanga	:	Centre for Ganga River Basin Management and Studies
Cumec	:	Cubic meter per second
CWC	:	Central Water Commission
DEM	:	Digital Elevation Model
GIS	:	Geographic Information System
GRBMP	:	Ganga River Basin Management Plan
HE	:	Hydroelectric
JPVL	:	Jaiprakash Power Ventures Ltd
Km	:	Kilometer
L&T	:	Larsen and Toubro
LULC	:	Land Use/ Land Cover
M	:	Meter
MCM	:	Million Cubic Meter
mm	:	millimeter
MW	:	Mega Watt
NHPC	:	National Hydroelectric Power Corporation
SoI	:	Survey of India
Sq. Km.	:	Square Kilometer
SWAT	:	Soil & Water Assessment Tool
THDC	:	Tehri Hydro Development Corporation
UJVNL	:	Uttarakhand Jal Vidyut Nigam Ltd
UK	:	Uttarakhand

INTRODUCTION

Alaknanda and Bhagirathi Rivers are the head streams of River Ganges flowing through the mountainous terrain in temperate to freezing climate and known for verdant greenery, rich wildlife, speeding rivers, and opulent lakes and springs. The present volume is a first attempt to map the rich river network of Alaknanda and Bhagirathi basins in as fine a detail as possible. Much of the information contained in this River Atlas is not available in any other document and was created in original from available earth images with appropriate data and image processing tools and software on GIS platform. Naturally, there may be shortcomings in some of the maps herein, including missing small streams, which can be expected to be duly refined and included in later versions. Also, a river atlas is often useful in conjunction with other natural resource and anthropogenic information such as the distribution of rainfall and other climatic data, other waterbodies, forest cover, elevations, soil types, other physiographic information, land use, tourist and pilgrimage centres, and infrastructure including roads and highways. Such other relevant informations are also expected to be processed, assembled and included later in a fuller version of this Atlas. In the meanwhile, it is hoped that this Atlas will provide a useful window to Alaknanda and Bhagirathi river resources.

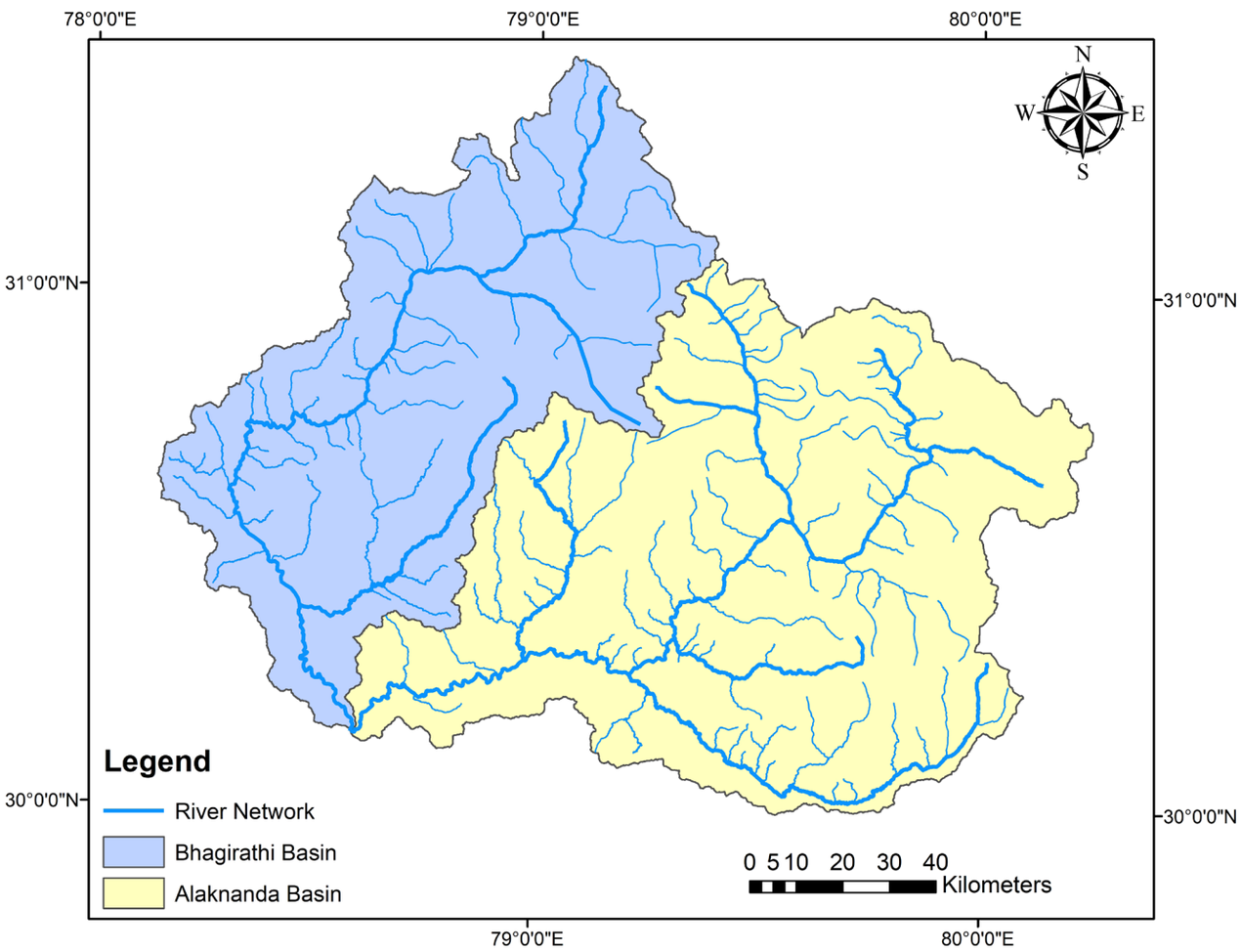


Figure: Alaknanda and Bhagirathi River Networks

ALAKNANDA AND BHAGIRATHI BASINS: SALIENT FEATURES

S No	Particulars	Details
1	Basin Extent	Latitude: 28° 40' & 31° 28' N and Longitude: 78° 35' & 80° 15' E
2	Total Catchment Area (sq. km.)	Alaknanda Basin: 11,058.74, Bhagirathi Basin: 7,566.05
3	Area contributing to Ganga Basin (sq. km.)	18,624.79
4	Percentage of the Ganga Basin Area (%)	2.2
5	Districts (Census 2011)	07 districts of Uttarakhand and 01 district of Himanchal Pradesh
6	Towns (Census 2011)	Class I: 0; Class II: 0; Class III: 04
7	Total Population (Census 2011)	3,096,718
8	Average Annual Rainfall (mm)	1200
9	Average Temperature Range (°C)	-3.4 – 40.8
10	Major Rivers	Alaknanda, Bhagirathi, Bhilangana, Pinder, Nandakini, Mandakini, Saraswati, Jadganga, Rishiganga, Dhauliganga
11	Number of Major Basins	07
12	Number of Water Resources Structures	(Dams: 07, Barrages: 04, Weir: 03, Anicuts, Lifts, Power houses)
13	Highest Dam	Tehri Dam - 260.5 m
14	Longest Dam	Tehri Dam - 592.7 m
15	Highest Barrage	Joshiyara Barrage - 39 m
16	Longest Barrage	Tapovan Vishnugad Barrage - 200 m
17	Total Storage Capacity of Projects (MCM/ BCM) (Completed and under construction projects)	--
18	Number of HE projects (> 25 MW)	07
19	Number of Ground Water Observation wells	No observation wells
20	Number of CWC Sites	35
21	Water tourism and Water Sport sites	Uttarkashi, Tehri Lake, Gangotri, Dodi Tal, Rudraprayag, Karnprayag, Joshimath etc.

ALAKNANDA AND BHAGIRATHI BASIN: RIVERS TRAVERSING THROUGH VARIOUS DISTRICTS IN BASIN AREA

S No	State	District	Area (Sq. Km)	Population (Census 2011)	Growth Rate (%)	Density	Rivers
1	Uttarakhand	Pauri Garhwal	5329	687,271	-1.41	129	Alakhnanda, Pindar, Alagad, Kaakda Gad, Dichli Gad
2		Tehri Garhwal	3642	618,931	2.35	170	Alakhnanda, Badiyar Gad Bhagirathi, Syansu Gad, Nagun Gad, Jalkur, Bhilangana, Jola, NailChami, Dwari Gad, Bal Ganga, Dharamganga
3		Pithoragarh	7090	483,439	4.58	68	Alakhnanda, Dhauliganga, Girthiganga
4		Chamoli	8030	391,605	5.74	49	Alakhnanda, Saraswati, Khir Ganga, Laxman Ganga, Dhauli Ganga, Kosa Gad, Duna Gad, Juma Gad, Girthi Ganga, Phagti Gadhera, Duii Gadhera, Rishi Ganga, Trisuni, Raunthi Gadhera, Dudh Ganga, Pindar, Baura Gad, Mauni Gad, Kail Ganga, Kail Ganga, Pranmati Gad, Pranmati Gad, Chor Gad, Simlin Gad, Ala Gad, Ala Ga, Kakra Gad, Kalpa Ganga, Sem Kora, Mona, Birahi, Pati Gadhera, Balkhila, Bani Gad Hera, Nagal Gad, Khuna Gad, Sari Gad, Nandakini, Ghat Gahdera, Chufula Gad, Mola Gad, Karani Gadhera, Gondoya Gad, Jetha Gad
5		Uttarkashi	8016	330,086	11.89	41	Bhagirathi, Chaturang Bamak, Meru Bamak, Kedarganga, Kakora Gad, Jalandhari Gad, Sian Gad, Lawalakhal Nala, Andhri Gad, Kamar Gad, Gawana Gad, Assiganga, Indrawati Gad, Boround Gad, Rano Gad, Dhanari Gad, Gamri Gad, Nagun Gad, Dikchli Gad, Jalkur, Jad Ganga, Jadhang Gad, Chor Gad, Nilapani Gad, Nila Pani, Khurmola Gad, Daski Gad, Anyari Khala, Badalda Gad, Bhilangana, Bal Ganga, Dharamganga
6		Bageshwar	2241	259,898	4.18	116	Alakhnanda, Pindar, Kaphni Gad, Sunder Dhunga Gad, Baura Gad
7		Rudraprayag	1984	242,285	6.53	122	Alakhnanda, Nandakini, Jetha Gad, Badiyar Gad, Mandakini, Vashuki Ganga, Kali Ganga, Madhyamaheshwar Ganga, Kaakda, Basti Daamar Gad, Lan Gad, Chak Gad, Laster Gad
8	Himanchal Pradesh	Kinnaur	6401	84,121	7.39	123	Chor Gad

CWC BASINS

Basin Code	Basin Name
1	Indus (Up to Indian Border)
2a	Ganga
2b	Brahmaputra
2c	Barak and others
3	Godavari
4	Krishna
5	Cauvery
6	Subernarekha
7	Brahmani and Baitarni
8	Mahanadi
9	Pennar
10	Mahi
11	Sabarmati
12	Narmada
13	Tapi
14	West flowing rivers from Tapi to Tadri
15	West flowing rivers from Tadri to Kanyakumari
16	East flowing rivers between Mahanadi and Pennar
17	East flowing rivers between Pennar and Kanyakumari
18	West flowing rivers of Kutch and Saurashtra including Luni
19	Area of inland drainage in Rajasthan
20	Minor rivers draining into Myanmar (Burma and Bangladesh)

Source: River Basin Atlas of India, Ministry of Water Resources, GoI (October 2012)

Source: River Basin Atlas of India, Ministry of Water Resources, GoI (October 2012)

Magical views of landscape of Bhagirathi River near Tehri Dam, Chamba, Uttarakhand, India. Tehri Dam is the highest dam in India. Green mountains

MAJOR DAMS ON ALAKNANDA, BHAGIRATHI AND THEIR TRIBUTARIES

S.No.	District	Name	Latitude	Longitude	River	Status	Type	Length (m)	Max ht abv foundation	Yr start	Yr comp	Total vol (cumec)	Design flood (cumec)	Purpose
1	Chamoli	Vishnupryag Dam	30.57	79.55	Alakhnanda	Completed	Gravity & Masonry	70	23		2006	72.6	2050	Irrigation/Hydroelectricity
2	Tehri Garhwal	Srinagar Dam	30.24	78.83	Alakhnanda			248	90		2015		19200	Hydroelectricity
3	Chamoli	Vishnugad Pipalkothi Dam	30.42	79.41	Alakhnanda		Gravity & Masonry	89	65				11050	Hydroelectricity
4	Uttarkashi	Maneribhali Dam-1	30.74	78.53	Bhagirathi	Completed	Gravity & Masonry	127	39		1984	13.7	5000	Hydroelectricity
5	Tehri Garhwal	Tehri Dam	30.38	78.48	Bhagirathi	Completed	Earthen / Gravity & Masonry	592.7	260.5		2005	27980	13000	Irrigation/Hydroelectricity
6	Uttarkashi	Maneribhali Dam-2	30.73	78.42	Bhagirathi	Completed					2008			Hydroelectricity
7	Tehri Garhwal	Koteshwar Dam	30.26	78.50	Bhagirathi	Completed	Gravity & Masonry	300.5	97.5		2011	560	13290	Irrigation/Hydroelectricity

Source: http://india-wris.nrsc.gov.in

MAJOR BARRAGES AND WEIRS ON ALAKNANDA, BHAGIRATHI AND THEIR TRIBUTARIES

S No	District	Name	Type	River	Nearest City	Status	Yr_Com-mensemt	Comple-tion Year	Length (m)	Height upto Crest (m)	Pond level (m)	Design flood discharge (cumec)	Purpose
1	Chamoli	Vishnupryag Barrage	Barrage	Alakhnanda		Completed		2006	63	17	2275	65	Hydroelectricity
2	Chamoli	Tapovan Vishnugad Barrage	Barrage	Dhauliganga	Joshimath	Under Construction			200	22	1803.5	4100	Hydroelectricity
3	Chamoli	Lata Tapovan Barrage	Barrage	Dhauliganga	Joshimath	Under Construction			85.5	24.5	2423	2950	Hydroelectricity
4	Uttarkashi	Joshiyara Barrage	Barrage	Bhagirathi	Bhatwari	Completed		2007	81	39	1108		

Source: http://india-wris.nrsc.gov.in

MAJOR HYDROELECTRIC PROJECTS ON RIVER ALAKNANDA, BHAGIRATHI AND THEIR TRIBUTARIES

S No.	Project Name	Year of Commissioning	State	District	River	Basin	Hydroelectric Region	Total Installed Capacity (MW)	Type of Project	Hydroelectric Project Status	Purpose	Owner	Owner Name
1	Vishnuprayag Hydroelectric Project	2006	Uttarakhand	Chamoli	Alaknanda	Ganga	North HE Region	400	Major (> 25 MW)	Completed	Hydroelectric	Private	JPVL
2	Srinagar HPS	2015	Uttarakhand	Pauri Garhwal	Alaknanda	Ganga	North HE Region	330	Major (> 25 MW)	Completed	Hydroelectric	State	UJVNL
3	Singoli Bhatwari Hydroelectric Project	2020	Uttarakhand	Rudaraprayag	Mandakini	Ganga	North HE Region	99	Major (> 25 MW)	Completed	Hydroelectric	Private	L & T
4	Maneri Bhali - I Hydroelectric Project	1984	Uttarakhand	Uttarkashi	Bhagirathi	Ganga	North HE Region	90	Major (> 25 MW)	Completed	Hydroelectric	State	UJVNL
5	Tehri Hydroelectric Project	2006	Uttarakhand	Tehri Garhwal	Bhagirathi	Ganga	Northern HE Region	2000	Major (> 25 MW)	Completed	Hydroelectric	Central	THDC
6	Maneri Bhali Stage - II Hydroelectric Project	2008	Uttarakhand	Uttarkashi	Bhagirathi	Ganga	North HE Region	304	Major (> 25 MW)	Completed	Hydroelectric	State	UJVNL
7	Koteshwar Hydroelectric Project	2011	Uttarakhand	Tehri Garhwal	Bhagirathi	Ganga	North HE Region	400	Major (> 25 MW)	Completed	Hydroelectric	Central	THDC India Ltd

Source: http://india-wris.nrsc.gov.in

ALAKNANDA AND BHAGIRATHI BASINS: SUMMARY OF HYDROELECTRIC PROJECTS

Overview of Hydroelectric Projects in Alaknanda and Bhagirathi Basin

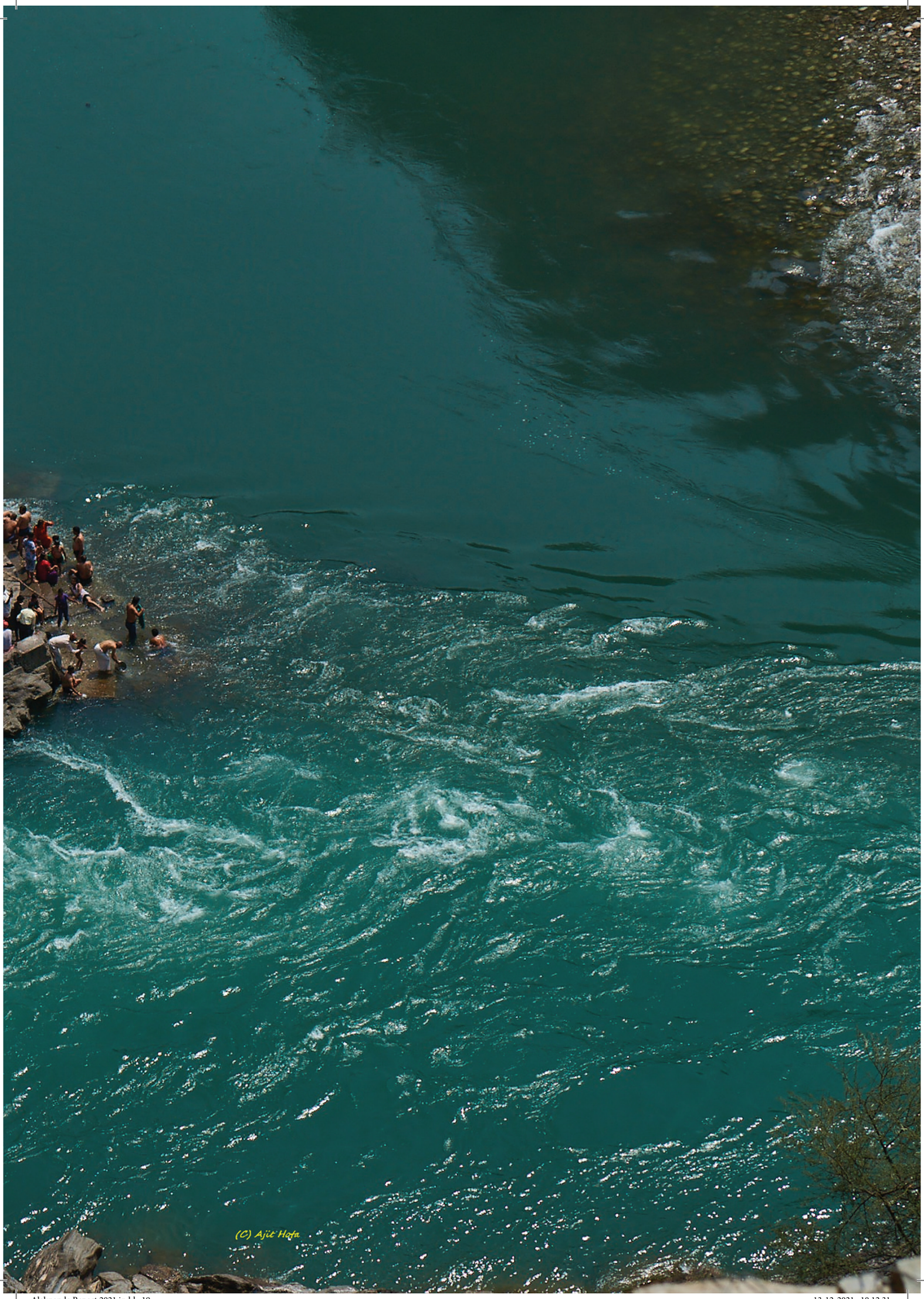
S No	Basin	Existing Hydro Projects		Under Construction Hydro Projects		Proposed Hydro Projects		Total Hydro Projects	
		No of Projects	Capacity, MW	No of Projects	Capacity, MW	No of Projects	Capacity, MW	No of Projects	Capacity, MW
1	Alaknanda	33	786.97	16	1291.1	74	5199.25	122	6947.32
2	Bhagirathi	13	1851.10	13	1084.75	22	801.9	48	3737.75
	TOTAL	**46**	**2638.07**	**29**	**2375.85**	**96**	**6001.15**	**170**	**10685.07**

Summary of Existing Hydroelectric Projects in Alaknanda and Bhagirathi Basin

S No	Basin	Large Hydro Projects (above 25 MW)		Small Hydro Projects (above 1 - 25 MW)		Mini - Micro Hydro Projects (below 1 MW)		Total Hydro Projects	
		No of Projects	Capacity, MW	No of Projects	Capacity, MW	No of Projects	Capacity, MW	No of Projects	Capacity, MW
1	Alaknanda	2	730	10	54.75	21	2.22	33	786.97
2	Bhagirathi	4	1794	5	56.7	4	0.4	13	1851.1
	TOTAL	**06**	**2524**	**15**	**111.45**	**25**	**2.62**	**46**	**2638.07**

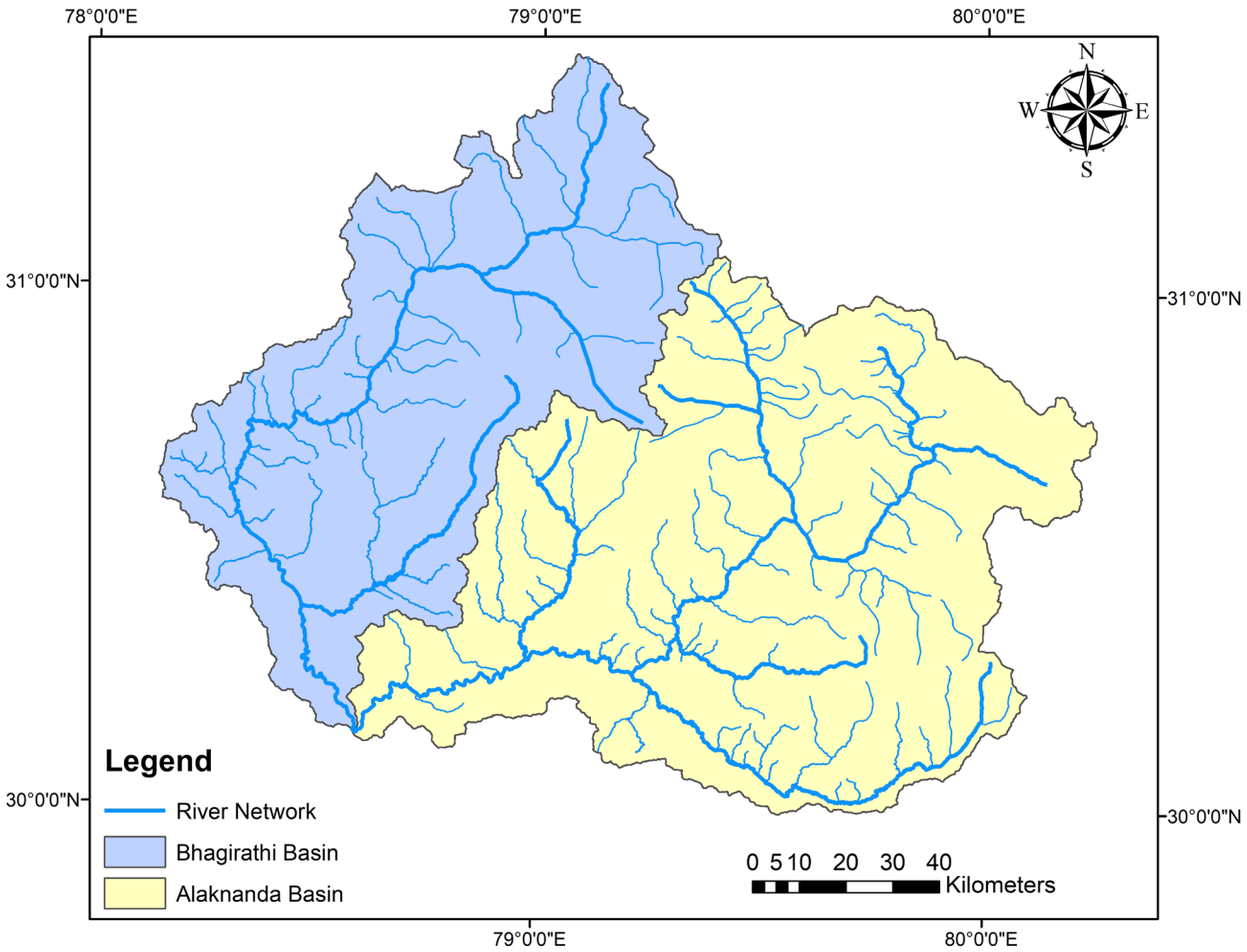
Overview of Proposed Hydropower Projects in Alaknanda and Bhagirathi Basin

S No	Basin	Large Hydro Projects (above 25 MW)		Small Hydro Projects (above 1 - 25 MW)		Mini - Micro Hydro Projects (below 1 MW)		Total Hydro Projects	
		No of Projects	Capacity, MW	No of Projects	Capacity, MW	No of Projects	Capacity, MW	No of Projects	Capacity, MW
1	Alaknanda	29	4823	43	375.6	2	0.65	74	5199.25
2	Bhagirathi	5	675	13	125.5	4	1.4	22	801.9
	TOTAL	**34**	**5498**	**56**	**501.1**	**6**	**2.05**	**96**	**6001.15**


(C) Ajit Hafa

ALAKNANDA AND BHAGIRATHI BASINS AND THEIR RIVER NETWORKS

Total Basin Area: 18,624.79 sq. km. Number of Rivers- 141 Total Length of Rivers- 2,949.46 km.



Methodology: The method adopted, in brief, to obtain the river network are stepwise as follows:

Step 1 : Tracing of river streams using Google Earth (.kmz file)

Step 2 : Vetting of the stream maps with 30 m resolution DEM generated streams using SWAT. DEM is downloaded from USGS.

Step 3 : Streams' verification from Survey of India (SoI) toposheets.

Step 4 : Post-processing and cleaning of data for preparation of stream network maps.

Step 5 : Preparation of stream network map on GIS platform using ArcMAP 10.5.

Disclaimer: The accuracies of the maps generated by the above method are subject to the limitations of the data processing tools and software used for the particular geographical regions as represented in Google Earth images, and are subject to future refinement.

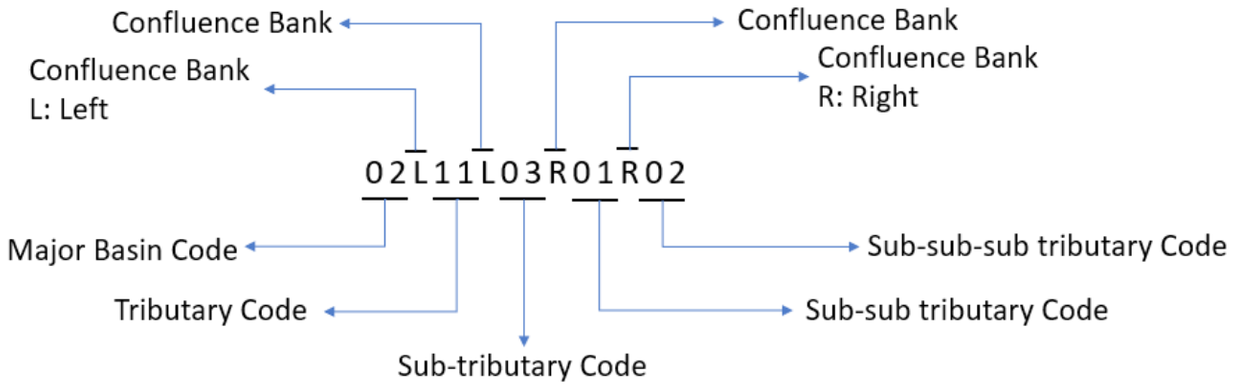
RIVER CODIFICATION SYSTEM

In the present Atlas alphanumeric characters are used for coding the river systems within natural and administrative boundaries. Each sub step in codification system is assigned a digit which reflects the length of the code up to that sub step. The coding has been done for the two different types of compartmentalizing river basins as stated below.

a) Codification system based on natural delineation
b) Codification system based on administrative delineation

The natural delineation approach is better suited to study and understand the basin area as a natural ecological unit while administrative delineation is good for determining specific interventions and fixing responsibilities in the implementation of any project relevant to rivers. Both approaches are important for their own reasons and, therefore, it was decided to develop the codification system for both natural as well as administrative delineations.

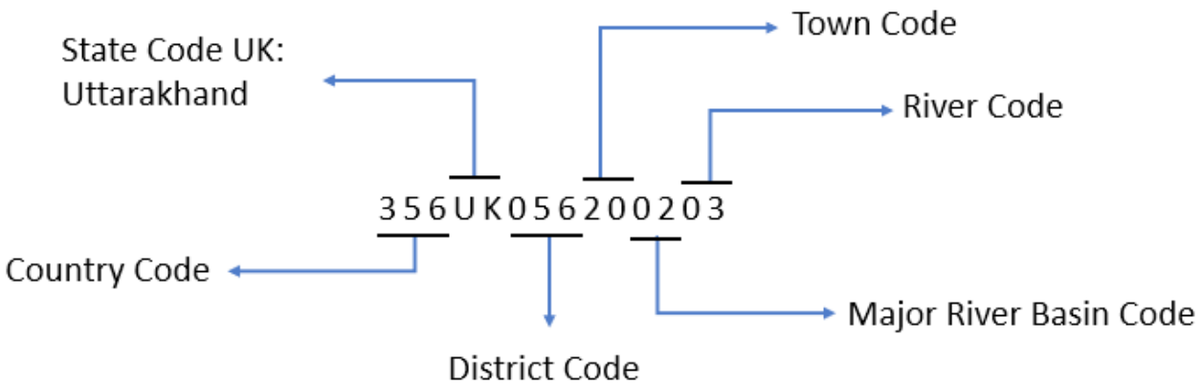
a) Codification system based on natural delineation: In the natural delineation approach, major basin codes given by CWC in River Basin Atlas of India, jointly published by CWC and NRSC, ISRO in October 2012, have been adopted here. These codes are accepted at regional level. In the second step, tributary code is given based on their confluence bank and their sequential number from the origin of the major river. R and L represents Right Bank and Left Bank, respectively, for the confluence bank in this code. For example, L11 in the code represents the 11th tributary (from the head of the major river) joining the major river at the left bank. In steps 3, 4, 5, etc. the same coding procedure as in step 2 is followed for sub-tributaries joining the tributaries and so on. Thus, the code can be extended without any alteration until it reaches down to the lowest order river.



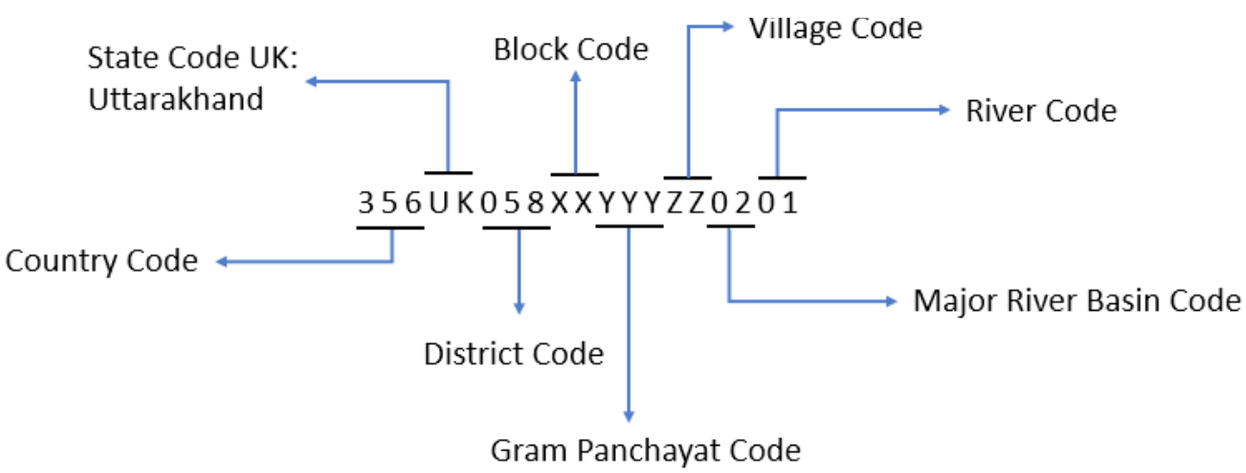
b) Codification system based on administrative delineation: In administrative delineation codes are generated separately for areas coming under urban and rural jurisdictions as further described.

Codification system based on administrative delineation –Urban: In administrative delineation-urban the first 3 digits of the code represent the country code adopted from ISO 3166-1. The next 5 digits give the state code and district code. State code is taken from transportation department

and district code is adopted from Census codes. The next 2 digits represent the town, which adopted from the census town codes. In the next step, 2 digits are assigned for major river basins and the codes are adopted from River Basin Atlas of India given by CWC. The last 2 digits of the code represent the river based on higher to lower river order approach, and if there are more than one river of the same order then code is allotted in alphabetical order.



Codification system based on administrative delineation-Rural: In administrative delineation-rural the first 3 digits of the code represent the country code adopted from ISO 3166-1. The next 5 digits give the state code and district code State code is taken from transportation department and district code is adopted from Census codes. Block, Gram Panchayat and Village codes are further generated based on district codes. In the next step, 2 digits are assigned for major river basin as per the River Basin Atlas of India given by CWC. The last 2 digits of the code represent the river code based on higher to lower river order approach, and if there be more than one river of same order then the code is allotted in alphabetical order.



ALAKNANDA BASIN

Alaknanda River UID Code: 02L01
Basin area: 11,058.74 sq. km.
Major rivers: Mandakini, Pindar, Nandakini, Dhauli Ganga, Saraswati
Number of rivers- 93
Total length of rivers- 1,817 km.

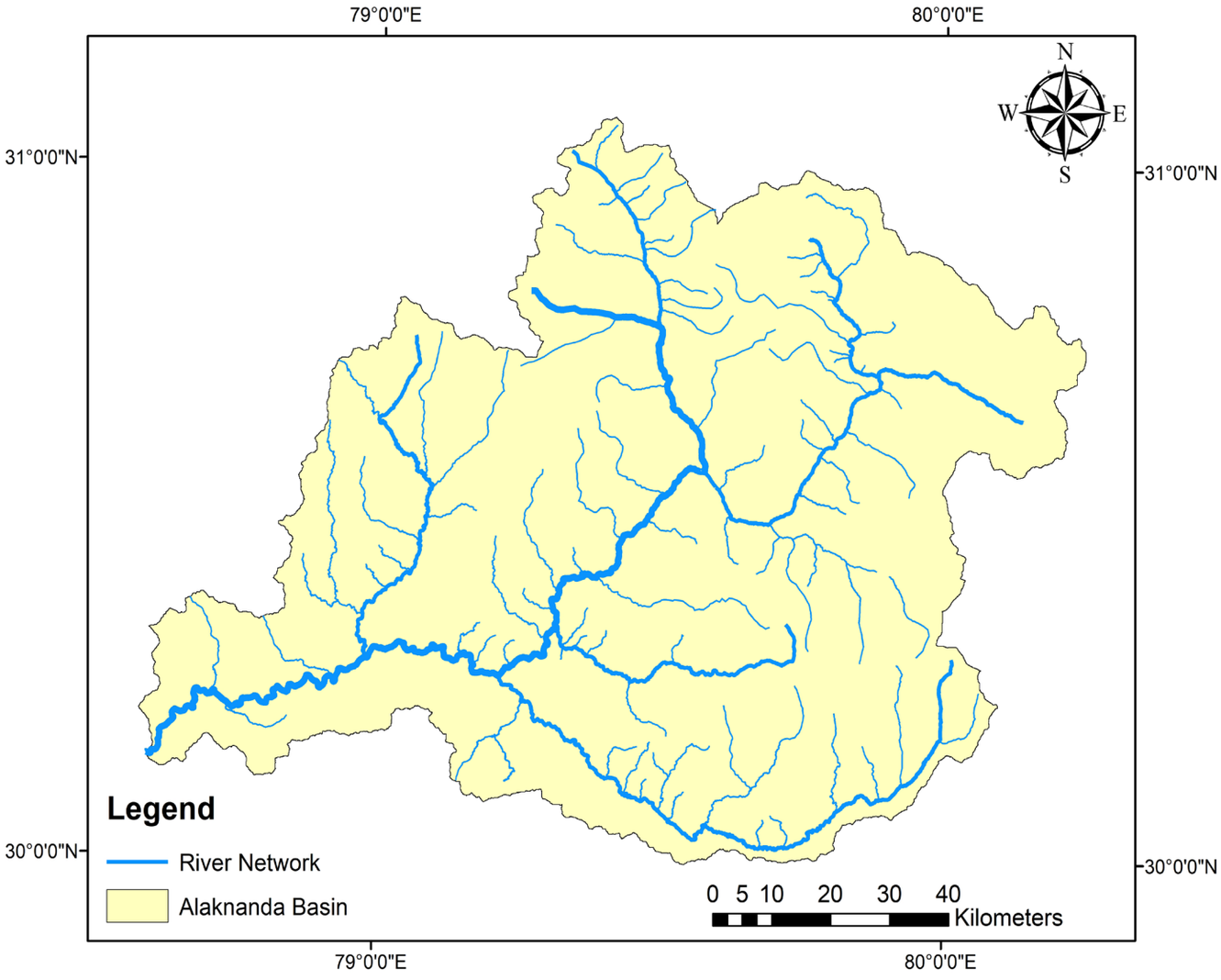
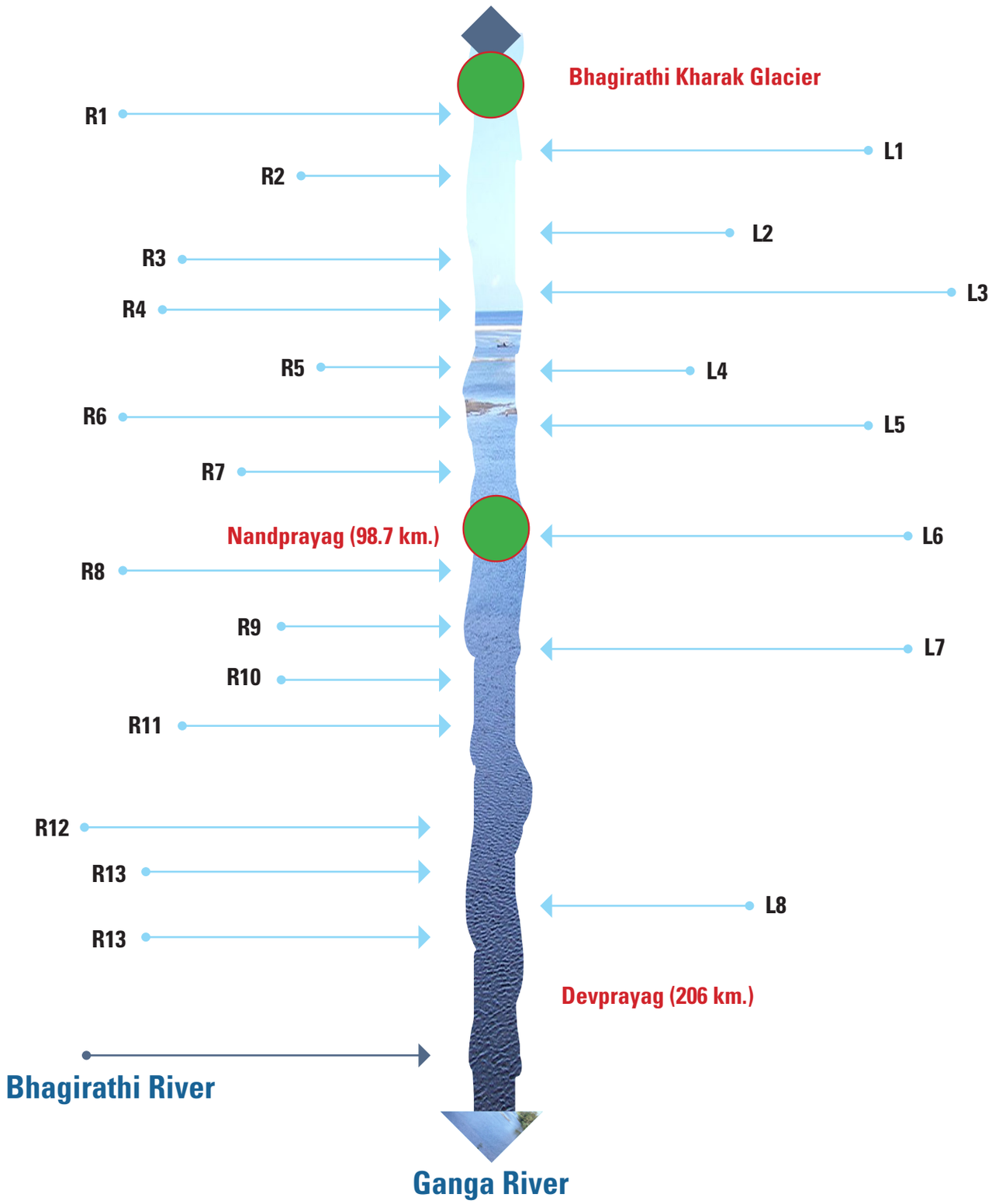


Figure: Alaknanda basin river network

FLOW DIAGRAM: ALAKNANDA RIVER AND HER TRIBUTARIES

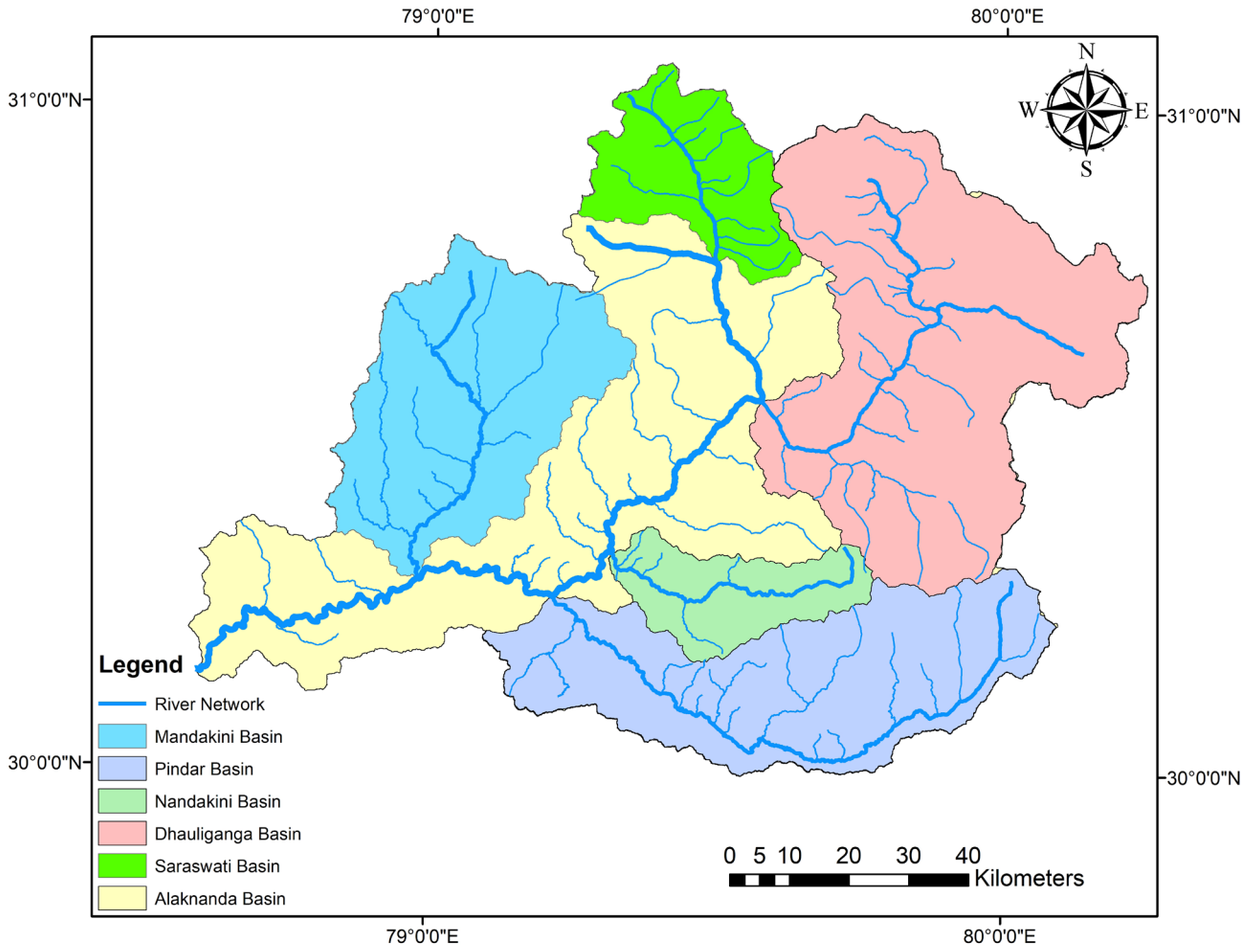


Alakhnanda River and Her Tributaries					
S No	Confluence Bank	Length (km.)	Confluence Co-ordinates		Distance from origin (km.)
			Latitude	Longitude	
2	L1	35.8	30.77	79.49	24
3	R2	16.7	30.69	79.51	34.3
4	L2	24.5	30.62	79.56	43.7
5	L3	102	30.56	79.58	50.8
6	R3	22.9	30.53	79.51	59.9
7	L4	10.9	30.49	79.48	65.3
8	R4	25.6	30.46	79.43	70.9
9	L5	36.2	30.41	79.39	79.8
10	R5	6.13	30.41	79.36	83.4
11	R6	24.9	30.39	79.32	88.5
12	R7	7.95	30.36	79.31	92.5
13	L6	59.3	30.33	79.32	96.4
14	R8	24.5	30.32	79.30	98.6
15	R9	5.8	30.28	79.24	109
16	L7	127	30.26	79.22	112
17	R10	6.72	30.28	79.17	118
18	R11	9.57	30.29	79.15	121
19	R12	76	30.29	78.98	144
20	R13	18.4	30.26	78.92	152
21	L8	13.8	30.22	78.74	178
22	R14	19.5	30.23	78.71	182

ALAKNANDA: MAJOR SUB-BASINS

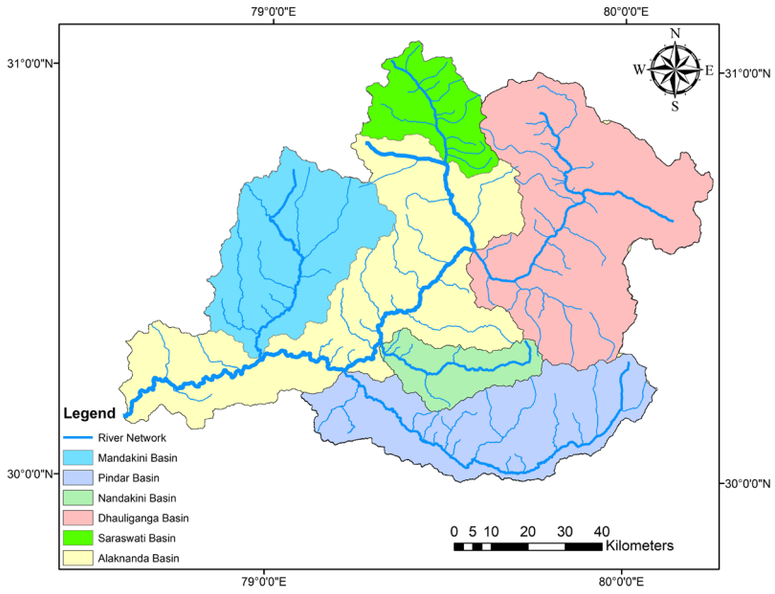
Major sub-basins of Alaknanda River are as follows:

- Mandakini basin
- Pindar basin
- Nandakini basin
- Dhauliganga basin
- Saraswati basin



MANDAKINI BASIN

Mandakini River UID Code: 02L01R12
Basin area: 1,636.78 sq. km.
Number of rivers- 10
Total length of rivers- 252 km.



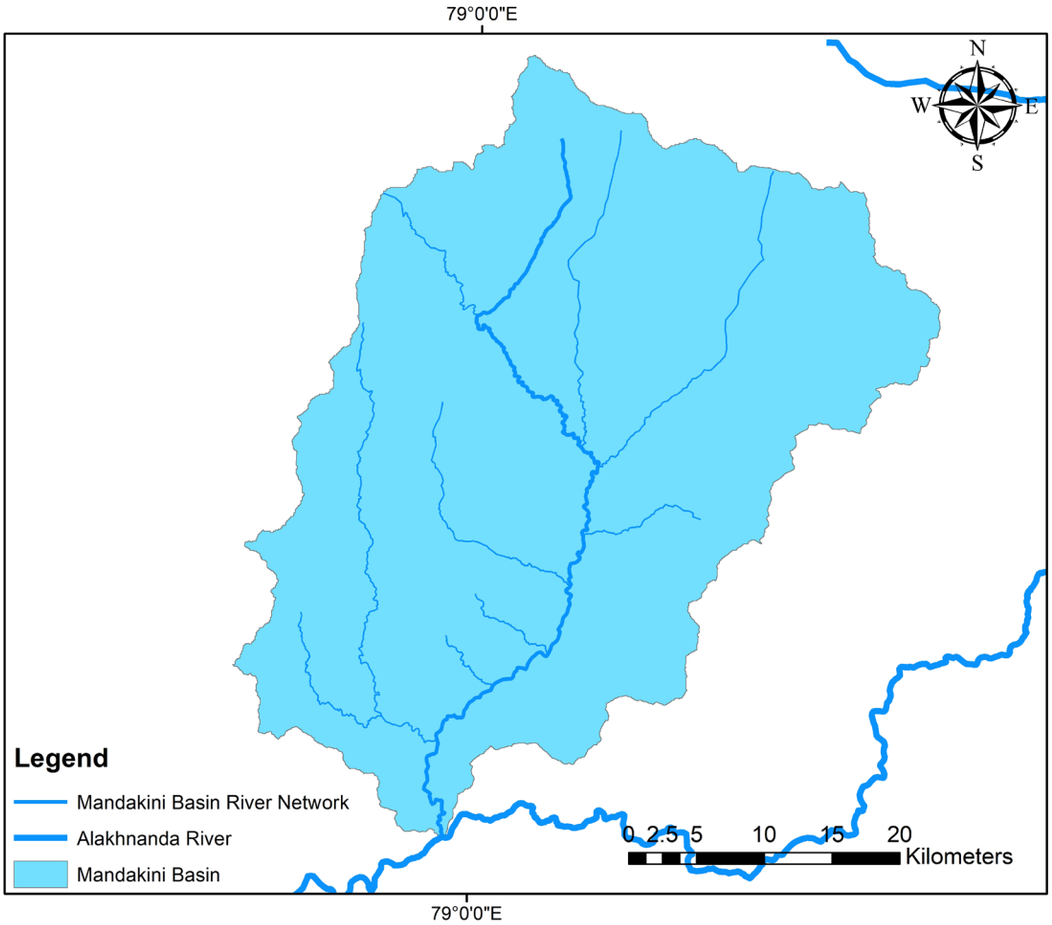
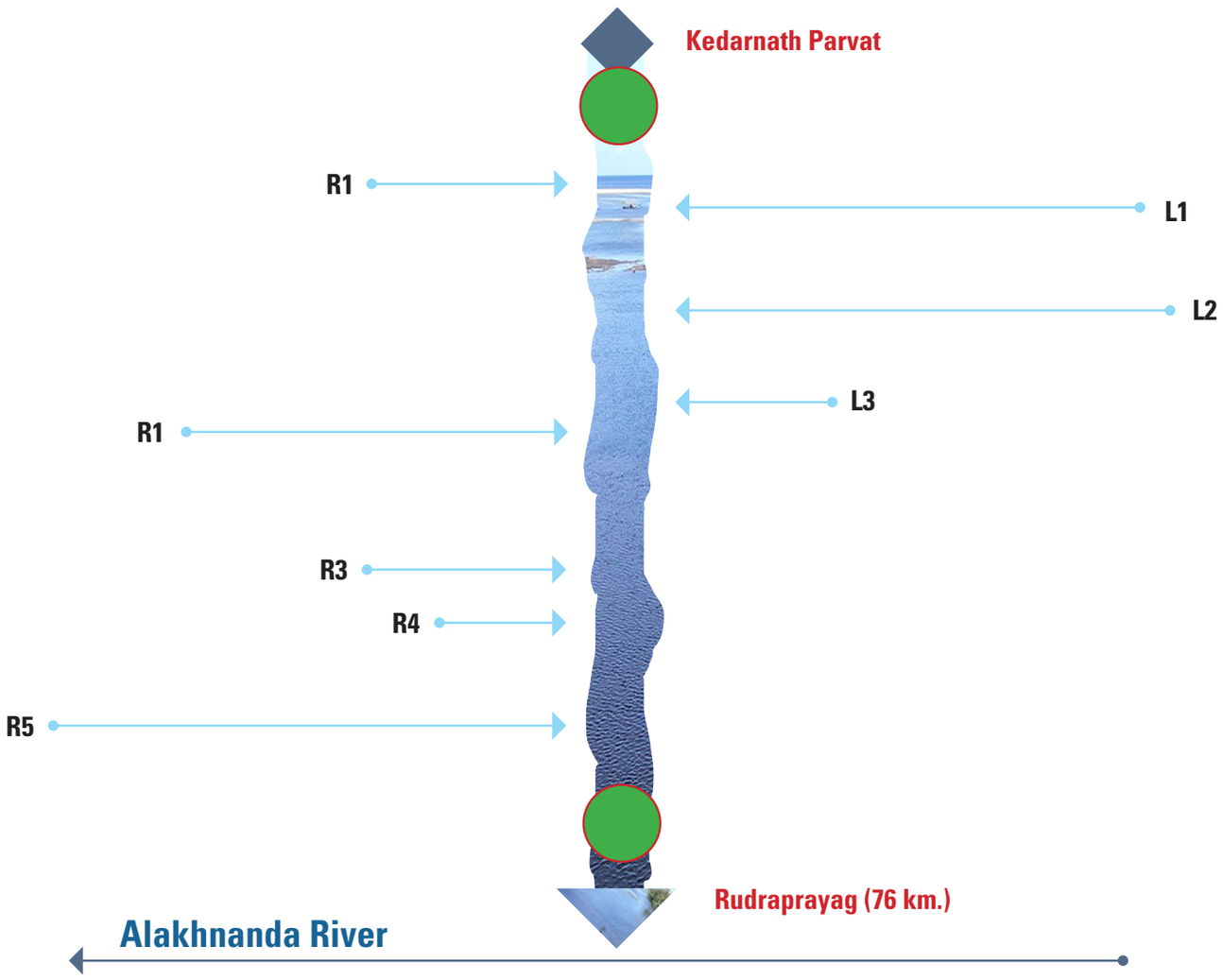


Figure: Mandakini river network in Alaknanda basin

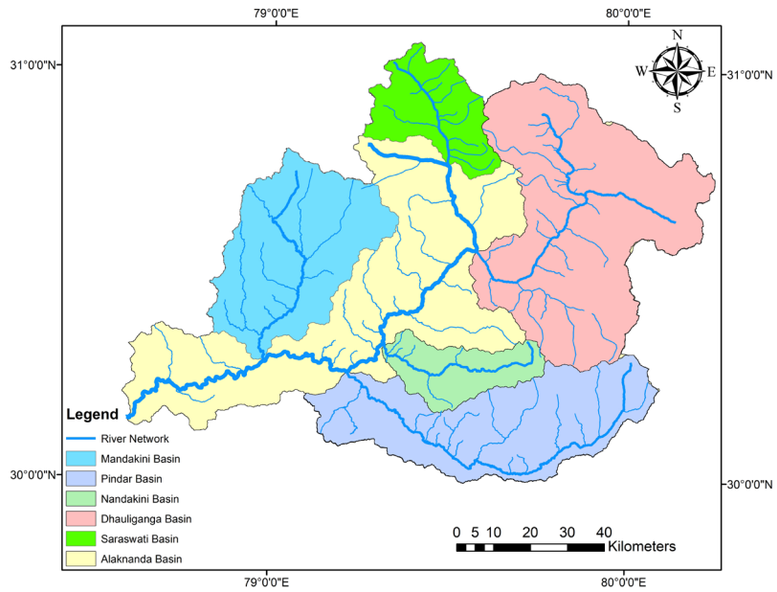
FLOW DIAGRAM: MANDAKINI RIVER AND HER TRIBUTARIES



Mandakini River and Her Tributaries					
S No	Confluence Bank	Length (km.)	Confluence Co-ordinates		Distance from origin (km.)
			Latitude	Longitude	
1	R1	15.7	30.63	79.00	16
2	L1	26.9	30.55	79.08	33.5
3	L2	28.5	30.54	79.10	35.5
4	L3	10.7	30.49	79.08	42.5
5	R2	21.7	30.46	79.07	46.8
6	R3	8.72	30.41	79.06	52.9
7	R4	6.52	30.39	79.02	58.5
8	R5	42.4	30.35	78.97	65.2

PINDAR BASIN

Pindar River UID Code: 02L01L07
Basin area: 1,888.47 sq. km.
Number of rivers- 18
Total length of rivers- 357 km



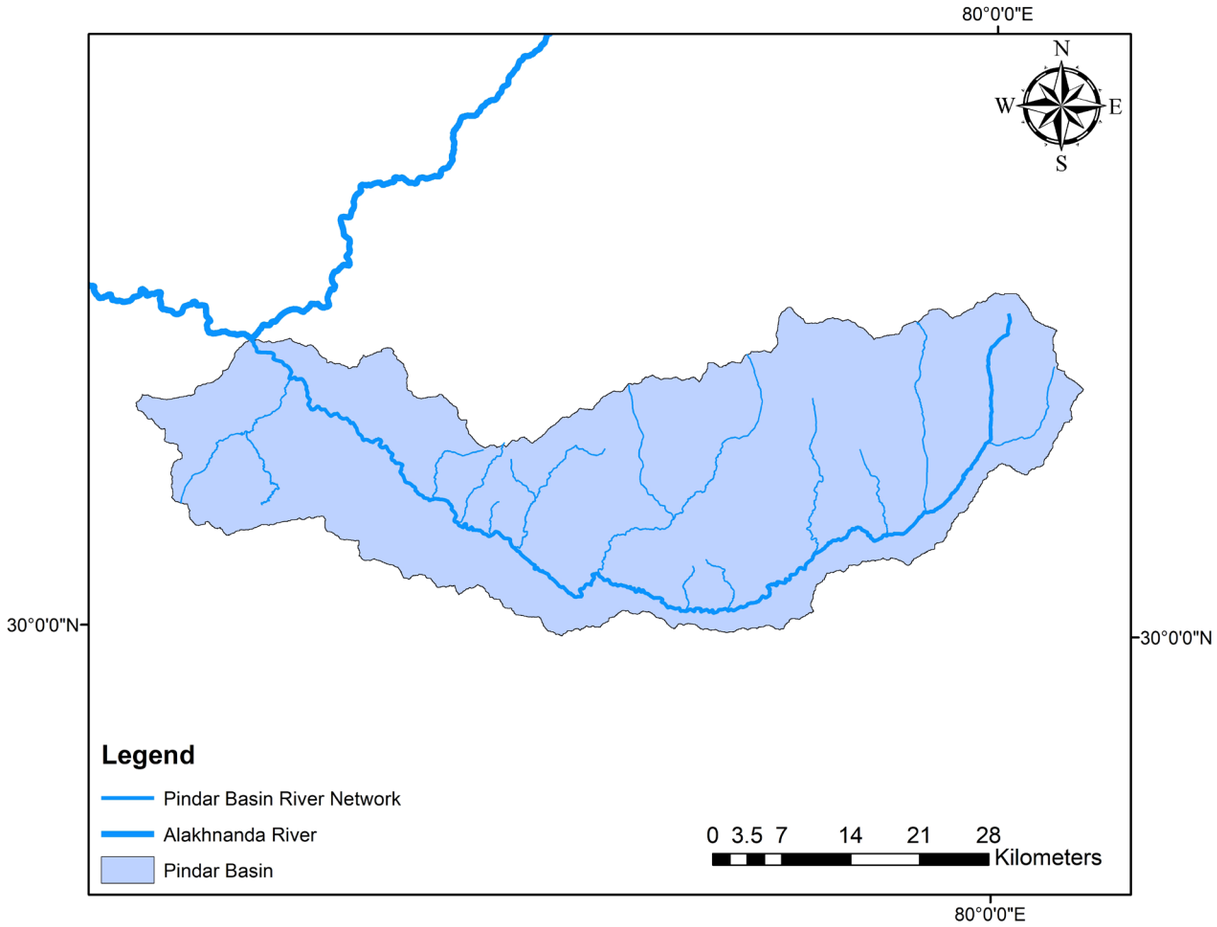
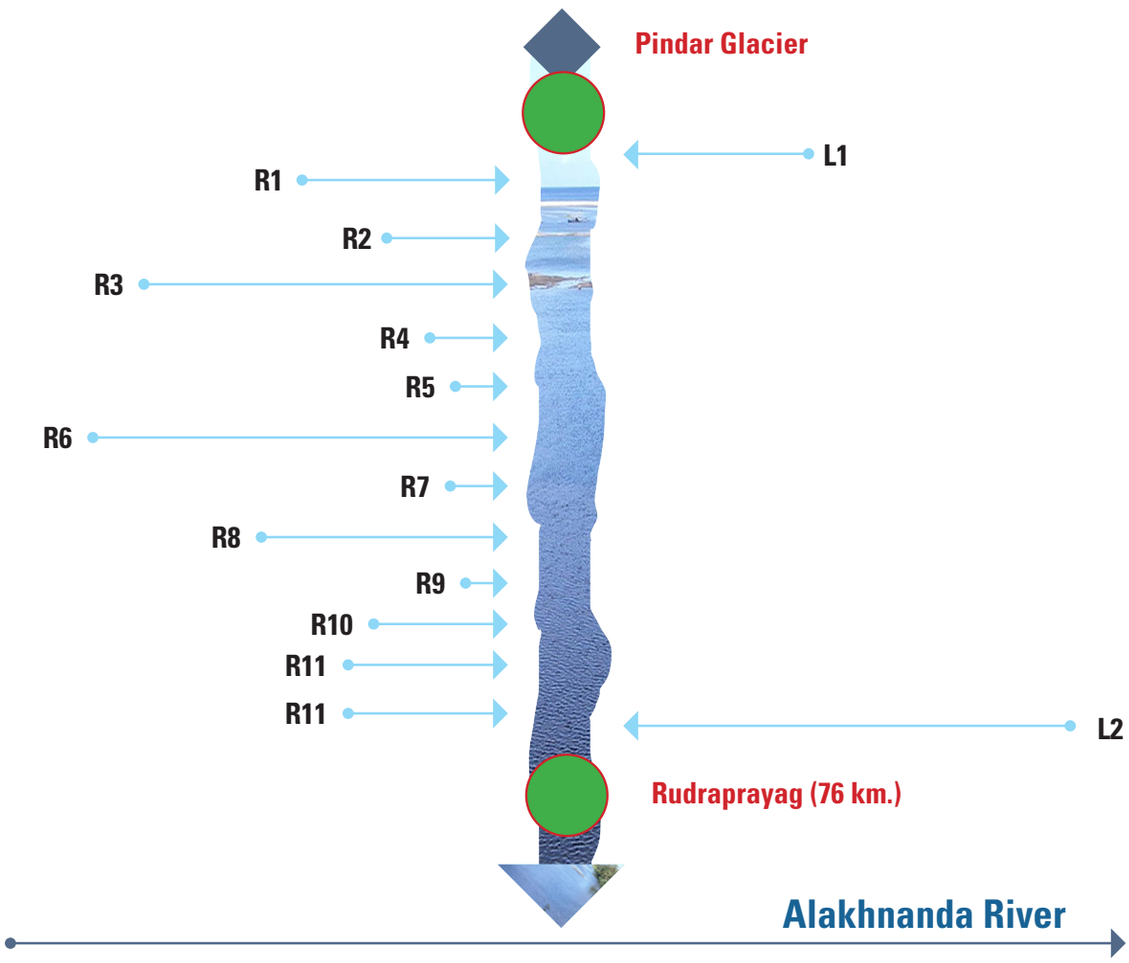


Figure: Pindar river network in Alaknanda basin

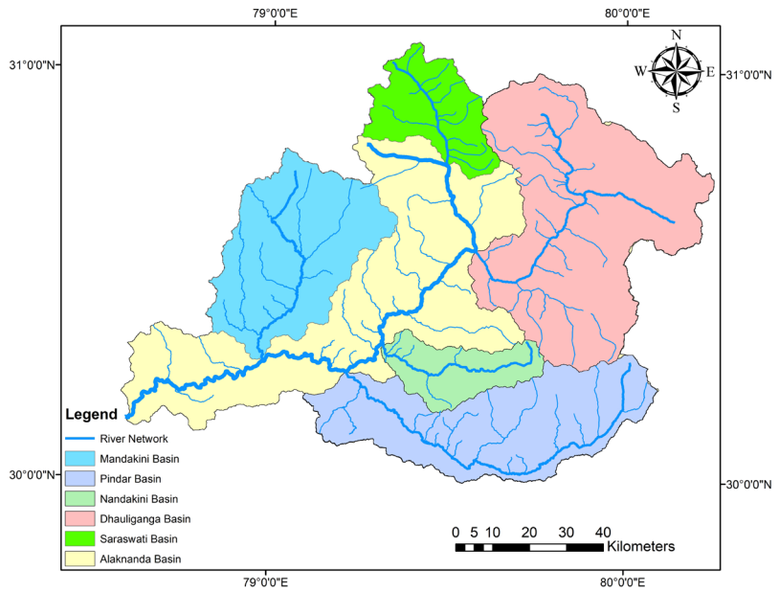
FLOW DIAGRAM: PINDAR RIVER AND HER TRIBUTARIES



Pindar River and Her Tributaries					
S No	Confluence Bank	Length (km.)	Confluence Co-ordinates		Distance from origin (km.)
			Latitude	Longitude	
1	L1	12.7	30.18	80.00	14.3
2	R1	20.8	30.11	79.93	24.6
3	R2	10.5	30.09	79.89	29.6
4	R3	19.7	30.07	79.81	39
5	R4	7.68	30.02	79.72	52
6	R5	5.52	30.02	79.68	57.5
7	R6	35.9	30.06	79.52	69.3
8	R7	6.66	30.06	79.52	79.8
9	R8	19.2	30.08	79.50	82.6
10	R9	4.42	30.09	79.47	85.9
12	R10	11.1	30.10	79.44	90.7
13	R11	10.4	30.12	79.41	95
14	R12	11.1	30.17	79.34	106
15	L2	21	30.23	79.26	114

NANDAKINI BASIN

Nandakini River UID Code: 02L01L06
Basin area: 544.38 sq. km.
Number of rivers - 07
Total length of rivers- 101 km.



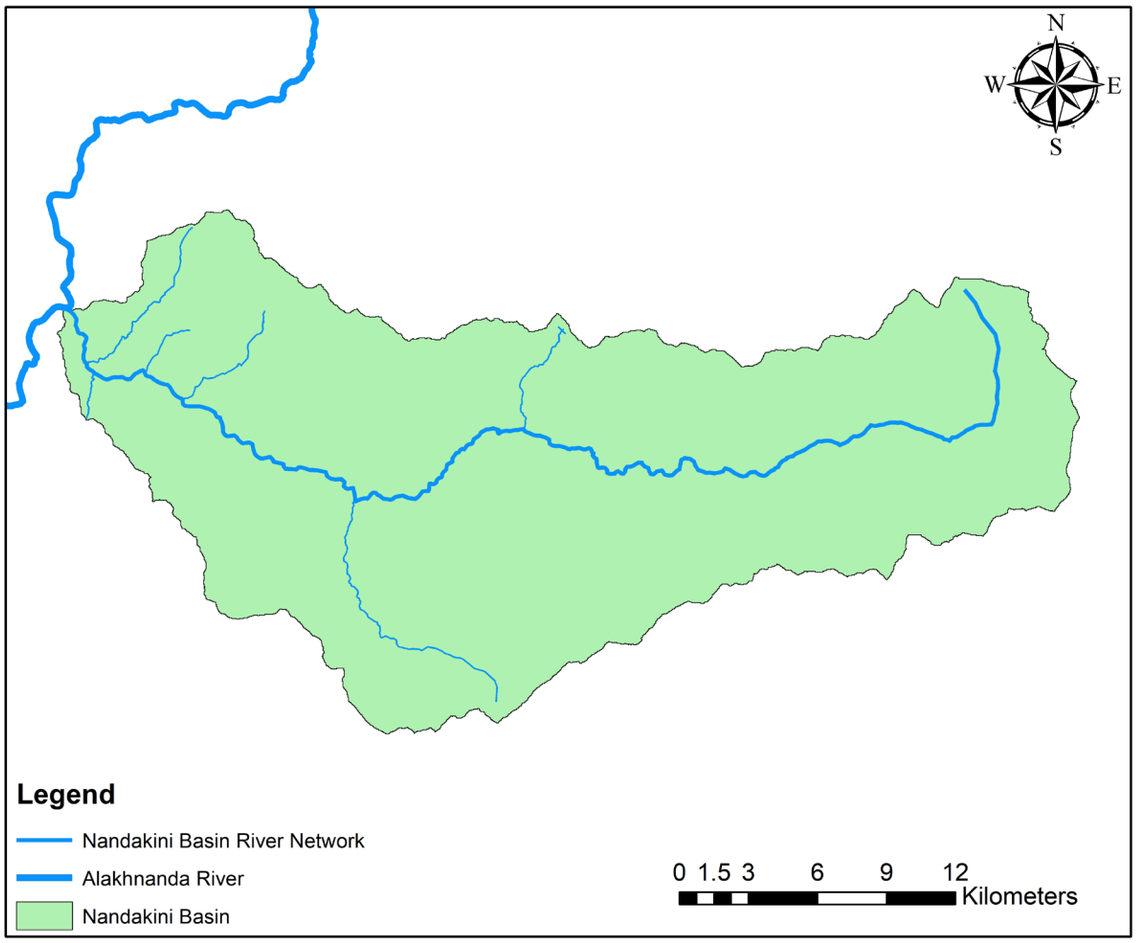
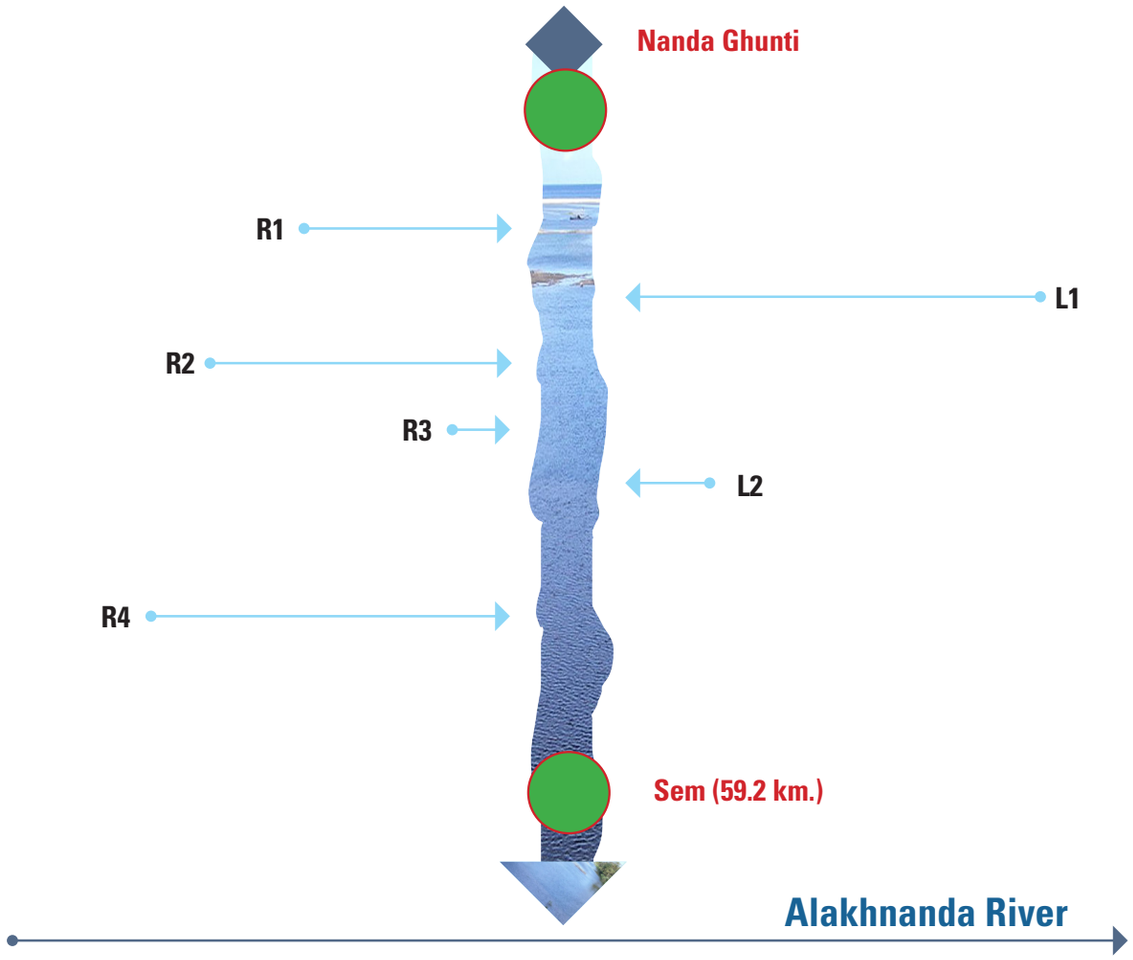


Figure: Nandakini river network in Alaknanda basin

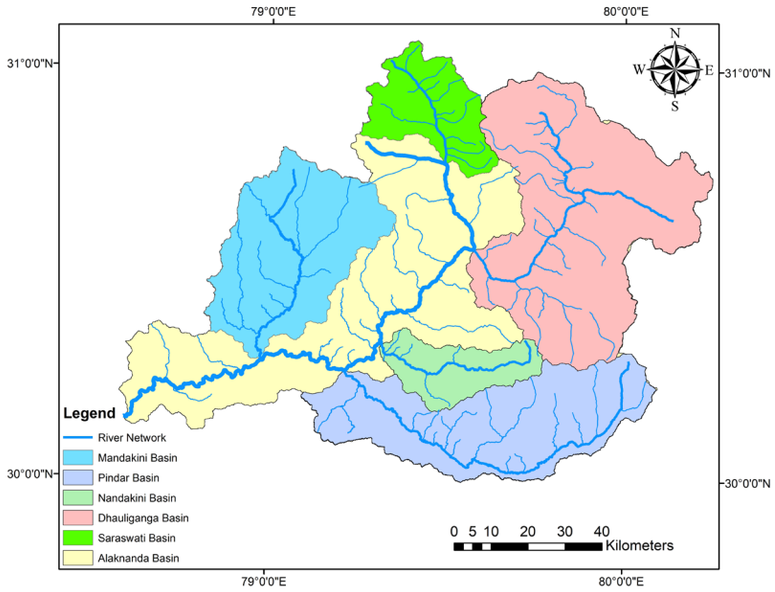
FLOW DIAGRAM: NANDAKINI RIVER AND HER TRIBUTARIES



Nandakini River and Her Tributaries					
S No	Confluence Bank	Length (km.)	Confluence Co-ordinates		Distance from origin (km.)
			Latitude	Longitude	
1	R1	5.56	30.29	79.52	31
2	L1	14	30.26	79.45	40.6
3	R2	7.84	30.30	79.37	51.1
4	R3	3.1	30.31	79.35	53.3
5	L2	2.26	30.31	79.33	55.7
6	R4	8.84	30.31	79.33	56.3

DHAULIGANGA BASIN

Dhauliganga River UID Code: 02L01L03
Basin area: 3,007.52 sq. km.
Number of rivers- 27
Total length of rivers- 444 km.



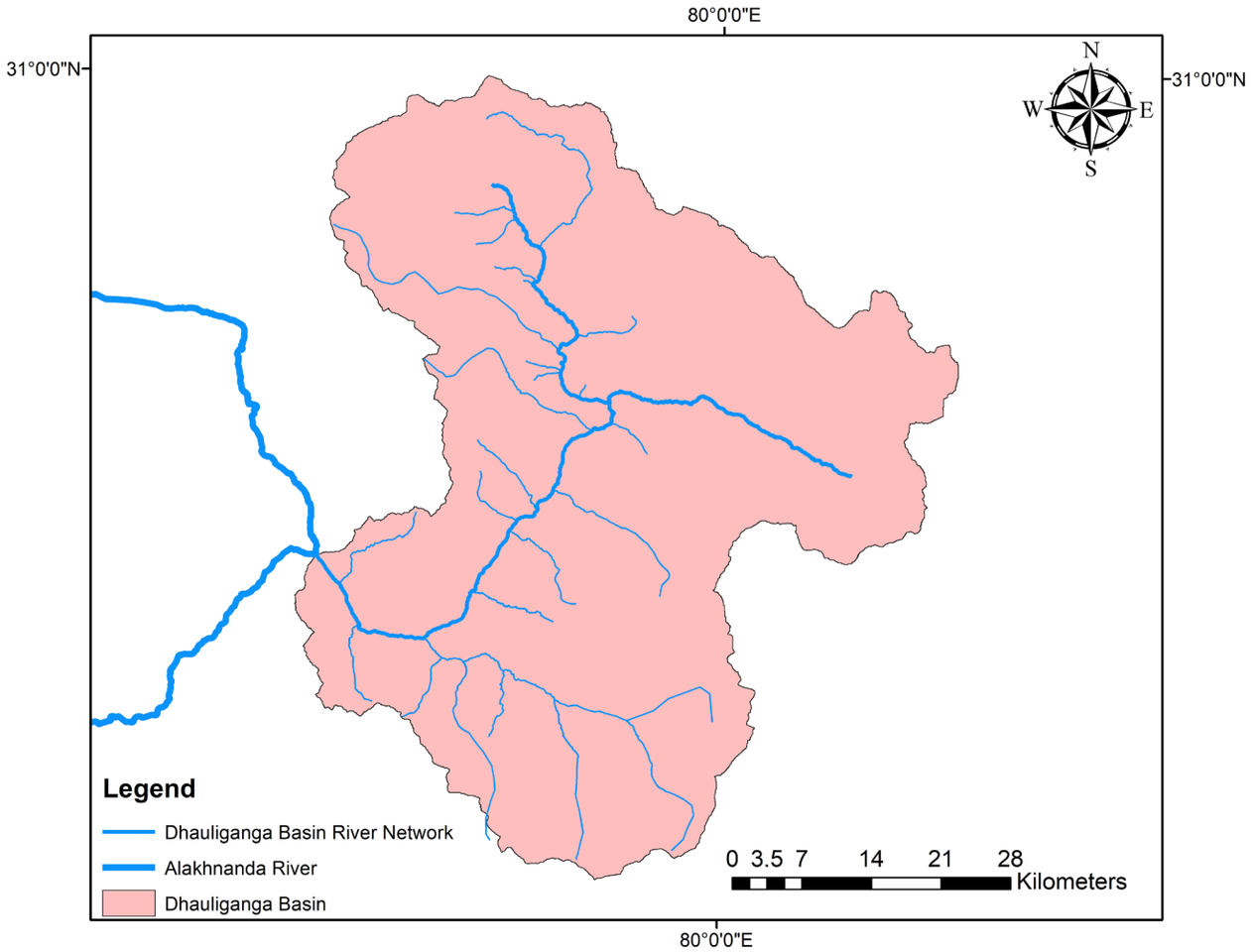
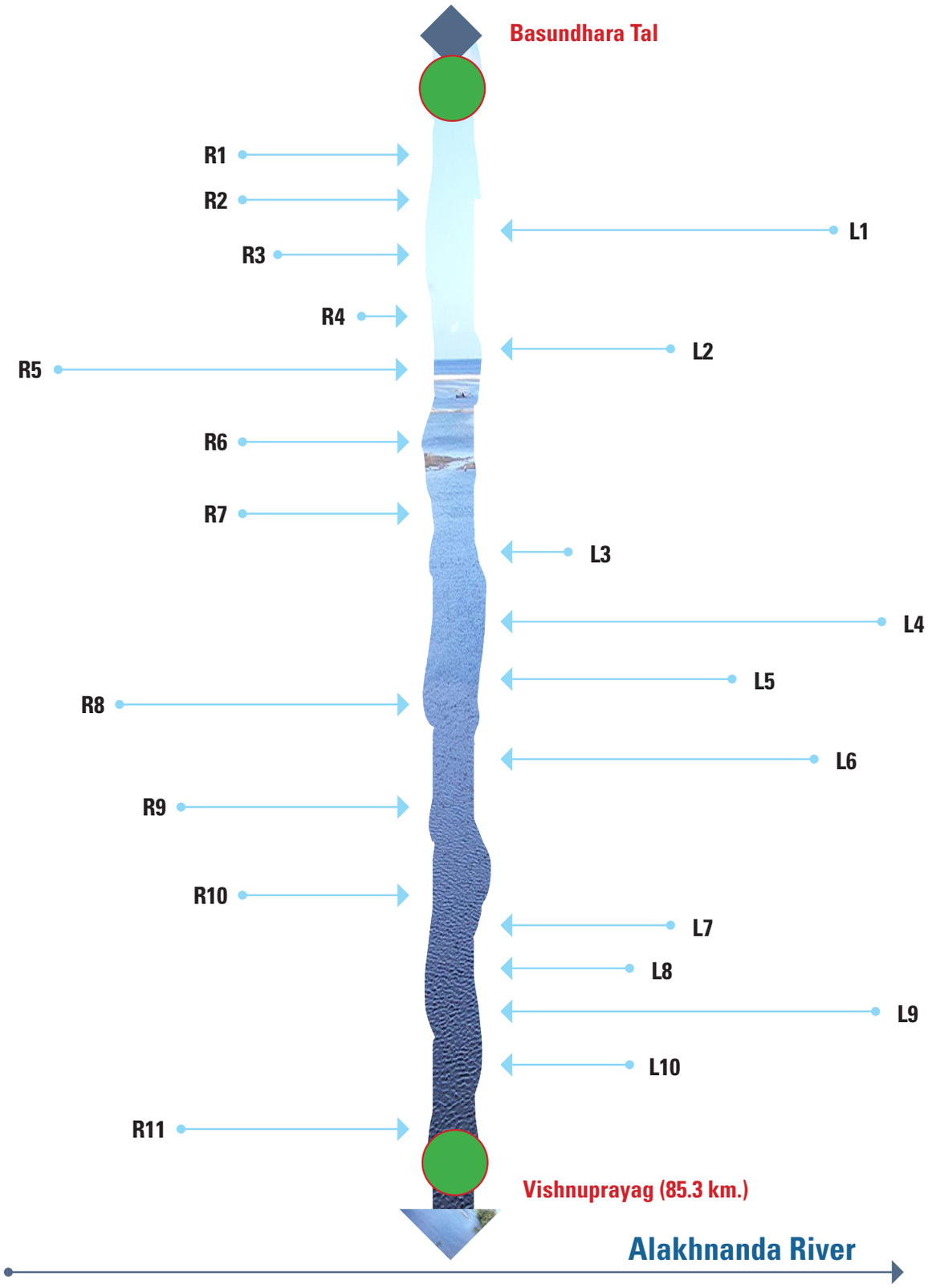


Figure: Dhauliganga river network in Alaknanda basin

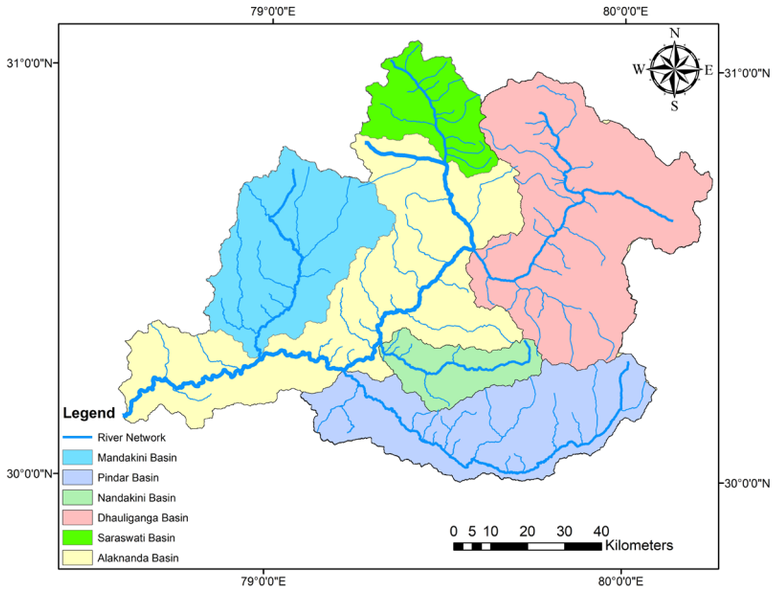
FLOW DIAGRAM: DHAULIGANGA RIVER AND HER TRIBUTARIES



Dhauliganga River and Her Tributaries					
S No	Confluence Bank	Length (km.)	Confluence Co-ordinates		Distance from origin (km.)
			Latitude	Longitude	
1	R1	6.38	30.88	79.78	3.96
2	R2	5.55	30.87	79.78	5.37
3	L1	25.4	30.84	79.81	9.23
4	R3	5.18	30.81	79.80	12.9
5	R4	1.1	30.81	79.80	13.3
6	L2	7.86	30.76	79.85	20.6
7	R5	30.3	30.75	79.83	23.4
8	R6	3.88	30.73	79.83	26.3
9	R7	3.36	30.73	79.83	26.5
10	L3	1.55	30.71	79.85	29.9
11	L4	33.7	30.70	79.88	33
12	L5	5.14	30.68	79.88	35.5
13	R8	23.1	30.68	79.86	38.2
14	L6	18	30.62	79.82	45.9
15	R9	10.3	30.60	79.81	48.8
16	R10	7.58	30.60	79.78	51.3
17	L7	12.2	30.58	79.78	52.6
18	L8	10.6	30.53	79.74	60
19	L9	37.4	30.49	79.69	67.4
20	L10	9.66	30.50	79.62	74.9
21	R11	12.9	30.54	79.60	79.4

SARASWATI BASIN

Saraswati River UID Code: 02L01L01
Basin area: 720.33 sq. km.
Number of rivers- 13
Total length of rivers- 165.25 km



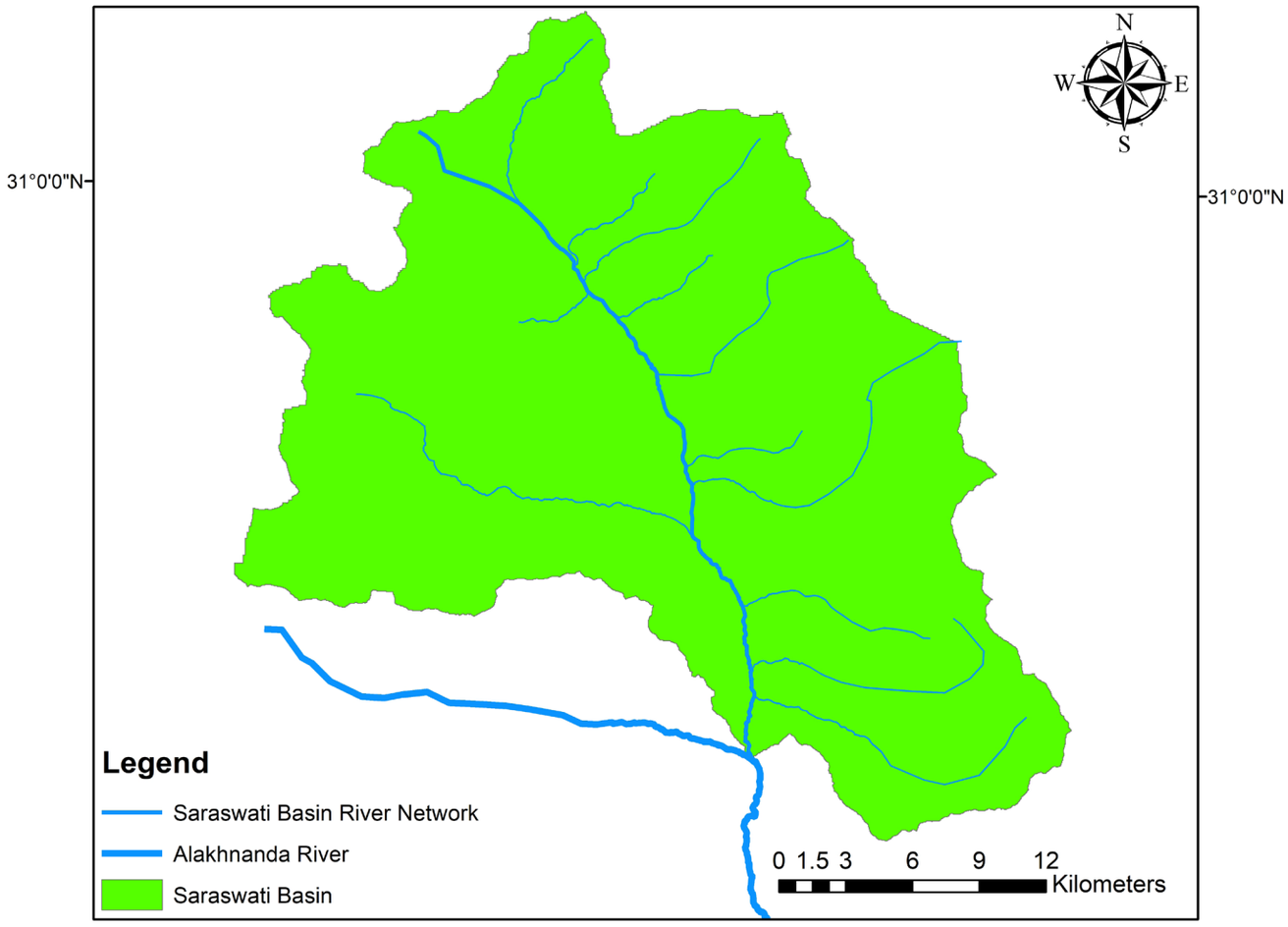
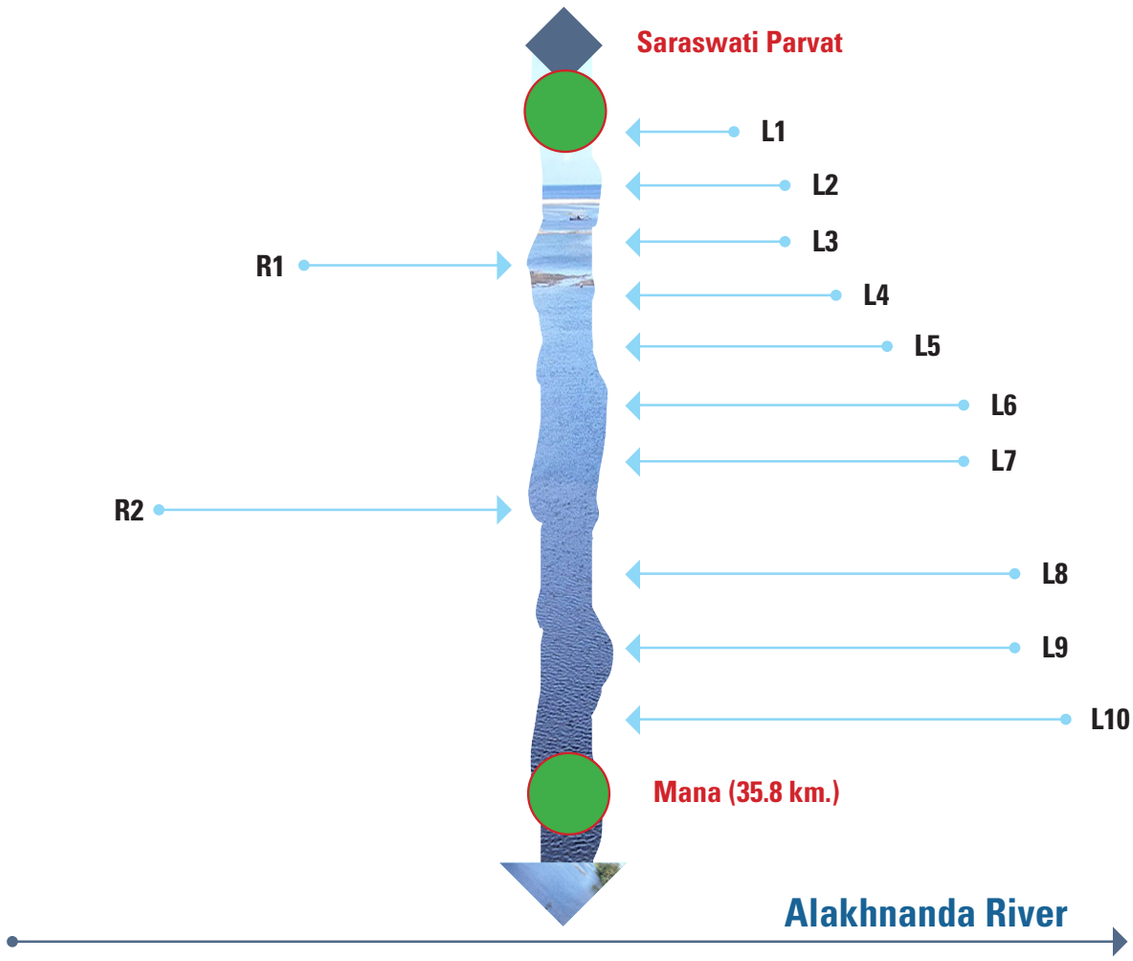


Figure: Saraswati river network in Alaknanda basin

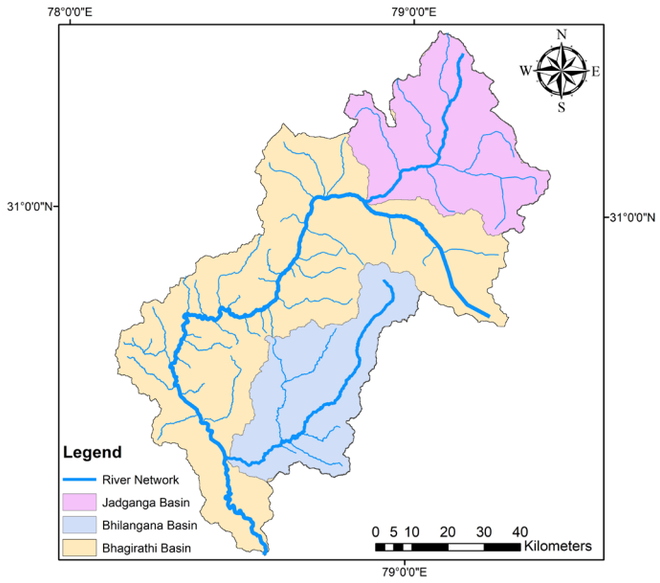
FLOW DIAGRAM: SARASWATI RIVER AND HER TRIBUTARIES



Saraswati River and Her Tributaries					
S No	Confluence Bank	Length (km.)	Confluence Co-ordinates		Distance from origin (km.)
			Latitude	Longitude	
1	L1	9.58	30.78	79.41	5.8
2	L2	6.84	30.77	79.49	9.61
3	L3	10.9	30.69	79.51	10.5
4	R1	3.97	30.62	79.56	11
5	L4	5.6	30.56	79.58	12.8
6	L5	11.9	30.53	79.51	16
7	L6	6	30.49	79.48	20.6
8	L7	17.2	30.46	79.43	21.5
9	R2	19.1	30.41	79.39	23.9
10	L8	9.36	30.41	79.36	28
11	L9	14	30.39	79.32	31
12	L10	15	30.36	79.31	32.3

BHAGIRATHI BASIN

Bhagirathi River UID Code: 02R01
Basin area: 7,566.05 sq. km.
Major rivers: Jadganga, Bhilangana
Number of rivers- 48
Total length of rivers- 1,132.46 km.



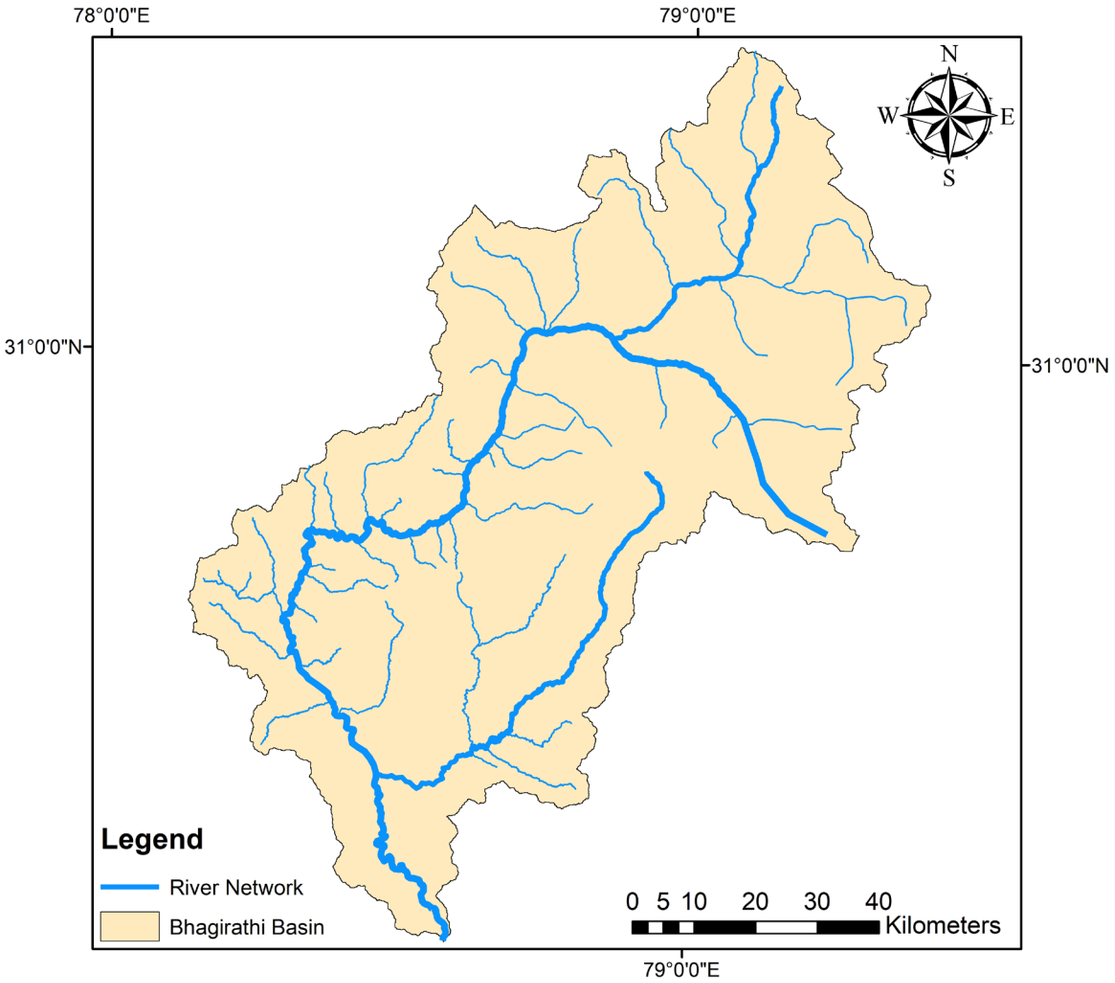
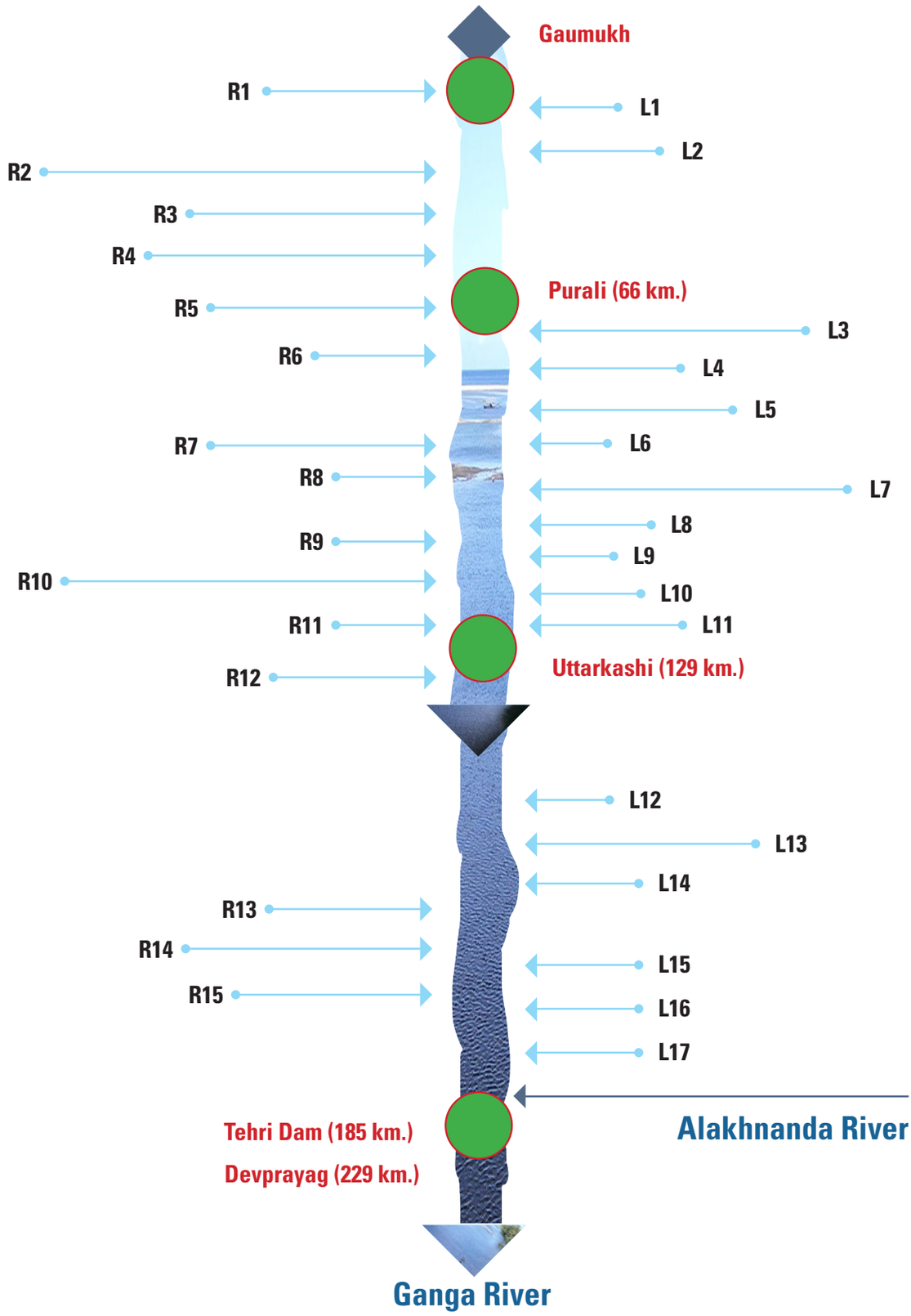


Figure: Bhagirathi river network in Uttarakhand.

FLOW DIAGRAM: BHAGIRATHI RIVER AND HER TRIBUTARIES

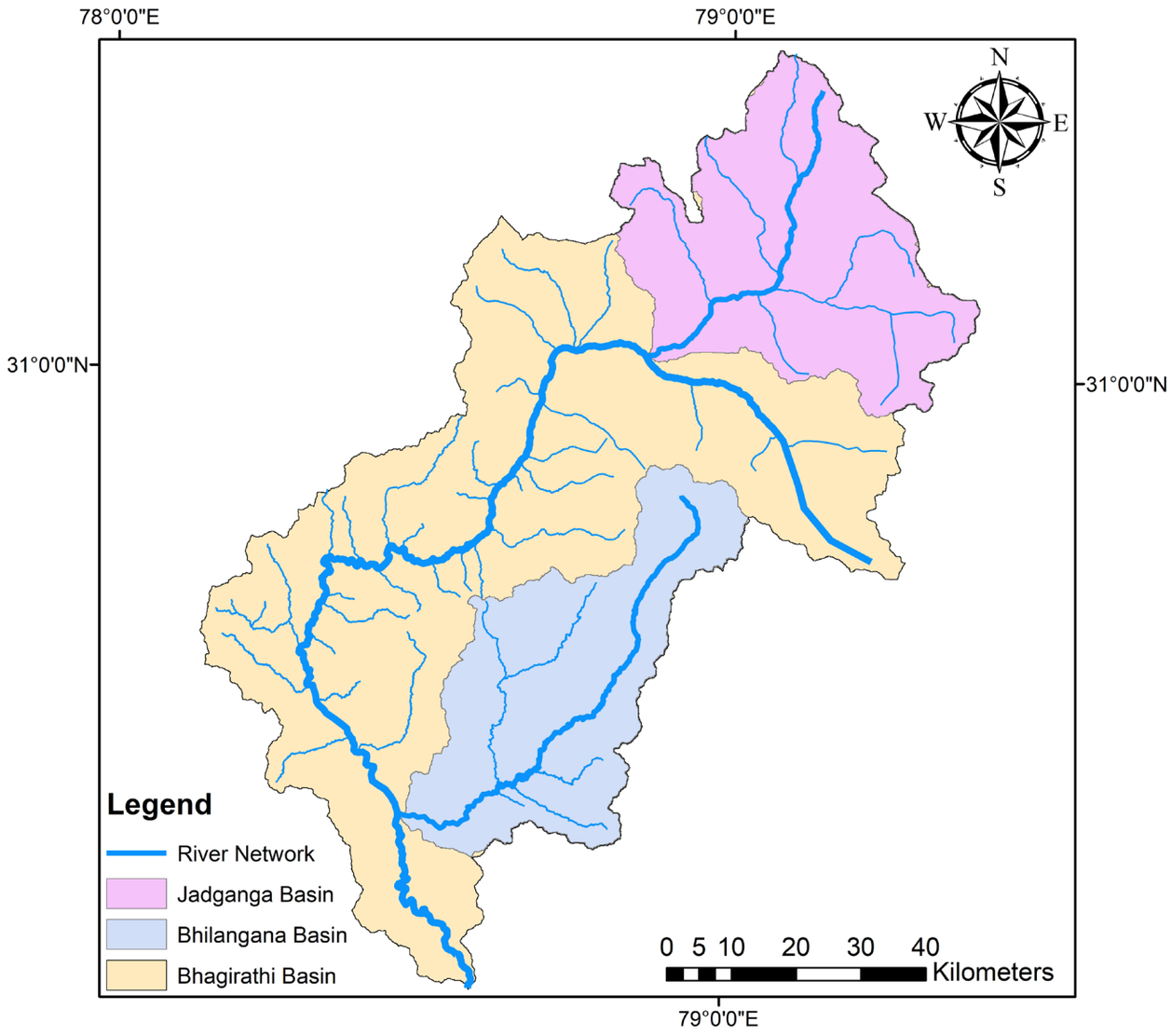


Bhagirathi River and Her Tributaries					
S No	Confluence Bank	Length (km.)	Confluence Co-ordinates		Distance from origin (km.)
			Latitude	Longitude	
1	R1	16.4	30.91	79.10	21.6
2	L1	8	30.92	79.08	24
3	L2	11.9	30.99	78.93	40.4
4	R2	62.2	31.02	78.86	49.2
5	R3	20.4	31.03	78.74	61.4
6	R4	24	31.03	78.74	61.6
7	R5	25.8	31.03	78.71	64.4
8	R6	11.3	30.97	78.69	71.9
9	L3	20.6	30.96	78.69	73.2
10	L4	8.51	30.88	78.67	81.7
11	L5	19	30.88	78.66	83.4
12	L6	3.99	30.86	78.65	85.6
13	R7	12.4	30.84	78.62	88.9
14	R8	6.16	30.82	78.62	91
15	L7	26	30.78	78.62	95.8
16	L8	9.34	30.76	78.59	99.3
17	L9	7	30.75	78.57	102
18	L10	8.97	30.74	78.52	108
19	R9	10.1	30.75	78.47	115
20	R10	17.7	30.75	78.45	116
21	L11	13.8	30.73	78.44	121
22	R11	14.7	30.74	78.41	124
23	R12	12	30.74	78.36	131
24	L12	6.49	30.69	78.36	138
25	L13	18.3	30.68	78.35	140
26	L14	5.71	30.63	78.33	146
27	R13	20.1	30.61	78.31	149
28	R14	22.3	30.56	78.33	156
29	L15	10.7	30.54	78.35	159
30	R15	18.8	30.49	78.40	167
31	L16	30.7	30.47	78.41	170
32	L17	93.6	30.38	78.48	185

BHAGIRATHI: MAJOR SUB-BASINS

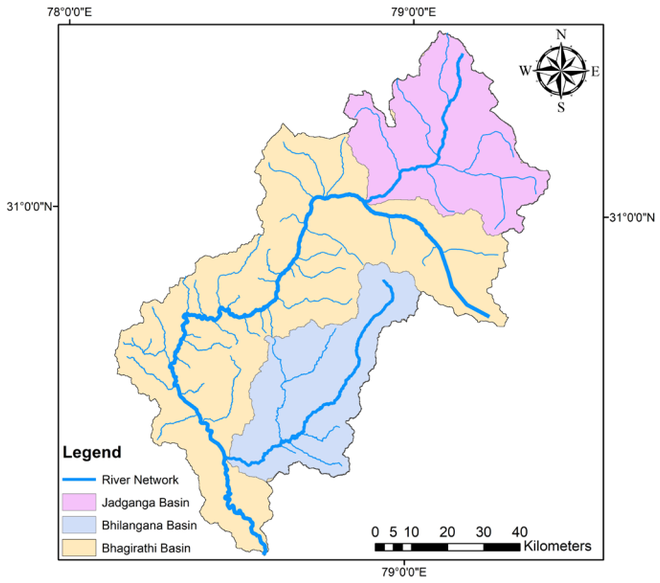
Major sub-basins of Bhagirathi River are as follows:

- Jadganga Basin
- Bhilangana Basin



JADGANGA BASIN

Jadganga River UID Code: 02R01R02
Basin Area: 1,698.03 sq. km.
Number of rivers- 08
Total length of rivers- 236.7 km.



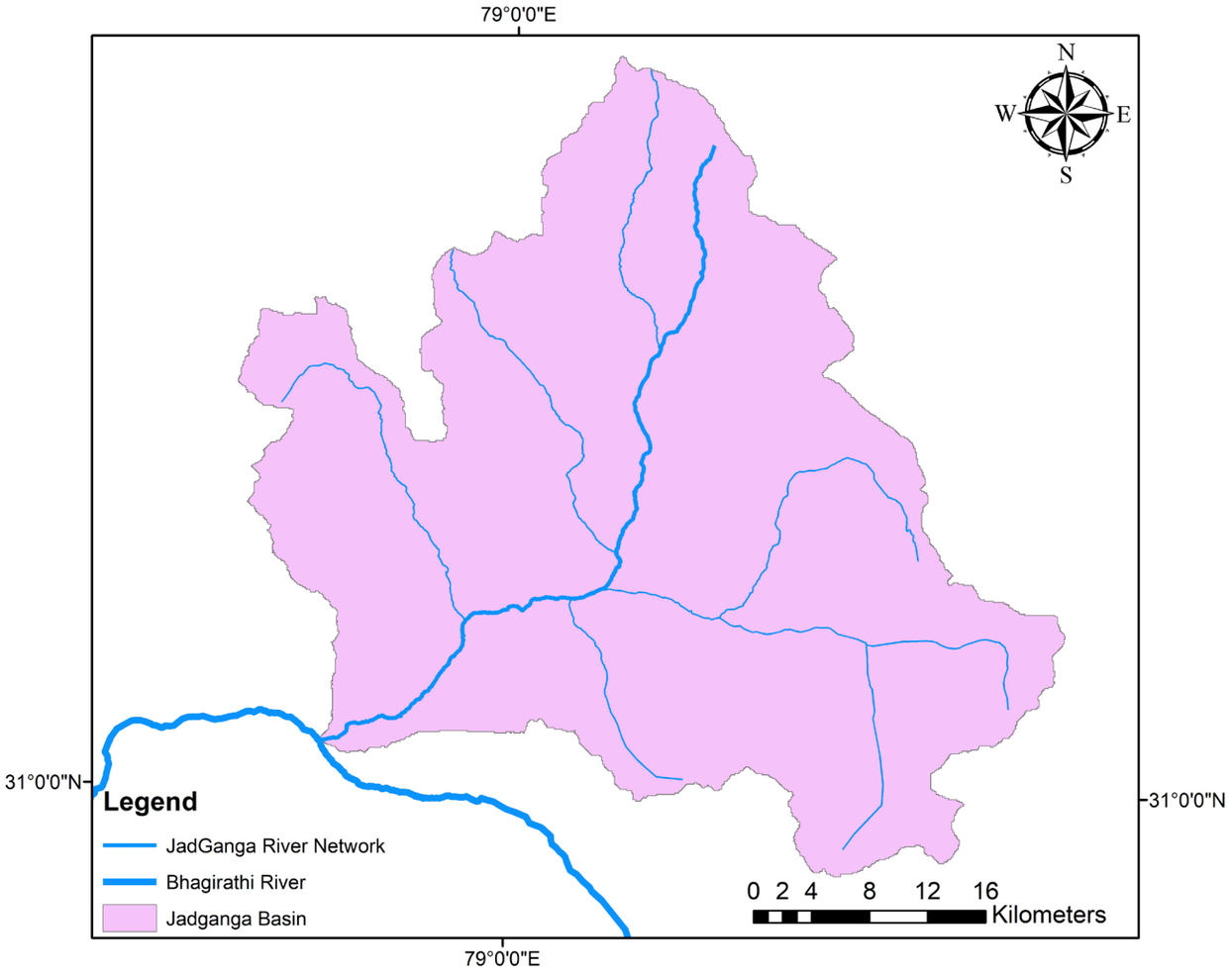
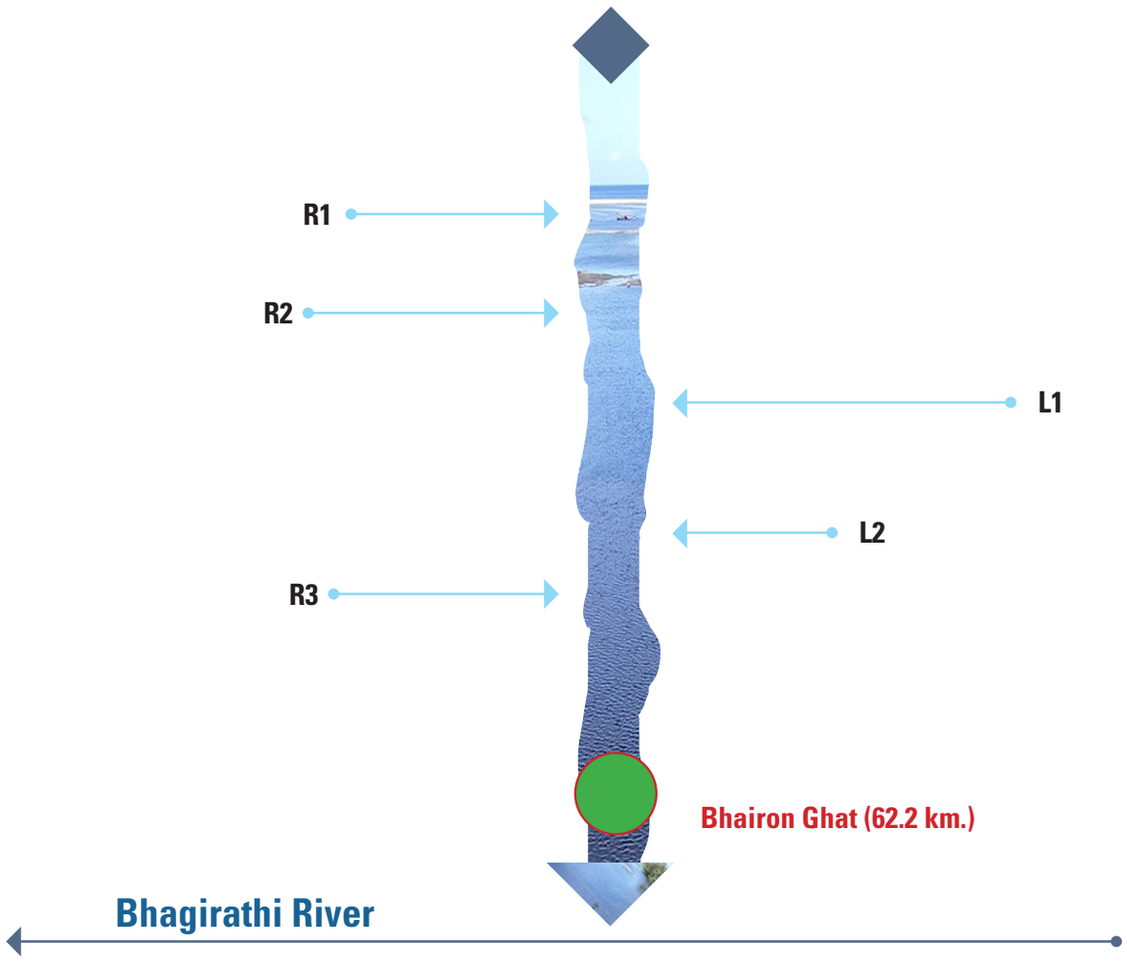


Figure: Jadganga river network in Bhagirathi basin

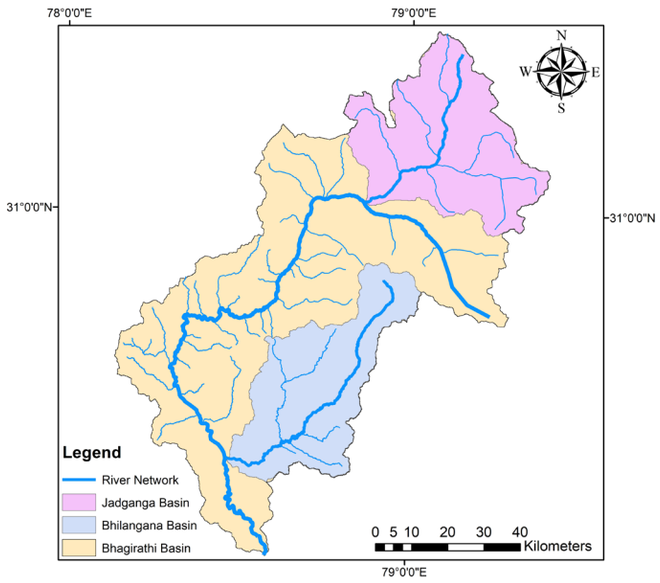
FLOW DIAGRAM: JADGANGA RIVER AND HER TRIBUTARIES



Jadganga River and Her Tributaries					
S No	Confluence Bank	Length (km.)	Confluence Co-ordinates		Distance from origin (km.)
			Latitude	Longitude	
1	R1	23.6	31.28	79.11	16
2	R2	31.5	31.15	79.08	31.7
3	L1	34.9	31.12	79.07	34.7
6	L2	16.3	31.12	79.04	37.1
7	R3	27.5	31.11	78.97	45.3
6	L5	11.9	30.53	79.51	16
7	L6	6	30.49	79.48	20.6

BHILANGANA BASIN

Bhilangana River UID Code: 02R01L17
Basin area: 1,470.16 sq. km.
Number of rivers- 06
Total length of rivers- 201 km.



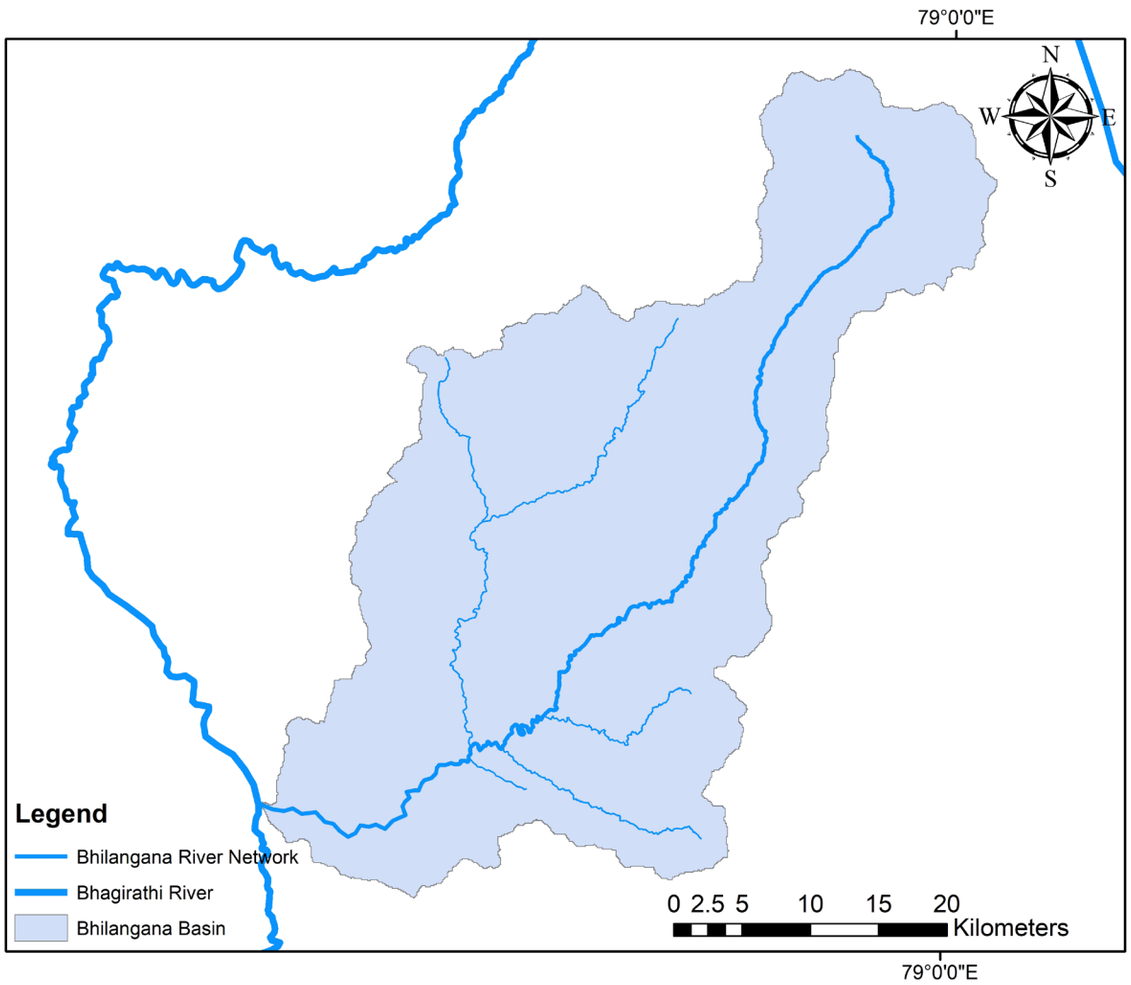
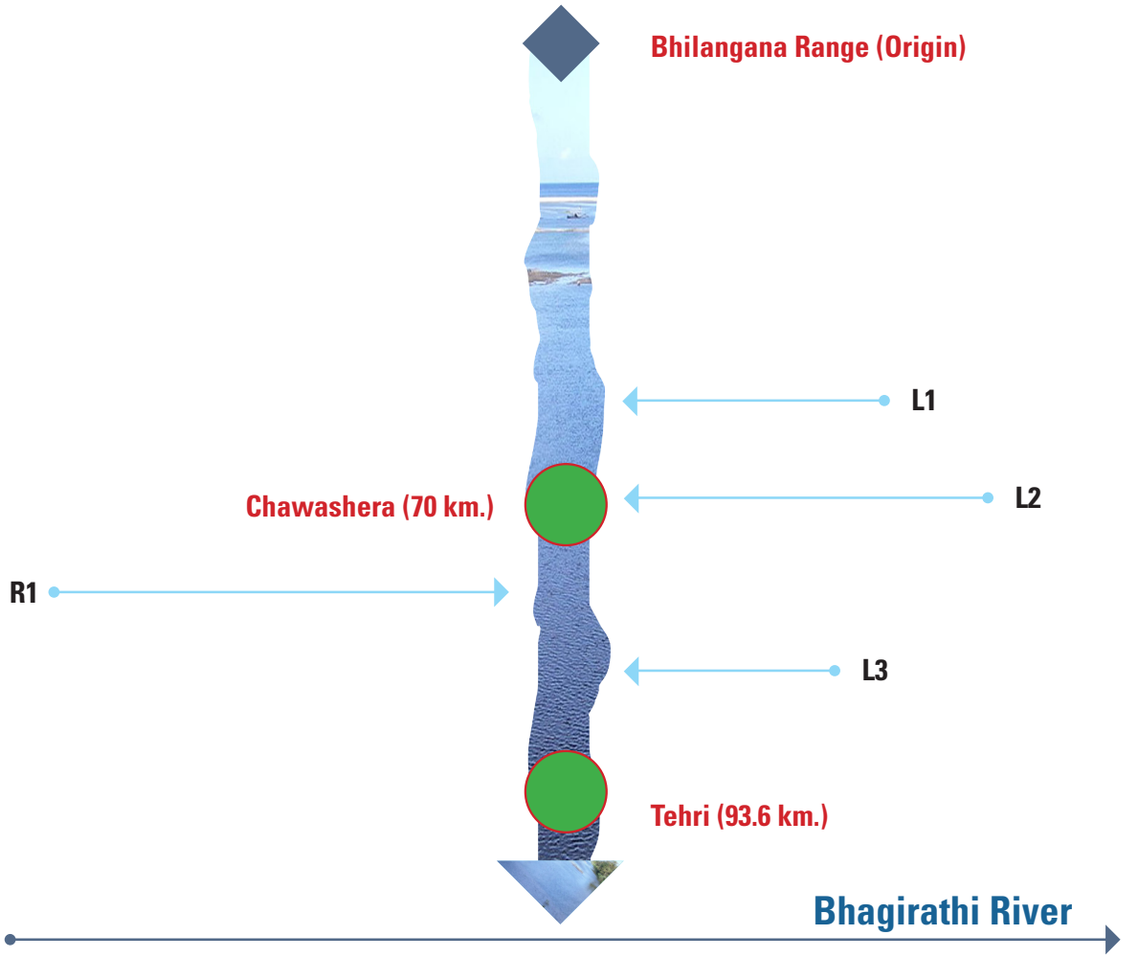
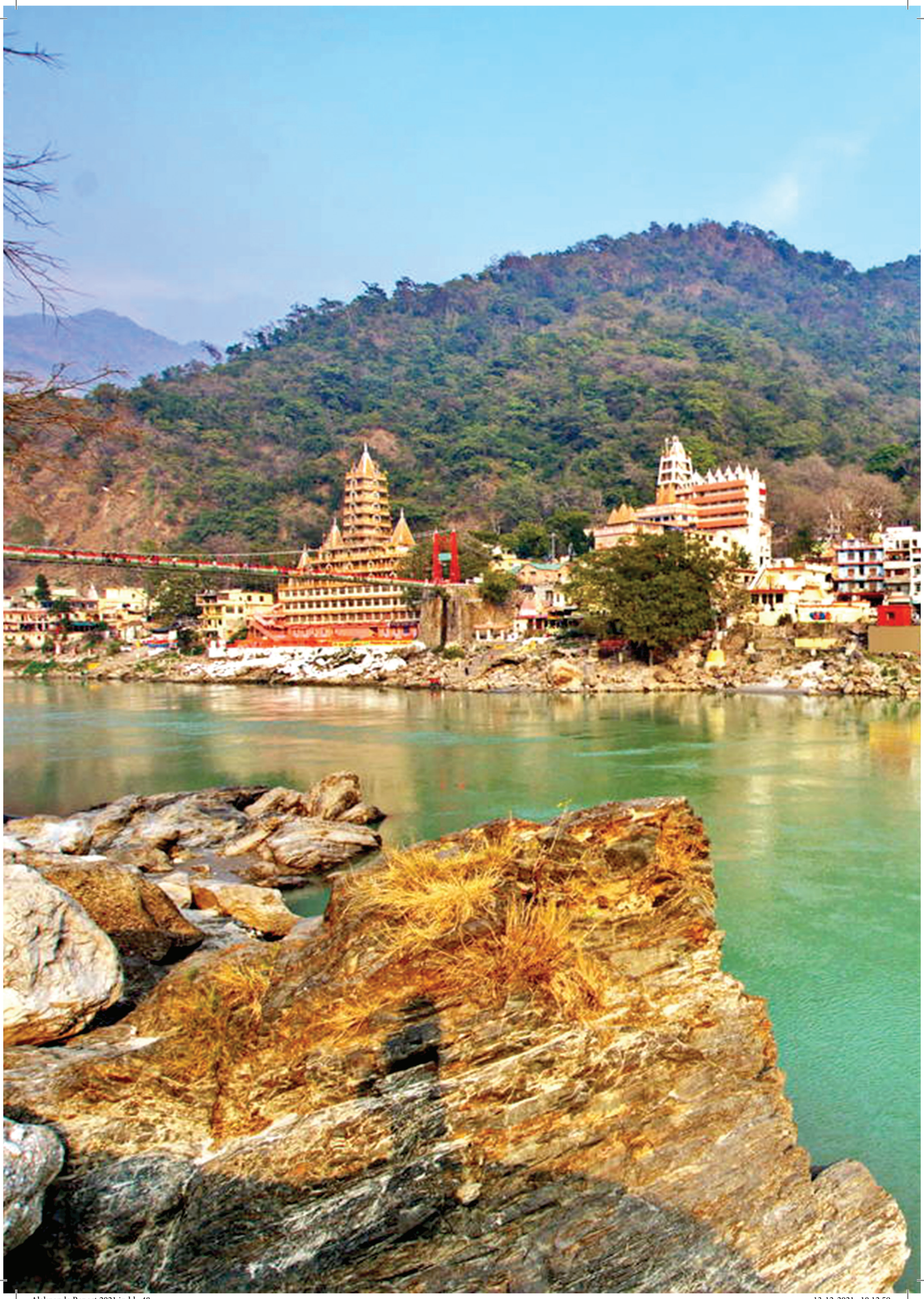


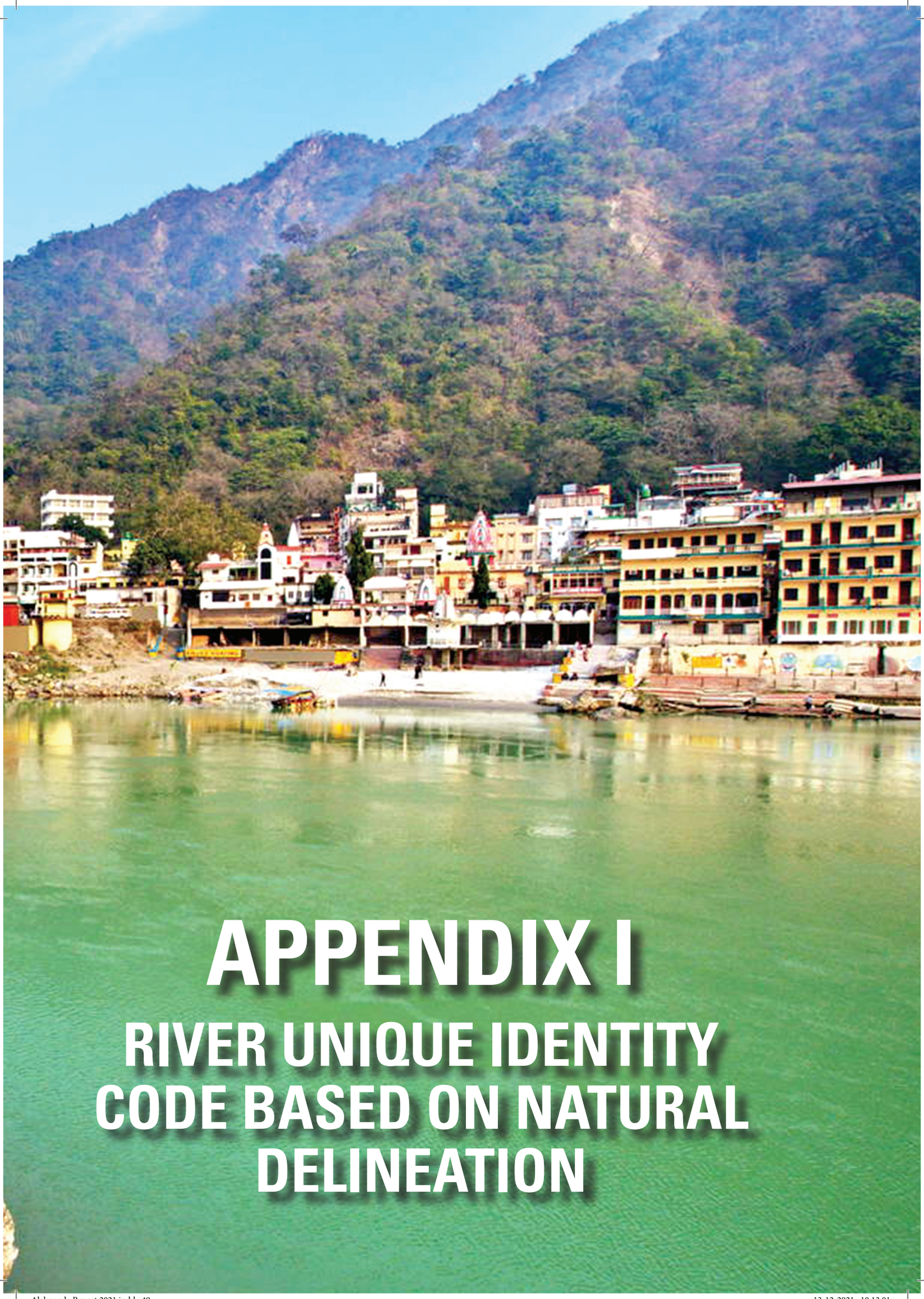
Figure: Bhilangana river network in Bhagirathi basin

FLOW DIAGRAM: BHILANGANA RIVER AND HER TRIBUTARIES



Bhilangana River and Her Tributaries					
S No	Confluence Bank	Length (km.)	Confluence Co-ordinates		Distance from origin (km.)
			Latitude	Longitude	
1	L1	17.1	30.45	78.70	62.6
2	L2	19.4	30.43	78.66	70
3	R1	51	30.43	78.64	73.3
4	L3	5.1	30.42	78.64	74.2





APPENDIX I

RIVER UNIQUE IDENTITY CODE BASED ON NATURAL DELINEATION

RIVER UNIQUE IDENTITY CODE BASED ON NATURAL DELINEATION: ALAKNANDA BASIN

	River Code	Origin Data			Confluence Data				
S.No	Unique Identification Number	Co-ordinate		Ele (m)	Co-ordinate		Ele (m)	Confluence with	Length Of the river (km.)
		Lat	Long		Lat	Long			
1	02-L-01	30.82	79.27	4822	30.15	78.60	471	Ganga River	206
2	02-L-01-R-01	30.71	79.25	5946	30.78	79.41	3922	Alakhnanda River	18
3	02-L-01-L-01	31.02	79.33	5428	30.77	79.49	3159	Alakhnanda River	35.8
4	02-L-01-L-01-L-01	31.06	79.42	5552	30.99	79.38	3935	Saraswati River	9.58
5	02-L-01-L-01-L-02	31.01	79.45	5668	30.97	79.41	4754	Saraswati River	6.84
6	02-L-01-L-01-L-03	31.02	79.49	6011	30.96	79.41	4723	Saraswati River	10.9
7	02-L-01-L-01-R-01	30.95	79.38	5288	30.96	79.41	4682	Saraswati River	3.97
8	02-L-01-L-01-L-04	30.97	79.47	5767	30.95	79.43	4611	Saraswati River	5.6
9	02-L-01-L-01-L-05	30.98	79.54	6091	30.92	79.45	4559	Saraswati River	11.9
10	02-L-01-L-01-L-06	30.90	79.52	5397	30.89	79.46	4187	Saraswati River	6
11	02-L-01-L-01-L-07	30.94	79.59	5920	30.88	79.47	4099	Saraswati River	17.2
12	02-L-01-L-01-R-02	30.92	79.31	5427	30.86	79.47	4016	Saraswati River	19.1
13	02-L-01-L-01-L-08	30.82	79.58	5400	30.83	79.49	3739	Saraswati River	9.36
14	02-L-01-L-01-L-09	30.83	79.59	5500	30.81	79.49	3522	Saraswati River	14
15	02-L-01-L-01-L-10	30.79	79.62	4744	30.80	79.50	3456	Saraswati River	15
16	02-L-01-R-02	30.66	79.39	4882	30.69	79.51	2377	Alakhnanda River	16.7
17	02-L-01-L-02	30.77	79.70	5089	30.62	79.56	1777	Alakhnanda River	24.5
18	02-L-01-L-03	30.93	79.60	6495	30.56	79.58	1446	Alakhnanda	102
19	02-L-01-L-03-R-01	30.87	79.72	5315	30.88	79.78	4474	Dhauli Ganga	6.38
20	02-L-01-L-03-R-02	30.84	79.74	5146	30.87	79.78	4101	Dhauli Ganga	5.55
21	02-L-01-L-03-L-01	30.96	79.75	5139	30.84	79.81	3876	Dhauli Ganga	25.4
22	02-L-01-L-03-R-03	30.83	79.76	4911	30.81	79.80	3790	Dhauli Ganga	5.18
23	02-L-01-L-03-R-04	30.81	79.79	4357	30.81	79.80	3780	Dhauli Ganga	1.1
24	02-L-01-L-03-L-02	30.78	79.91	4733	30.76	79.85	3384	Dhauli Ganga	7.86
25	02-L-01-L-03-R-05	30.86	79.59	5680	30.75	79.83	3239	Dhauli Ganga	30.3
26	02-L-01-L-03-R-06	30.74	79.80	5361	30.73	79.83	3136	Dhauli Ganga	3.88
27	02-L-01-L-03-L-03	30.72	79.80	5087	30.73	79.83	3114	Dhauli Ganga	3.36
28	02-L-01-L-03-L-04	30.72	79.86	3924	30.71	79.85	3027	Dhauli Ganga	1.55
29	02-L-01-L-03-L-05	30.63	80.16	4510	30.70	79.88	2925	Dhauliganga River	33.7
30	02-L-01-L-03-L-06	30.66	79.93	4877	30.68	79.88	2896	Dhauliganga River	5.14
31	02-L-01-L-03-R-07	30.74	79.69	5486	30.68	79.86	2818	Dhauliganga River	23.1

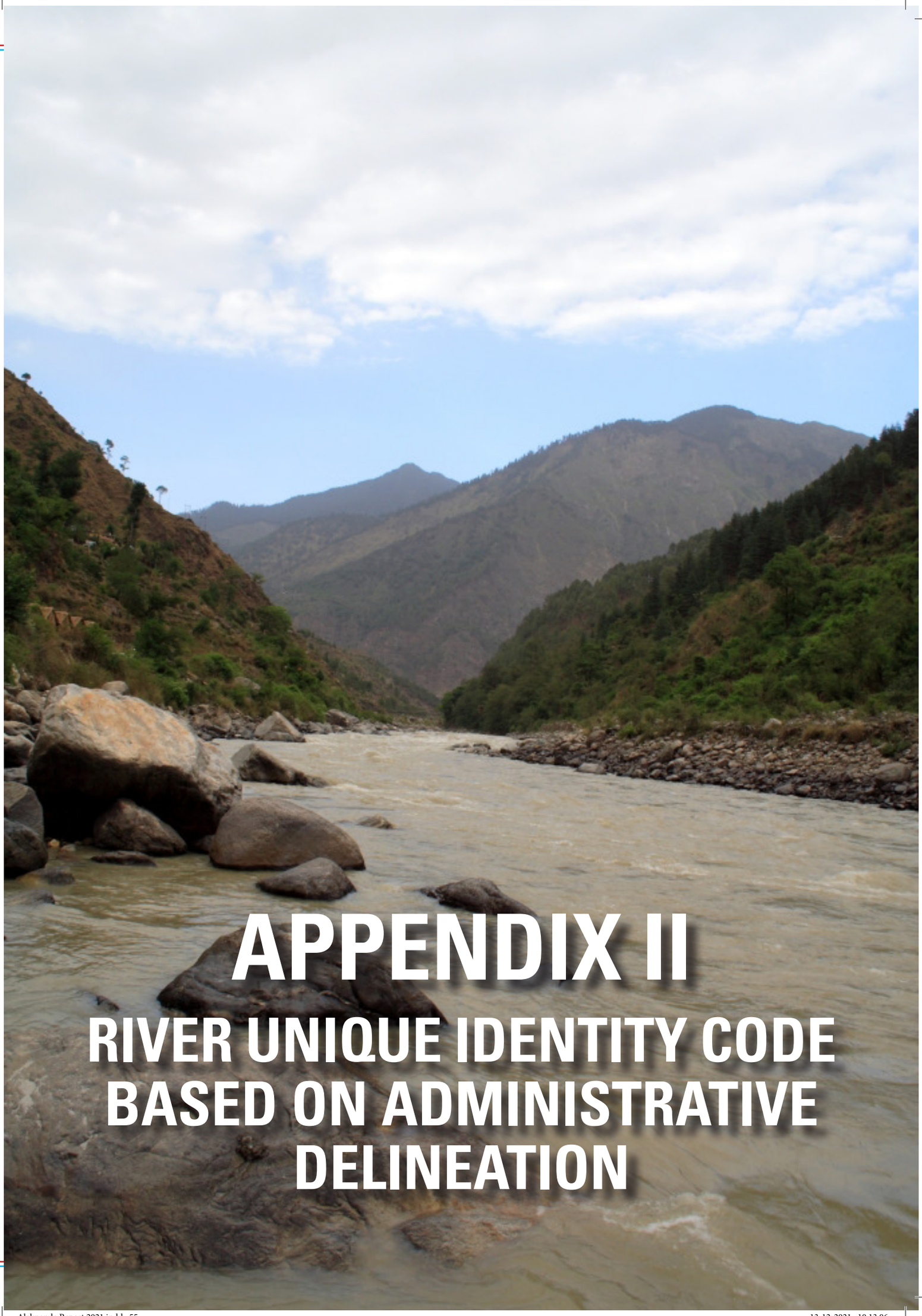
	River Code	Origin Data			Confluence Data				
S.No	Unique Identification Number	Co-ordinate		Ele (m)	Co-ordinate		Ele (m)	Confluence with	Length Of the river (km.)
		Lat	Long		Lat	Long			
32	02-L-01-L-03-L-07	30.53	79.94	4960	30.62	79.82	2619	Dhauliganga River	18
33	02-L-01-L-03-R-08	30.67	79.74	5264	30.60	79.81	2538	Dhauliganga River	10.3
34	02-L-01-L-03-R-09	30.64	79.75	4647	30.60	79.78	2452	Dhauliganga River	7.58
35	02-L-01-L-03-L-08	30.52	79.85	5383	30.58	79.78	2390	Dhauliganga River	12.2
36	02-L-01-L-03-L-09	30.50	79.83	4712	30.53	79.74	2172	Dhauliganga River	10.6
37	02-L-01-L-03-L-10	30.40	80.00	4740	30.49	79.69	1937	Dhauliganga River	37.4
38	02-L-01-L-03-L-10-L-01	30.30	79.95	5743	30.41	79.91	3985	Rishi Ganga	17
39	02-L-01-L-03-L-10-L-02	30.29	79.85	6382	30.43	79.83	3483	Rishi Ganga	17.3
40	02-L-01-L-03-L-10-L-03	30.40	79.76	5282	30.46	79.77	2984	Rishi Ganga	8.22
41	02-L-01-L-03-L-10-L-04	30.31	79.76	5693	30.47	79.73	2332	Rishi Ganga	20.2
42	02-L-01-L-03-L-10-L-05	30.42	79.67	4801	30.47	79.71	2126	Rishi Ganga	7.95
43	02-L-01-L-03-L-11	30.43	79.64	4116	30.50	79.62	1780	Dhauliganga River	9.66
44	02-L-01-L-03-R-10	30.60	79.68	4930	30.54	79.60	1687	Dhauliganga River	12.9
45	02-L-01-R-03	30.65	79.38	5285	30.53	79.51	1299	Alakhnanda River	22.9
46	02-L-01-L-04	30.46	79.56	3483	30.49	79.48	1200	Alakhnanda River	10.9
47	02-L-01-R-04	30.62	79.35	4986	30.46	79.43	1220	Alakhnanda River	25.6
48	02-L-01-L-05	30.34	79.69	4887	30.41	79.39	1040	Alakhnanda River	36.2
49	02-L-01-R-05	30.45	79.35	2771	30.41	79.36	995	Alakhnanda River	6.13
50	02-L-01-R-06	30.56	79.29	4570	30.39	79.32	940	Alakhnanda River	24.9
51	02-L-01-R-07	30.39	79.26	2271	30.36	79.31	922	Alakhnanda	7.95
52	02-L-01-L-06	30.35	79.72	3410	30.33	79.32	858	Alakhnanda River	59.3
53	02-L-01-L-06-R-01	30.33	79.54	3044	30.29	79.52	1668	Nandakini River	5.56
54	02-L-01-L-06-L-01	30.18	79.51	2689	30.26	79.45	1309	Nandakini River	14
55	02-L-01-L-06-R-02	30.33	79.41	1952	30.30	79.37	1040	Nandakini River	7.84
56	02-L-01-L-06-R-03	30.32	79.37	1794	30.31	79.35	994	Nandakini River	3.1
57	02-L-01-L-06-L-02	30.29	79.33	1345	30.31	79.33	951	Nandakini River	2.26
58	02-L-01-L-06-R-04	30.36	79.37	2592	30.31	79.33	925	Nandakini River	8.84
59	02-L-01-R-08	30.47	79.21	2243	30.32	79.30	840	Alakhnanda	24.5
60	02-L-01-R-09	30.32	79.24	1821	30.28	79.24	782	Alakhnanda	5.8
61	02-L-01-L-07	30.30	80.02	3591	30.26	79.22	766	Alakhnanda River	127
62	02-L-01-L-07-R-01	30.25	80.06	5317	30.18	80.00	2599	Pindar	12.7
63	02-L-01-L-07-R-02	30.29	79.92	5524	30.11	79.93	2019	Pindar	20.8

	River Code	Origin Data			Confluence Data				
S.No	Unique Identification Number	Co-ordinate		Ele (m)	Co-ordinate		Ele (m)	Confluence with	Length Of the river (km.)
		Lat	Long		Lat	Long			
64	02-L-01-L-07-R-03	30.16	79.87	4157	30.09	79.89	1913	Pindar	10.5
65	02-L-01-L-07-R-04	30.22	79.81	4880	30.07	79.81	1650	Pindar	19.7
66	02-L-01-L-07-R-05	30.07	79.70	3181	30.02	79.72	1472	Pindar	7.68
67	02-L-01-L-07-R-06	30.06	79.68	2816	30.02	79.68	1395	Pindar	5.52
68	02-L-01-L-07-R-07	30.26	79.74	5002	30.06	79.52	1229	Pindar	35.9
69	02-L-01-L-07-R-07-R-01	30.23	79.61	3022	30.10	79.66	1616	Stream 8	16
70	02-L-01-L-07-R-08	30.10	79.55	2328	30.06	79.52	1228	Pindar	6.66
71	02-L-01-L-07-R-09	30.17	79.59	3201	30.08	79.50	1192	Pindar	19.2
72	02-L-01-L-07-R-09-R-01	30.12	79.48	2518	30.12	79.52	1157	Pindar	5.46
73	02-L-01-L-07-R-10	30.12	79.48	2421	30.09	79.47	1171	Pindar	4.42
74	02-L-01-L-07-R-11	30.17	79.48	2697	30.10	79.44	1117	Pindar	11.1
75	02-L-01-L-07-R-12	30.17	79.46	2634	30.12	79.41	1055	Pindar	10.4
76	02-L-01-L-07-R-13	30.21	79.41	2329	30.17	79.34	937	Pindar	11.1
77	02-L-01-L-07-L-01	30.11	79.23	1655	30.23	79.26	834	Pindar River	21
78	02-L-01-L-07-L-01-L-01	30.11	79.14	2785	30.18	79.21	1125	Stream 1	12.2
79	02-L-01-R-10	30.32	79.21	2051	30.28	79.17	734	Alakhnanda	6.72
80	02-L-01-R-11	30.34	79.18	1408	30.29	79.15	706	Alakhnanda	9.57
81	02-L-01-R-12	30.75	79.06	3970	30.29	78.98	611	Alakhnanda	76
82	02-L-01-R-12-R-01	30.71	78.93	4482	30.63	79.00	1731	Mandakini	15.7
83	02-L-01-R-12-L-01	30.76	79.11	4816	30.55	79.08	1155	Mandakini	26.9
84	02-L-01-R-12-L-02	30.73	79.23	5406	30.54	79.10	1093	Mandakini	28.5
85	02-L-01-R-12-L-03	30.50	79.17	2003	30.49	79.08	983	Mandakini	10.7
86	02-L-01-R-12-R-02	30.58	78.97	3249	30.46	79.07	902	Mandakini	21.7
87	02-L-01-R-12-R-03	30.45	79.00	1893	30.41	79.06	827	Mandakini	8.72
88	02-L-01-R-12-R-04	30.42	78.98	1408	30.39	79.02	774	Mandakini	6.52
89	02-L-01-R-12-R-05	30.63	78.91	3618	30.35	78.97	714	Mandakini	42.4
90	02-L-01-R-12-R-05-R-01	30.44	78.87	2114	30.37	78.93	850	Stream 1	15
91	02-L-01-R-13	30.34	78.80	2087	30.26	78.92	608	Alakhnanda	18.4
92	02-L-01-L-08	30.20	78.84	1448	30.22	78.74	523	Alakhnanda	13.8
93	02-L-01-R-14	30.37	78.67	2266	30.23	78.71	512	Alakhnanda	19.5

RIVER UNIQUE IDENTITY CODE BASED ON NATURAL DELINEATION: BHAGIRATHI BASIN

	River Code	Origin Data			Confluence Data				
S.No	Unique Identification Number	Co-ordinate		Ele (m)	Co-ordinate		Ele (m)	Confluence with	Length Of the river (km.)
1	02-R-01	30.90	79.26	5443	30.91	79.10	4301	Bhagirathi	16.4
2	02-R-01-R-01	30.87	79.04	5399	30.92	79.08	4161	Bhagirathi	8
3	02-R-01-L-01	30.90	78.95	4309	30.99	78.94	3072	Bhagirathi	11.9
4	02-R-01-L-02	31.40	79.14	4300	31.03	78.87	2712	Bhagirathi	62.2
5	02-R-01-R-02	31.45	79.10	5108	31.28	79.11	4148	Jad Ganga	23.6
6	02-R-01-R-02-R-01	31.37	78.95	5589	31.15	79.08	3654	Jad Ganga	31.5
7	02-R-01-R-02-R-02	30.97	79.24	5577	31.12	79.07	3585	Jad Ganga	34.9
8	02-R-01-R-02-L-01	31.05	79.36	5591	31.09	79.26	4564	Nilapani Gad	14.4
9	02-R-01-R-02-L-01-R-01	31.15	79.30	5612	31.11	79.15	3892	Nilapani Gad	26.3
10	02-R-01-R-02-L-01-R-02	31.01	79.13	6724	31.12	79.04	3534	jad Ganga	16.3
11	02-R-01-R-02-L-01-L-01	31.24	78.83	5124	31.11	78.97	3280	jad Ganga	27.5
12	02-R-01-R-02-L-01-R-03	31.19	78.81	4791	31.04	78.75	2492	Bhagirathi	20.4
13	02-R-01-R-03	31.17	78.63	4308	31.04	78.75	2525	Bhagirathi	24
14	02-R-01-R-04	31.18	78.61	5059	31.03	78.72	2469	Bhagirathi	25.8
15	02-R-01-R-05	30.97	78.61	3538	30.97	78.70	2303	Bhagirathi	11.3
16	02-R-01-R-06	30.87	78.87	5139	30.96	78.70	2259	Bhagirathi	20.6
17	02-R-01-L-03	30.90	78.75	3224	30.89	78.67	1973	Bhagirathi	8.51
18	02-R-01-L-04	30.86	78.82	4225	30.88	78.66	1862	Bhagirathi	19
19	02-R-01-L-05	30.83	78.67	3262	30.86	78.65	1768	Bhagirathi	3.99
20	02-R-01-L-06	30.91	78.60	3636	30.84	78.63	1704	Bhagirathi	12.4
21	02-R-01-R-07	30.83	78.56	3179	30.82	78.62	1700	Bhagirathi	6.16
22	02-R-01-R-08	30.79	78.84	3790	30.78	78.62	1519	Bhagirathi	26
23	02-R-01-L-07	30.69	78.61	2899	30.76	78.59	1457	Bhagirathi	9.34
24	02-R-01-L-08	30.70	78.59	2966	30.75	78.57	1429	Bhagirathi	7
25	02-R-01-L-09	30.69	78.57	2277	30.74	78.52	1295	Bhagirathi	8.97
26	02-R-01-L-10	30.81	78.52	2872	30.75	78.47	1222	Bhagirathi	10.1
27	02-R-01-R-09	30.94	78.57	4286	30.76	78.46	1168	Bhagirathi	17.7
28	02-R-01-R-10	30.67	78.54	2448	30.73	78.44	1144	Bhagirathi	13.8
29	02-R-01-L-11	30.85	78.38	2610	30.74	78.41	1093	Bhagirathi	14.7

	River Code	Origin Data			Confluence Data				
S.No	Unique Identification Number	Co-ordinate		Ele (m)	Co-ordinate		Ele (m)	Confluence with	Length Of the river (km.)
30	02-R-01-R-11	30.83	78.34	2759	30.74	78.36	1030	Bhagirathi	12
31	02-R-01-R-12	30.69	78.42	2104	30.69	78.36	968	Bhagirathi	6.49
32	02-R-01-L-12	30.66	78.49	2247	30.68	78.35	929	Bhagirathi	18.3
33	02-R-01-L-13	30.61	78.37	1524	30.63	78.33	885	Bhagirathi	5.71
34	02-R-01-L-14	30.76	78.26	1656	30.61	78.31	859	Bhagirathi	20.2
35	02-R-01-R-13	30.68	78.20	1447	30.65	78.30	1004	Khurmola Gad	14.8
36	02-R-01-R-13-R-01	30.67	78.18	1945	30.66	78.21	1338	Daski Gad	4.58
37	02-R-01-R-13-R-01-R-01	30.68	78.26	1899	30.64	78.24	1220	Daski Gad	5.21
38	02-R-01-R-13-R-01-L-01	30.63	78.19	1649	30.56	78.33	807	Bhagirathi	22.3
39	02-R-01-R-14	30.57	78.41	1918	30.54	78.35	797	Bhagirathi	10.7
40	02-R-01-R-15	30.43	78.28	2507	30.49	78.40	749	Bhagirathi	18.8
41	02-R-01-L-15	30.64	78.49	2143	30.47	78.41	751	Bhagirathi	30.7
42	02-R-01-L-16	30.84	78.93	3790	30.39	78.49	646	Bhagirathi	93.6
43	02-R-01-L-17	30.47	78.81	2528	30.45	78.70	1012	Bhilangana	17.1
44	02-R-01-L-17-L-01	30.37	78.82	1845	30.43	78.66	873	Bhilangana	19.4
45	02-R-01-L-17-L-02	30.71	78.79	3543	30.43	78.64	830	Bhilangana	51
46	02-R-01-L-17-R-01	30.68	78.61	2951	30.58	78.64	1327	Balganga	14.7
47	02-R-01-L-17-R-01-R-01	30.40	78.68	1396	30.42	78.64	840	Bhilangana	5.1
48	02-R-01-L-17-L-03	30.75	79.23	4995	30.15	78.60	467	Ganga River	229



APPENDIX II

RIVER UNIQUE IDENTITY CODE BASED ON ADMINISTRATIVE DELINEATION

RIVER UNIQUE IDENTITY CODE BASED ON ADMINISTRATIVE DELINEATION: ALAKNANDA BASIN

S No	River Code		ENTRY			EXIT			Origin			Confluence			Length Travelled (km.)
	Administrative Code(village)	Administrative Code(Towns)	Lat	Long	Ele. (m)	Lat	Long	Ele. (m)	Lat	Long	Ele. (m)	Lat	Long	Ele. (m)	
1	356-UK-11-XX-YYY-ZZ-02-01		30.77	79.50	3145	30.77	79.50	3143							0.17
2	356-UK-11-XX-YYY-ZZ-02-02		30.77	79.49	3277	30.77	79.49	3225							0.1
3		356-UK-11-02-02-01	30.75	79.50	3094	30.74	79.49	3086							1.7
4	356-UK-11-XX-YYY-ZZ-02-01		30.70	79.50	2800	30.68	79.51	2418							4
5	356-UK-11-XX-YYY-ZZ-02-02								30.66	79.39	4478	30.69	79.51	2379	16.7
6	356-UK-11-XX-YYY-ZZ-02-01		30.68	79.51	2418	30.64	79.53	2060							4.58
7	356-UK-11-XX-YYY-ZZ-02-01		30.64	79.53	2066	30.63	79.55	1793							2.76
8	356-UK-11-XX-YYY-ZZ-02-02		30.65	79.58	2332	30.63	79.57	1944							3.4
9		356-UK-11-02-02-01	30.56	79.58	1438	30.57	79.55	1378							2.3
10		356-UK-11-02-02-02	30.55	79.59	1499							30.56	79.58	1438	1.77
11	356-UK-11-XX-YYY-ZZ-02-01		30.57	79.56	1399	30.56	79.54	1391							2.69
12	356-UK-11-XX-YYY-ZZ-02-01		30.56	79.54	1391	30.53	79.51	1349							4
13	356-UK-11-XX-YYY-ZZ-02-01		30.53	79.50	1273	30.52	79.49	1243							2.23
14	356-UK-11-XX-YYY-ZZ-02-02		30.53	79.49	1599	30.53	79.51	1378							2.13
15	356-UK-11-XX-YYY-ZZ-02-01		30.54	79.52	1385	30.53	79.51	1354							1.16
16	356-UK-11-XX-YYY-ZZ-02-01		30.53	79.51	1341	30.52	79.49	1236							2.47
17	356-UK-11-XX-YYY-ZZ-02-02		30.53	79.51	1372	30.53	79.51	1285							1.9
18	356-UK-11-XX-YYY-ZZ-02-01		30.52	79.49	1238	30.50	79.48	1198							1.82
19	356-UK-11-XX-YYY-ZZ-02-01		30.52	79.49	1255	30.49	79.47	1147							3.52

S No	River Code		ENTRY			EXIT			Origin			Confluence			Length Travelled (km.)
	Administrative Code(village)	Administrative Code(Towns)	Lat	Long	Ele. (m)	Lat	Long	Ele. (m)	Lat	Long	Ele. (m)	Lat	Long	Ele. (m)	
20	356-UK-11-XX-YYY-ZZ-02-01		30.49	79.47	1147	30.49	79.47	1110							2.12
21	356-UK-11-XX-YYY-ZZ-02-02		30.48	79.49	1424							30.49	79.47	1170	2
22	356-UK-11-XX-YYY-ZZ-02-01		30.49	79.47	1130	30.48	79.46	1106							1.11
23	356-UK-11-XX-YYY-ZZ-02-01		30.48	79.46	1149	30.47	79.45	1099							1.93
24	356-UK-11-XX-YYY-ZZ-02-01		30.46	79.43	1092	30.46	79.43	1081							0.84
25	356-UK-11-XX-YYY-ZZ-02-02		30.47	79.43	1159	30.46	79.43	1093							0.44
26	356-UK-11-XX-YYY-ZZ-02-01		30.46	79.43	1082	30.45	79.43	1079							0.46
27	356-UK-11-XX-YYY-ZZ-02-01		30.45	79.43	1106	30.44	79.43	1084							0.99
28	356-UK-11-XX-YYY-ZZ-02-01		30.43	79.43	1080	30.41	79.40	1060							2.95
29	356-UK-11-XX-YYY-ZZ-02-01		30.41	79.40	1056	30.41	79.39	1046							1.89
30	356-UK-11-XX-YYY-ZZ-02-01		30.41	79.38	1028	30.41	79.37	1020							0.91
31	356-UK-11-XX-YYY-ZZ-02-01		30.41	79.37	1020	30.41	79.36	1004							0.98
32		356-UK-11-03-02-01	30.41	79.36	1004	30.39	79.32	942							5.32
33		356-UK-11-03-02-02	30.41	79.36	1062	30.41	79.36	990							0.68
34	356-UK-11-XX-YYY-ZZ-02-01		30.39	79.32	941	30.39	79.32	935							0.48
35	356-UK-11-XX-YYY-ZZ-02-01		30.39	79.32	935	30.39	79.32	931							0.58
36	356-UK-11-XX-YYY-ZZ-02-02		30.39	79.32	967	30.39	79.32	932							0.58
37	356-UK-11-XX-YYY-ZZ-02-01		30.39	79.32	931	30.38	79.32	918							0.89
38	356-UK-11-XX-YYY-ZZ-02-01		30.38	79.32	918	30.36	79.32	885							3.77
39	356-UK-11-XX-YYY-ZZ-02-01		30.36	79.32	885	30.34	79.32	871							1.34
40	356-UK-11-XX-YYY-ZZ-02-01		30.34	79.32	871	30.33	79.32	857							1.4
41	356-UK-11-XX-YYY-ZZ-02-01		30.33	79.31	853	30.31	79.30	825							3
42	356-UK-11-XX-YYY-ZZ-02-02		30.32	79.29	865	30.32	79.30	835							0.56

S No	River Code		ENTRY			EXIT			Origin			Confluence			Length Travelled (km.)
	Administrative Code(village)	Administrative Code(Towns)	Lat	Long	Ele. (m)	Lat	Long	Ele. (m)	Lat	Long	Ele. (m)	Lat	Long	Ele. (m)	
43	356-UK-11-XX-YYY-ZZ-02-01		30.31	79.30	825	30.30	79.30	813							1.24
44	356-UK-11-XX-YYY-ZZ-02-01		30.30	79.30	813	30.30	79.30	811							0.25
45	356-UK-11-XX-YYY-ZZ-02-01		30.29	79.30	810	30.30	79.28	809							1.54
46	356-UK-11-XX-YYY-ZZ-02-01		30.30	79.29	809	30.29	79.28	790							1.32
47	356-UK-11-XX-YYY-ZZ-02-01		30.29	79.28	790	30.29	79.27	787							0.79
48	356-UK-11-XX-YYY-ZZ-02-01		30.29	79.27	787	30.29	79.26	781							1.1
49	356-UK-11-XX-YYY-ZZ-02-01		30.29	79.26	783	30.29	79.25	775							0.92
50	356-UK-11-XX-YYY-ZZ-02-01		30.29	79.25	775	30.28	79.24	772							1.36
51	356-UK-11-XX-YYY-ZZ-02-01		30.28	79.24	769	30.28	79.24	764							1
52	356-UK-11-XX-YYY-ZZ-02-02		30.28	79.24	764							30.28	79.24	761	0.1
53	356-UK-11-XX-YYY-ZZ-02-01		30.28	79.24	766	30.27	79.22	755							2.33
54		356-UK-11-06-02-01	30.27	79.22	752	30.27	79.21	765							0.76
55		356-UK-11-06-02-02	30.25	79.22	779							30.26	79.22	756	1.62
56	356-UK-11-XX-YYY-ZZ-02-01		30.27	79.20	777	30.27	79.19	742							1.51
57	356-UK-11-XX-YYY-ZZ-02-01		30.27	79.19	742	30.27	79.17	730							1.67
58	356-UK-11-XX-YYY-ZZ-02-01		30.27	79.17	734	30.27	79.17	733							0.72
59	356-UK-11-XX-YYY-ZZ-02-01		30.27	79.17	734	30.28	79.17	718							0.73
60	356-UK-13-XX-YYY-ZZ-02-01		30.28	79.17	721	30.29	79.17	714							0.66
61	356-UK-13-XX-YYY-ZZ-02-01		30.29	79.17	714	30.29	79.17	713							0.29
62	356-UK-13-XX-YYY-ZZ-02-01		30.29	79.16	718	30.29	79.15	711							0.85
63	356-UK-13-XX-YYY-ZZ-02-01		30.29	79.15	709	30.29	79.14	724							0.76
64	356-UK-13-XX-YYY-ZZ-02-02		30.30	79.15	737							30.29	79.15	702	1.13
65	356-UK-13-XX-YYY-ZZ-02-01		30.29	79.14	724	30.29	79.14	712							0.94
66	356-UK-13-XX-YYY-ZZ-02-01		30.29	79.13	707	30.29	79.12	695							0.8

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