National Mission on Himalayan Studies (NMHS)

NMHS Annual Progress Report (April 2021- March 2022) Revised

1. Project Information

Project ID:	NMHS-2018/SGP - 01	**Sanction Date:**	21.12.2018

Project Title:	Rejuvenation the Kosi River of Kumaun Himalaya through field intervention and people's participation
BTG:	Water Resource Management

PI and Affiliation (Institution):	**Shri Kailash Nath Tiwari** Principal Investigator District Developmental Officer (DDO) Vikas Bhawan, Almora, Uttarakhand
Name & Address of the Co-PI, if any:	**Dr. Vasudha Agnihotri** Co-Principal Investigator Scientist – D GB Pant National Institute of Himalayan Environment & Sustainable Development, Kosi Katarmal, Almora, Uttarakhand

Structured Abstract - detailing the current year progress [Word Limit 250 words]:	Kosi River is the life line of Almora City and villages, as it serves all types of water requirements for lakhs of people who live in the command area of the river. It is mainly a rain fed river, and for last few years the volume of water in the river is decreasing and has reached up to a critical condition. The mountain aquifers that have been serving as source of water into the river have now became aquitards. The number of springs ('naula' or 'srot' in the region), that supply the water in the river have reduced to almost less than half in past few decades. Addressing such issues, this project was sanctioned with following objectives: • To supplement and support water conservation activities for rejuvenation of the Kosi River • To monitor the water availability in the Kosi River and its tributaries through flow and discharge measurements along with quality measurement • To develop the conservation models in selected villages and schools in 2 (1-remaining) recharge zones of Kosi River Watershed • Creation of an Institution for monitoring Kosi River system • Skill capacity building of the local youth (SC/ST/Women) as a Tourist Guide and other activities in the upper Kosi-watersheds. 14 recharge zones have been identified, which are being worked up with convergence of various departments in the district focussing mainly on Hawalbagh & Takula block. Two main approaches mechanical & biological treatment is being implemented, in convergence with NMHS-SGP Kosi River rejuvenation Project.

	Methodology: Preliminary studies regarding site selection were done using modern approach of GIS techniques. A total of 14 recharge zones (micro-watershed) covering an area of about 179 sq. km. have been identified. Works for rejuvenation of Kosi River are being undertaken under two components, i.e. Biological & Mechanical measures. Biological measures involve plantation of tree saplings and the grass plantation to hold the soil cover and increase infiltration of rain water. Check Walls and wired fencing are being done to protect the saplings from animals and forest fires. Apart from this, mechanical measures involve digging of Infiltration Holes, Infiltration Trenches, Ponds to retain the runoff during rainfall over mountain slopes. Concrete Check dams and Bio-check dams are being constructed at specific sites such as in second / third order streams flowing down the steep gradient. **Result:** About 180 million litres / year of rainwater conservation capacity has been developed through aforementioned structures. **Conclusion:** Our theoretical analysis suggests with continued efforts replenishment of aquifers will lead to revival of springs & hence the Kosi River, and work for reaching the target is still ongoing. **Recommendations:** Since Rejuvenating a River is a herculean task, hence it has been recommended by several authorities in State & Central Governments to make it a long term project, with the initial extention of 5 years with additional grants.

Project Partner Name	Affiliations	Role & Responsibilities
Dr.Vasudha Agnihotri	GB Pant National Institute of Himalayan Environment,Kosi Katarmal, Almora, Uttarakhand- 263643	Continuous monitoring of water resources in Gadhwali & Simtola recharge zones (approx. 147 hectares area), and to estimate effect of water conservation structure, prepared by district administration, on quantiy and quality of water through hydrochemical studies.

2. Project Site Details

Project Site:	14 Recharge Zones (Deolikhan, Simtola, Riyuni, Dharpani, Kausani, Binasar, Jariyakholi, Gananath, Mayolikhan, Dinapani, Syahidevi, Lod Bhatina, Airadeo, Chuniya) Pilot Project sites were selected in Deolikhan & Simtola recharge zone of Kosi watershed		
IHR States Covered:	Uttarakhand		
Long. & Lat.:	S.No	Recharge Zones	Co-ordinates of Centroids of Polygons

			Latitude	Longitude
	1.	Simtola	29° 36' 53.9665" N	79° 41' 07.5662" E
	2.	Deolikhan (Gadhwali)	29° 38' 27.3303" N	79° 34' 54.1273" E
	3.	Dharpani Dhar	29° 51' 17.6425" N,	79° 30' 41.5332" E
	4.	Kausani	29° 50' 34.3705" N,	79° 37' 01.2506" E
	5.	Binasar	29° 50' 34.3705" N,	79° 37' 01.2506" E
	6.	Jariyakholi	29° 47' 02.0362" N,	79° 40' 45.8706" E
	7.	Gananath	29° 44' 39.8416" N,	79° 40' 35.9680" E
	8.	Mayolikhan	29° 42' 19.3613" N,	79° 43' 38.1363" E
	9.	Dinapani	29° 40' 05.9927" N,	79° 41' 17.9162" E
	10.	Siyahidevi	29° 34' 57.4247" N,	79° 33' 20.5109" E
	11.	Riyuni	29° 40' 32.2515" N,	79° 32' 07.0756" E
	12.	Chuniya	29° 46' 22.9585" N,	79° 33' 24.3919" E
	13.	Airadeo	29° 43' 07.6378" N,	79° 34' 37.1060" E
	14.	Lod Bhatina	29° 48' 52.8218" N,	79° 33' 46.4827" E
Site Maps* (No.):	14 maps (Figure 1 a-g; Annexure – I), Pilot project sites (02) (Figure 4; Annexure II)			
Site Photographs* (No.):	Site photographs in Annexure II			

*Attach a separate Descriptive Annexure/ Files (.JPG, .TIFF, etc.).

3. Project Activities Chart w.r.t. Timeframe [Gantt or PERT]

S.No.	Activities	2020-21												
		Feb-20	Mar-20	Apr-20	May-20	Jun-20	Jul-20	Aug-20	Sep-20	Oct-20	Nov-20	Dec-20	Jan-21	Feb-21	Mar-21
1	Re-recruitment of Project Staff														
2	Project Work & Other Official Works														
3	Intervention Activity (Monitoring other activities)														
4	Plantation Activity														
5	IEC Activities, Skill Building and Awareness Programmes														

4. Financial and Resource Information

Note: A separate bank account is expected to be opened for NMHS Project as per the provision of Direct Beneficiary Account (DBA) as laid out by the Govt. of India and also facilitate the audit of accounts. The interest earned out of the NMHS project funds should be reported clearly in the utilization certificate.

Total Grant:	3,04,94,400.00	Grant Received Date:	01-02-2019
1st Installment	1,48,40,800.00		

Project Partner(s)	Affiliations/ Institution	Budget Allocated to	Work Done by each Project Partner
Partner 1	GB Pant National Institute of Himalayan Environment	Dr. Vasudha Agnihotri Scientist – D Co- Principal Investigator	All scientific works of water quantity and quality monitoring, site survey, geological and geophysical surveys etc.
Partner 2	Department of Horticulture, Vikas Bhawan, Almora	Chief Horticulture Officer	Preparation of nurseries, and ensuring availability of plant saplings for mega plantation activities.
Partner 3	Department of Agriculture, Vikas Bhawan, Almora	Chief Agriculture Officer	For creating and ensuring availability of plant saplings for mega plantation activities.
Partner 4	Department of Education	Chief Education Officer	Organizing mass awareness programmes for 'Saving Kosi River' in institutions and schools at district level.

Project Staff Information:

S. No.	Name	Qualification	Designation	Fellowship/ Wages paid	Remarks
1.	Shivendra Pratap Singh	M.Sc. (Applied Geology) Ph.D. (pursuing)	Project Coordinator	48,600.00	
2.	Devendra Chauhan	M.Sc. (Geology)	Senior Project Fellow	23,800.00	
3.	Nazia Parveen	M.Sc. (Geology), Ph.D. (pursuing)	Field Officer	23,800.00	
4.	Gopal	B.A.	Field Assistant	10,000.00	
5.	Munna	B.A.	Field Assistant	10,000.00	

5. Equipment and Asset Information

S. No.	Equipment Name (Qty)	Details (Make/ Model)	Cost (`)	Date of Installation	Photographs of Equipment*	Lowest Quotation, if not purchased
	Equipment 1	**No New Equipment Purchased**				

***Note*: Attach a Descriptive Annexure/ File separately.**

6. Expenditure Statement and Utilization Certificate

Please update the annual Expenditure Statement and Utilization Certificate (UC) periodically.

Expenditure Information: (up to 31/12/2021)

S. No.	Financial Position/Budget Head	Funds Sanctioned (1st Grant)	Expenditure	% of Total cost
I	Salaries/Manpower cost	12,40,800.00	26,29,268.00	211.90
II	Travel	4,00,000.00	60,798.00	15.19
III	Expendables &Consumables			
IV	Contingencies	3,00,000.00	2,85,663.00	95.22
V	Activities & Other Project cost	1,20,00,000.00	96,79,160.60	80.65
VI	Institutional Charges			
VII	Equipments	9,00,000.00	8,99,941.00	99.99
	Total	1,48,40,800.00	1,35,54,830.00	91.33
	Interest accrued	29,084.00		
	Grand Total	1,48,69,884.00		

Period	Expenditure Statement*	Utilization Certificate (UC)*
Annual	Submitted	Submitted

***Attach the descriptive Annexure/ File in the prescribed NMHS format.**

7. Project Beneficiary Groups

Beneficiary Groups [Capacity Building]	Target	Achieved
No. of Beneficiaries with income generation:	**200 (for 3 years)**	**0**
No. of stakeholders trained, particularly women:	**70 (for 3 years)**	**0**
No. of capacity building Workshops/ trainings:		**3 Workshops & Trainings**
No. of Awareness & outreach programmes:		**17**

No. of Research/ Manpower developed:	2	2

8. Project Progress Summary* (as applicable to the project)

Description	Total (Numeric)	Description **(Name of descriptive Annexure/ File attached) ***
IHR States Covered	1	• Uttarakhand
Project Site/ Field Stations Developed:	14/ 2 field stations (Annexure I)	Annexure I Maps & Figures II & III and Annexure II (Works done in 14 Rcharge Zone Table - I)
No. of Patents filed (Description):	N/A	•
Article/ Review/ Research Paper/ Publication:	1	Chauhan Devendra Kumar, Singh Shivendra Pratap, Agnihotri Vasudha, Kumar Kireet (2019). Water quality of springs in Deolikhnan recharge zone of Kosi watershed. ENVIS bulletin, 27, 25-28.
New Methods/ Modelling Developed (description in 250 words):		•
No. of Training (No. of Beneficiaries):		•
Workshop:	*1*	•
Demonstration Models (Site):	*Under development*	• 2 sites
Livelihood Options:		•
Training Manuals:		• N/A
Processing Units:	.... (attach photos)	• N/A
Species Collection:		• N/A
Species identified:		• N/A
Database (Numeric/Images/GIS Maps, etc.):		Annexure I, II & III

***Attach a separate descriptive Annexure/ File.**

***Note*: Numeric Database should be provided in .xls format. Photos/Maps should be submitted in high quality (min. 300 dpi res.) compatible formats *viz.*, JPEG, .JPG, .PNG, .SHP, etc. along with suitable figure legend/ caption.**

9. Project Linkages (with concerned Institutions/ State Agencies)

S. No.	Institute/ Organization	Type of Linkages	Brief Description
1.	GB Pant National Institute of Himalayan Environment	Scientific Research & Development	----

***Note*: Attach a separate, descriptive Annexure/ File.**

		Garnet which are found embedded in Garnetiferous Mica Schist.	
3. To develop the conservation models in selected villages and schools in 2 recharge zones of Kosi Watershed	In two village panchayats viz. Gadhwali & Simtola, micro-watersheds have been identified, where water conservation measures have been implemented. Government Inter College, Hawalbagh is selected for the development of a water conservation model.	01 completed & 1 Remaining	
4. Creation of an Institution for monitoring the Kosi river system	For the monitoring of the Kosi River Rejuvenation works a Kosi Cell has been established in the premises of Vikas Bhawan, Almora.	Monitoring of works being carried out in 14 recharge zones & 06 Van Panchayats through the cell (Figure 10)	
5. Skill capacity building of the local youth (SC/ST/Women) as a tourist guide and other activities in the upper Kosi watershed.	Mass Awareness Programs for increasing public participation have been conducted which included the promotion of biological measures such as plantation and also about water conservation. .	1. Essay & Speech competition regarding water conservation & river rejuvenation organized at schools in Hawalabag & Takula Blocks. 2. World Water Day 2021 celebrated through Rangoli & Painting, Essay, Poems Competition in all schools of Kosi Watershed in Hawalbag & Takula Blocks. Cleaning Kosi Programme with students of GIC Hawalbag, Almora. 3. Plantation Drive 4. "Celebrating Rivers of India" Nadi Utsav Programme organized for a week 17-23 December 2021. 5. Webinar on National Science Day – 2022, "Wastewater Management & Sanitation" organized on 28th Feb 2022. 6. World Water Day 2022 celebrated at Kathpuriya GIC. Several Programmes were organized at the school. Students were encouraged to initiate the water conservation works at household levels.	

Methodology (in brief):	The NMHS-SGP funded Kosi River Rejuvenation project objectively concerns with the revival of depleting water levels in the Kosi River of the Kumaun region. Himalayan range of Almora, springs, and other streams in the region are the main source of water present in the Kosi river. On a pilot basis, monitoring of the quality and quantity of water is being carried out in two pilot sites in regular intervals. Apart from it, 14 recharge zones have been selected in the Hawalbagh and Takula blocks where mechanical works such as the digging of infiltration holes, trenches, ponds, etc., and construction of concrete and bio check dams are being constructed. A topographic map is developed using ArcGIS (version 10.1), which shows the surface relief, which means undulation of the ground surface, and which type of slope present at the ground (gentle slope and steep slope). Geophysical Resistivity surveys have been carried out for aquifer mapping. 23 springs, of different orders, have been identified in three catchments (A, B, and C) of the Deolikhan recharge zone (Figure 2). Out of those, 9 springs have regular water flow since November 2019. The selected springs are being observed for their discharge rates and water quality since November 2019. Water level recorders are established on the third-order stream of the Deolikhan recharge zone and data have been collected since January 2020. Major rock type of the recharge zones has been identified eg Deolikhan Recharge Zone have various types of Metamorphic rocks such as Garnetiferous Mica Schist, Quartzite and Quartz veins which are highly fractured. The water quality was found affected by high iron content as its concentration is higher than the acceptable or desirable limit which might be due to the weathering of Almandine Garnet which is found embedded in Garnetiferous Mica Schist. The mass awareness programs, for Kosi river conservation, in schools, SHGs, and at village levels are being conducted at regular intervals. (Annexure V)
Major Research Achievements:	The project got first prize under the National Water Awards 2018 & 2019 by the Ministry of Water Resources based on the efforts taken for conserving the Kosi river.
Brief Conclusion - the current year progress – during the reporting period (point-wise):	• A geophysical resistivity survey has been completed for pilot sites in Devalikhan and Simtola recharge zones, which will be helpful for the identification of potential locations for making water conservation structures (Figure 1). • GIS Mapping of the selected sites has also been completed. • Flow and discharge data are being collected and analyzed at regular intervals).

10. Knowledge Products – Publication, recommendations, etc.

Time Period	Publications (Research Papers, Information Material, Policy drafts, Patents, etc.)
Annual [Year 2020]	Chauhan Devendra Kumar, Singh Shivendra Pratap, Agnihotri Vasudha, Kumar Kireet (2019). Water quality of springs in Deolikhan recharge zone of Kosi watershed. ENVIS Bulletin, 27, 25-28.

***Note*: Attach a separate, descriptive Annexure/ File.**

11. Project Concluding Remarks

Kindly update the following Progress Parameters for the Reporting Period:

Project Objectives	Quantifiable Output against each objective	Progress made against Monitoring Indicators (specified in Sanction Letter)	Remarks
1. To supplement and support water conservation activities for rejuvenation of the Kosi River	The rejuvenation work was conducted in two ways i.e. mechanical and biological.	Details mentioned in Table (Annexure-II)	
2. To monitor the water availability -in the Kosi river and its tributaries through flow and discharge measurements along with quality measurement	Discharge measurements, water level recording, and water quality estimation are regularly monitored in the two pilot sites of Gadhwali & Simtola recharge zones as two replicable models.	The stream treatment work is going on in two pilot sites, The impact of mechanical and biological measures for water conservation are being analyzed on spring flow, and water quality . The Water Quality Data for selected sites in Upper Kosi Watershed is shown in Annexure III. (Table). The discharge measured from August 2020 to December 2021 and the water quality data for Gadhwali & Simtola Pilot Project Sites for the preriod between August 2020 – December 2021 is shown in Annexure IV. The general physical and chemical properties for all the springs were found below the acceptable limit except the iron content. Iron was present above the desirable limit (ie., 0.30 mg/L) in all the springs. The high iron content might be attributed due to the presence of Almandine	

	• The target for skill development of the local youth, women, and students at various schools in the perspective of water conservation is achieved. However, more citizens are encouraged to participate with the help of various departments such as Education, Horticulture, Forest, ILSP, etc. at the district level.
Progress Achieved (%):	--%
Remaining work to be done:	Remaining works to be done involve para-hydrogeological and tourist guide trainings, skill capacity building, nursery strengthening, geo-physical survey for aquifer thickness-change detection in pilot sites, adding up to ongoing water conservation works in 14 recharge zones etc.

Kindly attach the descriptive Annexure/ Files separately for the segments marked for the detailed description required. Please fill the NMHS Progress Report pro forma as applicable with respect to time and other requirements and return *via* post/ e-mail at: nmhspmu2016@gmail.com

Submitted to:
Nodal Officer, NMHS-PMU
National Mission on Himalayan Studies (NMHS)
GBPNIHESD HQs, Kosi-Katarmal,
Almora 263643, Uttarakhand

E-mail: nmhspmu2016@gmail.com

Submitted by:
Project PI (Signature):
Institution (Seal):
Dated (dd/mm/yy): 10/5/2022

District Development Officer
ALMORA