# Revised Action Plan
# for Rejuvenation of Kosi River Stretches

## Priority –IV

## 1. INTRODUCTION

The Kosi originates in the middle Himalayas of Kumaon region of Uttarakhand. Kosiriver 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. Kosiriver also provides drinking water for wild animals from Corbett Tiger Reserve. Ramnagar town is main urban settlement in the catchment of Kosiriver. 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.

The google image of river Kosi along with Sultanpurpatti is annexed at Annexure – 01

## 2. WATER QUALITY GOALS:

It is an important aspect for revival of river Kosi at identified polluted river stretch viz. Sultanpur Patti 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 and drinking purposes, therefore after *Kosi barrage* only restricted river water flows is in river Kosi. The said polluted river stretch receives wastewater from pulp and paper industries through open channel parallel to National Highway and joins river Kosi at downstream of village Mukandpur.

### Water Quality Characteristics of River Kosi:

River quality monitoring is carried out by the Uttarakhand Pollution Control Board at down stream and upstream analysis report is given as bleow:

### River Kosi at Upstream (2018)

| Month | pH | BOD (mg/L) | DO (mg/L) |
|---|---|---|---|
| **Jan-18** | 7.1 | 4 | 7.2 |
| **Feb-18** | 7.3 | 2.2 | 7.8 |
| **Mar-18** | 6.8 | 6 | 6.4 |
| **Apr-18** | 7.48 | 14 | 4 |
| **May-18** | 7.3 | 12 | 5.2 |
| **Jun-18** | 7.3 | 10 | 6.4 |
| **Jul-18** | 7.4 | 4 | 6.8 |
| **Aug-18** | 7.2 | 3.2 | 7.2 |
| **Sep-18** | 6.9 | 3.4 | 7.2 |
| **Oct-18** | 7.2 | 3.2 | 6.8 |
| **Nov-18** | 7.1 | 4.8 | 6.6 |
| **Dec-18** | 7.5 | 2.4 | 7.6 |

**River Kosi at Upstream (2019)**

| Month | pH | BOD (mg/L) | DO (mg/L) |
|---|---|---|---|
| **Jan-19** | 7.2 | 2 | 8.2 |
| **Feb-19** | 7.6 | 4 | 6.2 |
| **Mar-19** | 8.1 | 12 | 8.2 |
| **Apr-19** | 7.4 | 3.4 | 5.8 |
| **May-19** | 7.6 | 3.8 | 6 |
| **Jun-19** | 7.4 | 3 | 6.2 |
| **Jul-19** | 7.6 | 2 | 4.6 |
| **Aug-19** | 7.1 | 2.4 | 6.2 |
| **Sep-19** | 7.1 | 3.4 | 4.6 |
| **Oct-19** | 7.5 | 5 | 4.8 |
| **Nov-19** | 7.1 | 8 | 3 |
| **Dec-19** | 7.3 | 4.6 | 4.2 |

**River Kosi at Upstream (2020)**

| Month | pH | BOD (mg/L) | DO (mg/L) |
|---|---|---|---|
| **Aug** | 7.69 | 4.8 | 6.7 |

**River Kosi at Down stream (2020)**

| Month | pH | BOD (mg/L) | DO (mg/L) | Total coliforms MPN/100ml |
|---|---|---|---|---|
| **May** | 7.8 | 3.6 | 5 | - |
| **June** | 8.1 | 4.6 | 3.2 | - |
| **July** | 7.9 | 4 | 4.2 | 93 |
| **August** | 7.69 | 4.8 | 6.7 | 500 |

## 3. IDENTIFICATION OF SOURCE OF POLLUTION:

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:

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. Regulatory regime including “Charter for Prevention and Control of Pollution on Pulp and Paper Industries- 2015”.

#### (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 Bhela.
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 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 REJUVENATION PLAN:

Following are the action plan for rejuvenation of river Kosi (Sultanpur Patti to Patti Kalan) as detailed below:

### 4.1 Industrial Effluent Management:

The UKPCB is vigil on operation of effluent treatment plants particularly in grossly polluting industries (GPIs) and other categories of water polluting industries. There are 02 GPIs (waste paper based pulp and paper industries) are operating in the catchment of river Kosi. Details of above two GPIs are given as below:

| SN | Industry Name | Water Consumption (KLD) | Wastewater Generation (KLD) | Compliance Status |
|---|---|---|---|---|
| 1 | Cheema Paper Ltd, 9- Km,Stone, Bazpur Road, Kashipur | 3530 | 2649 | Comply |
| 2 | Multiwal Pulp & Board Mills (P) Ltd., 9th . Km. Stone, Bazpur Road, Kashipur | 3250 | 1230 | Comply |

Treated wastewater of above two wastepaper based pulp and paper industries runs parallel through open channel to the national highway and thereafter passes through underground drain and joins river Kosi at downstream of village Mukanpur.

Category wise number 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 | 03 | 21 | 05 | 29 | All units have their own ETP. |

GPIs are being monitored in every quarter apart from other surprise inspection. Online effluent monitoring systems have also been provided at effluent outlet and real time data are being transmitted to Central Pollution Control Board andUKPCB.

There are one industrial drain coming towards river Kosi from industries at joining at downstream of village Mukandpur. Drain carries about 3879 KLD wastewater from above said two GPIs.

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.

## 4.2 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 Domestic Sewage Management:

About 0.064 MLD sewage is generated from the entire city. At present there is no sewerage treatment facility is available in the town. The details of Sewage management and proposed action plan is as follows:

| S.N. | Name of ULB | Total Sewage generation MLD | | Available treatment facility | Action Plan |
|---|---|---|---|---|---|
| | | Existing | Expected for 2032 | | |
| 1 | Nagar PalikaSultanpur Patti | | 0.064 | No | DPR for Bio-remediation of drains of Rs. 8 Lakh to send to NMCG for approval.<br><br>DPR for STP and interception & diversion of Rs. 1374 lakh is prepared and send to NMCG for approval. |

UttarakhandPeyjal Nigam has identified 01 major drains which draining to river Kosi. The details of the drains and analysis report is as follows:

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

**General Parameters**:

| S.N. | Drain | Discharge MLD | pH | BOD Mg/l | DO Mg/l | Faceal Coliform MPN/l00 ml | FacealSteptrococci MPN/l00 ml |
|---|---|---|---|---|---|---|---|
| 1 | MukundpurNala | 86.94 | 7.01 | 18 | 4.7 | 540 | 210 |

**Heavy Metals**

| S.N. | Drain | Cd Mg/l | Cr Mg/l | Ni Mg/l | Zn Mg/l | Fe Mg/l | As Mg/l |
|---|---|---|---|---|---|---|---|
| 1 | MukundpurNala | 0.001 | 0.02 | 0.01 | 0.15 | 2.36 | 0.01 |

## 4.4 Solid Waste Treatment:

Total 2 MTD solid wastes is generated from the Nagar Panchayat, Sultanpur Patti is statuary body responsible for management of solid wastes as per provisions of Solid Waste Management Rules, 2016 as amended. The population of Nagar Panchayat, Sultanpur Patti is 9881 as per census of 2011. Nagar Panchayat, Sultanpur Patti is divided into 07 wards. 100% door to door collection is being undertaken.

| S. N. | Name of ULB | No. of Wards | Quantity of Waste MTD | D-to-D collection | Source segregation | Compliance status |
|---|---|---|---|---|---|---|
| 1 | Nagar Panchayat, Sultanpur Patti | 07 | 2.0 | 100% | 0% | DPR of Rs 13.99 Crore for common disposal facility is prepared and send to GoI. This facility is integrated with Gadarpur cluster. |

## 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. The office order issued is annexed at Annexure – 01

## 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 Kosi | 7.94 | 412 | 206 | 7.6 | 0.45 | 180 |
| Downstream of River Kosi | 7.59 | 789 | 338 | 6.2 | 0.42 | 249 |

**Heavy Metals**

| Locations | Parameter (mg/l) | | | | | |
|---|---|---|---|---|---|---|
| | Cd | Cr | Ni | Zn | Fe | As |
| Upstream of River Kosi | 0.001 | 0.02 | 0.01 | 0.13 | 1.08 | 0.01 |
| Downstream of River Kosi | 0.001 | 0.01 | 0.01 | 0.05 | 0.98 | 0.01 |

## 4.7Flood Plan Zone (FPZ):

The department of irrigation has proposed to prepare Flood Plan Zoning of River Kosi with own resources.

## 4.8 Environmental Flow (E-Flow):

River Kosicarrying the natural water during all seasons. The irrigation department has initiated measurement of flow from October 2020.

## 4.9 Monitoring of Action Plan:

The proposed Action Plan will be monitored by the River RejuvenationCommittee (RRC) constituted by Government of Uttarakhand vide Office orderdated 05.12.2018, under the overall supervision and co-ordination of PrincipalSecretary, Forest & Environment, Govt. of Uttarakhand

## 4.10 Activities wise Gap Analysis details

**Municipal Solid waste**

| S. no. | Name of ULB | Total Solid Waste Generation (MTD) | Available facility | Gaps |
|---|---|---|---|---|
| 1 | Nagar PalikaParishad, Sultanpur Patti | 2 | 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 PalikaParishad, Sultanpur Patti | 0.064 | 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 PalikaParishad, Sultanpur Patti | 03 | 21 | 05 | 29 | All the units have their own ETP and are complying to norms | 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 PalikaParishad, Sultanpur Patti | 20 | 13 | 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 Kosi | Agency Responsible for Execution of the Action Plan | Budgetary Requirement (Rs. In Lacs) | Remarks |
|---|---|---|---|---|
| **1. Industrial Effluent Management:** | | | | |
| a) | Routine /surprise inspection GPIs 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 / UKPCB | Nil | Continuous activity. |
| b) | Strengthening of Environment Surveillance Squad (ESS) of UEPPCB | UKPCB | Nil | Continuous activity. |
| c) | Monitoring of drains carrying industrial wastewater. | UKPCB | Nil | Continuous activity. |
| **2. Sewage Management:** | | | | |
| a) | Interception and diversion of MukundpurNala | | **1382.06** | Proposed activities will be completed in two years from sanction and release of funds. |
| b) | Installation of STP of 110 KLD capacity at Mukundpur | | | |

| | | | | |
|---|---|---|---|---|
| c) | Operation and Maintenance of STP for 15 years; Operation and Maintenance of I&D Works for 15 years; Land acquisition etc. expenses | UttarakhandPeyjalJal Nigam | | |
| **3. Solid Waste Management:** | | | | |
| a) | Door to door collection of solid waste in all 40 wards of town. | Nagar PalikaParishad, Sultanpur Patti | DPR of Rs 1399.00 has been send Govt. of India for approval.(The facility is integrated with Gadarpur Cluster) | Proposed activities will be completed in two years from sanction and release of funds |
| b) | Source segregation of wastes in all 40 wards of town. | | | |
| c) | Setting up solid waste processing facilities. | | | |
| **4.Groundwater Quality** | | | | |
| a) | Groundwater quality monitoring at during summer (May-June) and winter (December-January). | UKPCB | - | Twice in a year |
| **5. Flood Plain Zone:** | | | | |
| a) | Flood plain zoning of Rivers Gola (along Kichha town) and Kosi (from Sultanpur Patti to Patti Kalan). | Irrigation Department | The department of irrigation has proposed to prepare Flood Plan Zonning of River Kosi with own resources. | Work will be completed within 18 months after approval . |
| **6. Environmental Flow:** | | | | |
| a) | River Kosicarrying the natural water during all seasons and restricted flow during the non-monsoon periods is maintained. | | | |
| **7. Catchment are treatment:** | | | | |
| a) | The catchment are treatment of the river is proposed to be carried out through CAMPA, the work will be initiated from January 2021. | | | |

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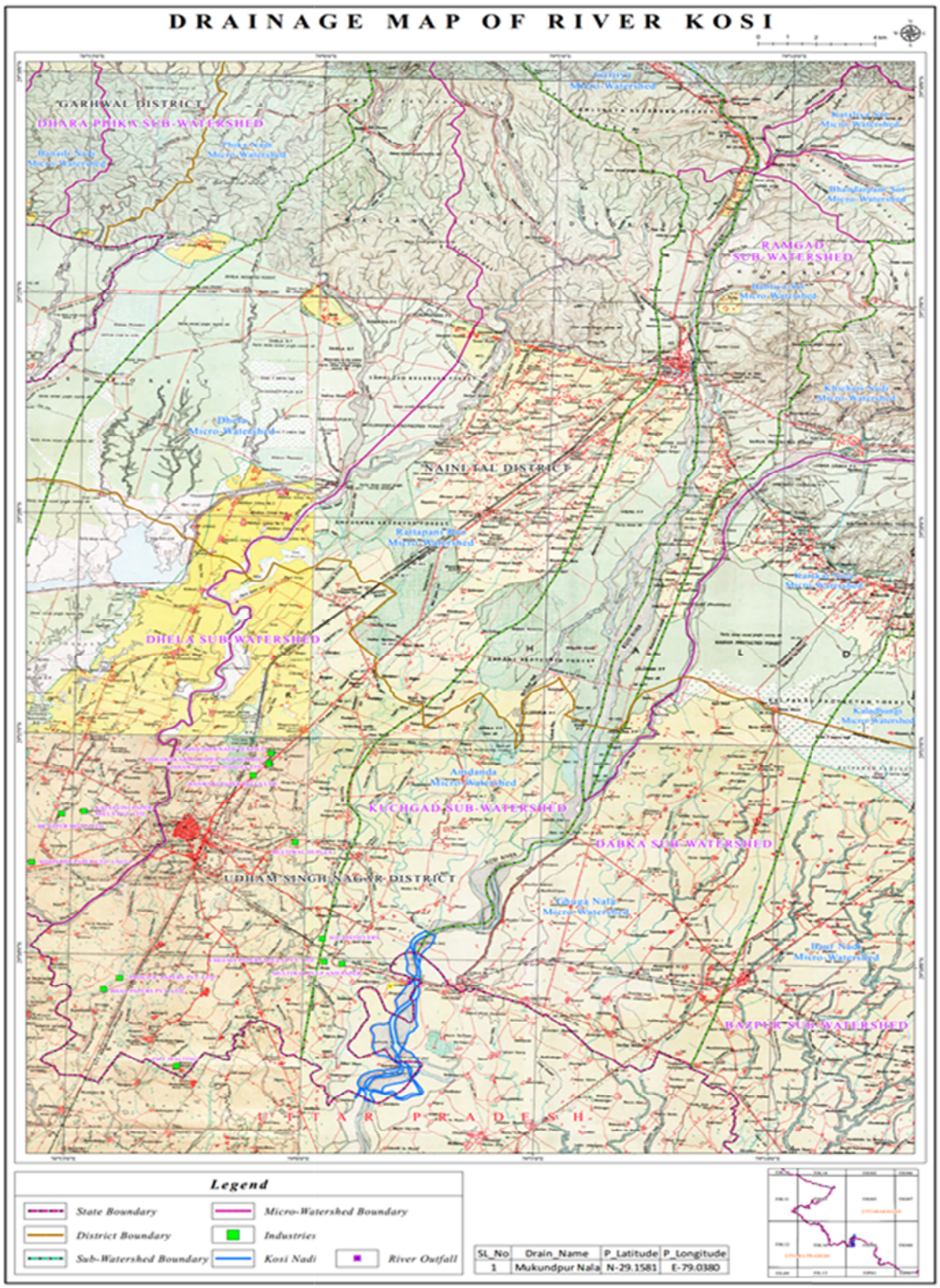
**Annexure - 01**

**Annexure - 02**


DRAINAGE MAP OF RIVER KOSI
GARHWAL DISTRICT
DHARA-PHIKWA SUB-WATERSHED
RAMGAD SUB-WATERSHED
NAINI TAL DISTRICT
DHELA SUB-WATERSHED
KUCHGAD SUB-WATERSHED
DABKA SUB-WATERSHED
UDHAM SINGH NAGAR DISTRICT
BAZPUR SUB-WATERSHED
U T T A R P R A D E S H
Legend
State Boundary
District Boundary
Sub-Watershed Boundary
Micro-Watershed Boundary
Industries
Kosi Nadi
River Outfall
SL_No Drain_Name P_Latitude P_Longitude
1 Mukundpur Nala N-29.1581 E-79.0380

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