

**Action Plan  
for Rejuvenation of  
River Kosi**

**(River Stretch: Sultanpur Patti to Pattikalan)**

**Distt. US Nagar  
(Uttarakhand)**

**Priority - IV**

**January, 2019**

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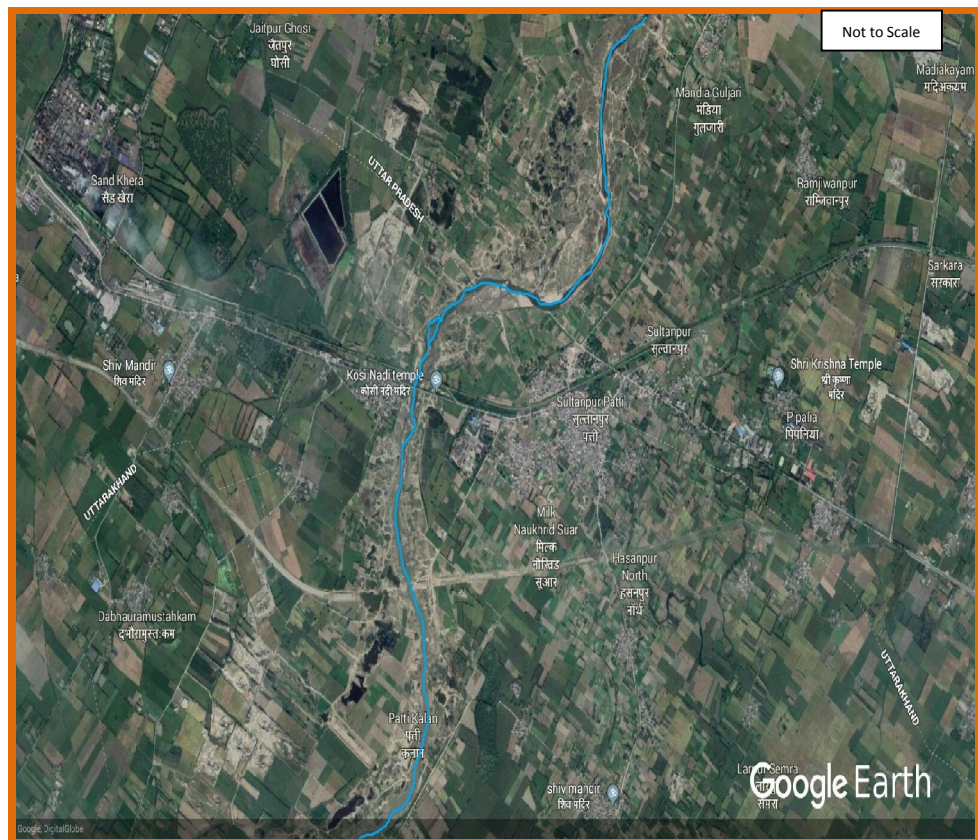
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## 1. INTRODUCTION

The Kosi originates in the middle Himalayas of Kumaon region of Uttarakhand. Kosi river is one of the few major Himalayan rivers that does not have a glacial source. Kosi is the main river of the district Almora and Nainital. River Kosi arising out of Koshimool near Kausani flows on the western side of the district, draining a fair share of Kumaon's abundant monsoons, leaving the hills at Ram Nagar. The Kosi is a perennial river like the Ramganga and its catchment lies partially in Corbett Tiger Reserve. From Mohan through Dhikuli till Ramnagar, the Kosi forms the eastern boundary of Jim Corbett National Park, where many hotels/resorts are located. Kosi river also provides drinking water for wild animals from Corbett Tiger Reserve. use it for drinking. Its bed is strewn with boulders and its flow is erratic and often changes course.

Ramnagar town is main urban settlement in the catchment of Kosi river. Barrage is prepared on river Kosi, where river water is diverted to irrigation and drinking purposes and therefore regulated water flow is maintain from downstream of barrage.



Google image of river Kosi along the Sultanpur Patti and Pattikalan. (Not to scale).

## **2. WATER QUALITY GOALS:**

It is an important aspect for revival of river Kosi at identified polluted river stretch viz. Sultanpur to Pattikalan in context of meeting water quality criteria for bathing. As stated above natural flow of river Kosi is restricted through *barrage at Ramnagar*, wherein river water is diverted for irrigation purposes and drinking purposes, therefore after *Kosi barrage* only restricted river water flows in river Kosi. The said polluted river stretch receives wastewater water from pulp and paper industries through open channel parallel to National Highway, which might be a cause of water quality deterioration.

### **Water quality characteristics of river Kosi at Bazpur Road, Kashipur in the year 2018.**

<b>Month</b>	<b>pH</b>	<b>BOD (mg/L)</b>	<b>COD (mg/L)</b>	<b>DO (mg/L)</b>
<b>Jan-18</b>	7.1	4	14.2	7.2
<b>Feb-18</b>	7.3	2.2	14	7.8
<b>Mar-18</b>	6.8	6	18	6.4
<b>Apr-18</b>	7.48	14	38	4
<b>May-18</b>	7.3	12	32	5.2
<b>Jun-18</b>	7.3	10	28	6.4
<b>Jul-18</b>	7.4	4	12	6.8
<b>Aug-18</b>	7.2	3.2	10	7.2
<b>Sep-18</b>	6.9	3.4	12	7.2
<b>Oct-18</b>	7.2	3.2	10	6.8
<b>Nov-18</b>	7.1	4.8	12	6.6
<b>Dec-18</b>	7.5	2.4	10	7.6
<b>Average</b>	<b>7.21</b>	<b>5.76</b>	<b>17.51</b>	<b>6.6</b>
<b>Min-Max</b>	(6.8-7.5)	(2.2-12)	(10-38)	(4-7.8)

### **Basis of Proposed Action Plan for rejuvenation of river Kosi between Sultanpur to Pattikalan:**

As River Kosi receives industrial wastewater from pulp & Paper industries between identified polluted river stretch, however, it is imperative to keep close watch on those mills along with other small scales commercial activities if any along the said course. Therefore, the action plan for prevention and control of pollution of river Kosi between Sultanpur to Pattikalan has been prepared based on the following components:

### **3. COMPONENTS OF ACTION PLAN:**

The proposed action plan for rejuvenation of river Kosi 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:**

There are 02 Pulp & Paper industries located along the National Highway and wastewater goes through open channel to river Kosi.

Followings are action points for industrial pollution control:

- i. Inventorisation of industries: Two pulp and paper mills are identified and permitted to discharge after tertiary level treatment to channel leading to river Kosi. List of paper mills along with their consented wastewater discharge is given in **Annexure-1**.
- ii. Categories of industry and effluent quality; Quarterly assessment of wastewater is being carried out presently.
- iii. Treatment of effluents, compliance with standards and mode of disposal of effluents; and
- iv. Regulatory regime including "Charter for Prevention and Control of Pollution on Pulp and Paper Industries- 2015".
- v. Action plan for stringent discharge Norms for pulp & paper industries as water for dilution is not available in the river.

##### **(b) Channelization, treatment, utilization and disposal of treated domestic sewage**

Followings are action points for Channelization, treatment, utilization and disposal of treated domestic sewage

- i. Identification of drains & their discharge in the catchment of river Kosi between Sultanpur Patti to Pattikalan.
- ii. Estimation of quantity of sewage generated and requirement of treatment.

- iii. Storm water drains now carrying sewage and sludge joining river Kosi and interception and diversion of sewage to treatment.
- iv. Treatment and disposal of septage and controlling open defecation.
- v. Coverage of piped water supply to all household.
- vi. Control on water consumption through metering system on piped water supply & bore wells.

**(c) Solid Waste Management:**

- (i) Sultanpur Patti is closest urban settlement.
- (ii) Approximately 2.95 MTPD solid waste is generated from the town. Presently collected waste is being dumping in open areas.
- (iii) As per action plan prepared by the Directorate of Urban Development, it is proposed to development waste disposal facility in cluster approach along with four nearby local bodies.

Followings are action points for Solid Waste Management:

- i. Collection, segregation, transportation, disposal and treatment of municipal solid wastes generated from town in accordance of provisions of the Solid Waste Management Rules, 2016.
- ii. MSW processing plant with sufficient treatment capacity should be established in time bound manner.
- iii. Restriction on illegal disposal of solid waste along the river bank, drains and flood plain zones.
- iv. Burning of solid waste should be strictly prohibited.
- v. Strict vigilance on Bio-medical waste generators to restrict mixing of BMW with MSW.
- vi. Construction and demolition wastes should be disposed in designated areas and no case it should be disposed in to river beds or flood plain zone.

**3.2 River catchment/Basin management - Controlled ground water extraction and periodic quality assessment:**

- i. Periodic assessment of groundwater resources and regulation and regulation of ground water extraction by industries particularly in over exploited and critical zones/blocks.

- ii. Ground water re-charging/rain water harvesting.
- iii. Periodic ground water quality assessment and remedial actions in case of contaminated ground water tube wells/bore wells or hand pumps.
- iv. Assessment of the need for regulating use of ground water for Irrigation purposes.

### **3.3 Flood Plain Zone.**

- i. Demarcation and Notification of flood plain zone.
- ii. Regulating activities in flood plain zone.
- iii. No disposal of Municipal, Plastic, Hazardous, Bio-medical and Electrical and Electronic wastes in Flood Plain Zone.
- iv. Greenery development - Plantation plan.

### **3.4 Ecological/Environmental Flow (E-Flow)**

- i. Issues relating to E-Flow.
- ii. Irrigation practices.
- iii. To Explore possibility to maintain minimum E-flow.

## **4. RIVER KOSI REJUVENATION PLAN:**

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

### **4.1 Industrial Pollution Control:**

Following are the action points for sector-wise pollution control: -

#### **(i) Pulp and Paper Industries:**

- (a) Pulp and Paper manufacturing units should not be permitted to dispose polluted or coloured effluents in any drains leading to river Kosi.
- (b) Agro-based pulping should be allowed only with Chemical Recovery Plant (CRP) with Zero Black Liquid Discharge in the catchment area of river Kosi or drains leading to Kosi river.
- (c) Pulp and paper units shall meet Charter criteria as prescribed by Central Pollution Control Board (CPCB) and Uttarakhand Environment Protection and Pollution Control Board (UEPPCB) all the time.
- (d) Proper records of Sludge used for boards making should be maintained. The concerned industry shall ensure that no over-flow from sludge drying bed occurs.



- (e) The inert lime sludge which is presently found disposed near river banks should be prohibited. The possibility of installation of common lime kiln should be explored.
- (f) Considering lean flow or dry condition of river Kosi at identified stretch during summer season, the practise of use of treated effluent into irrigation should be carried out as per Charter. A comprehensive action plan should be prepared by units discharging wastewater into river Kosi.
- (g) Pulp and paper industry should install Sewage Treatment Plant for their domestic sewage. Treated sewage should reuse in gardening/irrigation purpose.

**(ii) Specific Action Points:**

- (a) UEPPCB with the support of District Industry Centre (DIC) shall carryout inventory of industries within two months' time.
- (b) All the industries which are presently in operation without Consent under Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981 as the case may be should be directed by UEPPCB to obtain consent within three months and failing which action should be taken by UEPPCB for closure of all such industrial units.
- (c) All the hazardous waste generating industries or the industries covered under Schedule-I of the Hazardous and Other Waste (Management & Transboundary Movement) Rules, 2016 as amended, should be directed to obtain authorization within a month from UEPPCB and failing which action should be taken by UEPPCB for closure of all such industrial units.
- (d) All the GPls category industries have provided OCEMS at the outlet of ETPs. Industries shall be directed to take measures to transfer real time data with auto validation facilities to the UEPPCB and CPCB with immediate effect.
- (e) No industry should operate or continue manufacturing process unless they possess valid permission for ground water extraction from Central Ground Water Authority (CGWA). All such industries shall obtain groundwater extraction permission from the Central Groundwater Board (CGWA) within three-month time period.
- (f) Small scale/tiny and service providing units located in urban or semi-urban limits like Dairies, Auto Service Stations etc.,



should not be allowed to dispose waste water effluents or sludges into drains, thereby ensuring not causing damages to drains or sewers. Such units should have minimum provision of Oil & Grease traps.

- (g) Drains carrying industrial wastewater shall be monitored regularly by the UEPPCB.
- (h) Burning of any kind of waste including industrial solid waste and agriculture residue should be completely prohibited.

#### **4.2 Treatment of Sewage:**

- (a) Municipal drains leading to river Kosi should be intercepted and sewage diverted for treatment.
- (b) Uttarakhand Jal Nigam would undertake measurement of flow of the drain(s) and formulate detailed project report (DPR) for each drain for treatment within 2 months.
- (c) The flow in each drain should exclude monsoon flow. Further, any drain if receiving fresh water from any escape channel etc, should be examined for its diversion rather than mixing with sewage.
- (d) Treatment plant and its design should be based on its full utilization capacity and ensuring that all the house are connected to sewers.
- (e) The design aspect of treatment plant should include sewage utilization plan, instead of disposal into the drain/river. As directed by the Hon'ble NGT in Ganga matter (Segment 'A') at least 75% sewage should be utilized. For the remaining 25% to be discharged into river, strict standards of BOD and FC should be followed and complied.
- (f) DPRs should be submitted to the River Rejuvenation Committee (RRC) for consideration as a part of Ganga/Yamuna basin management plan.
- (g) Hotels/Restaurants particularly located on road-side should not dispose untreated sewage and solid waste into nearby public drain or rivers, such establishments should be properly regulated and levied with fines as directed by Hon'ble NGT in Ganga matter in case of any violation.
- (h) Drains carrying industrial wastewater shall not be diverted to STPs.
- (i) Septage management protocol shall be strictly followed.

#### **4.3 Solid Waste Treatment and Disposal:**

- (a) Door to Door collection of solid waste shall be carried out and only segregated waste shall be accepted.
- (b) Biodegradable wastes shall be used for composting while recyclable waste shall be sent to registered recyclers.
- (c) Action Plan for Solid waste Management for nearby town(s) as prepared by the Urban Development Directorate, Uttarakhand shall be implemented.
- (d) No case Construction and Demolition waste shall be disposed in river bed or flood plain zone. Nagar Panchayat, Sultanpur Patti shall identify the site for such wastes.

#### **4.4 Ground Water Quality:**

- (a) So far contamination of groundwater is not reported in the area, however groundwater quality monitoring shall be carried out at least twice in the year (winter: December-January and summer: May-June) at three locations to ascertain level of pollutants in groundwater.
- (b) CGWA should identify over exploited and critical blocks in the area with respect to the ground water extraction and industries be directed to comply with CGWA conditions.
- (c) UEPPCB should be vigilant and conduct surprise inspection of the industry to rule out any forceful injection of industrial effluents into groundwater resources or disposal of effluent in rain water recharge pits.
- (d) No industrial unit should be establishment or allowed to continue its operation unless they obtain permission from CGWA for ground water extraction within three month.
- (e) Rain water harvesting of industrial, commercial and other institutions may be insisted upon by CGWA and groundwater recharging with only clean water be encouraged by CGWA.

#### **4.5 Flood Plan Zone (FPZ):**

The Uttarakhand Irrigation Department shall identify/demarcates Flood Plain Zone and regulate the activities. Such regulations would also cover:

- (a) Plantation in Flood Plain Zone (FPZ) – By State Forest Department.
- (b) Checking encroachments – By District/Local Administration.
- (c) Prohibition of disposal of municipal and bio-medical waste particularly in drains – By Local administration.
- (d) State Government may notify FPZ – within six months.

#### **4.6 Environmental Flow (E-Flow):**

- (a) River Kosi carrying restricted flow from Kosi barrage at Ramanagar as river water is diverted for irrigation and drinking purposes through barrage.
- (b) Fresh water flowing through escape channels/small barrages should be checked. Good quality of water should not be used for dilution of pollution unless; required degree of treatment is achieved for municipal sewage and industrial effluents.
- (c) To conserve water and good irrigation practices to be adopted by the farmers for which mass awareness programmes through media be provided in vernacular languages to the farmers by the Uttarakhand State Irrigation and Agriculture Departments.

#### **4.7 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, Environment, Govt. of Uttarakhand.

### **5 ACTION PLAN:**

**Short Term and Long Term Action and the Identified Authorities for initiating actions and the time limits for ensuring compliance:**

<b>S.N.</b>	<b>Action plan for rejuvenation of river Kosi (between Sultanpur Patti to Pattikalan)</b>	<b>Organisation/ Agency Responsible for Execution of the Action Plan</b>	<b>Time Target</b>
<b>1.</b>	<b>Industrial Pollution Control</b>		
	a) Action plans suggested under section - of the draft Action Plan.	UEPPCB	Within Three months.
	b) Inventorisation of the industries in the catchment area of River Kosi covering	DIC, US Nagar & UEPPCB	Within two months.

S.N.	Action plan for rejuvenation of river Kosi (between Sultanpur Patti to Pattikalan)	Organisation/ Agency Responsible for Execution of the Action Plan	Time Target
	assessment on aspects relating to Status of Consents under Water & Air Acts and Authorisation, Effluent Generation, ETP capacities and final mode of effluent discharges.		
	c) Actions against the Identified industries in operation without Consents under Water & Air Acts/Authorisation under the H & OW (M & TM) Rules, 2016 as amended.	UEPPCB	Within three months.
	d) Action against the industries not installed ETPs or ETPs exist but not operating or ETP outlet or treated effluent is not complying with effluent discharge norms.	UEPPCB	Within three months.
	e) Action against the GPs which have not provided continuous real-time effluent quality data to UEPPCB and CPCB.	UEPPCB	Within a month.
	f) Routine /surprise inspection GPs and Red category of industries for ensuring compliance of effluent discharge standards as prescribed under E(P) Rules, 1986, as amended.	Special Environmental Surveillance Task Force / UEPPCB	Regularly.
	g) Small scale/tiny and service providing units located in urban or semi-urban limits like Dairies, Auto Service Stations etc., have minimum provision of Oil & Grease traps.	UEPPCB	Within three months.
	h) Monitoring of drains carrying	UEPPCB	Within a

S.N.	Action plan for rejuvenation of river Kosi (between Sultanpur Patti to Pattikalan)	Organisation/ Agency Responsible for Execution of the Action Plan	Time Target
	industrial wastewater.		month.
	i) Prohibition of Burning of any kind of waste including agro-residue.	Nagar Panchayat, Sultanpur Patti / District Administration	Within a month.
2.	<b>Sewage Treatment &amp; Disposal Plan</b>		
	a) Estimation of total sewage generation, existing treatment facilities, quantum of disposal of sewage presently through drains and the gaps in sewage treatment capacity.	Jal Nigam / Nagar Panchayat, Sultanpur Patti	Within two months.
	b) To undertake measurement of flow of all the drains presently contributing pollution load in river Kosi and formulate Detailed Project Report (DPR) for each drain and submit DPR to RRC. Plan for utilization of treated water (at least 75%) should be a part of DPR. Proposal should include installation of OCEMS & PTZ camera at STP Outlet.	Jal Nigam / Nagar Panchayat, Sultanpur Patti	Within two months.
	c) Channelization including diversion of sewage generated from household / township / villages to sewer lines and interception of all drains (excluding drains carrying industrial wastewater) for ensuring proper treatment.	Jal Nigam / Nagar Panchayat, Sultanpur Patti	Within six months after commissioning of treatment system.
	d) Ensuring dairy / automobile service stations and Hotels/ Restaurants should be connected with sewer line /	UEPPCB / Nagar Panchayat, Sultanpur Patti.	Within three months.

S.N.	Action plan for rejuvenation of river Kosi (between Sultanpur Patti to Pattikalan)	Organisation/ Agency Responsible for Execution of the Action Plan	Time Target
	should have their own treatment system and levy of fine in case of violation.		
	e) Monitoring of STP outlet effluent quality w.r.t. STPs effluent discharge norms prescribed under E(P) Rules, 1986 as amended.	UEPPCB.	After commissioning of STP.
<b>4.</b>	<b>Solid Waste Treatment and Disposal</b>		
	a) Action plan for Solid Waste Management for Sultanpur Patti town prepared by Urban Development Directorate, Uttarakhand shall be implemented. No case collected solid waste shall be disposed illegally into river bed /flood plain zone.	Urban Development Directorate / Nagar Panchayat, Sultanpur Patti.	Within six months.
	b) Door to door collection of solid waste shall be encouraged.	Nagar Panchayat, Sultanpur Patti.	Within a month.
	c) Composting will be made out of bio-degradable waste and recyclable waste shall be disposed thorough registered recyclers.	Nagar Panchayat, Sultanpur Patti.	Within two months.
	d) Construction and demolition waste shall be disposed in designated area/place only. Designated place shall be earmarked by the Local authority.	Nagar Panchayat, Sultanpur Patti.	Within a month.
<b>5.</b>	<b>Ground Water Quality</b>		
	a) Groundwater quality monitoring at three locations during summer (May-June) and winter (December-	UEPPCB	Within a month.

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	January).		
	b) Identification of over exploited and critical area w.r.t. groundwater extraction.	CGWA	Within six months.
	c) To conduct periodic surprise inspection of industries to rule out any forceful injection of industrial wastewater in to groundwater or disposal of wastewater through rainwater recharging pit.	UEPPCB / CGWA	Within two months.
	d) All the industry should be directed to obtain necessary permission for groundwater extraction from CGWA.	UEPPCB /CGWA	Within three months.
	e) Ensure rainwater harvesting by industries, commercial complexes / institutions and groundwater recharging with clean water.	CGWA	Within six months.
<b>6.</b>	<b>Flood Plain Zone (FPZ)</b>		
	a) Demarcation of flood plain zone and notification of Flood Plain Zone	Uttarakhand Irrigation Department.	Within six months.
	b) Plantation in Flood Plain Zone	Uttarakhand Forest Department	Within six months.
	c) Checking encroachment in the FPZ of Kosi River.	District Administration, US Nagar / Nagar Panchayat, Sultanpur Patti	Within three months.
	d) Prohibition of disposal of municipal plastic waste and biomedical wastes particularly in drains and Flood Plain	Local Administration / Nagar Nigam	Within a month.



<b>S.N.</b>	<b>Action plan for rejuvenation of river Kosi (between Sultanpur Patti to Pattikalan)</b>	<b>Organisation/ Agency Responsible for Execution of the Action Plan</b>	<b>Time Target</b>
	Zones.		
<b>7.</b>	<b>Environmental Flow (E-Flow) and Irrigation Practices</b>		
	a) Measurements of Kosi River flow of at upstream of Kosi barrage and downstream of Pattikalan and maintain record.	Uttarakhand Irrigation Department.	Regularly
	b) To conserve water and good irrigation practices to be adopted by the farmers by organising mass awareness programmes through media in vernacular language.	Uttarakhand Irrigation Department / Department of Agriculture.	Regularly.

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**List of GPIs located in the catchment of River Kosi, US Nagar.**

<b>SN</b>	<b>ID</b>	<b>Industry Name</b>	<b>Address</b>	<b>Waste Water Generation (KLD)</b>
1	13189	Cheema Paper Ltd	103,9 Km,Stone, Bazpur Road, Kashipur	2649
2	14197	Multiwal Pulp & Board Mills (P) Ltd.	9th . Km. Stone, Bazpur Road, Kashipur	1230

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