

**Revised Action Plan
for Rejuvenation of Kalyani River
Stretches**

Priority – III

1. INTRODUCTION

River Kalyani originating from the Tanda forest area of district Nainital and passing through agriculture fields of Pantnagar areas and followed by Integrated Industrial Estate (IIE), Pantnagar. River Kalyani receives wastewater from Common Effluent Treatment Plant (CETP) having installed capacity of 4.0 MLD, however, presently CETP receiving about 2.5 MLD to 2.8 MLD wastewater from 305 industrial Unit. About 193 industrial units are not connected with CETP as conveyer system is not available for those industries. The work of conveyance system is in progress is to be completed by 31-01-2021, however individual industrial units have made their effluent treatment plant (ETP) as per requirement. About 11.5 Km length of River Kalyani along the IIE Pantnagar and downstream of Pantnagar is identified as polluted river stretch. River Kalyanai receives treated wastewater from CETP through its storage lagoon and other industrial units where conveyer system is not available. Apart from these sources, it also receives municipal drains from residential areas of Rudrapur city located downstream of Integrated Industrial Estate (IIE), Pantnagar.

2. WATER QUALITY GOALS:

It is an important aspect for maintain wholesomeness of river Kalyani in context of meeting designated water quality criteria. The natural flow of river Kalyani is very low. As it passes through IIE Pantnagar, it receives industrial wastewater and CETP outlet discharge as well as wastewater from residential areas. It is pertinent to mention that because of low natural flowing water during most of the time, even if the industries located in industrial estate meet the prescribed discharge norms as stipulated under the Environment (Protection) Rules, 1986, **it would not be possible to achieve river water quality of Class 'B'**.

Water Quality Characteristics of River Kalyani:

River quality monitoring is being carried out by the Uttarakhand Pollution Control Board at upstream of IIE Pantnagar at Nagla Road, Pantnagar and downstream at SidculChowki, Pantnagar. Water quality data as given blow:

Water Quality Characteristics of River Kalyani at U/S Pantnagar (2018)

Month	pH	BOD (mg/L)	DO (mg/L)
Jan-18	7.2	3.2	8.2
Feb-18	7.2	2.2	8
Mar-18	River is non –perennial in nature ,during summer season river found dry		
Apr-18	River is non –perennial in nature ,during summer season river found dry		
May-18	River is non –perennial in nature ,during summer season river found dry		
Jun-18	7.2	3.2	7.2
Jul-18	7.6	2.6	7.2
Aug-18	7.6	1.8	7.8
Sep-18	7.5	4	7.2
Oct-18	7.3	8	6.2
Nov-18	7.2	4.2	6.8
Dec-18	7.4	3.2	6.4

Water Quality Characteristics of River Kalyani at D/S Pantnagar (2018)

Month	pH	BOD (mg/L)	DO (mg/L)
Jan-18	7.9	8.2	5.20
Feb-18	7.4	6	5.20
Mar-18	6.98	20	1.80
Apr-18	6.86	80	0.60
May-18	7.1	52	1.20
Jun-18	6.4	48	1.20
Jul-18	7.3	44	1.80
Aug-18	7.8	30	3.20
Sep-18	6.9	34	2.80
Oct-18	7.3	36	2.00
Nov-18	7.6	26	2.60
Dec-18	6.8	30	2.80

Water Quality Characteristics of River Kalyani at U/S Pantnagar (2019)

Month	pH	BOD (mg/L)	DO (mg/L)
Jan-19	7.1	4	6.2
Feb-19	7.7	4	6
Mar-19	7.3	4.6	5.2
Apr-19	7.5	5.2	6
May-19	7.4	4.6	5.8
Jun-19	7.7	4.2	6.4
Jul-19	7.1	6	6.8
Aug-19	7.2	6.2	4
Sep-19	7.2	6	4
Oct-19	7.8	6.2	5.2
Nov-19	7.5	6	4.2
Dec-19	7.4	10	3.2

Water Quality Characteristics of River Kalyani at D/S Pantnagar (2019)

Month	pH	BOD (mg/L)	DO (mg/L)
Jan-19	6.7	24	3.2
Feb-19	6.9	20	2.8
Mar-19	7.6	14	4.8
Apr-19	7.2	12	2
May-19	6.8	10	2.4
Jun-19	7.4	6	2
Jul-19	7.1	4	6.4
Aug-19	7.2	6	6.4
Sep-19	6.5	4	6.5
Oct-19	7.2	6.4	1.8
Nov-19	7	9	2.2
Dec-19	7.3	22	1.8

River Kalyani at Upstream of Pantnagar at Nagla road, (US Nagar) (2020)

Month	pH	BOD (mg/L)	DO (mg/L)	Total Coliforms MPN/100ml
Jan-20	7.2	5.2	6.8	-
Feb-20	7.54	8	4.4	-
Mar-20	8.5	6	2	-
Apr-20	7.4	3	8	-
May-20	7.6	4.6	6.2	-
Jun-20	7.2	6.4	3.1	-
Jul-20	7.8	50	2.8	540
Aug-20	7.3	3.9	7.1	500

River Kalyani at Downstream of Pantnagar (US Nagar) (2020)

Month 2020	pH	BOD (mg/L)	DO (mg/L)	Total Coliforms MPN/100ml
Jan-20	7.3	16	1.4	-
Feb-20	7.16	20	1.6	-
Mar-20	7.9	6.8	2.8	-
Apr-20	7.5	5.2	3.7	-
May-20	7.0	6.4	3.1	-
Jun-20	7.8	8.2	2.9	-
Jul-20	7.4	15	2.5	920
Aug-20	7.45	12	5.8	1600

Basis of Proposed Action Plan for rejuvenation of river Kalyani:

River Kalyani is a spring fed river and river water quality before entering into IIE, Pantnagar, as such not receives any direct source of pollution. Deterioration in water quality is reported mainly because of industrial wastewater and CETP outlet domestic wastewater from residential colonies. Efficient operation of CETP as well as effluent treatment plants of industries which are not connected with CETP, along with interception, diversion and treatment of domestic wastewater drains are matter of grave concerned. Therefore, action plan for prevention and control of pollution of river Kalyani has been prepared based on the following components:

3. IDENTIFICATION OF SOURCE OF WATER POLLUTION:

The proposed action plan for rejuvenation of river Kalyani consisting following components:

3.1 Source Control:

Source control includes industrial pollution control and treatment and disposal of Domestic sewage as detailed below:

(a) Industrial Pollution control:

- i. Identification of pollution potential industries
- ii. Sector specific categorization of industries.
- iii. Assessment of Water consumption and wastewater discharge and gap in treatment of industrial effluent.

- iv. Provision of wastewater treatment system.
- v. Efficient Operation of CETP of IIE Pantnagar.
- vi. Establishment of leftover networking of conveyor system of CETP.

The drainage map of river Kalyani is annexed at Annexure- 01

(b) Sewage Management:

- i. Estimation of quantity of sewage generated and requirement of treatment capacity.
- ii. Gap analysis in terms of sewage generation, existing installed treatment capacity and required treatment capacity.
- iii. Identification of municipal drains & their discharge in the catchment of river Kalyani.
- iv. Interception and diversion of municipal drains to STP.
- v. Treatment and disposal of septage and controlling open defecation.

(c) Solid Waste Management:

- i. Implementation of Door-to-Door collection.
- ii. Source segregation as biodegradable and non-biodegradable wastes.
- iii. Identification of suitable site for setting up common waste processing and secure landfill facility.
- iv. Transportation, disposal and treatment facilities of municipal solid wastes generated from town in accordance of provisions of the Solid Waste Management Rules, 2016.
- v. Restriction on illegal disposal of solid waste along the river bank and flood plain zones.
- vi. Prohibition on burning of solid wastes.
- vii. Implementation of Construction and Demolition Wastes Management Rules.

3.2 Groundwater Water Quality:

- i. Periodic groundwater quality assessment at strategic locations.

3.3 Flood Plain Zone.

- i. Flood plain zoning.

3.4 Ecological/Environmental Flow (E-Flow)

- i. Maintaining E-Flow.

4. RIVER KALYANI REJUVENATION PLAN:

Following are the action plan for rejuvenation of river Kalyani as detailed below:

4.1 Industrial Pollution Control:

The UKPCB is vigil on operation of Common Effluent Treatment Plant (CETP) and individual effluent treatment plants of industries which are located in the area where connectivity to CETP is not available. Grossly polluting industries (GPIs) and other

categories of water polluting industries are motoring closely. There are 03 GPIs operating in the catchment of river Kalyani. Details of GPIs are given as below:

S N	Industry Name	Water Consumption (KLD)	Waste Water Generation (KLD)	Compliance Status
1	Tata Motors Ltd., Sector-1, IIE, Pantnagar (US Nagar)	4600	3840	Comply
2	Ashok Leyland Ltd, IIE, Plot No. 1, Sector-12, Pantnagar (US Nagar).	1500	610	Comply
3	Bajaj Auto Ltd., Plot No. 2, Sector-10, IIE Pantnagar (US Nagar)	395	300	Comply

Category wisenumber of industries operating in the area are as follows: All the unit have valid CCA and complying the norms.

S.N.	Number of Unit			Total	Compliance status
	Red	Orange	Green		
1	99	362	207	688	305 unit are connected to CETP and 193 unit having their own ETP are yet to be connected with CETP. Rest of unit are located out side of the industrial estate and they have their own ETP.

4.2 Networking of Conveyor system of CETP:

There are total of 522 Nos. of industries, out of which 498 industries in operation and 24 industries are under construction in the IIE Pantnagar. 305 Nos. of industries are connected with CETP through common conveyor system, while 193 nos. of industries are not connected with CETP due to non-availability of conveyor network. SIIDCUL has proposed to provide conveyor network of about of 8 Km with approximate cost of Rs. 10.00 Crore. It is proposed that networking would be completed by January 31,2021.

Regular monitoring of CETP outlet will be carried out in order to comply outlet discharge standards as specified under Environment (Protection) Rules, 1986 as amended.

Environmental Surveillance Squad (ESS) also formed at head office level in order to make surprise inspection. Strengthening of ESS will be carried out for effective surveillance.

4.3 Industrial hazardous waste management:

Recyclable hazardous wastes, mainly used oil/contaminated barrels are being recycled through registered recyclers, while landfillable waste is being disposed thorough M/S Bharat Oil and Waste Management Pvt. Ltd. located at Laksar, Distt. Hardiwar with an installed capacity of 667 MT/month landfill. Incinerable waste is either disposed through

common incinerator of 1000 MT/month incineration capacity or through co-processing in cement kilns.

4.3 Sewage Management:

About 37 MLD sewage is generated from the entire city. At present there is no sewerage facility in the town.

UttarakhandPeyjal Nigam has identified 22 major drains which draining to river Kalyani. The details of the drains and BOD load is as follows:

S.No	Name of Drain	Discharge (MLD)	BOD (mg/L)
1	AtariyaMelaNalla(28°59.389'N, 79°24.515'E)	0.23	14
2	AtariyaNalla Ward No. 06(28°59.379'N, 79°24.512'E)	3.22	5.2
3	Near Atariya Bridge Nala(28°59.338'N, 79°24.505'E)	0.51	16
4	Mukherjee Nagar Nala(28°59.290'N, 79°24.517'E)	0.93	11
5	MachhliwalaNala (Azaad Nagar Nala) (28°59.054'N, 79°24.451'E)	5.27	22
6	SamsaanGhatNalla(28°58.982'N, 79°24.399'E)	3.22	24
7	BrihaspatiMandirwalaNalla ward no -09 (28°58.974'N, 79°24.289'E)	2.59	7.1
8	Shiv Nagar Nalla-1(28°58.920'N, 79°24.243'E)	0.04	12
9	Shiv Nagar Iron Bridge Nala(28°58.907'N, 79°24.234'E)	0.06	7
10	Ravindra Nagar WalaNalla -1(28°58.907'N, 79°24.234'E)	0.04	62
11	Kali MandirNallaRavindranagar(28°58.857'N, 79°24.228'E)	0.16	4.7
12	Ravindra Nagar MaidanWalaNalla(28°58.389'N, 79°24.515'E)	0.29	19
13	Shiv Nagar Wala Nalla-2(28°58.879'N, 79°24.294'E)	0.04	12
14	Shiv Nagar Nalla-3(28°58.868'N, 79°24.312'E)	0.04	36
15	Shiv Nagar KhatekoNalla-Ward No. 09 (28°58.793'N, 79°24.265'E)	0.04	92
16	KhatikoNala- 2 (28°58.774'N, 79°24.237'E)	0.16	8.2
17	DD Chowkwalanalla(28°58.686'N, 79°24.167'E)	2.00	9.1
18	Roadways WalaNala (28°58.637'N, 79°24.147'E)	0.16	Closed
19	Dariya Nagar WalaNalla(28°58.528'N, 79°24.149'E)	0.23	112
20	Meat Market walanalla(28°58.373'N, 79°24.111'E)	6.26	5.1
21	Kali MandirNallaRampura(28°57.993'N, 79°24.122'E)	1.11	261
22	RampuraNalla(28°57.883'N, 79°24.139'E)	2.00	13

The water quality of various drains contributing pollution to river Kalyani is as follows:

General Parameters:

S.N.	Name of Drain	pH	BOD	DO	Feacalcolifrom	FeacalStreptococci
1	AtariyaMelaNalla	7.33	14	5.8	540	220
2	AtariyaNalla Ward No. 06	7.33	5.2	6.8	280	170

3	Near Atariya Bridge Nala	7.19	16	2.8	>1600	920
4	Mukherjee Nagar Nala	7.22	11	6.2	540	350
5	MachhliwalaNala (Azaad Nagar Nala)	7.36	22	4.1	>1600	540
6	SamsaanGhatNalla	7.39	24	3.8	>1600	920
7	BrihaspatiMandirwalaNalla ward no -09	7.12	7.1	6.6	540	350
8	Shiv Nagar Nalla-1	7.28	12	6	920	430
9	Shiv Nagar Iron Bridge Nala	7.46	7	6.7	350	240
10	Ravindra Nagar WalaNalla -1	7.13	62	2.8	>1600	920
11	Kali MandirNallaRavindranagar	7.49	4.7	7	210	Absent
12	Ravindra Nagar MaidanWalaNalla	7.4	19	5.4	>1600	540
13	Shiv Nagar Wala Nalla-2	7.47	12	6.3	430	280
14	Shiv Nagar Nalla-3	7.28	36	4	920	350
15	Shiv Nagar KhatekoNalla-Ward No. 09	7.15	92	<1	>1600	>1600
16	KhatikoNala- 2	7.01	8.2	6.6	920	350
17	DD Chowkwalanalla	7.27	9.1	3.8	>1600	540
18	Behind Jaycees Public School (Roadways WalaNala)	Closed				
19	Dariya Nagar WalaNalla	6.93	112	1.4	>1600	540
20	Meat Market walanalla	7.01	5.1	7.2	350	110
21	Kali MandirNallaRampura	7.26	261	<1	>1600	540
22	RampuraNalla	7.4	13	6	920	280

Heavy Metalsparameters :

S.N.	Drain	Cd	Ni	Cr	Zn	Fe	As
1	AtariyaMelaNalla	<0.001	<0.01	0.02	0.09	1.43	<0.01
2	AtariyaNalla Ward No. 06	<0.001	0.01	0.02	0.1	1.37	<0.01
3	Near Atariya Bridge Nala	<0.001	0.01	0.02	0.09	1.9	<0.01
4	Mukherjee Nagar Nala	<0.001	<0.01	0.026	0.09	1.19	<0.01
5	MachhliwalaNala (Azaad Nagar Nala)	<0.001	0.01	0.04	0.09	1.23	<0.01
6	SamsaanGhatNalla	<0.001	0.02	0.02	0.09	1.37	<0.01
7	BrihaspatiMandirwalaNalla ward no -09	<0.001	0.012	0.02	0.11	1.51	0.01
8	Shiv Nagar Nalla-1	<0.001	<0.01	0.03	0.08	1.14	<0.01
9	Shiv Nagar Iron Bridge Nala	<0.001	0.02	0.03	0.13	1.37	0.84
10	Ravindra Nagar WalaNalla -1	<0.001	0.03	0.04	0.24	3.75	0.01
11	Kali MandirNallaRavindranagar	<0.001	0.02	0.02	0.11	1.33	<0.01
12	Ravindra Nagar MaidanWalaNalla	<0.001	0.03	0.04	0.21	2.1	<0.01
13	Shiv Nagar Wala Nalla-2	<0.001	0.01	0.02	0.14	1.27	0.01
14	Shiv Nagar Nalla-3	<0.001	<0.01	<0.05	BDL	<0.10	<0.01
15	Shiv Nagar KhatekoNalla-Ward No. 09	<0.001	0.01	0.02	0.11	1.34	<0.01
16	KhatikoNala- 2	<0.001	0.01	0.03	0.11	1.81	<0.01
17	DD Chowkwalanalla	<0.001	<0.01	0.02	0.08	1.18	<0.01

18	Roadways WalaNala	Closed					
19	Dariya Nagar WalaNalla	<0.001	0.01	0.03	0.12	1.73	<0.01
20	Meat Market walanalla	<0.001	0.01	0.02	0.08	1.15	<0.01
21	Kali MandirNallaRampura	<0.001	<0.01	0.03	0.1	1.3	<0.01
22	RampuraNalla	<0.001	<0.01	<0.05	0.09	1.18	<0.01

The details of Sewage management and proposed action plan is as follows:

S.N.	Name of ULB	Population in 2011	Total Sewage generation MLD		Available sewage treatment facility	Action Plan
			Existing	Expected for 2032		
1	Nagar Nigam Rudrapur	1,75,713	18.9	37.0	No	DPR for Bio-remediation of drains of Rs. 684.18 Lakh to send to NMCG for approval. DPR for STP and interception & diversion under preparation.

4.4 Solid Waste Management:

About 60 MTPD solid wastes is generated from the Rudrapur city. Nagar Nigam, Rudrapur is statutory body responsible for management of solid wastes as per provisions of Solid Waste Management Rules, 2016 as amended. The population of Rudrapur town is 175723 as per census of 2011. Nagar Nigam is divided into 40 wards. 100 % door to door collection is being undertaken. Nagar Nigam has approved Bye Laws for user charges and implemented.

S. N.	Name of ULB	No. of Wards	Quantity of Waste MTD	D-to-D collection	Source segregation	Action Plan
1	Nagar Nigam Rudarpur	40	60	100%	10%	DPR for common disposal facility approved. This facility is cluster with Haldwani disposal side. Work order issued for Bio-remediation of legacy waste

4.5 C & D Waste Management:-

The Uttarakhand Urban Development Department has issued necessary directions to all local body for identification of site for disposal of C& D Waste.

4.6 Ground Water Quality:

So far contamination of groundwater is not reported in the area, however groundwater quality monitoring carried out. The analysis report is as follows, it is proposed at least twice in the year, the monitoring of ground water will be carried out.

General Parameter:

Locations	Parameter (mg/L)					
	pH	EC	TDS	COD	Fluoride	Total Hardness
Upstream of River Kalyani	7.95	488	244	7.8	0.48	216
Downstream of River Kalyani	7.89	351	176	7.8	0.32	140

Heavy Metals parameter:

Locations	Parameter (mg/L)					
	Cd	Cr	Ni	Zn	Fe	As
Upstream of River Kalyani	0.001	0.03	0.01	0.57	1.02	0.01
Downstream of River Kalyani	0.001	0.02	0.01	0.2	1.19	0.01

4.7 Flood Plan Zone (FPZ):

River Kalyani is non perennial river hence no flood plain zone is required as reported by irrigation department, therefore flood plain zoning is not required for river Kalyani.

4.8 Environmental Flow (E-Flow):

River Kalyani carrying very less natural water during non-monsoon months. Wastewater from industries and CETP outlet increases the flow of river. Therefore, it would be difficult to maintain natural environmental flow in the river, however the irrigation department has initiated the measurement of flow and river by October 2020.

4.9 Catchment Area Treatment:

The catchment area treatment of river Kalyani is proposed by CAMPA. The work will be started from 01.01.2021.

4.10 Monitoring of Action Plan:

The proposed Action Plan will be monitored by the River Rejuvenation Committee (RRC) constituted by Government of Uttarakhand vide Office order dated 05.12.2018, under the overall supervision and co-ordination of Principal Secretary, Forest & Environment, Govt. of Uttarakhand. The sub committee will be formed for the periodical monitoring of activities.

4.11 Activities wise Gap Analysis details

Municipal Solid waste

S.no.	Name of ULB	Total Solid Waste	Available facility	Gaps

		Generation (MTD)		
1	Nagar Nigam, Rudrapur	60	No Treatment and disposal facility available	100 %

Municipal Sewage Management

S.no.	Name of ULB	Total Waste Water Generation (MID)	Available Treatment facility	Gaps
1	Nagar Nigam, Rudrapur	37	No Treatment facility available	100 %

Industrial Waste Water Management

S.no.	Name of ULB	No. of Unit				Available Treatment facility	Gaps
		Red	Orange	Green	Total		
1	Nagar Nigam, Rudrapur	99	362	207	688	305 Units are connected with CETP and remaining Units have their own ETP. All the units are complying to norms. SIDCUL has submitted proposal for Connection of remaining units by January 2021.	Nil

Bio-Medical Waste Management

S.no.	Name of ULB	Total No. of HCF	Total BMW Generation (KG/Day)	Available Treatment facility	Gaps
1	Nagar Nigam, Rudrapur	76	120	Common BWM Treatment Facility Gadarpur	Nil

5. ACTION PLAN:

Identified activities and concerned authorities for initiating actions and the time limits and budgetary requirements:

SN	Action plan for rejuvenation of river Kalyani	Agency Responsible for Execution of the Action Plan	Budgetary Requirement (Rs. In Lacs)	Time Target
1. Industrial Effluent Management:				
a)	Routine /surprise inspection GPIs and Red category of industries for ensuring compliance of	Special Environmental Surveillance Task Force / UKPCB	Nil	Continuous activity.

	effluent discharge standards as prescribed under E (P) Rules, 1986, as amended.			
b)	Strengthening of Environment Surveillance Squad (ESS) of UKPCB	UKPCB	Nil	Continuous activity.
c)	Monitoring of drains carrying industrial wastewater and CETP outlet.	UKPCB	Nil	Continuous activity.
2. Networking of Conveyor System of CETP:				
a)	Establishment of leftover 8 Km. conveyor networking leading to CETP.	SIDCUL	960.00	Work order issued and work to be completed by January 31,2021.
3. Sewage Management:				
a)	Interception and diversion of 22- drains.	UttarakhandPeyjalJal Nigam.	DPR under preparation	Two year from sanction of funds..
b)	Installation of 2-Nos. of STPs at – Rampura Trenching Ground (18 MLD) and Ravindra Nagar Maidan (26 MLD).			
c)	Operation and Maintenance of 2 Nos. of STPs for 15 years; Operation and Maintenance of 3 Nos. I&D Works for 15 years; Land acquisition etc. expenses.			
4. Solid Waste Management:				
a)	Door to door collection of solid waste in all 40 wards of town.	Nagar Nigam, Rudrapur.	DPR of Rs. 3873 lakh has been approved with integrated solid waste management Plan withHaldwani Cluster.	Within two year.
b)	Source segregation of wastes in all 40 wards of town.			
c)	Setting up solid waste processing facilities.			

			The DPR of Legacy waste for the amount of 2.10 crore approved and work order issued	
5. Groundwater Quality:				
a)	Groundwater quality monitoring.	UKPCB	-	Monitoring is been carried out twice in the Year
6. Flood Plain Zone:				
a)	River Kalyani is non-perennial water body, therefore flood plain zoning is not required for river Kalyani.			
7. Environmental Flow:				
a)	River Kalyani is non-perennial water body. Irrigation department has initiated the flow measurement of river from October 2020			
8. Catchment area treatment:				
a)	The catchment area treatment of river Kalyani is proposed by CAMPA. The work will be started from 01.01.2021.			

Annexure - 02


