

NMHS-FINAL TECHNICAL REPORT (FTR)

Demand-Driven Action Research Project Grant

NMHS Reference No. NMHS/MG-2017/68

Date of Submission: 27/07/2020

INNOVATIVE TECHNOLOGIES FOR CLIMATE CHANGE MITIGATION AND BIODIVERSITY CONSERVATION WITH ALTERNATE LIVELIHOOD OPPORTUNITIES FOR MOUNTAIN COMMUNITIES IN NORTH WESTERN HIMACHAL HIMALAYAS

Project Duration: from (01.04.2017) to (31.03.2020)



Submitted to:

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Dr. Vinod Joshi

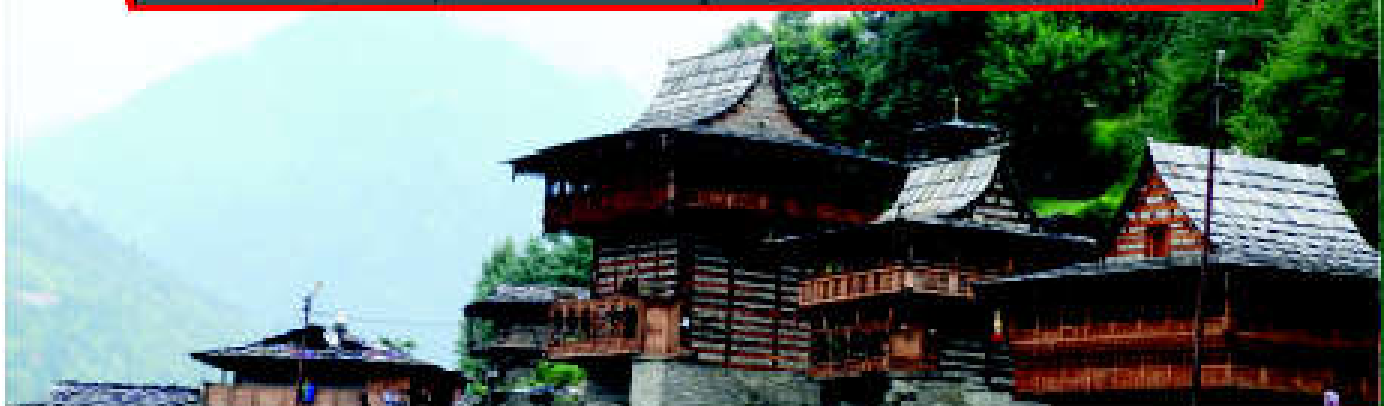
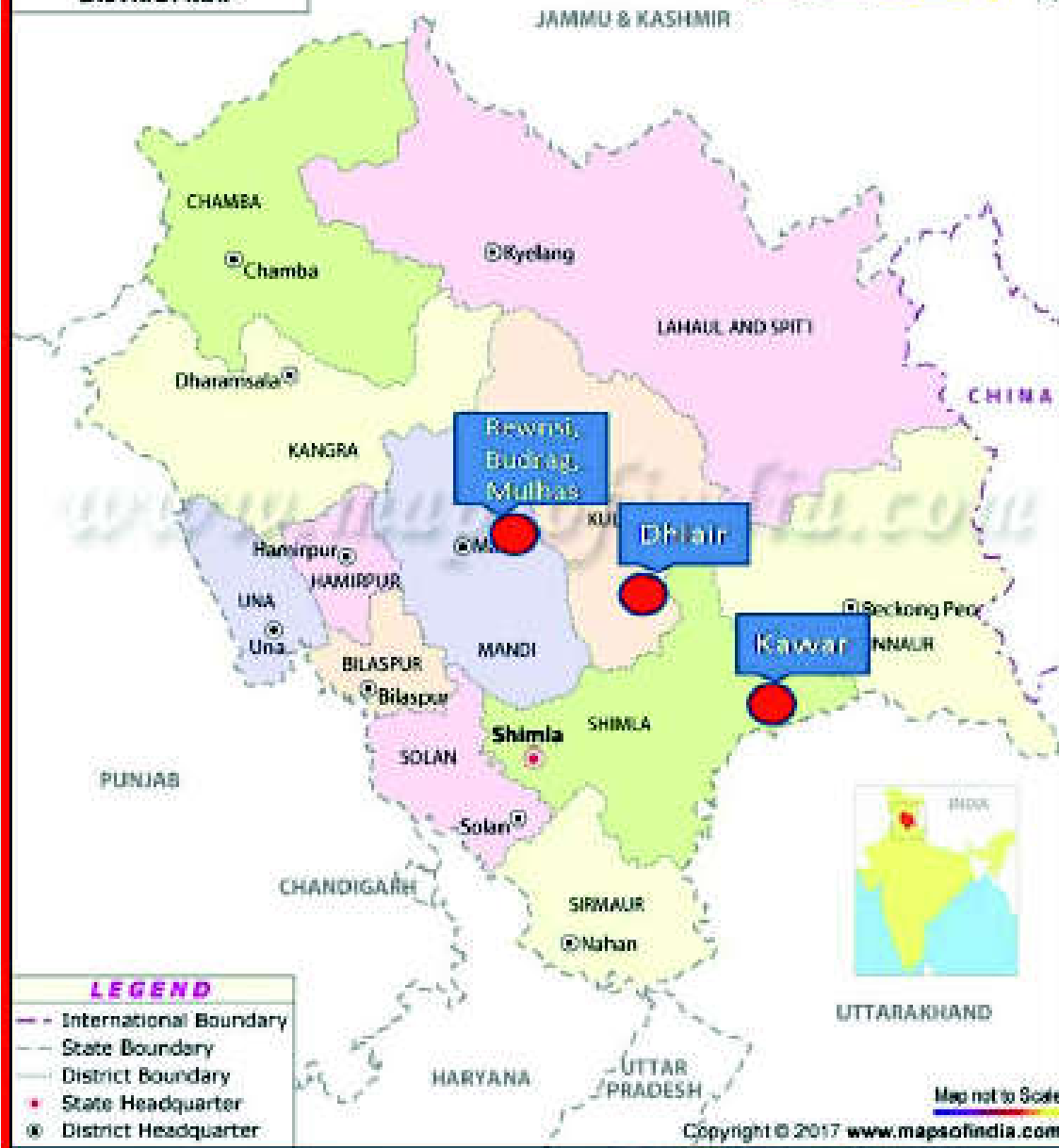
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NMHS-FINAL TECHNICAL REPORT (FTR)

2020

**HIMACHAL PRADESH
DISTRICT MAP**

Project Sites



NMHS-FINAL TECHNICAL REPORT (FTR)

Demand-Driven Action Research Project Grant

NMHS Reference No.:	NMHS/MG-2017/58	Date of Submission:	2	7	0	7	2	0	2	0
			d	d	m	m	y	y	y	y

PROJECT TITLE

**INNOVATIVE TECHNOLOGIES FOR CLIMATE CHANGE MITIGATION AND
BIODIVERSITY CONSERVATION WITH ALTERNATE LIVELIHOOD OPPORTUNITIES
FOR MOUNTAIN COMMUNITIES IN NORTH WESTERN HIMACHAL HIMALAYAS**

Project Duration: from (01. 04. 2017) to (31. 03. 2020).

Submitted to:

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NMHS-Final Technical Report (FTR)

Demand-Driven Action Research Project

DSL: Date of Sanction Letter

3	1	0	3	2	0	1	7
d	d	m	m	y	y	y	y

DPC: Date of Project Completion

3	1	0	3	2	0	2	0
d	d	m	m	y	y	y	y

Part A: Project Summary Report

1. Project Description

i.	Project Reference No.	NMHS/MG-2017/58					
ii.	Type of Project	Small Grant	Medium Grant	<input checked="" type="checkbox"/> Large Grant			
iii.	Project Title	Innovative Technologies for Climate Change Mitigation and Biodiversity Conservation with alternate livelihood opportunities for mountain communities in North Western Himachal Himalayas					
iv.	State under which Project is Sanctioned	Himachal Pradesh					
v.	Project Sites (IHR States covered) (Maps to be attached)	Himachal Pradesh					
vi.	Scale of Project Operation	Local	<input checked="" type="checkbox"/> Regional	Pan-Himalayan			
vii.	Total Budget/ Outlay of the Project	Rs. 0.8687 (in Cr)					
viii.	Lead Agency	<i>Himalayan Research Group (HRG), Core Group-SEED-DST Govt. of India, Umesh Bhavan Chotta Shimla, Shimla-171002 H.P.</i>					
	Principal Investigator (PI)	Dr. Lal Singh <i>Himalayan Research Group (HRG), Core Group-SEED-DST Govt. of India, Umesh Bhavan Chotta Shimla, Shimla-171002 H.P.</i>					
	Co-Principal Investigator (Co-PI)	Dr. Vaneet Jishtu <i>Himalayan Forest Research Institute (HFRI) Conifer Campus, Panthaghati, Shimla-171009 H.P.</i>					
ix.	Project Implementing Partners	Himalayan Forest Research Institute (HFRI), Conifer Campus, Panthaghati Shimla-171009 H.P.					
	Key Persons / Point of Contacts with Contact Details, Ph. No, E-mail	Dr. Lal Singh , Himalayan Research Group (HRG), Core Group-SEED-DST Govt. of India, Umesh Bhavan Chotta Shimla, Shimla-171002 H.P. Tel. No. 0177-2626820, 9816026820. Email: lalhr@gmail.com					

2. Project Outcome

2.1. **Abstract** (not more than 500 words) [it should include background of the study, aim, objectives, methodology, approach, results, conclusion and recommendations).

Background: Mountains of Indian Himalayan Region (IHR) caters to the needs of the communities living in close proximity. Households exploit natural resources for their domestic, agricultural, and livelihood needs. Increasing population and commercial interests resulted in extraction and utilization of Himalayan resources with accelerated pace. There is urgent need for interventions in close association with the community to maintain the ecology and regular demands of the resources. Project activities implemented at three sites in Himachal Pradesh (HP) having high dependence of community on forests to mitigate forest degradation. Innovative four technology models of mountain solar water heating system locally fabricated by rural artisan, button mushroom cultivation for immediate cash returns, improved fodder and composting and multiplication and sustainable harvesting of high value endangered medicinal plants were demonstrated. These designed to meet community needs and subsequent objective of ecosystem conservation. *Objectives/ Aim:* Project was implemented with five objectives of providing mountain solar water heating systems, improved fodder and composting, tools and techniques for multiplication and sustainable harvesting of Non Timber Forest Products (NTFPs) and technology based locations specific options for household enterprise to generate immediate returns and employment of forest dependent people in mountains.

Methodology: Project activities were implemented with community orientation, organization, training and skill improvement during three years of project duration. Identified community groups at three sites were provided with technology package having material and knowledge to carry out the proposed activities. Pre-fabricated mountain solar water heating systems, seeded button mushroom compost, planting tufts of improved fodder, vermiculture, planting material of fuel tree species and NTFPs was provided after training to the selected households for setting their respective activities. *Approach:* Baseline data for forest dependence, fuel wood, fodder, NTFP collection on predesigned survey format in selected sites was collected. Similarly the household profile data was collected on household survey schedule. Regular data collection of all the technology related activities was collected by the project staff for report compilation. Performance of mountain solar water heating system was carried out with high end temperature data loggers. Approach was to

implement the project with community involvement and achieve the efficient usage of forest resources.

Results: Encouraging results with involvement of total 335 households (HH) and saving of 40% fuel wood with mountain solar water heating systems in 307 households were observed. Each unit mitigated average 2.70 t Carbon emission/HH/annum and reduced women drudgery in fuel wood collection. Rural artisan earned Rs. 6,46,500/- from fabrication of Solar water heating system. At the same time button mushroom cultivation model for forest communities provided immediate cash and generated Rs. 5,20,898/- for 131 HH in two years. Mushroom activity generated 40000 kg spent compost for improved composting for agriculture without collecting forest biomass. Skill development of 335 HH for sustainable harvesting and *ex-situ* propagation of selected NTFPs e.g. *Swertia cordata*, *Taxus wallichiana* and *P. kurooa*. 3000 rooted cuttings of *T. wallichiana* were planted and harvesting of *Swertia cordata* (Chirayita) produced 300 g seeds and distributed among farmers for increasing propagation. 307 women participants were provided with vermiculture 2 Kg each for initiating improved composting, 80-100 improved fodder tufts for bund plantation and 40 plants each of *Q. oblongata* for plantation around their houses. These inputs were provided with proper demonstration for preparation of compost and planting details. **Conclusion:** Project activities addressed most stressing demand of rural households in mountains. Activities not only addressed conservation needs but also helped in community empowerment and livelihood generation which was unique in the project approach. Scaling of activities through financial institution linkages and commercialization expected to address significantly in issues of conservation of biodiversity, livelihood and mitigation of CO₂ from degradation of Himalayan Ecosystem.

Recommendations: Replication of activities through demonstration necessary for scaling up efforts of Himalayan ecosystem conservation and sustainable utilization. Activities need to be incorporated in regular practices of conservation in different line departments of IHR with proper policy interventions. Details of study and model of basic fuel, fodder, food and livelihood with mandate of environment conservation should be demonstrated by MoEF&CC to different agencies like NITI Ayog for further inclusion and implementation.

2.2. Objective-wise Major Achievements

S. No.	Objectives	Major achievements (in bullets points)
1	Study impact of solar energy use in domestic needs of water heating through innovative cost effective solar panel for mitigation of household carbon emissions, forest degradation and women drudgery in mountains of Himachal Himalayas.	Installation of 307 mountain solar water heating systems demonstrated efficient usage of fuel wood with 40% average annual saving. This saving of fuel wood was estimated to mitigate 2.7 t (Estimated 2.68 t, 2.82 t and 2.68 t carbon emission respectively at village Dhaliar (Kullu) and Rewnsi Budhrag Mulhas (Mandi) and Kawar (Shimla) respectively) of CO ₂ emission/ unit/ household/ annum and is one of the major contributions of the project deliverable. With this result annual CO ₂ emission mitigation with 307 households will be 767.5 t /annum. In addition to this Himalayan ecosystem will be saved of 40% fuel wood extraction which normally constitute important species of Pine, Oak and bushes which will be conserved and increase productivity of forests to further fix CO ₂ which was not estimated but will almost be equivalent to the estimated above for savings with efficient usage. At the same time this activity of mountain solar water heating system reduced indoor pollution and women drudgery to a significant level which resulted in improvement of health conditions of household inmates. Availability of hot water in mountain households improved general health and hygiene especially of women who due to inadequate heating facilities were not able to take regular baths. This is one of the major technology interventions which need to be up scaled and implemented across the Himalayan region to sustain Himalayan ecosystem. Success of the technology made this popular and HIMCOSTE, Shimla installed 290 mountain solar water heating systems in five of their Vigyan Grams in Himachal Pradesh.

2	Capacity building and community orientation for sustainable management of important NTFP's and to augment plantations of fuel and fodder species for future requirements.	Skill developments of 335 households were oriented three times during the project period in sustainable harvesting and <i>ex-situ</i> propagation of selected NTFPs e.g. <i>Swertia cordata</i> , <i>Taxus wallichiana</i> and <i>Picrorhiza kurroa</i> was carried out. 3000 rooted cuttings of <i>T. wallichiana</i> were planted and harvesting of <i>S. cordata</i> (Chirayita) produced 300 g seeds for distribution to farmers to cover additional area under propagation of this species. Production of rooted cuttings of <i>T. wallichiana</i> was continued and HRG nursery at Dhangara has stock of about 5000 cuttings for enriching plantation of this species in near future. Planting stock of <i>P. kurroa</i> (5170 plants) were in stock of HFRI nurseries at the time of report compilation for further distribution to the trained households for which necessary provision was made by the HFRI team.
3	Tools and techniques for assessment, sustainable harvesting, value addition, marketing and <i>ex-situ</i> propagation of selected high value endangered NTFPs to improve livelihood and resource conservation.	12000 Oak (<i>Quercus oblongata</i> = synonym <i>Q. leucotrichophora</i>) and 25000 improved fodder slips (Tall fescue) planted. 4980 Oak (1000 at HRG); 2200 <i>Celtis</i> , 12000 <i>Salix</i> , 700 <i>Robinia</i> , 1200 <i>Q. floribunda</i> were in HFRI and HRG Nurseries for planting for which necessary provision was made for planting during the coming monsoon season. There was delay in development of planting material of fodder and NTFP species which was covered in successive years and provision for planting the stock in July – Dec. 2020 have been made for available planting stock distribution selected sites by HFRI. In Addition 50000 tufts of improved fodder grasses were planted in five Vigyan Grams of HP with linkages to HIMCOSTE Shimla.

4	Improved fodder development and composting to reduce forest dependence and enhance livestock and agriculture productivity for nutritional security.	307 women participants were provided with 2 Kg vermiculture each for initiating improved composting, 80-100 improved fodder tufts for bund plantation and 40 plants each of <i>Q. oblongata</i> for plantation around their houses. These inputs were provided with proper demonstration for preparation of compost and planting details. 2000 Kg mushroom spent compost was available at two sites to prepare farm yard manure (FYM) and reduced equal amount forest biomass collection. All households took keen interest in all these activities. Visitors from other villages to the site of plantation were also interested in these activities and can be supplied once these multiply in initial households.
5	Planning, development and demonstration of technology based locations specific options for household enterprise to generate immediate returns and employment of forest dependent people in mountains to achieve conservation for long term objective of sustainable development.	To develop and demonstration technology-based household enterprises for livelihood options button mushroom cultivation, fabrication of mountain solar water heating system and sale of vermicompost were promoted for forest dependent households. Total 4206.8 Kg mushrooms of Rs. 5,20898/-for marketing in addition to consumption in their houses in three years (2017-2019). 8 Artisan earned Rs. 6,46,500/- from Fabrication of Solar water heating System. Two women earned 4000 through sale of vermicompost. Economic valuation of fodder development with milk sale and improvement in production will take time for improved fodder to establish. 2500 Button Mushroom Compost Bag of 10 Kg each were provided to 50 households in 5 Vigyan Grams of HIMCOSTE Shimla.

2.3. Outputs in terms of Quantifiable Deliverables*

S. No.	Quantifiable Deliverables *	Monitoring Indicators*	Quantified Output/ Outcome achieved	Deviations made, if any, and Reason thereof:
1.	Installation of 300 solar water	<ul style="list-style-type: none"> Monitoring in comparison to the 	Installation of 307 systems against sanctioned 300 was completed. Data collection	-No Deviation and

	heating systems.	<p>baseline information to be provided by proponent:</p> <ul style="list-style-type: none"> • Number of solar system installed (No.) 	<p>of for fuel wood saving at different site completed and analyzed and achieved average 40% fuel wood saving resulting in mitigation of 2.7 t Carbon Emission/HH/annum with use of solar water heating systems. High efficiency authenticated by the data logger output SOP for mountain solar water heating system fabrication, installation and usage developed.</p>	<p>implemented successfully all units in the field-</p>
2.	Plantation of 100000 plants with community participation.	<ul style="list-style-type: none"> • Number of plantation made/ area covered (No./area) 	<p>12000 Oak (<i>Q. oblongata</i>) and 25000 improved fodder slips planted. 4980 Oak (1000 at HRG), 2200 <i>Celtis</i>, 12000 <i>Salix</i>, 700 <i>Robinia</i>, 1200 <i>Q. floribunda</i> at HFRI and HRG Nurseries for planting for which necessary provision was made for planting in coming season. In Addition 50000 tufts of improved fodder grasses were planted in five Vigyan Grams of HP with linkages to HIMCOSTE Shimla.</p>	<p>There was delay in development of planting material of fodder and NTFP species which was covered in successive years and provision for planting the stock have been made.</p>
3.	Skill development of 300 people in sustainable	<ul style="list-style-type: none"> • Framers/Community trained/ (Nos.) • Income 	<p>Skill developments of 335 households were oriented in sustainable harvesting and <i>ex-situ</i> propagation of selected NTFPs (e.g. S.</p>	<p>-No Deviation and implemented successfully</p>

	harvesting and <i>ex-situ</i> propagation of NTFPs.	increased (Rs per capita/% from baseline)	<i>cordata</i> , <i>T. wallichiana</i> and <i>P. kurroa</i>). 3000 rooted cuttings of <i>T. wallichiana</i> were planted and harvesting of <i>S. cordata</i> (Chirayita) produced 300 g seeds for distribution to farmers to cover additional area under propagation of this species. Production of rooted cuttings of <i>T. wallichiana</i> was continued and HRG nursery at Dhangiara has stock of 5000 cuttings for enriching plantation of this species in near future. Planting stock of <i>P. kurroa</i> (5170 plants) were in stock of HFRI nurseries for further distribution. Seasonal calendar for sustainable harvesting of important NTFPs developed. Popular material for important NTFPs of Dhodra Kawar developed. Video on Nirgal utilization as substitute to plastic was developed.	all units in the field-
4	Development of training material for orientation of 300	<ul style="list-style-type: none"> • Training manuals developed on harvesting and <i>ex-situ</i> 	335 households were provided with vermiculture for initiation of improved composting for improving soil fertility and crop	-No Deviation and implemented successfully

	people in improved composting and fodder development	propagation of selected high value, endangered species/ improved composting/ nutritional security (Nos).	productivity. Popular material for training of farmers in vermicomposting was also developed.	all units in the field-
5	Planning, development and demonstration of technology-based household enterprises as livelihood	<ul style="list-style-type: none"> (No.) of households trained and involved 	131 households were involved out of 200 trained in button mushroom cultivation at Mandi and Kullu Site with practical involvement of forest dependent communities in the setting up of household level enterprise. SOP for Button Mushroom Cultivation for forest dependent communities developed.	-No Deviation and implemented successfully all units in the field-

(*) As stated in the Sanction Letter issued by the NMHS-PMU.

2.4. Strategic Steps with respect to Outcomes (in bullets)

S. No.	Particulars	Number and Brief Details	Details of Attachment/ Supporting Document
1.	New Methodology developed:	3 No. <ul style="list-style-type: none"> Mountain Solar Water Heating Sustainable harvesting method of <i>Picrorhiza kurroa</i> Bund planting of improved fodder grasses in terraced fields 	Explained all in detail in report

S. No.	Particulars	Number and Brief Details	Details of Attachment/ Supporting Document
2.	New Models/ Process/ Strategy developed:	<ul style="list-style-type: none"> • 3 No. • Mountain Solar Water Heating • Sustainable harvesting method of <i>Picrorhiza kurroa</i> • Bund planting of improved fodder grasses in terraced fields 	Explained all in detail in report
3.	New Species identified:	---	---
4.	New Database established:	<ul style="list-style-type: none"> • 2 Nos. • Forest Dependence at three Sites in H.P. as reference for future • Temperature profile at Mandi site for one year with data loggers having date, time interval for one year 	Forest dependence detail presented in report in Table No. -1
5.	New Patent, if any:	---	---
	I. Filed (Indian/ International)	---	---
	II. Granted (Indian/ International)	---	---
	III. Technology Transfer(if any)	---	---
6.	Others (if any):	---	---

3. Technological Intervention

S. No	Type of Intervention	Brief Narration on the interventions	Unit Details (No. Of villagers benefited Area Developed)
1.	Development and deployment of indigenous technology	<ul style="list-style-type: none"> • Mountain Solar Water Heating System • Sustainable development and harvesting of high value Himalayan Medicinal Plants • Improved fodder and composting development model • Button mushroom cultivation model for forest dependent households 	At three sites in HP 335 households were involved in project activities.
2.	Diffusion of High-end Technology in the region	<ul style="list-style-type: none"> • Solar energy in domestic needs of mountain households • NTFP multiplication and sustainable harvesting models 	307 HH
3.	Induction of New Technology in the region	<ul style="list-style-type: none"> • Three model technologies listed at Sr No. 1. Were all new and were demonstrated for the first time 	335 HH
4.	Publication of Technological / Process Manuals	<ul style="list-style-type: none"> • Paper Published-1 • Paper Submitted-3 • Under Preparation-3 • Popular Material Published-4 • Popular Material Under Preparation-1 • Video Prepared-1 • Video under preparation-1 • SOPs Submitted-2 • SOPs under preparation-2 	
	Others (if any)	----	----

4. New Data Generated over the Baseline Data

S. No.	New Data Details	Status of Existing Baseline	Additionality and Utilisation New data
1	Forest dependence in NW Himalayan Mountains	<ul style="list-style-type: none"> Showing High Forest Dependence and Fuel, Fodder, and NTFP collection major drivers for forest and environment degradation 	Efficient utilization and sustainable harvesting for Himalayan Ecosystem Conservation
2	Fuel wood saving data with mountain solar water heating system	<ul style="list-style-type: none"> Reduced usage of fuel wood with solar water heating system by average 40% than baseline 	Mitigation of household Carbon emission and policy framework.
3	Climate Temperature Reference at Village Dhangiar, P.O. Jahal, Mandi H.P. with date, time interval for one year	<ul style="list-style-type: none"> This temperature profile will act as reference for future studies to record changes in Temperature 	Reference for related studies year after year

5. Demonstrative Skill Development and Capacity Building/ Manpower Trained

S. No.	Type of Activities	Details with number	Activity Intended for	Participants/Trained			
				SC	ST	Woman	Total
1.	Workshops	-		-	-	-	-
2.	On Field Trainings	5	NTFPs propagation, fodder development, improved composting and solar water heating system	92	0	243	335
3.	Skill Development	5	- do -	92	0	243	335
4.	Academic Supports	0	- do -	0	0	0	0
5.	Others (if any)	0	- do -	0	0	0	0

6. Linkages with Regional & National Priorities (SDGs, INDC, etc)/ Collaborations

S. No.	Linkages /collaborations	Details	No. of Publications/ Events Held	Beneficiaries
1.	Sustainable Development Goal (SDG)	<ul style="list-style-type: none"> Project activities contributed to the achievement of 12 SDGs and their 51 targets 	1	Planners, PRI's, Govt Departments
2.	Climate Change/INDC targets	<ul style="list-style-type: none"> The emission reduction through efficient mountain solar water heating system with 40% fuel wood saving and mitigation of 2.7 MT/system/household/ annum contributed significantly to the INDC 	1	335 households with coverage of about 1200 population.
3.	International Commitments	○-	-	-
4.	Bilateral engagements	○-	-	-
5.	National Policies	<ul style="list-style-type: none"> Contributed to Sustainable Heating Solutions to Mountains by WWF, TERI, ISHARE submitted to MNRE Govt. of India. WWF India 2020 	-	-

6.	Others collaborations	<ul style="list-style-type: none"> • Vigyan Grams, HIMCOSTE, Shimla • IIT Mandi Himalayan Start-up Trek-2019 • National Institute of Solar Energy (NISE) Gurgaon for testing of solar systems • UNDP-GEF- SECURE Himalaya Project HP Wildlife Department Govt. of H.P. Shimla 	<p>Covered 5 Panchayats with installation of 250 mountain solar water heating systems in 5 districts of H.P.</p> <p>Validation, certification and scale-up Testing and certification</p> <p>Installation of 16 Units</p>	<p>250 Rural Households in 5 districts of H.P.</p> <p>Commercialization</p> <p>Villagers of Tribal village in Pangi and Lahual, H.P.</p>
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7. Project Stakeholders/ Beneficiaries and Impacts

S. No.	Stakeholders	Support Activities	Impacts
1.	Gram Panchayats	<ul style="list-style-type: none"> • Community organization, capacity building, training and technology inputs 	Households in Four Panchayats were involved in different project activities. 307 households were provided with mountain solar water heating systems, improved fodder plantation, Vermiculture, NTFP seeds, fuel plantation, and button mushroom cultivation kits.

			Major immediate impact was saving of 40% fuel wood, direct economic benefit to mushroom growers and new techniques for harvesting and propagation of NTFPs and Fodder.
2.	Govt Departments (Agriculture/ Forest)	<ul style="list-style-type: none"> • Adoption of project activities in their development programmes 	<ul style="list-style-type: none"> • 800 Households of 5 Vignyan Grams were covered for three activities of mushroom cultivation, fodder development and mountain solar water heating system installation. • H.P. Wildlife Department shortlisted Mountain solar water heating system for installation in UNDP-GEF-SECURE Himalaya Project • IIT Mandi Selected Mountain Solar Water Heating System for incubation under Himalayan Start-up Trek (HST)-2019. • Mountain Solar Water and Space Heating Systems installed at National Institute of Solar Energy (NISE) for BIS Certification.
3.	Villagers	<ul style="list-style-type: none"> • Adopted project activities to meet their household needs 	335 households with estimated population of about 1200 were covered under proposed activities
4.	SC Community	<ul style="list-style-type: none"> • Adopted project activities to meet their household needs 	92 SC Community households were involved at all three sites in different

			project activities.
5.	ST Community	• -	-
6.	Women Group	• Demo and adoption of different project activities.	Preference was given to women for their involvement in project activities. 15 organized women groups of 150 members out 243 actively participated in different project activities.
	Others (if any)		-

8. Financial Summary (Cumulative)

S. No.	Financial Position/Budget Head	Funds Received	Expenditure/ Utilized	% of Total cost
I.	Salaries/Manpower cost	2610000.00	2700000.00	100.00
II.	Travel	506767.00	493401.00	93.09
III.	Expendables & Consumables	1007000.00	1005903.00	99.89
IV.	Contingencies	434781.00	442565.42	98.34
V.	Activities & Other Project cost	712049.00	714087.00	95.21
VI.	Institutional Charges	447289.00	500000.00	100.00
VII.	Equipments	2750000.00	2750000.00	100.00
	Total	8467886.00	8605956.42	99.06
	Interest earned	130137.00		
	Grand Total	8598023.00		

* Please attach the consolidated and audited Utilization Certificate (UC) and Year wise Statement of Expenditure (SE) separately, *ref. Annexure I.*

9. Major Equipment/ Peripherals Procured under the Project** (if any)

S. No.	Name of Equipments	Cost (INR)	Utilisation of the Equipment after project
1.	Mountain Solar Water Heating Systems (locally fabricated by the rural artisan) 307 Units	2750000.00	Domestic water heating in rural households of 3 selected project sites in H.P.

**Details should be provided in details (*ref Annexure III & IV.*)

10. Quantification of Overall Project Progress

S. No.	Parameters	Total (Numeric)	Details of Attachments/ Supporting Documents
1.	IHR States Covered	1	Site Detail on the inner cover of project report in Himachal Map
2.	Project Site/ Field Stations Developed	3	Described in report
3.	New Methods/ Modeling Developed	4	Explained in Report
4.	No. of Trainings arranged		
5.	No of beneficiaries attended trainings	335	Explained in Report
6.	Scientific Manpower Developed (Phd/M.Sc./JRF/SRF/ RA):	5	Explained in Report Annexure
7.	SC stakeholders benefited	92	
8.	ST stakeholders benefited	0	
9.	Women Empowered	243	
10.	No of Workshops Arranged along with level of participation	0	-
11.	On-field Demonstration Models initiated	3	
12.	Livelihood Options promoted	3	
13.	Technical/ Training Manuals prepared	3	
14.	Processing Units established	15	Organized mushroom cultivation units of 150 HH
15.	No of Species Collected	-	-
16.	New Species identified	-	-
17.	New Database generated (Types):	2	Forest Dependence Temperature profile at one site with date and time for one year
	Others (if any)	-	-

11. Knowledge Products (KPs) and Publications

S. No.	Knowledge Products (KPs)/ Publication	Number		Total Impact Factor	Remarks/ Enclosures
		National	International		
1.	Journal Research Articles/ Special Issue (Published):	1	0		HP Govt Journal
2.	Journal Research Articles/ Special Issue (Submitted):	3	0	0	0
3.	Journal Research Articles/ Special Issue (In preparation):	3	0	0	0
4.	Book Chapter(s)/ Books:	0	0	0	0
5.	Technical Reports	0	0	0	0
6.	Training Manual (Skill Development/ Capacity Building)	4	0	0	0
7.	Papers presented in Conferences/Seminars	0	0	0	0
8.	Policy Drafts/Papers	0	0	0	0
9.	Others: SOPs Submitted	2	0	0	0

*Please append the list of KPs/ publications (with impact factor and further details) with due Acknowledgement to NMHS.

12. Recommendation on Utility of Project Findings, Replicability and Exit Strategy

Particulars	Recommendations
Utility of the Project Findings:	Project activities are of direct utility to the different line departments like, Forest, Agriculture, Energy and S&T Departments of different states in IHR.
Replicability of Project:	Replicability of project activities is very high keeping in view the high dependence on forests in mountains of IHR. Sustaining Himalayan ecosystem requires innovations and technology in the field to address issues of livelihood, conservation along with sustainable utilization and were demonstrated successfully during the 3 years of this project duration at 3 locations in the state of HP.

Exit Strategy:	Technology models of all the activities implemented are available for immediate replication by any individual, organization, department and funding agencies. Interested stakeholders regularly contact us for the similar activities on cost under different project being implemented by the line departments. At the same time efforts were made to link the two technology models of mountain solar water heating system and processing of Chirayita (<i>Swertia cordata</i>) in Start-up mode. Both these technologies are under incubation at IIT Mandi and HIMCOSTE Shimla Technology Business Incubators for commercial scale up.
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(PROJECT PROPONENT/ COORDINATOR)



(PROJECT COORDINATOR)
Partner Institution

(Signed and Stamped)



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Place: Shimla
Date: 27/07/2020