

NMHS Progress Report

(Period from April, 2017 to March, 2018)

[ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora, Uttarakhand]

1. Project Information

Project ID:	NMHS/2015-16/SG03/03	Sanction Date:	31-03-2016
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Project Title:	Identification, assessment and enhancement of soil carbon and nitrogen sequestration potential of different ecosystems in the central Himalayan through a community participatory approach
BTG: 2	Environmental Assessment & Management

PI and Affiliation (Institution):	Dr. Vijay Singh Meena ICAR- Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora, Uttarakhand	
Name & Address of the Co-PI, if any:	Dr. Brij Mohan Pandey Dr. Anirban Mukherjee Dr. Tilak Mondal Dr. RP Yadav Dr. Nawal Kishore Singh	ICAR- Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora, Uttarakhand
	Dr. Harish Chandra Joshi	Krishi Vigyan Kendra, ICAR-VPKAS, Sinduri-Baskhola, Kafligair-263628, Bageshwar, Uttarakhand
	Pankaj Nautiyal	Krishi Vigyan Kendra, ICAR-VPKAS, Chinyalisaur-249196, Uttarkashi, Uttarakhand
	Gaurav Papna	
Structured Abstract - detailing the current year progress [Word Limit 250 words]:	Three awareness programme and one farmers training were conducted, the beneficiary 120 farmers. Four land uses forest, grass, cultivated and barren land confirmed distinct effects on WBC, LOC, TC, TN and CMI. Averaged across the soil depth WBC, TC and TN concentrations were generally highest under forest land, followed by grass land, cultivated land, and least in barren land. NLC, LC, LI and CPI concentrations also followed similar trends as WBC, TC and TN. Overall, TC and TN concentrations decreased markedly with increase in soil depth under FL, GL, CL and BL, while in case of LOC in the barren land almost exhibited the same in the 0–30 cm depth. Different land uses had different impact on carbon and nitrogen stability and decomposition. Averaged across the depth of 0–45 cm, forest land had the significantly higher C:N ratio than soil of grass land, barren land and cultivated land exhibited the least. As the BL soil was higher in the CMI, especially in the 0–45 cm depth showed lowest CMI in the forest and grass land system. While forest and grass land could effectively enhance WBC, TC, TN, CMI, carbon and nitrogen sequestration, and reduce soil C:N	

ratio tendency. The carbon and nitrogen sequestrations significantly greater for forest followed by grass, cultivated and barren land use system. Conversely, cultivated and barren land had relatively weak effect on TC and TN sequestration by forming WBC. Among all four land use systems forest land, in the top layer the soil for sequestration of carbon and nitrogen higher than 15–30 and 30–45 cm soil depth. The depth distribution of WBC, TC and TN were impacted by different land use system, which may influence the potential nutrients supply to crop/plant. Forest and grass land system which promoted maintenance of litter fall/root residues in the soil may have beneficial impacts on soil fertility through maintenance of carbon and nitrogen storage in the Indian mid-Himalayans ecosystem. The LUS management is necessary for increasing soil carbon and nitrogen stocks, and the research on the carbon and nitrogen storage of different LUS is required for making future policies and strategies on land use planning and management. The high carbon and nitrogen losses upon deforestation of natural forest and potential for carbon and nitrogen storage upon cultivated and grass land abandonment stress the importance of carefully assessing ongoing and future land use system changes. Hence, conservation and restoration of natural ecosystems in addition to incorporation of tree components on cultivated, barren and grass land system will enhance soil quality and sustainability.

Project Partner Name	Affiliations	Role & Responsibilities
Partner 1	ICAR-Vivekananda ParvatiyaKrishiAnusandhanSansthan, Almora-263601, Uttarakhand	Responsibilities for mid hills (Balta cluster, Hawalbagh, Almora)
Partner 2	KrishiVigyan Kendra, ICAR-VPKAS, Sinduri-Baskhola, Kafligair-263628, Bageshwar, Uttarakhand	Responsibilities for higher hills (Shama cluster, Kapkot block, Bageshwar district) and all analysis part is going on with nodal center
Partner 3	KrishiVigyan Kendra, ICAR-VPKAS, Chinyalisaur-249196, Uttarkashi, Uttarakhand	Responsibilities for lower hills (Badethi cluster, Chinyalisaur, block, Uttarkashi) and all analysis part is going on with nodal center

2. Project Site Details

Project Site	Location	Long. & Lat.	Altitude
Project Site	1. Lower hills (Badethi cluster, Chinyalisaur, block, Uttarkashi)	Long. & Lat.	30° 36' 10.89 N 78° 18' 58.75 E 990 above MSL
	2. Mid hills (Balta cluster, Hawalbagh)	Long. & Lat.	29° 37' 55.7 N

	block, Almora)		79° 40' 51.1 E 1367 above MSL
	3. Higher hills (Shama cluster, Kapkot block, Bageshwar)	Long. & Lat.	29° 58' 47.5 N 80° 01' 26.6 E 2007 above MSL
Site Maps	It will be prepared in last year of project		
Site photographs	Fig for lower Attached	Fig. 1, 2 and 3	

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

PROJECT ACTIVITIES	WORK UNDERTAKEN					OUTPUT
	Year 2017-18					
	Qtr 1	Qtr 2	Qtr 1	Qtr 2		
Identification and collections of soils, base line survey of selected site	Yellow	Yellow	Yellow	Yellow	Yellow	All three site (lower, mid and higher hills) baseline survey has been finished
Collect the data from primary and secondary sources	Red	Red	Red	Red	Red	Primary data for two data collected, rest of the data collection will be finished very soon
Knowledge about the traditional crop management practices	Green	Green	Green	Green	Green	On the basis of farmers precipitation traditional crop management practices surveyed
Soil analysis with standard procedure	Blue	Blue	Blue	Blue	Blue	Carbon and nitrogen sequestration of higher and mid hills were calculated, rest of the soil analysis is going on
BMPs and RMPs	Grey	Grey	Grey	Grey	Grey	On the basis of field experiment BMPs and RMPs recommended to farming communities

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:	1229000.00	Grant Received Date:	31.03.2016
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Project Partner(s)	Affiliations/ Institution	Budget Allocated to	Work Done
Partner 1	ICAR-Vivekananda Parvatiya Krishi Anusandhan Sansthan, Almora-263601, Uttarakhand	60%	Responsibilities for mid hills (Balta cluster, Hawalbagh, Almora)
Partner 2	Krishi Vigyan Kendra, ICAR-VPKAS, Sinduri-Baskhola, Kafligair-263628, Bageshwar, Uttarakhand	20%	Responsibilities for higher hills (Shama cluster, Kapkot block, Bageshwar district) and all analysis part is going on with nodal center
Partner 3	Krishi Vigyan Kendra, ICAR-VPKAS, Chinyalisaur-249196, Uttarkashi, Uttarakhand	20%	Responsibilities for lower hills (Badethi cluster, Chinyalisaur, block, Uttarkashi) and all analysis part is going on with nodal center

Project Staff Information:

S. No.	Name	Qualification	Designation	Fellowship/ Wages paid	Remarks
1.	Sanjay Singh Negi	10 th	Filed Staff	Rs. 8000/month	Continue
2.	Neeraj Kumar	10 th	Field Staff	Rs. 8000/month	Continue
3.	Suraj Kumar Joshi	10 th	Filed Staff	Rs. 8000/month	Continue

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
1.	Yodar apparatus assembly		150000.00	Waiting for Deliver	Not Available	Not purchased
2.	Hand held advance	Garmin	25000.00	June, 2017	Attached	

3.	GPS Core soil sampler kit	GPSMAP 78s	25000.00		Not Available	Not purchased
4.	Soil auger-assembly		25000.00		Not Available	Not purchased
5.	Portable digital balance	Two digit	10000.00	Waiting for Deliver	Not Available	

6. Expenditure Statement and Utilization Certificate

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

Expenditure Information: - **Please see the attached annexure I and II**

7. Project Beneficiary Groups

Beneficiary Groups [Capacity Building]	Target	Achieved
No. of Beneficiaries with income generation:	325	273
No. of stakeholders trained, particularly women:	50	35
No. of capacity building Workshops/ trainings:	05	02
No. of Awareness & outreach programmes:	12	08
No. of Research/ Manpower developed:	10	06

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

Description	Total (Numeric)	Description
<i>IHR States Covered</i>	01	Three district (Almora, Bageshwar and Uttarkashi)
<i>Project Site/ Field Stations Developed:</i>	03	Lower hills (Badethi cluster, Chinyalisaur, block, Uttarkashi). For mid hills (Balta cluster, Hawalbagh, Almora) and for higher hills (Shama cluster, Kapkot block, Bageshwar district)

<i>No. of Patents filed (Description):</i>	00	NIL
<i>Article/ Review/ Research Paper/ Publication:</i>	03	02 Published 01 Communicated
<i>New Methods/ Modellings Developed(description in 250 words):</i>	00	NIL
<i>No. of Trainings (No. of Beneficiaries):</i>	03 (120)	Soil health management and improved crop production technologies
<i>Workshop:</i>	01	Soil and environment quality
<i>Demonstration Models (Site):</i>	03	Uttarkashi, Almora and Bageshwar districts
<i>Livelihood Options:</i>		
<i>Training Manuals:</i>	00	Under process
<i>Processing Units:</i>	00	NIL
<i>Species Collection:</i>	00	NIL
<i>Species identified:</i>	00	NIL
<i>Database/ Images/ GIS Maps:</i>	03	1. Balta cluster, Hawalbagh, Almora 2. Shama cluster, Kapkot block, Bageshwar 3. Badethi cluster, Chinyalisaur, block, Uttarkashi

Note: Photos/ maps should be attached in high quality in compatible formats viz., JPEG, .JPG, .PNG, .SHP, etc. along with a suitable figure legend/ caption.

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

S. No.	Institute/ Organization	Type of Linkages	Brief Description
	-----NIL-----		

10. Additional (publication, recommendations, etc.)

Time Period	Publications (Research Papers, Information Material, Policy drafts, Patents, etc.)
Annual [2017-18]	02 Published (Copy attached) 01 Communicate

11. Project Concluding Remark

Kindly update the following Progress Parameters for the Reporting Period:

Project Objectives	Project Output against each objective	Progress made against Monitoring Indicators (specified in sanction letter)	Remarks
1. To assess the soil organic carbon (SOC) and soil total nitrogen (STN) under different land use, land cover and cropping system (forest to agricultural ecosystem) in lower, middle and higher Himalayas of Uttarakhand state	All three site soil sampling from different land use system and various cropping system has been completed.	Data base and digital maps on the selected soil parameter (Nos). No. of long-term monitoring systems established Nos/ Area in ha).	Soil map will be prepared in this year after finishing all soil parameter analysis Recommendations from experiment were followed by farmers
2. To estimate C and N sequestration potential under selected pilot sites in community and measure the socioeconomic and environmental benefits of improved land management practices	Carbon and nitrogen sequestration of two sites has been completed and lower hills soil analysis is under process.	Models and knowledge products developed and published out of the projects (Nos).	Published 02 Communicated 01
3. To provide capacity building and training on the optimal land use and land management options to promote environmental awareness, to sequester C and N, enhance land productivity to combat land degradation in central Himalayas	273 farmers/extension workers/self-help group members	Communities/ households engaged in Trainings/ Awareness Camps/ Workshops (Nos.).	03 awareness programme The farmers training will be continued in this year
4. To provide information and policy options for	Three training programmers on soil	● Master trainers/ Women participation in	It will be continued in this

the use of carbon (C) and nitrogen (N) sinks in transferring C and N from the atmosphere to soil system	health management and improved crop management practices	science outreach programmes (Nos.)	year
Methodology (in brief):	<p>Soil carbon and nitrogen sequestration (Mg ha^{-1} in a single land use system was calculated as follows: :</p> $\text{C storage (Mg C ha}^{-1}) = [\text{SOC (\%)} \times \text{BD (Mg m}^{-3}) \times \text{d (m)} \times 10^4 \text{ m}^2 \text{ ha}^{-1}] / 100$ <p>where C storage at 0-0.45 m depth (d) (Mg C ha^{-1}), TOC concentration (%) and BD is the bulk density of 0-0.45 m (Mg m^{-3}). Likewise, total soil nitrogen (TSN) content and sequestration (Mg N ha^{-1}) determined.</p>		NIL
Major Research Achievements:	<ul style="list-style-type: none"> ▶ Three awareness programme and one farmers training were conducted. ▶ Four land uses forest, grass, cultivated and barren land confirmed distinct effects on WBC, LOC, TC, TN and CMI. ▶ Averaged across the soil depth WBC, TC and TN concentrations were generally highest under forest land, followed by grass land, cultivated land, and least in barren land. ▶ Overall, TC and TN concentrations decreased markedly with increase in soil depth under FL, GL, CL and BL, while in case of LOC in the barren land almost exhibited the same in the 0–30 cm depth. ▶ Among all four land use systems forest land, in the top layer the soil for sequestration of carbon and nitrogen higher than 15–30 and 30–45 cm soil depth. 		NIL
Brief Conclusion-the current year progress-during the reporting period (point-wise):	<ul style="list-style-type: none"> ▶ The significantly lowest pH and soil bulk densities were observed in the top 0–15 cm depth and increased with increase in soil depth ($p < 0.05$). ▶ Significantly lowest soil bulk densities was observed in the forest land 1.30 Mg m^{-3} followed by grass, cultivated and barren land 1.31, 1.32 and 1.33 Mg m^{-3}, respectively for surface soil layer (0–15 cm). ▶ The WBC decrease in CL and BL was accompanied by mean increase in soil bulk density of 21% compared with FL. The 		NIL

	<p>WBC and LOC concentrations from barren land, cultivated land, grass land and forest land significantly varied among the LUS and soil depth form 0–15, 15–30 and 30–45 cm soil depth.</p> <p>▶ Data showed that TC and TN concentrations significantly varied in different LUS for the 0–15, 15–30 and 30–45 cm soil depth.</p> <p>▶ The TC significantly highest (22.92 g C kg⁻¹) was observed in the 0–15 cm depth followed by 15–30 cm (19.94 g C kg⁻¹) and lowest (17.01 g C kg⁻¹) was recorded with 30–45 cm soil depth.</p> <p>▶ Highest TN concentration (2.23 g N kg⁻¹) was recorded in 0–15 cm soil depth followed by 15–30 and 30–45 cm soil depth with 2.06 and 1.89 g N kg⁻¹, respectively. In addition, the cultivated land contained significantly higher TC (15.39 g C kg⁻¹) and TN (1.91 g N kg⁻¹) as compared to barren land TC (15.18 g C kg⁻¹) and TN (1.75 g N kg⁻¹) under various soil depth of ecosystem.</p>	
Progress Achieved (%):	70	
Remaining work to be done:	<ul style="list-style-type: none"> ● C and N-sequestration for lower higher hills ● Farmers training programme 	

Submitted to:

Nodal Officer, NMHS-PMU

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Please fill the NMHS Progress Report pro forma as applicable with respect to time and other requirements and return *via* post/ e-mail. In case of any query, please contact at: nmhspmu2016@gmail.com