

# PROJECT END IMPACT ASSESSMENT STUDY



Climate smart actions and strategies in Northwestern Himalayan region for sustainable livelihoods of agriculture-dependent hill communities (2016-2021)

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Ministry of Environment, Forest  
& Climate Change



## Abbreviations

AFB	:	Adaptation Fund Board
AI	:	Artificial Insemination
BAIF	:	Bharatiya Agro Industries Foundation <sup>1</sup>
CBO	:	Community Based Organization
DIG	:	Dairy Interest Group
EE	:	Executing Entity
ha or Ha	:	Hectar
HH	:	Household
IHR	:	Indian Himalayan Region
KVK	:	Krishi Vigyan Kendra
NABARD	:	National Bank for Agriculture and Rural Development
NIE	:	National Implementing Entity
NRM	:	Natural Resource Management
NTFP	:	Non-timber forest produce
PIG	:	Polyhouse Interest Group
SHG	:	Self-help group
ToT	:	Training of Trainer
UNFCCC	:	United Nations Framework Convention on Climate Change
VP	:	Van Panchayat
WIG	:	Wadi Interest Group

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<sup>1</sup> BAIF Development and research foundation was formerly registered as BAIF (Bharatiya Agro Industries Foundation). In the context of this report, BAIF Development and research foundation will be shortly referred as BAIF

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## Executive Summary

India is one of the most vulnerable countries to climate change and sudden extreme events. With a billion plus mouths to feed, climate change is emerging as a biggest threat to Indian economy. The Indian Himalayan Region is amongst the most fragile and vulnerable ecosystems that is highly exposed to the climate change. Rural communities in this part are totally dependent on climate sensitive livelihood sectors. Uttarakhand is predominantly an agricultural state with 75% population dependent on agriculture, of which 91% farmers are small and marginal owning 66% of cultivable land. Average land holding of small marginal farmer is 0.6ha (30 Nali). Climate change is an important aspect that is likely to influence agriculture and thus food security and livelihoods of the small and marginal farmers. The region is experiencing several challenges in the form of – changed precipitation, reduced snow fall, extreme weather events like flash floods, high intensity rainfall, cloud burst, etc., changing rainfall pattern, change in vegetative zone due to temperature change, longer dry spells, land and soil degradation, new pests and diseases etc. The impact of these vagaries have been exacerbated with the anthropological factors with the case-specific socio-

economic and anthropological factors like gender inequalities. The changing rainfall pattern and temperature is not conducive for agriculture and allied livelihood activities which are closely link to natural resources.

To address this Vulnerability of Hill Communities, Adaptation Fund Board (AFB), has come forward with a financial support for the project named “Climate Smart Actions and Strategies for Sustainable Livelihood of Agriculture Dependent Hill Communities”. The project was launched in 2016 for four years in the 10 villages of Champawat district, Uttarakhand in North West Himalayan region of India. NABARD is a National Implementing Entity (NIE) here and BAIF Development Research Foundation is an Executing Entity (EE) for the project.

Under the project, many multi sectoral climate smart interventions, technologies and services have been introduced in, 10 villages, reaching to up to 800 vulnerable households, among which <number> are woman headed households. The hill climate change adaptation model so introduced includes multi sectoral interventions like -

- (a) **Water Resource Development:** Natural Spring Rejuvenation and recharge measures, Roof top rainwater harvesting, Drip and Sprinklers for water use efficiency, Water channelization for improved access to water near houses and water lifting using solar pumps, Protected irrigation and water security for critical stage of crop growth.
- (b) **Climate Resilient Farming Practices:** Vegetable Cultivation under protected condition using low-cost bamboo-based polyhouses, Conservation and revival of Niche, native crops in Himalayan region, Promotion of Temperate and subtropical fruit species for horticulture plantation, Participatory fodder, feed promotion and silvi-pasture development on degraded community pasture lands known as Vanpanchayats in Uttarakhand
- (c) **Scientific management of livestock resource:** Through Improved breeding using cross bred and sorted semen technology, Feed and Nutrition care, Fodder access, Climate Proof Housing for cattle
- (d) **Other:** Additionally, farmers are also linked to weather Forecasting services through SMS, marketing linkages have been created and funds from government schemes are mobilized for improved livelihoods and allied activities.

The processes adopted to implement the project include – community mobilization, participatory approach, vulnerability assessment of each villages, establishment of community-based organizations, village level institutions, resource based planning and appropriateness of technical intervention in the local context, emphasize on gendered approach, capacity building for create pool of trained cadre, knowledge dissemination to communities in various form, differential strategy to adopt to the need of the villages and farmers, etc. The important institutions build and strengthened during the project period in all the 10 villages are - Vanpanchayat Committees , Polyhouse owners group, SHGs, Water

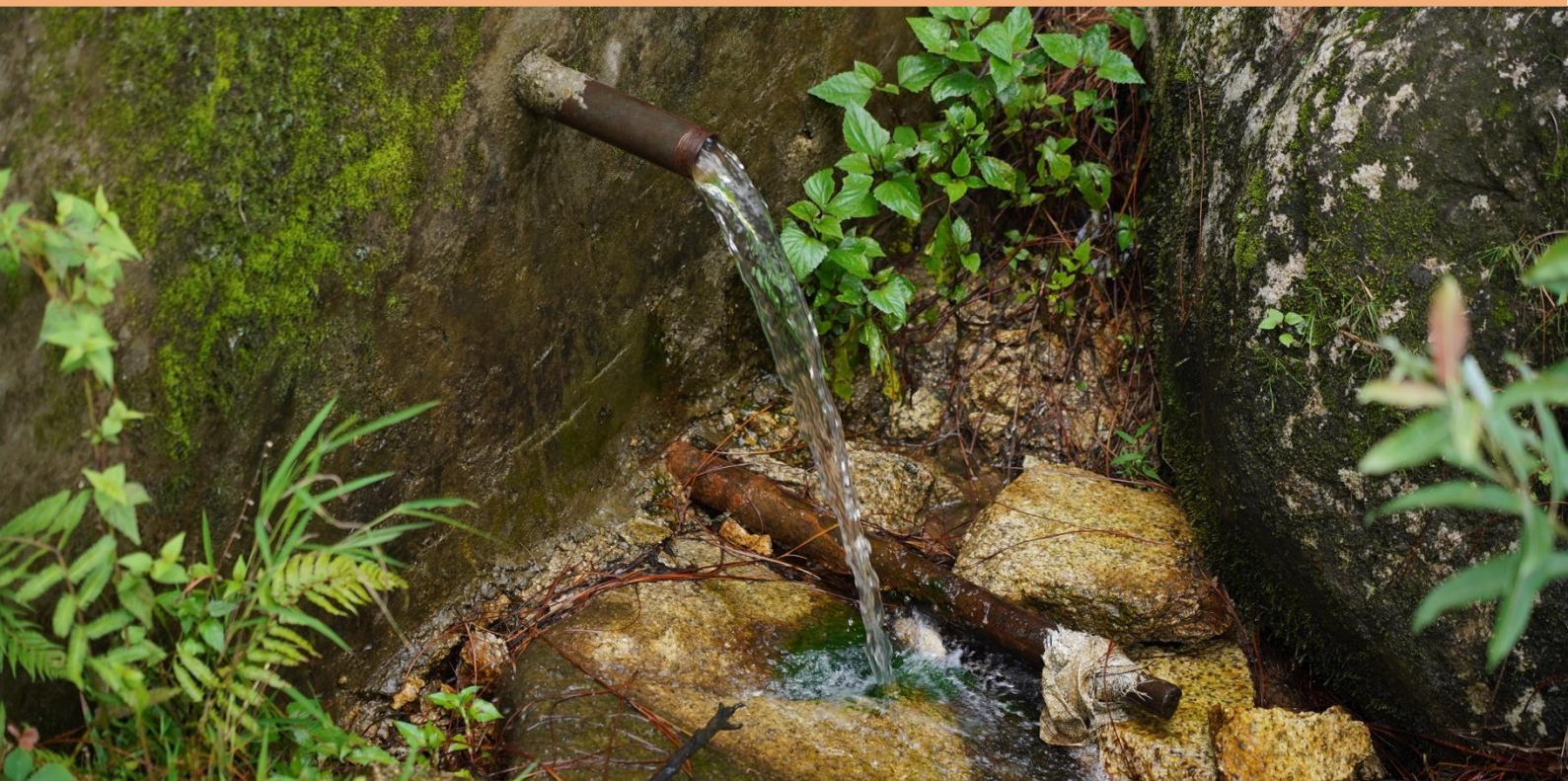
user or management groups (Jal Samiti) ,Farmer interest groups, Livestock keepers groups, etc.

All these efforts have project has resulted in to several socio- economic and ecological outcomes. This has also helped reducing vulnerability of the communities due to climate change. The key achievements under the project are:

- Project reach out to 800 plus families directly and to additionally 400 families through indirect benefits.
- 252 Families have been engaged with gainful employment and sustained income through Polyhouse farming.
- 136 ha. Area has been developed with Silvi-pasture interventions
- 120000 trees have been planted in the region under agroforestry and horticulture.
- 10 Village Councils (Van panchayats) restored community pasture lands in an ecologically sound manner
- 1500 Million litres water capacity created through rejuvenation of 15 natural springs.
- 650 Families have been associated with crop and weather advisory services.
- 25 Land races or local native crops of indigenous food crops are being conserved by community and local seed bank established . Total 72 landraces of 22 crops from 4 types.
- The average additional income that families involved in polyhouses have earned is up to Rs. 25000 to 35000 in a year, the income ranges from Rs. 25000 to Rs. 1lakhs.

The project focuses on diversification of production systems and improving the institutional capacities to adopt climate smart technologies and practices in Himalayan Hill context. As a strategy, linkages and partnerships are developed with relevant technical and scientific institutes in the region for required technology back stopping. The collaborative areas include strategic research, technology demonstrations and transfer, applied field-based research, capacity building and improved outreach. The Project also strives to complement on-going government programs and thereby try to achieve an objective of convergence for effective adaptation. This study elaborates the potential replicable and scalable model for IHR for climate change mitigation and adaptation and building climate change resilient communities in the region.





## Section I: Project highlights

Project Title	Climate smart actions and strategies in Northwestern Himalayan region for sustainable livelihoods of agriculture-dependent hill communities
Project Duration	2016 - 28 February 2022
Reporting for the duration	2016 - 28 February 2022
Name of Department	Climate Change Vertical, FSDD, NABARD
Funding organization	Adaptation Fund Board Supported Project through NABARD under UNFCC commitment
Implementation Agency	BAIF Development Research Foundation



	10 Gram Panchayat villages, Champawat district, Uttarakhand, India								
	<table> <tr> <th>Blocks</th><th>Number of GP/villages</th></tr> <tr> <td>Champawat</td><td>5</td></tr> <tr> <td>Pati</td><td>4</td></tr> <tr> <td>Lohaghat</td><td>1</td></tr> </table>	Blocks	Number of GP/villages	Champawat	5	Pati	4	Lohaghat	1
Blocks	Number of GP/villages								
Champawat	5								
Pati	4								
Lohaghat	1								
Agro climatic zone	<p>Zone – I Western Himalayan agro climatic region<sup>2</sup></p> <p>Zone – B (1000-1500m) Mid Hills of Uttarakhand<sup>3</sup></p>								
Project Beneficiaries	<p>(1) Direct benefits to 800 families belonging to small and marginal farming community, targeting approximate population of 4000.</p> <p>(2) Additional 400+ families through spin-off effect</p>								
Financial Outlay	Rs. 536.4 lakhs for four years (Investment of Rs. 16000 per direct beneficiary family annual)								
Project Objectives	<p>To improve the adaptive capacity of rural small and marginal farmers including hill women in North Western Himalayan region by introducing a combination of Climate Smart Farming Technologies along with required social engineering and capacity building processes.</p> <p>To improve /sustain the livelihoods of vulnerable hill communities, show ways of diversification of income while also initiating the process of natural resource management in the region in the wake of climate change</p>								
Key Components	<p>(1) Community Mobilization and Organization</p> <ul style="list-style-type: none"> <li>Community awareness and community mobilization for collective planning and execution,</li> <li>Capacity building of communities and knowledge generation</li> <li>Establishment of Community based organizations (CBO) – activity user's groups, Jal Samitis, Van Panchayat, Self-help groups (SHG) etc.</li> </ul> <p>(2) Introduction of Water Resource Development and Climate Smart Farming Technology</p> <ul style="list-style-type: none"> <li>Creation of water reserves in regions through rain water tapping interventions</li> <li>Adoption of efficient water use practices and technologies</li> </ul>								

<sup>2</sup> As per 15 zones across country according to Planning Commission of India

<sup>3</sup> <https://shm.uk.gov.in/pages/display/6-state-profile>

	<ul style="list-style-type: none"> <li>• Introduction to climate smart farming technologies with hill specificity</li> <li>• Introduction of improved breeding service at doorstep of farmers with required management practices including fodder and feed</li> </ul> <p>(3) Knowledge Management including knowledge creation and wider dissemination actions</p> <ul style="list-style-type: none"> <li>• Knowledge generation through field action component</li> <li>• Wider dissemination of acquired knowledge</li> </ul>
Key Achievements	<p>(1) Community Mobilization and Organization</p> <ul style="list-style-type: none"> <li>• Participatory vulnerability assessment in 10 villages.</li> <li>• Formation and strengthening of 99 various forms of CBOs (users' group and executive committees)</li> <li>• 91 women SHGs with 932 members, saving Rs. 27.05 lakhs as on May 2021</li> <li>• Capacity building Program for communities, community resource persons and field team with 32 thematic training, 52 training days and 795 participants with 74% participants being women; 16 exposures visits.</li> </ul> <p>(2) Introduction of Water Resource Development and Climate Smart Farming Technology</p> <ul style="list-style-type: none"> <li>• 620 families are provided with safe drinking water through rejuvenation of 17 springs in 10 villages; 150 families are provided with Roof Top rainwater harvesting.</li> <li>• Drip and sprinkler implementation with 262 families over 26600 Sq.meter</li> <li>• Agriculture and allied intervention with 675 families (600 agroforestry and horticulture, 252 poly houses)</li> <li>• 800 families have linked with improved breeding service at doorstep of farmers with required management practices including fodder and feed</li> <li>• 650 Families have been associated with crop and weather advisory services.</li> <li>• 25 Land races or local native crops of indigenous food crops are being conserved by community and local seed bank established . Total 72 landraces of 22 crops from 4 types.</li> </ul>
Key outcomes	<p>(1) Community Mobilization and Organization:</p> <ul style="list-style-type: none"> <li>• 60% participation of targeted vulnerable section of society in meetings and institutions and 70% beneficiaries are from same section. 50% members from CBOs are women, 100% members in Van</li> </ul>

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Panchayat and Jal Samiti are women, 75% interventions are implemented with women farmers.

- Almost 80% beneficiary families adopted to climate smart interventions.

(2) Water management:

- 1500million of water has been augmented through various activities – soil water conservation, spring rejuvenation, rainwater harvesting, and water saving through drip and sprinkler.
- 95% villages achieve drinking water security
- Drudgery reduction of women.

(3) Agriculture and allied activities

- Overall production enhancement through polyhouse and small irrigation facilities.
- The additional income that families involved in polyhouses have earned is up to Rs. 25000 to 35000 in a year.
- Range of income enhancement through various combinations of interventions is Rs 25000 to Rs. 1 lakhs.
- More than 500 families (65%) acquired the skill, knowledge. Almost 100% families are connected to market through CBOs.

(4) Livestock program:

- More than 900 families are made aware of the program, almost all the families (800) have adopted to livestock management practices.
- Increased Income from livestock management is Rs 30000- 40000 per year per family

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Overall Impact

The project proves to be moving in direction of sustainability on three parameter – environmental based aspect of natural productivity enhancement, and social and economical impacts. The efficacy and relevance of the interventions is evident based on the impact on the natural resources and socio-economic impacts. The specific interventions are found to be replicable in the specific context of western Himalayan region, whereas the overall approach is replicable in Indian Himalayan region provided that technological solutions are modified in each agro-ecological and hydrological set up. The project components can be easily scaled up within the current policy framework and government schemes. The project is headed towards sustainability in terms of nutritional, food, and livelihood security amid the current climate change scenario and it is based on principles of inclusion and equity, but handholding for few more years with community is needed to see the long-term impact on sustainability in coming years.

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## Section II: Context

In this chapter, the important aspects of the project are discussed to set up the context for the proposed impact assessment study as the study methodology is closely based on this understanding of the project.

### **II.1. Background of the project:**

Climate change has emerged as a major threat to rural livelihoods in India, due to the high dependency on small-scale agriculture and natural resources, especially amongst the poor. The negative impact of climate change on agriculture is also likely to have a serious impact on poverty and food security, especially for the most vulnerable: the small and marginal landholders. Rainfed agriculture, which is practiced in nearly 60 percent of the total agricultural area, and is dominated by poor farmers, will feel the main impacts. India has been identified as being not only highly vulnerable to the impacts of climate change, but also with a low capacity to adapt to the constraints and issues involved. India is highly vulnerable to climate change, not only because of high physical exposure to climate related disasters (65 percent of India is drought prone, 12 percent flood prone, and 8 percent of the country is



susceptible to cyclones), but also because of the dependency of its economy and majority of population on climate-sensitive sectors (e.g. agriculture, forests, tourism, animal husbandry and fisheries) and due to lack of access to technological and financial resources. **Hence, Adaptation to climate change is thus considered vital to support the livelihoods of the rural poor and to improve the productivity of the agriculture sector more broadly. Adaptation is also necessary to effectively address the poverty and food security issues for the people of rural India.**

The effects of the climate change have been seen differentially on the various region, depending upon the ecological and socio-economic fragility of the region, Indian Himalayan Region is being one of those highly fragile and vulnerable regions. The entire Himalayan zone, including the high mountains, the foothills and the Tarai area, constitutes an extremely fragile ecological zone. From west to east, the IHR also has distinctive socio-cultural regions and sub-regions. In most of the region, the pace of economic growth is low. Communities here try to create livelihood opportunities in the difficult terrain with a dwindling resource base. In spite of inhabiting this originally resource-rich area, the socioeconomic progress of its people is minimal. The economy of the IHR is predominantly rural and highly dependent on climate sensitive sectors like agri-horticulture and livestock; other economic activities are limited. Agriculture is mostly practiced on sloping lands and small parcels of terraced lands and relies entirely on the seasonal rainfall. Owing to the very small land holdings, families rely heavily on natural fodder resources including the forest areas to feed their livestock. There is continuous degradation of natural resources to meet the various needs of its growing population.

With this background, BAIF has identified the adverse effect of the climate change on each aspect of the **agriculture production systems** (covering Agriculture, Water, Livestock) and differential impact on the lives and livelihoods of the communities residing in Champawat district of Uttarakhand, based on secondary data analysis, primary data analysis, and interaction with the local communities. *The climate change vulnerability and possible solutions identified by BAIF based on resilience framework (discussed in section IV.1) are summarized in the Table (1).*

Table (1): Climate change vulnerability and possible solutions – pre-project situation analysis

Main Problems identified	Technology Solutions
<ul style="list-style-type: none"> <li>• <b>Growing scarcity of water</b> (surface and sub-surface) for drinking and irrigation purposes due to unseasonal , irregular, less consistent, unpredictable rains in</li> </ul>	<ul style="list-style-type: none"> <li>• Recharging of Natural Springs- through site specific mechanical and vegetative measures</li> <li>• Roof top rainwater harvesting</li> <li>• Innovative water use efficiency demonstrations</li> </ul>

Main Problems identified	Technology Solutions
hills ,Drying up of natural water sources, mainly springs	<ul style="list-style-type: none"> <li>Ways for creating in situ natural water reserves in hills</li> </ul>
<ul style="list-style-type: none"> <li><b>Growing scarcity of fodder</b> resources in hills to support livestock</li> <li>Loss of habitats and increased neglect of common pastoral lands</li> </ul>	<ul style="list-style-type: none"> <li>Fodder promotion on private and community lands through Vanpanchayats</li> <li>Introducing ways and measures for perennial green fodder availability</li> </ul>
<ul style="list-style-type: none"> <li><b>Absence of optimum development of horticulture</b> e.g. cultivation of high value vegetables as a source of livelihood in spite of favorable conditions</li> <li><b>Sudden and extreme weather events posing threat to cultivation in open lands</b></li> <li>Limited options for crop and income diversification</li> </ul>	<ul style="list-style-type: none"> <li>Promotion of horticulture under protected conditions (low cost bamboo based small poly houses).</li> <li>Main crops to be promoted under the protective cultivation would be vegetables (e.g. Tomato, Capsicum, and Cucumber)</li> <li>Piloting actions for organized production intensification, collection, and marketing of farm produce by villagers</li> </ul>
<ul style="list-style-type: none"> <li><b>Low productivity of cattle and limited realization of livestock yield potential</b></li> <li>Absence of organized milk collection and marketing efforts</li> </ul>	<ul style="list-style-type: none"> <li>Improved breeding services (using semen of suitable milk cattle breeds) at the door-step of hill families and training and inputs for scientific and climate friendly livestock management</li> <li>Piloting efforts for organized milk collection and marketing, linkage development with government promoted dairy. <i>Anchal</i> dairy has an operational base throughout most of the state</li> </ul>
<ul style="list-style-type: none"> <li><b>Eroding base of the agro-biodiversity and diverse landraces</b> (mainly, niche crops and sturdy and nutritious millets of the hills<sup>4</sup>)</li> </ul>	<ul style="list-style-type: none"> <li>Participatory conservation and characterization of indigenous pulses &amp; millets (native varieties)</li> <li>Establishing community seed banks for conservation and multiplication</li> <li>Live trials for production enhancement, multiplication and pure seed production</li> <li>Improved market services for producers and buyers</li> </ul>

<sup>4</sup> Ex: *Mandua* (finger millets), *ramdana/chua* (amaranthus), *rajma* (common kidney beans), *ogal* (buckwheat), urad (green gram), *moong* (black gram), *naurangi* (mix of pulses), *gahath* (horsegram), *bhat* (soybean), *lobiya* (French beans), *kheera* (cucumber)

Main Problems identified	Technology Solutions
<ul style="list-style-type: none"> <li><b>Absence of scientific and farmer friendly weather data service and reach of weather based crop advisory services</b> in a region there by increasing community's vulnerability</li> </ul>	<ul style="list-style-type: none"> <li>Linkage development and increased partnership with local research and scientific institutes in a region for required technical inputs</li> </ul>
<ul style="list-style-type: none"> <li><b>Absence of crop diversification efforts</b> due to absence of techno-managerial inputs and lack of knowledge about required agro technology for introduction of temperate fruit varieties such as Plum, Malta, Apple, Peach, and Walnut in the field despite favourable climate conditions</li> </ul>	<ul style="list-style-type: none"> <li>Introduction of high value, temperate horticulture fruit types and grafts on private lands to develop orchard-based income source with required techno managerial and input support</li> <li>Improved market services for producers and buyers</li> </ul>
<ul style="list-style-type: none"> <li><b>Enhanced degradation of existing natural resources</b> in the region thereby adding <b>hardship for hill women</b></li> </ul>	<ul style="list-style-type: none"> <li>Planned combination of climate smart and resource-based development interventions to be able to enhance water, fodder, farm produce base in project villages</li> </ul>

Based on the above analysis (Table 1), the critical points of interventions were recognized during the proposal phase. **It was proposed to establish the climate adaptation model for the North Western Himalayan region with the aim of improving the adaptive capacity of rural small and marginal farmers including hill women in North Western Himalayan region by introducing a combination of Climate Smart Farming Technologies along with required social engineering and capacity building processes. The proposed packages of activities were expected to improve /sustain the livelihoods of vulnerable hill communities, show ways of diversification of income while also initiating the process of natural resource management in the region.**

## II.2. Project Location and beneficiaries:

The project was proposed to be implemented in a cluster of 10 villages / gram panchayats which is mainly administrative part of 3 blocks (Champawat, Pati, Lohaghat) of Champawat district. (Refer figure(1) for project location within IHR). The criterion was set to identify the project villages and potential beneficiaries depending upon the socio-economic profile of the region.

Table (2): Demographic Profile of the villages

Sr. No	Block	Gram Panchayat	Total House-hold (HH)	Total Population	Women headed families		Small and marginal farmers families	
					HH	% of total HH	HH	% of total HH
1	Champawat	Khalkariya	76	332	33	43%	68	89%
2		Suyalkhark	105	422	36	34%	99	94%
3		Digdai	79	446	27	34%	64	81%
4		Bhageena Bhandari	160	713	30	19%	147	92%
5		Narsingh Danda	162	833	60	37%	159	98%
6	Pati	Tapnipal	87	435	46	53%	81	93%
7		Ghoshani	419	1858	189	45%	402	96%
8		Tyarsun	100	484	44	44%	94	94%
9		Manar Malla	125	666	58	46%	123	98%
10	Lohaghat	Banjgaon	44	175	33	75%	39	88%
<b>Grand Total</b>			<b>1357</b>	<b>6364</b>	<b>556</b>	<b>41%</b>	<b>1276</b>	<b>94%</b>
					<b>41% of total HH</b>		<b>94% of total HH</b>	

- Average land holding size 1.3 ha, 1276 families have land holding below 2 ha, 70% population is dependent primarily on agriculture and livestock for livelihood.
- Of total geographical area of 3543 sq.km, 30% of the area is forest, 10% pastureland, and 51% of the area is cultivable land. Out of the total cultivable land only 28% of the area is net sown area.
- 5% of net sown area has irrigation facilities.
- **Average annual income per household is Rs. 28000/-**





Figure (1): Project location within IHR

### Selection of Beneficiaries:

Since this is the first of its kind effort in the IHR to pilot and test the package of a combination of climate smart technologies at the family level (household level), it was proposed to cover small number of families, which includes **800 vulnerable small and marginal farming families whose livelihoods are solely dependent on primary sectors such as agriculture and livestock.**

**The following criterion was set through participatory methods during planning of the project activities:**

- Families with sole dependence on agriculture / primary sector which are climate sensitive as only source of income and livelihoods
- Families staying in remote hill areas, where alternative livelihood options are limited
- Farmers with basic minimum resources to meet their livelihood requirements
- Small and marginal farmers with land holding less than 2 ha and satisfying the above three criterion on priority basis
- Women headed families where productive men have migrated to cities and thus females are taking care of farming and thus bear direct burden of degradation of natural resources due to falling effects of climate change /variability
- Poor households( Including Scheduled caste households ) to be jointly identified by villagers using participatory processes ( considering poverty and marginalization perspectives of the villagers

### II.3. Project components and expected output

As per the Result framework detailed out in the proposal, the project is divided into three major components. Each component is linked to expected outcome and expected outputs of the activities undertaken during the project period.

Table (3): Logical analysis framework \_ expected outcome and output

Components	Sr.No	Outcome	Output	Expected output
(1) Community Mobilization and Organization	1	Improved community mobilization to collectively plan and undertake climate change adaptation	Local level awareness generation and mobilization of the community for climate related hazards.	<ul style="list-style-type: none"> <li>• Covering all 10 villages;</li> <li>• 10 vulnerability assessment plans</li> <li>• Annual adaptation plan for each year, 10 villages</li> </ul>
			Strengthening of CBOs/POs for adaptation to climatic vulnerability	<ul style="list-style-type: none"> <li>• 10 Village committees</li> <li>• 50 CBOs (5 CBOs per village - 1 Climate adaptation group, 1 marketing group, 1-2 milk marketing</li> </ul>

				groups, 1-2 water user groups) <ul style="list-style-type: none"> <li>• Maximum participation of women</li> <li>• Trainings and exposure visits</li> </ul>
(2) Introduction of Water Resource Development and Climate Smart Farming Technology	2.1	Building resilience through increased water availability and efficient water use in hill region	Creation of water reserves in regions through rain water tapping interventions	<ul style="list-style-type: none"> <li>• 15 spring rejuvenation, 50 ha area to be treated</li> <li>• 150 families (capacity 15000 litre/family)</li> </ul>
			Adoption of efficient water use practices and technologies	<ul style="list-style-type: none"> <li>• Drip/Sprinkler irrigation coverage for 20000 sq.meter (2 ha)</li> </ul>
	2.2	Adoption of climate smart agriculture technologies and farm diversification options for climate resilient livelihoods	Introduction to climate smart farming technologies with hill specificity	<ul style="list-style-type: none"> <li>• Horticulture intervention with 600 families</li> <li>• Polyhouse promotion with 200 families</li> <li>• Conservation of local seed varieties (25 land races) in all 10 villages</li> </ul>
	2.3	Improved potential of livestock resources as an option for livelihood stabilization in hills	Introduction of improved breeding service at door step of farmers with required management practices including fodder and feed	<ul style="list-style-type: none"> <li>• AI service provision to all targeted families (800 families)</li> <li>• Silvi pasture on 100 ha of land</li> <li>• Promotion of feed practices with 800 families</li> </ul>
	3	Knowledge generation based on field actions and	Knowledge generation through field action component	<ul style="list-style-type: none"> <li>• Timely technical reports</li> </ul>
(3) Knowledge Management	3	Knowledge generation based on field actions and	Knowledge generation through field action component	<ul style="list-style-type: none"> <li>• Timely technical reports</li> </ul>

including knowledge creation and wider dissemination actions		wider dissemination to enhance awareness of hill communities and stakeholders as well as for better policy inputs		<ul style="list-style-type: none"> <li>• Stakeholder consultations at various levels</li> <li>• Documentation of best practices</li> </ul>
			Wider dissemination of acquired knowledge	<ul style="list-style-type: none"> <li>• Stakeholder consultations at national level, policy inputs</li> </ul>

#### II.4. Expected benefits

The project envisions to have long term impact on economic and social conditions of the targeted communities, improving the environmental conditions alongside. The following table enlist the expected impact on these three parameters with reference to the most vulnerable communities and vulnerable groups.

Table (4): Expected benefits of the project

Type of benefits	Benefits
<b>(1) Social</b>	<ul style="list-style-type: none"> <li>(a) building cohesive groups of villagers to respond positively to climate change, build collective response capacity</li> <li>(b) address the vulnerabilities of hill families, leading to better adaptation in their own setting and reduction in migration</li> <li>(c) Drudgery reduction of women</li> <li>(d) Inclusion of local knowledge right from planning, understanding the problem from community perspective, to adaptation of the various interventions</li> <li>(e) Conservation and revival of some of the traditional practices</li> <li>(f) Knowledge dissemination and build capacities of local communities, promotion of trained cadre (CRPs)</li> <li>(g) Conservation of diverse landraces – increase food and nutritional security</li> </ul>
<b>(2) Economical</b>	<ul style="list-style-type: none"> <li>(a) Livelihood security</li> <li>(b) ensure sustained income for hill farmers in their own settings under changing climate change context by focusing on regenerative capacities of resources</li> </ul>



	<p>(c) enhanced yield and income from agriculture, horticulture and livestock and off-farm sectors</p> <p>(d) adoption of income diversification options, and marketing services</p> <p>(e) Disaster preparedness, minimize economic damage due to sudden hazards</p> <p>(f) integration of climate change perspectives into specific livelihoods such as agriculture (annual and perennial crops), livestock, forest and fodder so that these will be more resilient and provide viable household incomes for the communities</p> <p>(g) Per farmer, Annual income enhancement</p> <ul style="list-style-type: none"> <li>• Agriculture interventions Rs. 9250 per year</li> <li>• polyhouse Rs. 4000 in five year, Rs. 20,000 in 10 years.</li> <li>• Milk sale Rs. 41,820 and heifer Rs. 14000.</li> </ul>
<b>(3) Environmental</b>	<p>(a) Interventions consider for mountain specificity and harmony with ecosystem</p> <p>(b) Creation of important reserves of natural resources (water, fodder, biomass, food)</p> <p>(c) Principles of environmental sustainability based on Restore, Reuse, Recycle</p> <p>(d) Expected outcome of – robust model of adaptation to climate change in hills of IHR, coexistence of communities and ecosystem</p>



## Section III: Research methodology

Under this project, it was proposed to conduct the participatory Impact assessment and to generate the knowledge dissemination material like policy briefs, information brochure, case study compendium etc. from the duration of May 2021 to June 2021. The research methodology used for this purpose is the mix of quantitative analysis as well as qualitative analysis. There are two components to this study:

- (1) to undertake the study on participatory impact assessment of the project to assess the outcome, measuring its efficacy in the context of the Indian Himalayan Region (IHR) and
- (2) to generate the knowledge dissemination material for various stakeholders (targeting mainly policy makers, decision makers, funding organization, practitioners, academicians etc.) and targeting various platforms (policy dialogue forums, social media etc.)

**This report is specifically for the part one of the proposed study i.e. Participatory impact assessment.** The following section describes the methodological framework used for this.

### III.1 Objective of Impact assessment study:

- (1) To assess the performance of the project and measure its relevance and efficacy in terms of output, outcome, impact on the lives and livelihoods of the north-western communities, and
- (2) To draw the learnings and recommendations for climate change adaptation and mitigation in the context of vulnerable fragile ecosystems of IHR.

### III.2 Methodological tools:

A mixed of quantitative and qualitative research methodology was used to achieve the above objectives and this includes:

#### (1) Pre-research and desk review:

- a. literature review to set up the context by understanding - climate change vulnerabilities, possible remedies, similar studies/work done in IHR.
- b. Desk review of documents provided by the implementation agency (IA) – proposal, Logical Framework analysis (LFA), timely reports, case studies, interim assessments, MIS etc.
- c. Formulating the detailed research methodology based on above reviews – structured and semi-structured questionnaires for various stakeholders (interviewees), documentation templates, case study template, data collection tools etc.
- d. Social science theories like social change theory, behavioural theory, participatory approaches, etc. has been studied before beginning this research.

- (2) **Field visit to the sampled villages:** The six GP villages out of ten were visited during 9<sup>th</sup> June to 14<sup>th</sup> June 2021, covering 2 villages from Champawat block, 3 villages from Pati block and one from Lohaghat block.

Table (5): Details of site visited during field visit

Block	Village	Purpose/Objective
Champawat	Khalkariya	Visiting different typologies of farmers (more aware and progressive farmers), visit to one farmer who has adopted the interventions polyhouse through BAIF and Poultry, Fishery, Solar system through convergence.
	Narsingh Danda	Visit to intervention of Solar based drinking water system, springshed development, and FGDs with Jal Samiti
Pati	Goshani	Visit to interventions - polyhouses, SHGs, Artificial Insemination, Rooftop Rainwater harvesting (RRWH) for

		agriculture, case of integrated farming system (polyhouse, horticulture farming); interview of individual farmers and FGD with community members and institutions
	Tyarsun	Two visits to this village. Visit to intervention of Springshed development, recharge area treatment and FGDs with Van Panchayat (Same as Jal Samiti), Learning community based approach to spring shed development, Interviews with key members of Jal samiti
	Manar Malla	Two visit to this village. understanding Community based Van Panchayat, Interview of Van Amma, FGDs, visit to forest area, FGDs with members of Van Panchayat and community members
Lohaghat	Banjgaon	Observation of interventions mainly Polyhouse, visiting 4 polyhouses and interviews with polyhouse farmers, case study documentation with Deepa Devi, Interaction with SHG members and Pradhan (He is VP Pradhan too)

- (a) Sampling criterion to select the sites to cover all the typologies of innovations.
- Sampling criterion for villages/families includes – profile of village, socio-economic status of communities, profile of family, emphasize on resource-based interventions, categorization of – best, medium and poor demonstrations in each thematic (this is to judge what worked best and what did not and what are the learnings coming from all the experiences.)
  - Typologies of innovations – as various innovations have been implemented under this project, the impact of individual innovation to the combinations of one or two or more, and combination of all will have differential impacts and hence differential learning for policy recommendations can be drawn.
- (b) Each intervention was visited along with the BAIF team to understand the processes and collection of the content for videography as well as case studies. The focus group discussions were conducted with the communities wherever possible to understand the processes adopted during project execution, benefits realized by communities and individual farmers, functioning of the village level institutions etc. The semi structured interviews were conducted with farmers, women farmers, AI trainee, livestock rearing farmers, etc. The structured interviews were conducted with BAIF team members – Dr. Dinesh Raturi (Associate thematic program expert) and Mr. Pushkar Bisht (Senior project officer) to understand the – project execution processes, processes and model of each



intervention, opportunities as well as challenges observed by them etc. The insight on processes like – marketing, training, community-based processes etc. was also understood through these interactions. The continuous dialogue with Dr. Rajashree Joshi (Programme Director) has helped in understanding the larger philosophy of the work, theory of change, approach, etc. and how this project will establish the pathways for future.

**(3) Secondary and primary data collection:** The secondary and primary data is collected with the help of BAIF team, which includes the Census data on village profile, baseline survey data from vulnerability assessment, primary data on economics of the interventions (From BAIF team as well as during field visit).

**III.3 Analytical framework:** BAIF has prepared the result framework, output and outcome indicator framework, some interim reports on collection of such indicators, interim reports on case studies, compendium of case studies etc. All this material has been used to develop the analytical framework and results are tabulated based on that (as explained in section V of this report). Analytical assessment tool like Excel has been used. The broader **Framework of the study** has been designed based on the **triangle of sustainability**<sup>5</sup>, proposed output indicators, outcome indicator and result framework of BAIF as explained in Section II. The measurable indicators in the framework are expanded on result framework considering the three major parameter of sustainability i.e. environmental, social and economical impact of the project interventions on the community and the cluster as in whole.

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<sup>5</sup> sustainability is a balanced three-way relationship between the environment, society, and the economy,

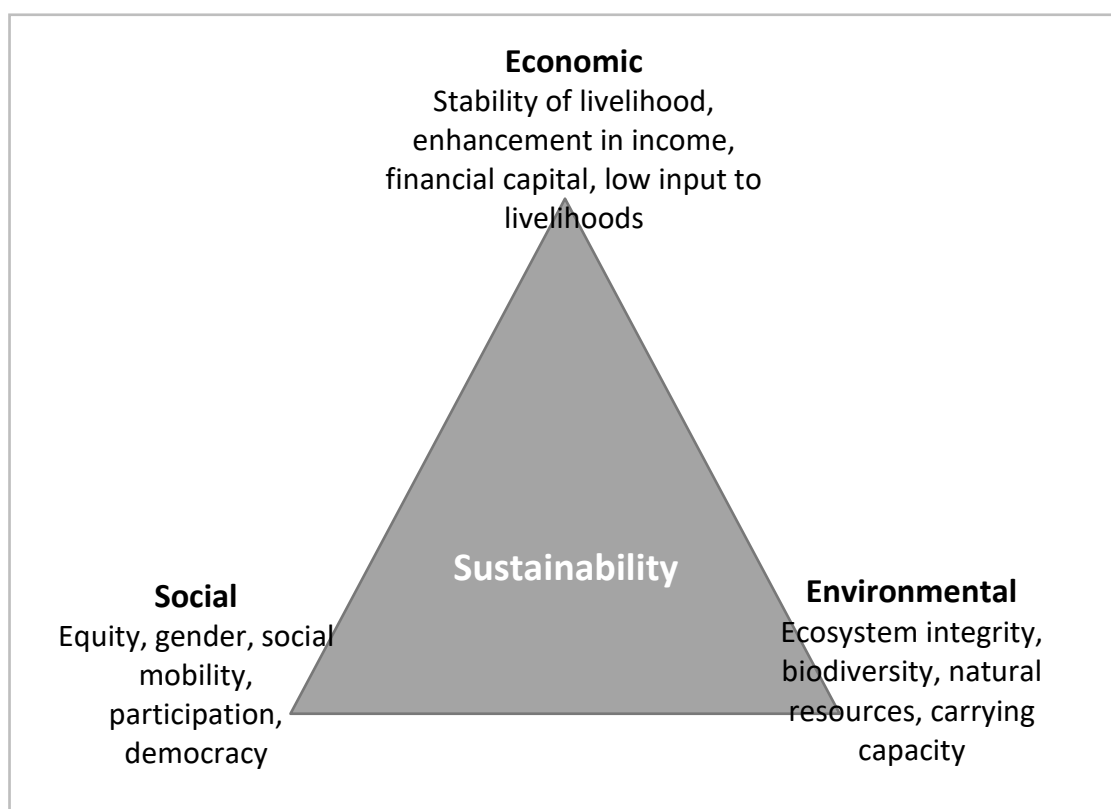


Figure (2): Triangle of sustainability adopted for impact assessment framework

Table (6): Framework for Participatory Impact Assessment Study and measurable indicators

Type of Impact	Measurable indicators	
	SN	Name and description of indicator
<b>(1) Environmental Impact</b>		
This is measured in terms of Natural resource productivity enhancement with environmentally sensitive interventions. The impact on natural resources can be measured in terms of - Water productivity, vegetative productivity, land productivity, Impact on soil erosion, soil conserved, water augmented, biomass generated, fodder availability etc. The context specificity of the interventions is also checked at interventions are to be in harmony with the local ecosystem.	1.1	Total area treated under the principles of soil-water conservation (Spring rejuvenation, Van Panchayat, Fodder development, Horticulture and agroforestry) in hectares
	1.2	Additional water augmentation through various measures (Million liters per annum)
	1.3	Vegetative or biomass Production (Metric tons)
	1.4	Fodder production (Silvi pasture in Van Panchayat + Fodder development on agriculture land) (tons)
	1.5	Agriculture productivity (Tons per family)
	1.6	Livestock productivity
	1.7	Impact on soil erosion in terms of Soil conserved
	1.8	Overall impact on natural resource productivity



Economic impacts on communities are at two level, first the enhanced household income and second is communities' ability to access the financial resources (due to increased mobilization). The impact on the household also includes food security, reduced dependency on the market, human development indicator etc. which are important along with monetized indicator of income.	2.1	Annual Income enhancement at family level
	2.2	Food security at family level (measured in terms of increased availability of food, and increased intake in diet)
	2.3	Market dependency (Reduced market dependency for inputs and increased market accessibility for selling produces)
	2.4	Accessibility to other financial resources like government schemes
<b>(3) Social Impact</b>		
Impact on communities to measure the adaptability, resilience (of communities towards the climate change), inclusion, equity, and gendered aspects. Participation levels and relevance of grassroots democratic institutions also be assessed.	3.1	Building climate resilience of communities
	3.2	Adaptability of interventions to suite local conditions
	3.3	Inclusion and equity (inclusion of weaker sections of societies and equitable distribution of resources, benefits, wealth etc.)
	3.4	Gendered aspects - women centrality
<b>(4) Sustainability</b>		
The overall impact on sustainability of the project based on above three components and additionally on lives and livelihoods of communities, relevance, efficacy, scalability, and replicability of the project in the context of IHR will be measured. The sustainability achieved through processes (training, mobilization, etc.) will also be assessed here.	4.1	Qualitative description based on above three impacts to address if the project is moving in the direction of sustainability.



## Section IV: Process document

In this section, the **theory of change** as envisioned by BAIF for this long-term project, the guiding principles and the socio-technical model adopted to implement that theory and differential processes adopted for the implementation of each intervention has been discussed in detail. To draw the understanding under this section, the copy of proposal and other literature provided by BAIF has been studied in detailed. The insight drawn during the field visit, FGDs with the community members, structured interviews with BAIF field staff and beneficiaries have contributed to this documentation.

### IV.1 Theory of Change and resilience framework

Climate change, though a natural phenomenon, it is well understood that climate change is also triggered by anthropological activities and the adverse effect are exacerbated by anthropological factors. The vagaries of climate change are particularly faced by those communities which are directly dependent on the natural resources for their lives and livelihoods, e.g. nomadic tribes, livestock herders, forest produce collectors, agriculture communities, etc. **Climate change mitigation** measures like soil water conservation,



## Guiding Principles

- (1) Climate change mitigation, adaptation, and building climate change resilience of communities
- (2) Community based process and participatory approach
- (3) Local natural resource-based interventions
- (4) Increase the social and financial capital of the communities.
- (5) Inclusion (weaker sections, women participation), equity, and democratic processes

increasing the base of natural productivity through forestry, fodder, land development etc. can nullify the impact of climate change to certain extent when interventions are implemented at macro level. At micro level, such interventions can help in bringing the stability to the base of natural resources. To achieve **climate change resiliency**, climate change adaptations are more important than mitigation measures to make the communities and ecosystem resilient. This understanding is clearly reflected in BAIF's work under this project.

**The climate change resiliency can be achieved in three ways – economic resilience, social resilience, and environmental resilience and this is to be implemented at various levels from micro to macro level, ie. From family/household as unit at micro level to community and systemic changes at macro level.** The systemic supports in the form of policy regime, knowledge systems, funds etc. are important to support the changes. This approach has been adopted by BAIF at

various stages of implementation and accordingly the roadmap has been prepared for long term. The resilience framework can be understood from the following sketch in figure (3).

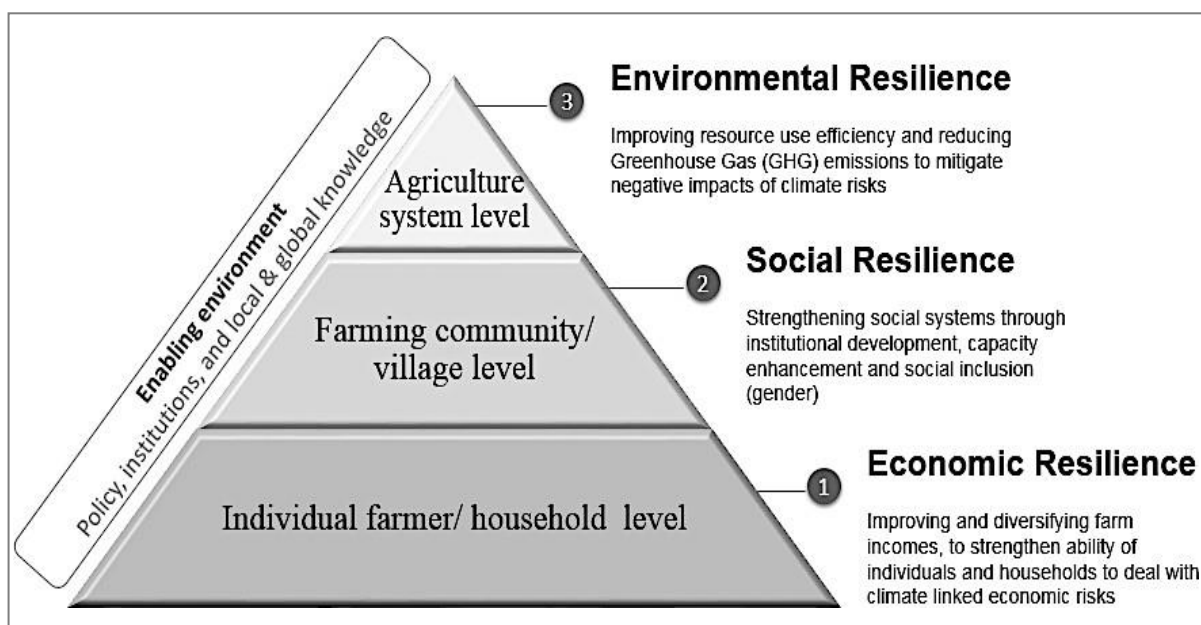


Figure (3): Resilience building framework

Interventions are planned in **participatory manner**, and they are based on - available resources, constraints on resources and new opportunities created by climate change in the context of local agriculture production system. The promotion of new horticulture crops instead of apple due to changing weather condition is the best example of adapting to new vegetative zone created by climate change.

The active participation of communities is very important to ensure the sustainability of project, where communities not only at the end of receiving benefits but actively planning the project activities, and taking the ownership of the activities/resources. Beneficiary participation in the project design and management have effect on the efficiency of implementation, cost recovery, and project sustainability. Development planners have a moral obligation to "listen to the people," both to understand their needs and to assess how their lives are actually being affected by donor-sponsored projects and policies. This moral obligation was clearly visible in BAIF's approach. The efforts have been made to introduce the strengthening of existing local level institutions through mobilization and involvement of the CBOs in participatory vulnerability assessment exercises, planning awareness events for enhancing their knowledge on various climate smart technologies. Actions are planned to build their capacities and skills after understanding the nature of climate risks, its sectoral implications and required coping strategies. The village level institutions like – user's group, polyhouse marketing groups, Van panchayats, Jal samiti etc. are the exemplary of the involvement of communities and communities taking the responsibility as well as ownership of the Project. The institutions ensure the democratic decision making at all level of the project execution.

Any development activity must consider for **natural resources** available in the local region. India is country of diversity and blanket approach of technological interventions developed for terrain like Punjab (case of green revolution) won't be suitable for Himalayan region which is very diverse and different from other terrains. Hence, appropriate interventions suitable for local ecological, typographical, social and economic are key to the success. Resource based livelihood planning – addressing the above factors for small and marginal farmers and women farmer was clearly visible during the assessment.

To sustain the intervention, **the social and financial capital of the communities** has been built by creating appropriate institutions. E.g. SHG mobilize women farmers to social strengthen and empower them as well as they build the financial capital by saving small amount. Such a small saving has been used for their need/crisis during emergency time. This also reduces their dependence on financial institutions for small but urgent needs. Likewise, farmers associated with dairy intervention, polyhouse intervention take the responsibility and set up the arrangements to strengthen the marketing of the local produces. The mobilization of the farmers into such groups is a creation of social capital to build the financial capital of the communities collectively.

There is a special focus on the **gendered aspect** of the developmental project. Women are not able to make their full contribution or receive their full share of benefits unless projects are designed to take into account the special needs and potentials of women. Women are change vehicle in this project, and they have been brought into the center of developmental activities. Their knowledge plays key role in biodiversity conservation (e.g. case of seed bank and conservation of 25 land races).

The processes and interventions adopted in the project, ensure the **inclusion of weaker sections** of society (like small and marginal famers, women farmers) and the equitable distribution of the benefits through democratic processes.

## IV.2 Socio-technical model

The unique socio-technical model has evolved through this project to mitigate the impact of climate change and increasing the climate change resilience of communities and their livelihoods. The significant modification in the technical interventions to suite the local need as well as enhancing the economic returns has been observed in the technical interventions. The striking features of these technologies are – First, it considers the economic benefits of the interventions by assessing the overall cost-benefit. The overall cost-benefit analysis gives the insight that the combination of interventions like polyhouses, horticulture and vegetable cultivation can earn more economic benefits than promoting technologies on cereal/pulse-based farming system. Second, the interventions are redesigned to suite the local need by

## Features of model

- Multi-sectoral approach
- Local context specific solutions and recognition to local knowledge
- Natural resources' based planning
- Diversification of livelihood options to safeguard against climatic events
- Scalable and replicable to Indian Himalayan region in the context of climate change
- Strong sense of community based organizations, participation of communities
- Inclusive and gender sensitive

incorporating the local knowledge, local material and local climatic factors. The choices of fruit plantation in the region depends on the changed vegetative zone and suitability in the local weather. Similarly, the size of polyhouse have been designed to suite the small, fragmented, terrace farming in the Himalayan terrain. Third feature of the technical intervention is the integrated approach. The agriculture, water, livestock and forest are so much integrated part of the mountain farming systems, and hence interventions are designed to address this. This also leads to diversification of the income sources which is much required in the unpredictability of the climate vagaries. The integrated farming system with intervention on polyhouse, horticulture, poultry, RRWH, promotion of local seed etc. have been observed which ensures the better return to the farmers and make his farming system more resilient to climate change. The fourth feature observed across the agriculture interventions is the synergy between modern and traditional knowledge. The modern science systems are

required to equip the communities with the new set of knowledge in the wake of climate change. E.g. Weather forecast messaging system through mobile phones helps farmer in taking the right decision on their agriculture practices. The traditional knowledge of seed biodiversity has been conserved and local seeds have been promoted as local varieties are more tolerant to climatic vagaries.

The social innovation on village level institutions, capacity building of the community resource persons, setting up democratic processes (as explained above), building market linkages, gendered approach etc. are interwoven with the technical interventions to make the system more sustainable. The users' groups (like Polyhouse owner group POG) are formed around the interventions so that farmers can share resources like – finances, seeds, input services, knowledge etc. The same group is involved in establishing the marketing systems. The collective selling of the produces increases the bargaining capacities of that group/institution.

These kinds of adaptation make the model of livelihood development replicable and scalable in the context of north-western IHR, provided that the interventions are fine-tuned to suit local needs, climatic conditions, and socioeconomics of the region.

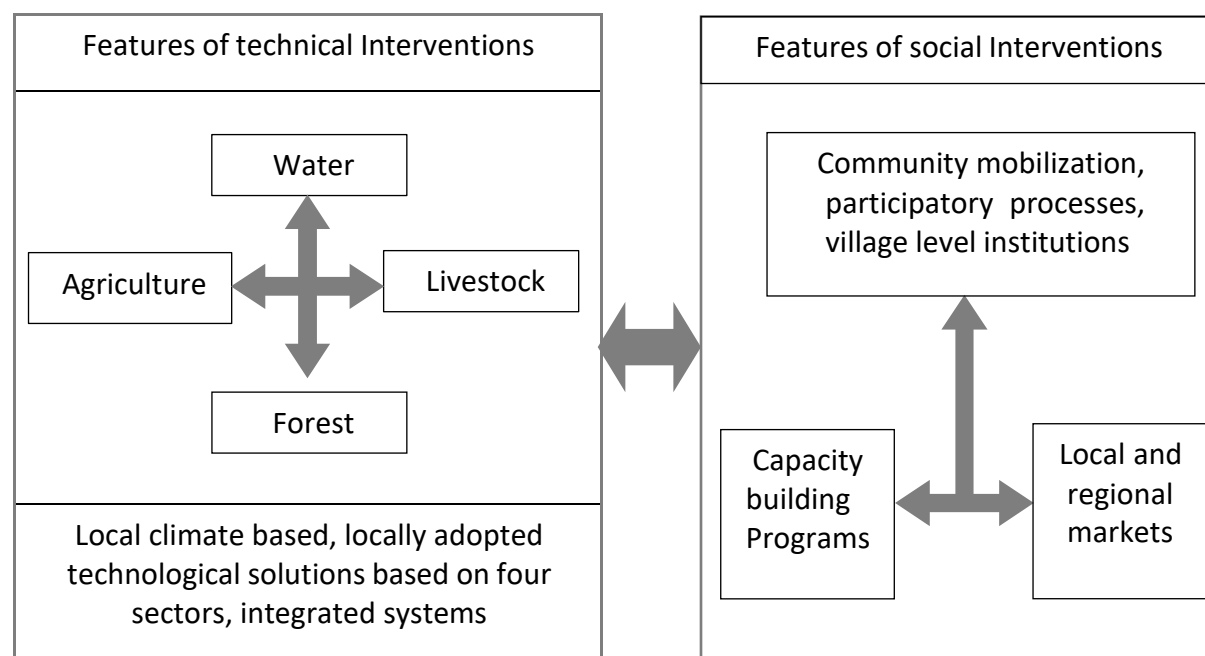


Figure (4): Features of socio-technical model

### IV.3 Process documentation of project execution:

#### (A) Project Approach:

The project follows the project life-cycle model of – first, designing the project components based on targeted objectives, implementation of project components to successfully demonstrate the model and third is to scale up the model through collaborations with various stakeholder/institutions by mobilizing various resources. The project achieves the goal by means of diversification of the production systems and improving the institutional capacities to adopt climate smart technologies and practices in Himalayan Hill context. As a strategy, linkages and partnerships are developed with relevant technical and scientific institutes in the region for required technology back stopping. The collaborative areas include strategic research, technology demonstrations and transfer, applied field-based research, capacity building and improved outreach. The Project also strives to complement on-going government programs and thereby try to achieve an objective of convergence for effective adaptation.



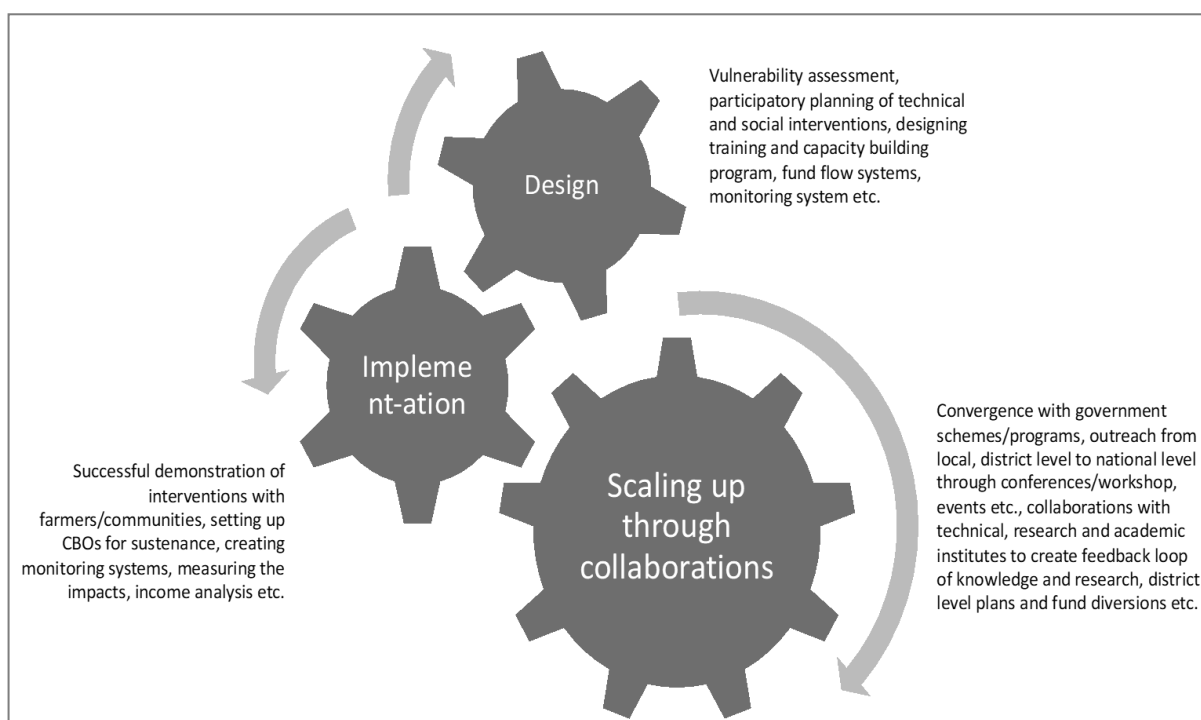


Figure (5): Schematic of project life-cycle approach

## (B) Interventions implemented:

The Model Introduced by BAIF in Himalayas includes mountain typology specific activities are such as:

Table (7): Sectoral interventions adopted under the project

SN	Sector	Objective	Components/Interventions
(1)	Water	To increase the water availability through rejuvenation of water resources (specially springs) and promote water use efficiency	<ul style="list-style-type: none"> <li>○ Rejuvenation of Springs and ecosystem services</li> <li>○ Rooftop rainwater harvesting</li> <li>○ Micro irrigation – Drip and Sprinkler</li> <li>○ CBOs - Jal Samiti (Water users' Group)</li> </ul>
(2)	Agriculture	To increase the livelihood and food security through climate smart adaptations and diversification of income source	<ul style="list-style-type: none"> <li>○ Low-cost bamboo polyhouse</li> <li>○ Wadi model of Horticulture promotion (agro-forestry) (promotion of varieties like Plum, Peach, Walnut, Apricot, Malta, Apple)</li> <li>○ Biodiversity conservation through conservation of local breeds of seeds</li> </ul>

			<ul style="list-style-type: none"> <li>○ CBOs - Polyhouse owner groups, Wadi Owner groups</li> </ul>
(3)	Livestock	To increase the productivity of livestock production system through scientific interventions on breed, food, and shed; market linkages for better economic returns	<ul style="list-style-type: none"> <li>○ Improved breed through Artificial insemination (AI) program</li> <li>○ Support in health services (shed, camps, deworming, vaccination)</li> <li>○ Improved feed and fodder practices</li> <li>○ Napier fodder plantation</li> <li>○ Dairy owner groups, Para-workers</li> </ul>
(4)	Forest	To increase the availability of fodder, fuel, timber, water by restoration of degraded forest and pasture lands through community-based systems	<ul style="list-style-type: none"> <li>○ Restoration of community forest lands</li> <li>○ Plantation of local indigenous varieties of timber, fodder, Non-timber forest produce (NTFP) etc. trees and grasses (<i>Banj, Khadku, Phalyan, Seetal, etc.</i>)</li> <li>○ Monitoring systems for data collection</li> <li>○ Establishment and strengthening of Van Panchayat Samitis</li> </ul>
(5)	Gendered based approach	To bring women to centre of developmental decision making, to empower them socially, economically, and politically, to reduce drudgery, to ensure their entitlements	<ul style="list-style-type: none"> <li>○ Gender sensitive adaptation strategies in all interventions</li> <li>○ Recognition of their knowledge and capacities</li> <li>○ Skill and capacity development of women farmers</li> <li>○ Women centric community-based organizations, SHGs</li> </ul>
(6)	Community mobilization	To bring awareness in the communities about climate change, and organize them into informal and/or formal groups to collectivize the efforts of climate mitigation and adaptation and to actively bring them to center of the development process	<ul style="list-style-type: none"> <li>○ Community awareness generation</li> <li>○ Participatory planning for vulnerability assessment and adaptation plan</li> <li>○ Mobilization of communities in community-based organizations like – Gram Jal Vayu Samiti and other users' groups as mentioned above</li> <li>○ Capacity building and training on climatic hazard, marketing, and institutions</li> </ul>
(6)	Capacity building	To create a cadre of trained youth and community	<ul style="list-style-type: none"> <li>○ Trainings on technological and social interventions</li> </ul>

		resource persons for long term sustainability and to build the climate resilient communities equipped with the knowledge and skills	<ul style="list-style-type: none"> <li>○ Training of Trainer (ToT)</li> <li>○ Exposure visits</li> <li>○ Collaboration with training and research institutes</li> </ul>
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**(C) Target groups:**

The criterion for selection of targeted families was decided earlier before the implementation of the project as follow and later the families were selected based on participatory and democratic process of village and community meetings.

- i. Families with sole dependence on agriculture / primary sector which are climate sensitive as only source of income and livelihoods
- ii. Families staying in remote hill areas, where alternative livelihood options are limited
- iii. Farmers with basic minimum resources to meet their livelihood requirements
- iv. Women headed families where productive men have migrated to cities and thus females are taking care of farming and thus bear direct burden of degradation of natural resources due to falling effects of climate change /variability
- v. Poor households (Including Scheduled caste households ) to be jointly identified by villagers using participatory processes (considering poverty and marginalization perspectives of the villagers)

**(D) The steps followed during execution:**

- i. First year was a grounding year for planning, mobilization, and setting up demonstrations.
  - a. Vulnerability mapping of villages and communities through participatory processes, preparation of vulnerability assessment and annual adaption plan for each village.
  - b. Mobilization of communities, awareness generation, formation of CBOs, Users's groups etc.
  - c. Demonstration with limited number of farmers, drawing learning, showcasing the result to other farmers
  - d. Initial seed funding to needy farmers in terms of input services, material, knowledge etc.
  - e. Capacity building and training on technical interventions, social processes, strengthening the working of CBOs etc.

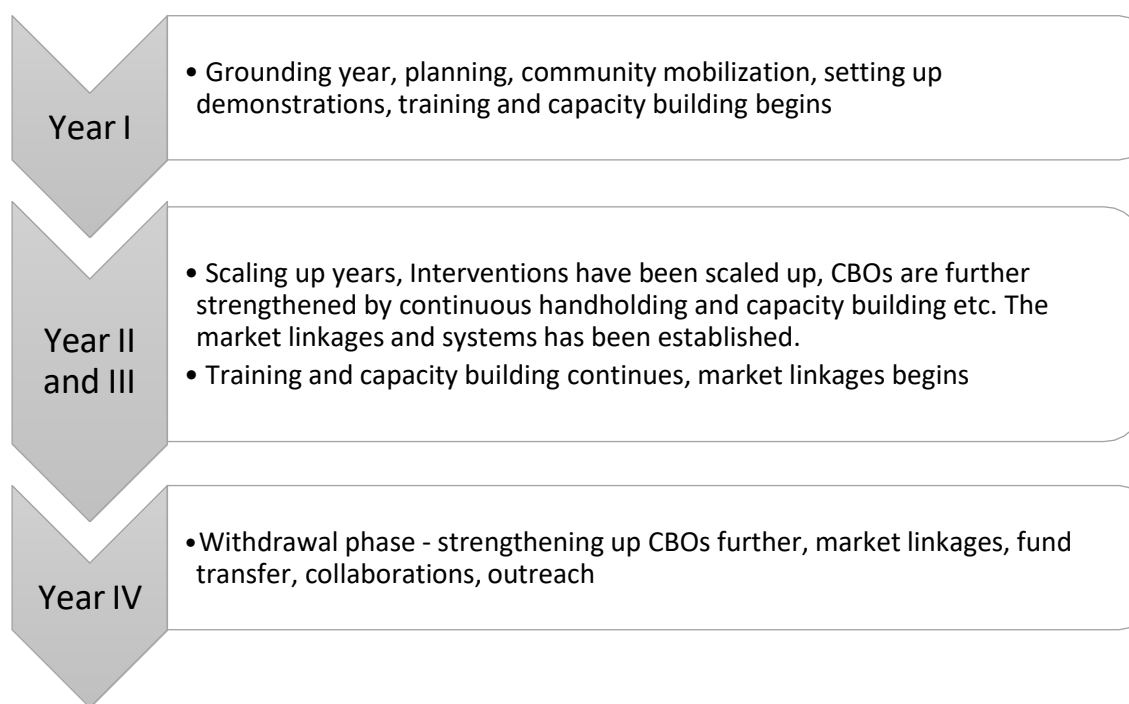


Figure (6): Year-wise project progression

- ii. Second and third year has been the scaling up year, when interventions have been scaled up, CBOs are further strengthened by continuous handholding and capacity building etc. The market linkages and systems has been established.
  - a. Scaling up the interventions through community participation, adaptation by other farmers in subsequent year
  - b. Mobilization of funds through government schemes for convergence of activities
  - c. Capacity building and training Program with technical and research institutes.
  - d. Further strengthening of CBOs to take the ownership and responsibility
  - e. Slowly establishing the market linkage and systems through CBOs for surplus produces from poly house, vegetable cultivation etc.
  - f. Conservation of niche and traditional seeds (landraces) in the form of seed bank at office level as well as village level.
  - g. Implementation of spring shed development plans for 15 springs.
- iii. Fourth year (along with extended period till August 2021) was used for withdrawal strategy.
  - a. Handing over the marketing, input service systems, and knowledge systems to communities.
  - b. Functional seed banks, CBOs, User's groups, SHGs, VPs in almost all the villages.
  - c. Transition of the project activities from NABARD funded sources to government funded source, through convergence with schemes.

- d. Stakeholder engagement and setting up institutional framework to involve all the stakeholder from local level (Gram Panchayat) to district/regional level. The technical expertise, academia, research institute etc. have been also linked in this project.
- e. Strengthening the market linkages (forward and backward for all the interventions)
- f. Setting up service systems required by farmers, and which are self-sustainable in long term (e.g. BAIF's model on artificial insemination and trainees for livestock promotions).





## Section V: Impact assessment

In this section, the impact of the project work has been documented based on Logical analysis framework and methodology adopted in section III. It was observed through the impact assessment study and data supported by BAIF that, **the project could reach out to more than 800 families with direct benefit whereas additionally 400 families have reached out to spin-off effect of the project out of which 75% interventions are implemented with women farmers of the family.** The major highlights of the project are:

- Targeted families: Project reach out to 800 plus families directly and to additionally 400 families through indirect benefits.
- Climate smart agriculture practices:
  - 252 families have been engaged with the gainful employment and sustained income through polyhouse farming
  - 600 families have been benefited with agro-forestry and horticulture interventions and they have been provided with 50 saplings of horticulture plant and 50 saplings of agro-forestry plants each family.

- Income enhancement ranges from Rs. 25000 to Rs. 1lakhs.
- Water management:
  - 17 springs have been rejuvenated in 10 villages benefitting 620 families with safe drinking water.
  - 150 families have been provided with rooftop rainwater harvesting tanks with the capacity of 15000liters each
  - Increased water availability through-out summer months
  - Drip and sprinkler irrigation provided to 262 families covering 26600 sq. Meter of land (2.7ha)
  - Water augmentation to the scale of 1500 Million litres through soil-water conservation, spring rejuvenation etc.
- Livestock Program:
  - Almost all the families within 10 villages (800+) benefitted with AI practices and improved breed and milk production
  - Almost 2266 cattle/annually have been provided with AI facility through BAIF's network of Pashu-kendra and trainees
  - Income enhancement through milk production and sell of better breed cattle to the tune of Rs 30000- 40000 per year per family
  - Additional income opportunities to rural youth through training and volunteering programs
  - Improved feed and fodder facilities provided to all the targeted families.
  - Forest rejuvenation and fodder development on the farm land, covering almost 140 ha of land
- Community based organizations
  - Total 99 various forms of community based organizations in the form of users' group and committees (Vanpanchayat Committees , Polyhouse owners group, Wadi users' group, SHGs, Water user or management groups (Jal Samiti) , Farmer interest groups, Livestock keepers groups, Gram Jal Vayu Parivartan committee) have been formed, with 75% members being women
  - Total 91 SHGs have been formed with 932 members with saving of Rs. 27.05 lakhs as on May 2021
  - 100 participation of women farmers in SHGs, Jal Samitis, Van Panchayats and 50% in other users' groups

### **V.1 LFA based output and outcome:**

The intervention wise overall achievement of the project activities is presented in the following Table (8) below. The detail activity wise and village wise break up can be found in Annexure (a).

Table (8): LFA based activity wise achievements as on December 2021

Component s	Outcome	Activities	Achievements
(1) Community Mobilization and Organization	Improved community mobilization to collectively plan and undertake climate change adaptation	Awareness Generation Meetings in all 10 villages	37 major meetings under awareness generation
		Baseline Survey and Vulnerability assessment of all 10 villages through Participatory Rural Appraisal and Preparation of Annual Adaption Plan	Vulnerability assessment of 10 villages and 10 participatory adaption plans
		Facilitation from Subject Matter Specialists / Technical	Provided by KVK, VPKAS, GB Pant University, relevant government departments, NIDHI, CITH, RSETI and BAIF
		Mobilization and Formation of CBOs.	
		(a) Poly house Interest group (No of PIG, Total members)	9 PIGs, 84 member families
		(b) Dairy IG (No of DIG, Total members)	35 DIGs, 325 member families
		(c) Wadi IG (No of WIG, Total members)	17 WIGs, 180 member families
		(d) Jal Samiti (No of samiti, Total members)	15 Jal Samitis, 174 member representatives (all female)
		(e) Van Panchayat Samiti (Number of committees, Total members)	13 VPs, 169 member representatives (all females)
		(f) Gram Jal Vayu Samiti (number, members, Male, Female)	10 Gram Jal Vayu Samitis, 120 member representatives (58 Male, 62 Female)
		(g.1) Self Help Groups (No. of groups)	91
		(g.2) SHGs number of members	932
		(g.3) Total saving of groups as on May 2021 (in INR)	2,705,575
		Training on suggested for technologies for participants and staff	16 exposures visits and 32 thematic training and exposure visits, 52 training days, 795 participants (207 M, 588F)
		Exposure visits on suggested technologies for participants	
(2) Introduction of Water Resource	Building resilience through increased water availability and efficient water use in hill region	Rejuvenation of natural springs	
		(a) No. of spring rejuvenated	17
		(b) No. of families benefitted	620
		Roof Top Rain Water Harvesting (No. of families benefitted with 15000 liter water tank each)	150 families, 225000-liter water augmented
		Introduction of Drip Irrigation for increase water use efficiency	

Component s	Outcome	Activities	Achievements
		(a) No. families benefitted	246
		(b) No. of area covered (Sq. meter) in polyhouse	20200
		(c) Drip system in open field area (400Sq. Meter/ farmer field (No. of families)	16 families, 6400 sq. meter coverage
		(d) Introduction of Sprinkler Irrigation (No. of families benefitted)	246
	Adoption of climate smart agriculture technologies and farm diversification options for climate resilient livelihoods	Introduction of climate resilient horticulture varieties on farmer's field (No. of beneficiary families)	600
		Introduction of high value vegetable cultivation under protected conditions (using bamboo-based poly houses to minimize the damage and losses due to extreme weather events (No. of beneficiary families)	252
		Conservation, revival, and adoption of climate resilient indigenous food crops as risk mitigation and food security measure	
		(a) Seed bank? (Yes/No)	3 village level seed bank (additionally one seed bank at cluster level hosted by BAIF)
		(b) Number of seed producing farmers	52
		(c) Type of seeds/species/varieties conserved	72 landraces of 22 crops from 4 types
		Introduction of improved breeding services with required management practices	
	Improved potential of livestock resources as an option for livelihood stabilization in hills	(a) No. of families benefitted through AI	800
		(b) No. of livestock benefitted through AI (As on August 2020)	2266
		(c) No. of Cattle sheds provided (= No. of families as beneficiaries)	800
		Fodder Tree Plantation	
		(a) No of Vanpanchayat (No.)	13
		(b) Area of Vanpanchayat (Ha.)	136
		(c) No of Farmers (individual land fodder promotion)	38

The overall outcome is discussed in the following Table (8). It can be observed that the project has achieved great strength of outcomes in the project area and the project is moving in the



direction of making communities self-reliant, but handholding for few more years will be required.

Table (9): LFA based outcome achieved

Compo nents	Proposed Outcome	Indicator	Outcome achieved
(1) Community Mobilization and Organization	Outcome 1.1: Improved community mobilization to collectively plan and undertake climate change adaptation	% of farmers using climate risk information to adjust their livelihood behavior	70% farming families from targeted 800 families adjusted their practices
		% Participation of village level representatives of vulnerable and marginalized groups	The participation of vulnerable and marginalized group was initially poor, but in later years have been improved because of the community meetings, mobilization and capacity building. The participation is still around 60% in the community meeting, but the reachability of the interventions is more than 70%
		No. of participants attending the meeting (M:F)	Participation of women has increased in later phase of the project, but initially emphasize has been given on separate meetings with women (e.g. SHG, training etc) to motivate their participation. Currently, almost 50% women participate in community or committee meetings, but 100% participation has been observed in SHG, Jal Samiti, Van Panchayat meetings.
		% families adopting climate resilient strategy as per Annual plan	Almost 80 % families adopt to interventions as planned in Annual adoption plan.
		Performance of CBOs	Communities participate actively in the meetings of CBOs for decision making and planning purpose. The CBOs like Polyhouse and dairy groups are very active in collective marketing of their produces but mainly participation of male farmers have been observed in these activities. Whereas CBOs like Pay Jal samiti, Van Panchayat Samiti has observed the active participation of women.
(2) Introduction of Water Resource Development and Climate Smart	Outcome 2.1 : Building resilience through increased water availability and efficient water use in hill region	Water augmentation (Millions liters)	Approx. 1500 million liters of water has been augmented through various activities.
		Saving of number of hours of hill women for water collection	Saving the approx. 120 to 180 hours / annually of each hill woman for water collection.
		Seasonal/perennial water availability (drinking and irrigation)	For drinking water, water is available throughout the year in 95% villages. In other villages, the water availability is increased by 2-3 months. Some of the spring still have low discharge rate as



Compo nents	Proposed Outcome	Indicator	Outcome achieved
	Outcome 2.2: Adoption of climate smart agriculture technologies and farm diversification options for climate resilient livelihoods		underlying geology restricts the capacity. Water is available throughout the year for irrigating polyhouses but irrigation facility for irrigating the farm field is still not completely available but only for 25% of cultivable area.
		No. of families adopting to climate smart agriculture	675 families (600 families adopted agro-forestry and horticulture; 252 families adopted to Polyhouses)
		overall enhancement in productivity and income	Overall productivity, mainly through polyhouses has increased to 1 tones/family/annually. The income enhancement ranges from Rs 25000 to 1 lakhs.
		Number of women headed families	542 women heading families adopting climate resilient strategy
		% families acquiring the skills, knowledge and accordingly adopting to the climate smart agriculture	More than 500 families (65%) acquired the skill, knowledge. Almost 100% families are connected to market through CBOs.
		Conservation of indigenous seeds	72 landraces of 22 crops from 4 types in all 10 villages and one community centric seed bank
	Outcome 2.3: Improved potential of livestock resources as an option for livelihood stabilization in hills	Quality and quantity of milk production	Improved potential of livestock through artificial insemination and introduction the scientific practices to farmers has certainly increased the quantity and quality of milk produce and calf.
		No. of families involved in livestock program	More than 900 families are made aware of the project, almost all the families (800) have adopted to livestock management practices
		Enhanced income from livestock program	Income from livestock per family Rs 30000-40000 per year per family

## V.2 Capacity building of community:

Trainings, exposure visit and facilitation through subject matter specialist from renowned institutes have played pivotal role in building the capacities and skills of local farmers, volunteers, village resource persons. Capacity building of the participants about the technologies introduced to them is the most integral part of the project, to achieve the desired results from it. Training activities were organized before starting up of any activity proposed under this project to provide technical specifications to the participants. For example, before implementation of drip-irrigation activity or construction of rainwater harvesting structure, a technical training was organized by the technical partners or field

team. In few cases, such as Spring rejuvenation Activity, BAIF staff was trained by HESCO/BARC team on the technology, for which Training of Trainers (ToT) were organized and trained staff members then guided the community regarding the know-how of the activity and implemented in the field. These technical trainings imparted in collaboration with technical partners and field teams.

From May 2017 to June 2021, **total 32 thematic trainings have been imparted over the period of 52 training days. 795 participants participated in the training out of which 588 (74%) were women farmers.** The subject matters of the level of Principle scientist, senior scientist were hired from KVKs, Vivekanand Parvatiya Krishi Anushandhan Sansthan (VPKAS), Almora, G.B.Pant University of Agriculture Technology Pantnagar (GBPUA&T Pantnagar), relevant government departments like horticulture department, veterinary department of Champawat district, , NIDHI, Centre institute of Temperate Horticulture (CITH), RSETI and BAIF. The details of the training can be found in Annexure (b).

Table (10): The summary of the trainings

<b>No. of thematic trainings</b>	<b>32 thematic trainings</b> <ul style="list-style-type: none"> <li>- <b>25 trainings on agriculture and allied activities</b></li> <li>- <b>1 training on spring rejuvenation (additionally on-field support experts and resource organizations)</b></li> <li>- <b>6 trainings on Institutions building</b></li> </ul>
<b>No. of training days</b>	52 days <ul style="list-style-type: none"> <li>- 37 days on agriculture and allied activities</li> <li>- 2 days on spring rejuvenation (mainly on geotagging)</li> <li>- 13 days on Institutions building</li> </ul>
<b>Participants</b>	795 participants (207 men, 588 women)
<b>Trainings hosted by various institutes</b>	9 training institutes <ul style="list-style-type: none"> <li>- 16 trainings by KVKs</li> <li>- 1 training each by CITH, GBPI &amp; A Pantnagar, Horticulture department Uttarakhand, Veterinary department Uttarakhand, NIDHI, RSETI</li> <li>- 2 trainings by VPKAS</li> <li>- 8 training by BAIF</li> </ul>
<b>Subject matter specialist</b>	<ul style="list-style-type: none"> <li>- 15 Principal scientist, 11 senior scientist and 13 scientist, 7 thematic program executives, and thematic experts on Horticulturist, Olericulturist, Soil Scientist, Plant Pathologist, geology, hydrogeologist and Veterinary expert from various training and research institutes have been involved</li> </ul>
<b>* In addition to above:</b> <ul style="list-style-type: none"> <li>- <b>16 exposure visits of community members have been conducted.</b></li> </ul>	

- **A regular handholding and on-site demonstration, training, meetings have been conducted regularly.**

### V.3 Stakeholder analysis:

In this project, stakeholders are considered at two levels:

- (1) Primary stakeholders are basically beneficiary communities (Farmer, farming community, villages), and they have a roles and responsibilities as primary stakeholder to sustain the project activities in the long run. The capacities of primary stakeholder are expected to be built to the extent that they can further sustain the project activities in various forms like – creating systems for input services, access the government funds, create local knowledge systems, collective marketing system etc. The stipulated roles and responsibilities for primary stakeholders are as follow:

Table (11): Primary stakeholders – roles and responsibilities

Institutions/groups	Who are the members	Roles and responsibilities
Village Committees  (Purpose based like Jal Samiti and/or executive committee like Gram Jal vayu Parivartan committee)	Panchayat members, technical experts related to activities (from secondary stakeholder group), women participants, representative from various executive committee (like Jal Vayu Samiti)	<ul style="list-style-type: none"> <li>○ Conducting PRA, village level planning, and community mobilization</li> <li>○ Facilitation of Implementation of project activities</li> <li>○ Create village level institutions for – beneficiary selection and equitable benefit sharing, conflict resolution</li> </ul>
Interest groups like PIGs, DIGs, WIGs, Marketing groups/Milk collection group	The beneficiary farmers/women farmers who are part of the activity can form small executive of 10-12 members as a marketing group or they all can be part of a group	<ul style="list-style-type: none"> <li>○ Information dissemination of concerned technology</li> <li>○ Mobilization of groups for training, meeting etc.</li> <li>○ Collective marketing for the produces and setting up systems in consultation with all members</li> </ul>
Resource person (e.g. Livestock trainees, women leaders)	As selected by local communities (among youth, women leaders, or any other suitable person)	<ul style="list-style-type: none"> <li>○ Knowledge dissemination</li> <li>○ Providing some of the input services – be it like AI, or knowledge services after training</li> <li>○ Handholding of local farmers, members of communities in implementation of new</li> </ul>

		adaptations
Women initiatives (like VP, SHGs)	Women from the communities, whoever wants to join the group, and accepted by other community members	<ul style="list-style-type: none"> <li>○ Mobilize women into groups, share knowledge, concerns, come up with solutions if any</li> <li>○ Collectivize the implementation of various activities, resource sharing, marketing and support each other</li> </ul>

(2) Secondary stakeholder: These stakeholders are organizations/institutions which can facilitate the process with primary stakeholder to establish the strong and successful model of climate change resilience and can push for policy change at systemic level. These stakeholders are BAIF, technical collaborations, support organizations, research institutes, academia and government functionaries). These organizations support primary stakeholders and BAIF, mainly in (1) building their capacities in the form of training, bringing in their expertise (2) research and academia institutes support the BAIF and primary stakeholder in giving them research, technological innovation support (3) mobilize stakeholders at government level to establish dialogue at state and national level for policy change. The component wise support organizations and stakeholders are listed below:

Table (12): Secondary stakeholders – roles and responsibilities

Component	Collaborations/linkages	Roles and responsibilities
Community Mobilization and Organization	<ul style="list-style-type: none"> <li>○ BAIF team Uttarakhand</li> <li>○ Pune State Steering Committee</li> <li>○ Local Community Cadre</li> <li>○ KVKs</li> <li>○ Local Panchayats</li> <li>○ Local CBOs</li> </ul>	<ul style="list-style-type: none"> <li>○ BAIF Pune Provides the experts monitoring of the program.</li> <li>○ BAIF Dehradun team supervises the activity and participates as an expert.</li> <li>○ Cluster level team handles field actions on the day to day basis</li> <li>○ Technical handholding is done by the scientists at KVKs ,</li> <li>○ The required platform is given by the Local Panchayats , Local CBOs</li> </ul>
Introduction of Water Resource Development and Climate Smart Farming Technology	<ul style="list-style-type: none"> <li>○ BAIF, PUNE Thematic Experts (NRM, livestock and Agriculture, Team Uttarakhand and TAC members</li> <li>○ Experts institutions like HESCO , ACWADAM, VIPKAS,</li> </ul>	<ul style="list-style-type: none"> <li>○ BAIF Pune Provide the experts monitoring of the awareness programme</li> <li>○ BAIF Dehradun's team supervises the activity and participates as an expert.</li> </ul>

	GB Pant Institute Of Himalayan Environment and Development Central Soil Conservation Research and Training Institute (CSWTRI), ○ National Remote Sensing Centre (NRSC) ○ State animal husbandry department ○ BAIF Cattle Development Centres	○ All the expert institutions gave their services as experts to the staff and farmers ○ Over-all strategy planning for the livestock based livelihood development by BAIF cattle development centre and state animal husbandry department ○ Linkages with government functionaries, Insurance linkages for forward milk marketing and milk collection
Knowledge Management including knowledge creation and wider dissemination actions	As above including ○ State Steering committees ○ Government State departments, Specific program related government functionaries (e.g GRAMYA) ○ NABARD and AFB	○ Knowledge documentation and dissemination and planning various program popularization efforts ○ Stakeholder workshops/consultation for policy dialogues

#### V.4 Overall Impact

Based on the framework proposed in section III, the long-term impact has been recorded for three main aspects – Environmental (natural resource productivity), social and economically. Based on the analysis of these factors, the overall sustainability has been discussed. The overall impact has been recorded in Table (10).

Table (13): Overall impact of the project

SN	Impact Indicators	Impacts observed
<b>(1) Environment Impact (Natural resource productivity)</b>		
1.1	Total area treated under the principles of soil-water conservation (Spring rejuvenation, Van Panchayat, Fodder development, Horticulture and agroforestry) in hectares	Approximately 370 ha of area is being treated including measures - Springshed development, Forest rejuvenation on Van Panchayat land, and horticulture, agroforestry and fodder development measures on the farm land.
1.2	Additional water augmentation through various measures (Million liters per annum)	Approximately 1500 Million liters of water has been augmented due to - Spring rejuvenation of 17 springs, Groundwater augmentation due to soil-water conservation, roof-top rainwater harvesting, and water saving due to water saving irrigation.
1.3	Vegetative or biomass Production (Metric tons)	Around 12000 Metric tons of biomass in the form of fodder, timber, leave, biomass etc. has conserved in the forest of Van Panchayats
1.4	Fodder production (Silvi pasture in Van Panchayat + Fodder development on agriculture land) (tons)	Around 6000 tons of green fodder can be generated annually from Van Panchayat and fodder development on agriculture land over
1.5	Impact on soil erosion in terms of Soil conserved	30 tons/hectare soil, microbial and organic matter is conserved annually through soil water conservation measures on 367 hectares of land which is around 11000 metric tons of soil matter.
1.6	Overall impact on natural resource productivity	From the above numbers, it is evident that project focuses on enhancement of the productivity of all the natural resources - water, land, forest, livestock which are four major resources for the farming and hill communities. The ecological aspect of the integrated-ness and interconnectedness of the natural resources management has been taken into account while planning the project activities. The productivity of soil (land), water, and forest has been improved based on soil-water conservation principles. The agriculture productivity has been also improved based on sound principles of agroecological and organic farming.
<b>(2) Economic Impact</b>		
2.1	Annual Income enhancement at family level	The income varies across the families ranging from Rs. 25000 to Rs.1 lakhs, depending upon the adaption of various interventions and their combinations. The families with agroforestry intervention will secure additionally income around Rs. 50000/annually in coming years



SN	Impact Indicators	Impacts observed
2.3	Market dependency (Reduced market dependency for inputs and increased market accessibility for selling produces)	Market dependency has been reduced by 5 months for purchasing of vegetables, cereals, and other agriproducts. The market dependency for sell of the agriproducts has been also reduced due to community-based institutions for creating market linkages. The market dependency for purchase of input services mainly for livestock has been totally reduced due to intervention of livestock support by BAIF and their well-trained village resource persons.
2.4	Accessibility to other financial resources like government schemes	Communities in all the villages have reported that they have been able to access more government funds through schemes like horticulture, agriculture and forest department. The funds have been converged for the purpose of - additional equipment for the agriculture, plants for horticulture, forest funds for plantation, infrastructure building like storage houses, tanks, pipelines etc. 932 members of SHGs have saved Rs. 27.05 lakhs, which is approximately Rs. 2900 saving by each women member. This money has been used by group members for inter-lending for the household needs.
2.5	Agriculture productivity (Tons per family)	At an average, a single polyhouse generates 1.2 tons of vegetable production and nursery annually which is additional production for a family.
2.6	Livestock productivity	Average 10 liter/cow/day increment in milk production due to improved breed and improved practices. Additional income is generated through sell of improved calf (bulls).
<b>(3) Social Impact</b>		
3.1	Building resilience of communities	The knowledge transfer and skill building through various training program has proven to be effective in building the capacities of the local farmers (both male and female) to adopt the interventions suitable to their conditions and improve the practices based on variation in climatic events. The economic resiliency as reported by respondents is that diversification of livelihood options gives them better stability of production and hence income even though one or two other interventions fail due to climatic events. 90% respondent families reported that they are better equipped with knowledge, skillset, income avenues, market facilities etc. to stabilize and improve their lives and livelihoods.
3.2	Adaptability of interventions to suite local conditions	All the interventions are modified and adopted to suite the local conditions of regional agroecology, climatic factors, and socio-cultural factors. The interventions are modified to suite the need of individual farmer or family and their economic conditions. The farmers have been equipped with the knowledge that can help them modify the technology, practices, tools etc., to suite their requirement. The interventions have been modified to accommodate the need of small farmers as well as big farmers.

SN	Impact Indicators	Impacts observed
3.3	Inclusion and equity	The project targets the small and marginal farming families (60%), and major focus is on the women farmers. 75% interventions are implemented with women farmer. In rest of the cases, the interventions are implemented with both the members of families (man and woman). This ensures the active participation of women in all the activities. The farming is seen as family business and hence involvement of both man and woman of the house is necessary and which is ensured in this project. The strong community-based organization ensures the democratic decisions, consensus building, and active participation of whole village in the community activities like of Van Panchayat. Users' groups ensure the inclusion and equity while reaching out to needy family as beneficiaries. They also ensure the reachability of small and marginal farmers to market through collective efforts, which leads to further inclusion and equity among the communities.
3.4	Gendered aspects - women centrality,	The project achieves the women centrality throughout the project progression as well as through all the interventions. The emphasize has been given on the implementation of interventions through women farmers as they are actively involved in the farming activities. The capacity building program has also targeted towards building their capacities on technical, social, economic fronts empowering them further. SHGs and user's groups have 100% and 70% participation of women farmers respectively. The knowledge of the women farmers has been also integrated into the project activities - like seed knowledge has been integrated into seed bank, knowledge about forest and water has been integrated into Spring and Van Panchayat work.

3.5	Food security at family level (measured in terms of increased availability of food, and increased intake in diet)	The overall food security is enhanced for all targeted families by 50%, mainly in the consumption of vegetables, dairy product due to direct impact of interventions like polyhouse and livestock improvement. The food security for cereals and pulses has also increased by 30% due to additional purchasing power and improvement in government systems like PDS according to 80% respondents.
<b>(4) Sustainability</b>		
		As explained above, the project successfully addresses the three vehicles of sustainability i.e., environment, social structures, and economics. The efficacy of the interventions is evident based on the above discussion on the impacts on natural resources and socio-economic impacts. The specific interventions are found to be replicable in the specific context of western Himalayan region, whereas the overall approach is replicable in Indian Himalayan region provided that technological solutions are modified in each agro-ecological and hydrological set up. The project components can be easily scaled up within the current policy framework and government schemes. The project is headed towards sustainability in terms of nutritional, food, and livelihood security amid the current climate change scenario and it is based on principles of inclusion and equity, but handholding for few more years with community is needed to see the long-term impact on sustainability in coming years.

## V.5 Key takeaways:

### 1) Comprehensive approach in building climate resilient communities:

The project exhibits the comprehensive approach by integrating the agriculture and allied sector livelihood opportunities with water management, forest development and livestock management. In rainfed farming system, these components are integrated and complimentary to each other. BAIF has wisely chosen the low-cost solutions suitable for the local conditions. The project not only emphasizes on the sound technical solutions, but also on active participation of communities, addressing gender issues and bringing communities to central to the development planning and execution. The effect of training, skill building and continuous handhold is evident through the impact and success stories of the farmers. Climate change impacts are variable in the spatial and temporal scale, and hence the project emphasizes the differential responses are required to make the communities climate resilient.

### 2) Single vs combination of technologies/practices:

From the data collected on income, it was evident that families adopting the combination of interconnected and complimentary interventions like – polyhouse and rainwater harvesting coupled with cash crop changes on the other parcels of land, livestock improvement coupled with community based forest and fodder management, involvement of women farmer at individual as well as community level etc. has led to better economic and social returns. The respondent also agreed that combinations of few but interconnected and complimentary interventions could lead to more stability of production and income than relying on just one livelihood option. Also it was evident that the majority of farmers are willing to implement a portfolio of technologies. Several practices and technologies were found to be complimentary and enabling enhancement of results. However, the important point to the fact that the portfolio of technologies need not be a long list as seen for the Super-Champions. Implementation of the few other supportive technologies including improved seed, nutrient management and agro advisory, as adopted by climate smart agriculture (CSA) farmers, can also be effective to enhance agricultural productivity and incomes.

### 3) Participatory approach and partnerships with the community is must:

The success of the project can be seen in the active participation of the communities, which was facilitated by BAIF on the philosophical grounds of Robert Chambers – “whose reality counts?”. BAIF has taken up an approach of bottom up development right from planning to implementation till monitoring. These kinds of participatory approaches adopted by BAIF promotes learning, improvement, and sustainability. This project learned that the majority of the farmers are keen to contribute to project monitoring and evaluation if given an opportunity to do so in ways that suit their farming activities and

helps them stabilize their economy. As implementers, therefore, the project team needs to come in with an open mind and be prepared to listen to what the primary stakeholders have to contribute. We also need to work in partnership with community stakeholders to set expectations and brainstorm actionable steps for successful implementation of the approach itself as well as the recommendations arising out of it.

#### **4) Capturing synergies of research and implementation:**

The problems of development sector are multi-sectoral, interdisciplinary and interconnected. Along with the implementation of new technologies/approaches, a feedback to research institutes and policy making institutes is necessary to make appropriate changes in the technological interventions as well as creating a support system through appropriate policy frameworks. A research institution by itself cannot achieve such results and nor can this be done by an NGO alone. Hence, synergy between these two sectors working together on the demonstrations, implementation, experimentation and changing the science/technology accordingly in a loop is an essential component for creating context and local condition interventions. BAIF has long standing working relationship with relevant scientific and technical institutes involved in similar work and hence, BAIF could bring together the expertise from the various organizations like - Vivekananda Parvatiya Krishi Anusandhan Sansthan (Almora), G.B.Pant University of Agriculture Technology (Pantnagar), GB Pant Institute Of Himalayan Environment and Development, (Kosi, Almora), Central Institute of Tropical Horticulture, Mukteshwar, Central Soil and Water Research Training Institute Dehradun, and Indian Council of Agriculture Research, Government of India etc.

#### **5) Gender and social inclusion:**

The local socio-economic context plays key role in participation of women in the developmental activities and decision making. In the context of hill women, it is widely known that agriculture, forest, livestock, water etc. has been traditionally nurtured by women, but this also increased their drudgery due to climatic vagaries. Hence, their participation was key to this project to address the issue drudgery, active participation in the developmental activities, bringing the climate resilience at the family and community level and acknowledging their knowledge of biodiversity and natural resources. Activities such as focused training, use of gender inclusive technologies, institutional mechanisms, and promoting entrepreneurship among others are some of the major activities which have displayed an encouraging impact on the life of women farmers. However, further work is required to promote transformative approaches that can potentially help in overcoming the socio-cultural barriers and enable better gender integration across adaptation interventions in the district.

## **6) Convergence key for climate resilience**

Research and development organizations (such as NGOs) can demonstrate the successful model at the grassroots level, but scaling up can happen through convergence with government schemes only. Convergence is key to building Climate resilience and public and private resources will be required for out-scaling climate resilient interventions. Post project convergence planning is equally important to identify gaps, and accordingly find the relevant schemes/programs against which investments can be sought. It was observed that some of the activities like rooftop rainwater harvesting, poultry sheds, cattle-sheds, fish-tank, etc. in conjunction with providing input services to agriculture and allied activities has been initiated in recent years. The government authorities at block and district level are showing interest in such comprehensive planning and diverting funds accordingly from relevant schemes. The project team has reportedly prepared the a post-project convergence roadmap for all the villages and communities and community leaders are planning to integrate them with GPDP (Gram Panchayat Development Plan) and Van Panchayat plans. Such, post-project convergence plans should become standardized components of future resilience projects.

## **7) Scalability and sustainability:**

The project adopted a multi-dimensional approach to ensure scalability and sustainability of project interventions to enhance the resilience of farmers and communities in the project areas. This was implemented through a project life-cycle approach, commencing right from its inception to the development a post-project roadmap for continued investments in climate smart technologies beyond the life of the project. A combination of activities comprising of training and capacity building, technology demonstrations, cost-sharing by farmers for adoption of technologies, mentoring community led institutions, creating marketing linkages, outreach, and convergence with government programs has laid the foundations for continued uptake and out scaling of climate smart intervention. In the past four years, the project has endeavoured to build the capacity of farmers and communities through various approaches to make project activities self-sustaining. The project has taken the following pathways to make the project scalable and sustainable –

- i. comprehensive and integrated model of agriculture based mountain farming systems
- ii. capacity building of communities on various aspects of project
- iii. Strengthening ownership of communities through participation and institutions
- iv. developing partnership with government, non-government organizations, research, academia etc. for scaling up the activities
- v. create knowledge based collaborations for further research
- vi. and promoting outreach through collaborations, conferences, digital media etc.



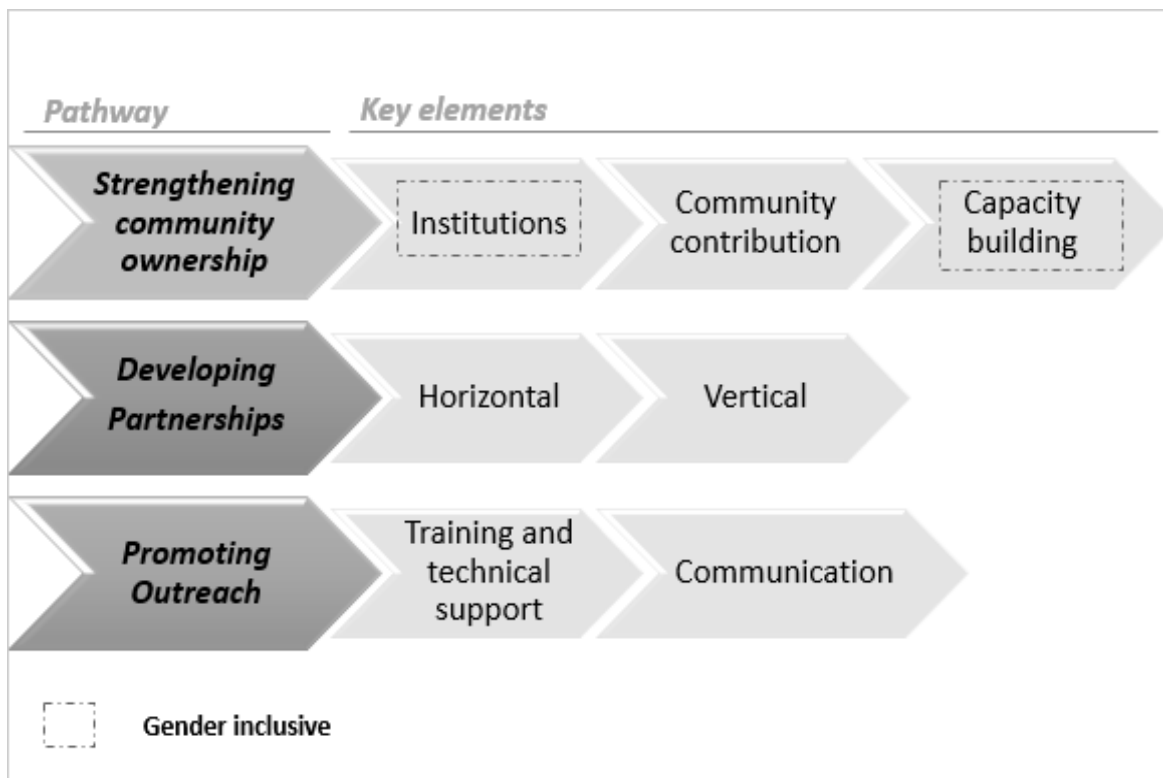


Figure (7): Pathways for scalability and sustainability

### V.6 Challenges in the project execution:

There are several challenges faced by the team members of organization and community members during the project execution. The biggest challenge according to the field staff were community mobilization and gaining trust of the communities during the project execution. The democratic systems in the villages and traditional ways of community integration are fragile and are susceptible to the influences from market and outside world. The young generation is losing faith in the agriculture-based livelihood, whereas older generation was sceptical to change their practices something new. Here, communities' confidence on the new technological intervention can be gained after first, successful demonstration and second, integrating those interventions into their existing practices or culture. Once the demonstration has been successfully presented, communities agree to adopt to it. To mobilize youth into farming-based livelihood, they need to be convinced that this can be a profitable business. Some of the youths were interested in participating the project particularly for the activities like – livestock training, training on building polyhouse, rainwater harvesting tanks, etc. where they could see the potential of assured job opportunities. There is a need to establish more stronger models of agriculture as successful business to motivate the youth. Communities' participation was sparse in the beginning, but eventually it scaled up because of awareness generation, knowledge capacity building,

successful demonstrations, stability of income due to marketing support and institutionalization. Likewise, participation of women was also less in the initial phase of the project, but eventually it scaled up due to capacity building and institutionalization and actively bringing them into decision making through polyhouse users' groups, Jal Samiti and Van Panchayats.

Second biggest challenge in the unpredictability of the climate, which take at least couple of years to testify the intervention and finally conclude the prototype which works in the region. Hence, Initially, the demonstrations were set up with the progressive farmers, be it man or woman. This led to the implementation with socially and economically relatively strong families as they have better coping mechanism to the risk associated with the new interventions. Once successful demonstrations were set up, the emphasize was given in selecting and reaching out to under-privileged family through democratic selection process.

Third challenge is convergence with the government schemes. Government schemes are implemented through specific design and prototypes. Hence, sometimes it is difficult to converge the funds for the activities as government may say that this does not fit into our design. The experience was observed mainly in case of polyhouse. The prototype for the polyhouse is for the larger capacity polyhouse, which is expensive and mainly meant for floriculture or nursery raising for horticulture. The low-cost bamboo developed by BAIF did not fit into the government's prototype. Hence, it was difficult initially to scale up BAIF's prototype through government schemes. The continuous dialogue with KVKs and agriculture universities and prototyping efforts under KVK is leading to accommodate the low-cost polyhouse structure into their existing schemes.

Final challenge is in impacting the policy framework of the state, and specifically in different part of Himalayan region as different typologies demand differential adaptation of approaches. BAIF through its collaborator has established the dialogue at state, regional and national level with policy makers and will be going to continue conducting conferences, workshops, policy dialogues through various mediums.

To mitigate the challenges, BAIF has performed the timely Risk Assessment through-out the project cycle and accordingly strategies were revised and/or strengthened. The sample risk assessment done by BAIF during Project Performance Cycle 2 (PPR2) i.e. December 2019 to November 2020 is attached in Annexure(c). The participatory project review and risk assessment with the involvement of the key stakeholders has helped in coming up with new ways of adaptation in project execution process itself.

## V.7 Policy recommendations:

Based on above key takeaways, challenges and risk mitigation strategy developed by BAIF, the recommended model for the state can be briefed as follow in Table (11).

Table (14): Possible policy recommendations based on project

Components	Suggestions
Emphasize on	Innovation, institutions, inclusion and investment for scalability and sustainability (Check schematic in Figure 6)
Knowledge system	<ul style="list-style-type: none"> <li>(1) Community based knowledge and extension systems</li> <li>(2) Design and promotion of local context specific technologies</li> <li>(3) Incorporation of traditional wisdom into technologies</li> <li>(4) Capacity building programmes to build the skills of community</li> <li>(5) SDGs monitoring and tracking systems</li> </ul>
Institutional framework	<ul style="list-style-type: none"> <li>(1) Inclusion of Climate change lense into all the policies and schemes</li> <li>(2) Coordination and convergence with all the line departments/schemes</li> <li>(3) Allocation of climate change fund for the sensitive sectors</li> <li>(4) Community based institutions for planning, decisions, input service, marketing, etc.</li> <li>(5) Collaboration with all stakeholders, including research/academia</li> <li>(6) Women centric institutions</li> </ul>
Strategic Approach	<ul style="list-style-type: none"> <li>(1) Local natural resource based planning and context specific solutions</li> <li>(2) Diversification of income sources</li> <li>(3) Conservation of climate resilient traditional knowledge</li> <li>(4) Democratic processes and inclusion</li> <li>(5) Gendered approaches</li> </ul>
Convergence with	(1) State Action Plan on Climate Change

existing framework	policy	(2) Disaster mitigation and management centre (3) Community Forest councils (Van Panchayat) (4) Watershed management Directorate – Watershed programme, GRAMYA project (5) People’s Biodiversity Register (6) Agriculture extension, Seed programme, Crop insurance (7) Uttarakhand Organic Community Board (UOCB) (8) Uttarakhand Space Application Center (USAC)
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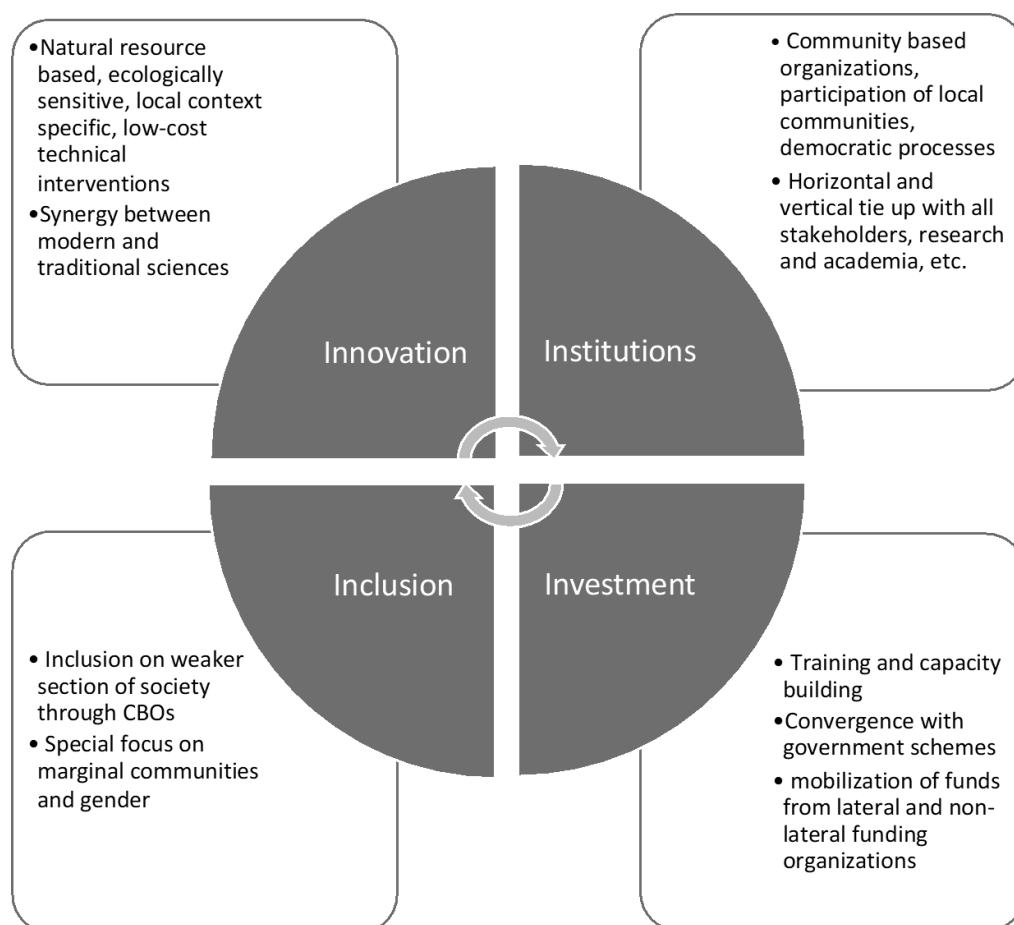


Figure (8): Four arms of policy framework for scaling up the project



## Section VI: Limitations of the study

- (1) Effect of pandemic: The COVID pandemic has impacted the field level study and data collection. The field visit was planned for 10-15 days, but it was required to reduce to 5 days due to COVID pandemic travel restriction of Uttarakhand state and village level councils at some places. The big community level meetings could not be conducted, instead discussion in smaller groups took place. Conducting meeting was difficult in many places due to surge of the COVID cases and hence, some of the villages could not be visited.
- (2) The detailed sampled data and case studies could not be collected due to less number of days in the field. BAIF has provided baseline data for all 10 villages, but there is no data at the family level on income, input etc. Hence, analysis at the family level could not be done for all the beneficiaries. The income analysis has been done quantitatively through some case study collection by BAIF's team, FGDs during field visit and case study collection during field visit.
- (3) Calculations of impact parameters: The calculations in the impact assessment table on water, soil conservation, biomass etc. have been done using principles of watershed management, secondary data from similar studies, and some of the standard coefficient

(e.g. water retention by soil etc.). The time series data except for spring discharge is not available at project level, hence, some standard coefficients suitable for the region are used using secondary literature. Hence, the quantification of such indicators is indicative of volume/scale of quantum but they are not exact quantities. Many parameters are qualitative and it is difficult to quantify qualitative information without proper scientific data collection and research framework, which was out of the scope of the study. Hence, alternate indicative parameters (e.g. number of hours reduced for water collection is indicative of reduction of drudgery) are used for some of the qualitative information and the description of qualitative information has been documented.





## Annexures

**Annexure (a): Logical Framework analysis: Achieved Output of the project activities Till December 2021**

Components	Outcome	Activities	Khalkandiya	Suyalkhark	Dingdai	Bhageena Bhandari	Narsingh Danda	Tapnipal	Goshani	Tyarshun	Manar Malla	Banjgaon	Grand total
(1) Community Mobilization and Organization	Improved community mobilization to collectively plan and undertake climate change adaptation	Awareness Generation Meetings in all 10 villages	2	2	5	4	5	2	4	6	3	4	37 major meetings under awareness generation
		Baseline Survey and Vulnerability assessment of all 10 villages through Participatory Rural Appraisal and Preparation of Annual Adaption Plan	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Vulnerability assessment of 10 villages and 10 participatory adaption plans
		Facilitation from Subject Matter Specialists / Technical	As per details in "Training and capacity building"										Provided by KVK, VPKAS, GB Pant University, relevant government departments, NIDHI, CITH, RSETI and BAIF
		Mobilization and Formation of CBOs.											
		(a) Poly house Interest group (No of PIg, Total members)	1(8)	1(7)		1(9)	1(8)		2(2 1)	1(1 2)	1(6)	1(1 3)	9 PIgS, 84 member families

Components	Outcome	Activities	Khalkandiya	Suyalkhark	Dingdai	Bhageena Bhandari	Narsingh Danda	Tapnipal	Goshani	Tyarshun	Manar Malla	Banjgaon	Grand total
		(b) Dairy IG (No of DIG, Total members)	1(10)	3(21)	1(10)	4(34)	3(24)	1(10)	13(113)	1(30)	3(24)	5(49)	35 DIGs, 325 member families
		(c) Wadi IG (No of WIG, Total members)	1(7)	1(11)	1(7)	1(6)	1(8)	2(23)	5(49)	2(20)	2(35)	1(14)	17 WIGs, 180 member families
		(d) Jal Samiti (No of samiti, Total members)	2(19)	1(13)	1(10)	3(26)	2(27)	1(11)	1(23)	1(13)	2(14)	1(18)	15 Jal Samitis, 174 member representatives (all female)
		(e) Van Panchayat Samiti (Number of committee, Total members)	1(10)	1(13)	2(20)	2(20)	1(9)	1(14)	1(10)	1(20)	2(36)	1(17)	13 VPs, 169 member representatives (all females)
		(f) Gram Jal Vayu Samiti (number, members, Male, Female)(10)	1, M-5, F-7	1, M-4, F-8	1, M-6, F-6	1, M-7, F-5	1, M-8, F-4	1, M-4, F-8	1, M-7, F-5	1, M-6, F-6	1, M-3, F-9	1, M-8, F-4	10 Gram Jal Vayu Samitis, 120 member representatives (58 Male, 62 Female)
		(g) Self Help Groups (No. of groups)	6	7	5	11	8	5	22	8	10	9	91
		SHGs number of members	54	65	47	95	76	58	216	95	115	111	932
		Total saving of groups as on May 2021 (in INR)	54,430	307,757	45,900	155,422	56,856	227,308	738,986	286,409	409,850	422,657	2,705,575

Components	Outcome	Activities	<div>Khalkandiya</div> <div>Suyalkhark</div> <div>Dingdai</div> <div>Bhageena Bhandari</div> <div>Narsingh Danda</div> <div>Tapnipal</div> <div>Goshani</div> <div>Tyarshun</div> <div>Manar Malla</div> <div>Banjgaon</div>	Grand total
		<div>Training on suggested for technologies for participants and staff</div> <div>Exposure visits on suggested technologies for participants</div>	<div>As per details in "Training and capacity building"</div> <div>As per details in "Training and capacity building"</div>	<div>16 exposure visits and 32 thematic trainings and exposure visits, 52 training days, 795 participants (207 M, 588F)</div>

Components		Outcome		Activities		Khalkandiya	Suyalkhark	Dingdai	Bhageena Bhandari	Narsingh Danda	Tapnipal	Goshani	Tyarshun	Manar Malla	Banjgaon	Grand total
(2) Introduction of Water Resource Development and Climate Smart Farming Technology		Building resilience through increased water availability and efficient water use in hill region	Rejuvenation of natural springs													
			(a) No. of spring rejuvenated	2	1	1	3	2	2	1	2	85	32	94	58	17
			(b) No. of families benefitted	105	37	25	94	39	51	85	32	94	58			620
			Roof Top Rain Water Harvesting (No. of families benefitted with 15000 liter water tank each)	6	4	12	6	21	8	35	26	15	17			150 families, 225000 liter water augmented
			Introduction of Drip Irrigation for increase water use efficiency													
			No. families benefitted	22	21	12	22	11	14	94	15	17	18			246
			No. of area covered (Sq. meter) in polyhouse	1660	1260	720	2000	1680	1520	6660	1240	2040	1420			20200
			Drip system in open field area (400Sq. Meter/ farmer field (No. of families)	7	0	0	1	0	0	6	0	1	1			16 families, 6400 sq. meter coverage
			Introduction of Sprinkler Irrigation (No. of families benefitted) [1]	22	21	12	22	11	14	94	15	17	18			246
			Adoption of climate smart agriculture technologies and	40	50	26	60	80	62	126	44	57	55			600
			Introduction of climate resilient horticulture varieties on famer's field [2] (No. of beneficiary families)													

Components	Outcome	Activities	Khalkandiya	Suyalkhark	Dingdai	Bhageena Bhandari	Narsingh Danda	Tapnipal	Goshani	Tyarshun	Manar Malla	Banjgaon	Grand total
	farm diversification options for climate resilient livelihoods	Introduction of high value vegetable cultivation under protected conditions (using bamboo based poly houses to minimize the damage and losses due to extreme weather events (No. of beneficiary families)	27	22	19	28	11	11	89	13	14	18	252
		Conservation, revival and adoption of climate resilient indigenous food crops as risk mitigation and food security measure											
		Seed bank? (Yes/No)	No	No	No	No	No	No	Yes	Yes	Yes	No	3 village level seed bank (additionally one seed bank at cluster level hosted by BAIF)
		Number of seed producing farmers	3			2			9	28	3	7	
		Type of seeds/species/varieties conserved	Explained separately.										52
	Improved potential of livestock resources as an option for	Introduction of improved breeding services with required management practices											
		No. of families benefitted through AI	48	55	31	97	58	78	190	71	78	94	800



Components	Outcome	Activities	Khalkandiya	Suyalkhark	Dingdai	Bhageena Bhandari	Narsingh Danda	Tapnival	Goshani	Tyarshun	Manar Malla	Banigaon	Grand total
	livelihood stabilization in hills	No. of livestock benefitted through AI (As on August 2020)	115	142	72	148	154	260	585	232	288	270	<b>2266</b>
		No. of Cattle sheds provided (= No. of families as beneficiaries)	48	55	31	97	58	78	190	71	78	94	<b>800</b>
		Fodder Tree Plantation [3]											
		No of Vanpanchayat (No.)	1	1	2	2	1	1	1	1	2	1	<b>13</b>
		Area of Vanpanchayat(Ha.)	10	10	20	22	13	10	10	10	21	10	<b>136</b>
		No of Farmers (individual land fodder promotion)	0	0	0	0	10	12	5	4	7	0	<b>38</b>

- [1] This was innovative approach to install small scale sprinkler along with drip and polyhouse. Hence, they have been added separately.
- [2] Mixed plantation of agroforestry and horticulture, with 100 plants each family.
- [3] Van Panchayats will be covered separately in the report, but we are adding benefits of fodder development through VPs here too.

**Annexure (b): Details of trainings under Capacity building Program**

SN	Training Month/Year	No. of days	Training Topic	Place of training	Training institute	Profile Resource person (position, specialization is imp)	No. of participants (Male and female)	
1	May-17	1	Vegetable Cultivation	KVK Lohaghat	KVK	Sr. Scientist, Scientist	10	14
2	May-17	2	Off Season Vegetable cultivation	KVK Lohaghat	KVK	Sr. Scientist, Scientist	8	18
3	Sep-17	1	Integrated Nutrient Manangement	KVK Lohaghat	KVK	Sr. Scientist, Scientist		9
4	Oct-17	2	Geotagging	Khetikhan	BAIF	Thematic Program Executive	5	7
5	Dec-17	1	Vegetable Cultivation	Manar	KVK	Senior Scientist, Scientist	11	16
6	Dec-17	3	Improved Vegetable and horticultural plantation	Almora	VPKAS	Horticulturist, Olericultures, Soil Scientist, Plant Pathologist	15	15
7	Jan-18	1	SHG capacity building	Khetikhan	BAIF	Thematic Program Executive		52
8	Feb-18	1	Temperate Fruit Nursery Raising	Manar	BAIF	Principle Scientist, Director Horticulture		26
9	Feb-18	1	Temperate Fruit Nursery Raising	Bhagana Bhandari	BAIF	Principle Scientist, Director Horticulture	10	7
10	Apr-18	1	Protected Cultivation	KVK Lohaghat	KVK	Principle Scientist, Sr. Scientist	17	7
11	May-18	1	Integrated Disease Management in fruit and vegetable plants.	KVK Lohaghat	KVK	Sr. Scientist, Scientist	4	23
12	Jul-18	1	Integrated Nutrient Manangement	KVK Lohaghat	KVK	Principle Scientist, Sr. Scientist	4	24
13	Jul-18	1	Value Chain and Marketing of Produce	Goshani	BAIF	Thematic Program Executive		13
14	Jul-18	1	Farmer's Producer Organisation	Khetikhan	BAIF	Thematic Program Executive	2	28
15	Aug-18	1	Mushroom Cultivation	KVK Lohaghat	KVK	Principle Scientist, Scientist	7	10
16	Sep-18	1	Dairy Development and Fodder Management	Narsinghdanda	Veterinary Department	Veterinary Expert	15	27
17	Sep-18	3	Livestock and Dairy Management	Pantnagar	GBPUA&T Pantnagar	Principle Scientist, Senior Scientist, Scientist	14	18
18	Sep-18	1	Agrobiodiversity Conservation	Khetikhan	BAIF	Principle Scientist, Scientist		8

SN	Training Month/Year	No. of days	Training Topic	Place of training	Training institute	Profile Resource person (position, specialization is imp)	No. of participants (Male and female)	
19	Sep-18	1	Protected vegetable and insect pest Management	Manar	KVK Lohaghat	Senior Scientist, Scientist	12	21
20	Oct-18	1	Dairy Development and Fodder Management	KVK Lohaghat	KVK	Principle Scientist	3	28
21	Oct-18	1	Organic Farming and Nutrition Management	Tyarshun	KVK Lohaghat	Principle Scientist, Scientist	3	22
22	Nov-18	1	Strengthening of SHG and CCL	Khetikhan	NIDHI	Thematic Program Executive	4	26
23	Nov-18	1	Orchard Development of Temperate Fruit	Mukteshwar	CITH	Principle Scientist, Senior Scientist	4	6
24	Jan-18	6	Capacity Building of SHG through vegetable production and fruit production	Goshani	RSETI	Thematic Program Executive		22
25	Feb-19	1	Nursery Raising of Temperate Fruits	Manar	Horticulture Dept. Uttarakhand	Thematic Expert	4	6
26	Mar-19	1	Vermicompost and Organic Farming	Banj Gaon	KVK Lohaghat	Senior Scientist	4	25
27	Mar-19	6	Mushroom Cultivation	Goshani	KVK Lohaghat	Principle Scientist	2	13
28	Jun-19	1	Disease Management in Vegetables	Khetikhan	KVK Lohaghat	Principle Scientist, Scientist	9	24
29	Jul-19	1	Organic Farming , Polyhouse Cultivation and Management	Narsinghdanda	KVK Lohaghat	Principle Scientist	1	31
30	Jul-19	1	Insect Pest Management in Fruit Plants	Khetikhan	KVK Lohaghat	Principle Scientist, Scientist	15	6
31	Aug-19	3	Improved Vegetable cultivation and horticultural plantation	Almora	VPKAS	Principle Scientist, Scientist	24	6

SN	Training Month/Year	No. of days	Training Topic	Place of training	Training institute	Profile Resource person (position, specialization is imp)	No. of participants (Male and female)	
32	Jun-21	3	SHG Capacity Building, Vegetable cultivation, Fruit Plantation	Khalkandiya	BAIF	Thematic Program Executive		30
Total		52					207	588

#### Annexure (c): Risk assessment

SN	Identified risk	Steps taken	Steps taken to reduce the risk
1.	Neglecting the principles such as access and equity.	A well laid down procedure has been operationalized to ensure access and equity.	The project participant selection processes is planned in such a way that principles of access and equity are being observed. Before identifying the participant families, project orientation meetings have been conducted involving men, women and youth from the project villages as well as members of local self-government. These orientation meetings have helped the community to understand the objectives and approach of the project and facilitate developing rapport with the community members. The project is mainly providing access to three types of vulnerable/disadvantaged populations i.e.: Small and Marginal Farmers, Women headed households and Scheduled Caste households. The processes have been adopted to ensure access and equity to all marginalized and vulnerable groups. The outcome of this is being monitored regularly both by the Executing Entity and the National Implementing Entity. Project teams thus undertake a regular assessment of the Access and Equity in respect of marginalized and vulnerable groups during the implementation stage through a consultative exercise with the communities.
2.	Project neglects marginalized and vulnerable Groups/ deny gains.	Identification of beneficiary families through a consultative and transparent process.	The project is basically aimed at providing alternate climate resilient livelihood options and income to marginalized/vulnerable communities. These include mainly small & marginal farmers, women headed households and Scheduled Caste/Schedules Tribe families. The selection of these beneficiaries is done through a well laid down consultative and transparent process.

3.	Project does not guarantee Gender Equity / Gender Empowerment	Women are the major beneficiaries of the project activities	In hills, women bear the main responsibility for agriculture and allied activities. Therefore, all the major activities of the project like horticulture, fodder plantation, spring rejuvenation, livestock management, etc. directly/indirectly supports/benefits the women farmer. Further, the project envisages formation of multiple Community based Organizations (CBOs) the members of which are primarily women.
4.	Project activities are not environmentally sound/ not climate smart	All actions are climate smart and environmentally sound.	The proposed project activities are being implemented on the principle of environmental sustainability. The interventions are planned to achieve resource efficiency and optimum use of available resources and as such would reverse further degradation of natural resources. Further, most of the activities are being introduced in a decentralized manner. All the proposed activities are climate smart in nature and will help communities to adopt climate resilient livelihoods. During execution of the proposed interventions, adherence to applicable standards is being ensured by the Project Team and the same is monitored by the NIE regularly.
5.	Involuntary Settlement	No involuntary settlement under the project	Majority of the activities planned under the project are proposed on individual lands. In case of structures in community land, such as spring rejuvenation, specific care is being taken for selection of sites which would not result in physical as well as livelihood resettlement. The selection of sites for individual interventions is also being done in such a manner to avoid any possibility or likelihood of involuntary resettlement due to project activities.
6.	Project violates human rights	No violation of Human Rights.	All efforts are being taken to ensure/protect human rights in project implementation. In all labour oriented activities prohibition of child labour and payment of minimum wages as guaranteed by the Centre/State governments is being ensured.
7.	Project poses threat to existing biodiversity in agriculture	All the project activities help in conserving and reviving the ecological biodiversity.	No project activity poses threat to existing biodiversity in agriculture. In fact, few activities like spring rejuvenation, fodder plantation, etc. help sustain ecological biodiversity. Efforts are also undergoing for maintaining seed bank of native diverse crops at village level The project also supports integration of climate smart options for disease and pest control in agriculture Conservation and promotion of native fodder species in situ, through regeneration of degraded community pastoral lands /natural habitats is under process.
8.	Project does not protect natural habitats / alters landscapes and natural heritages	Protection and conservation of natural habitats, spring rejuvenation is cornerstone of the project.	The sites for project interventions such as spring rejuvenation have been identified in consultation with the local villagers. There is no plan for any alteration to physical and cultural heritage in this project. The project activities indeed include conserving and protecting natural habitats like vanpanchayats / community pastoral lands.

9.	Project does not comply with social & environmental law and commitments of country and region.	All activities being implemented as per the extant social & environment laws of the land.	All project activities are planned keeping in view the various social/environmental laws of the land. Further, this is being monitored by district and state level committee who have representatives from the government and relevant stakeholders.
10.	Project neglects indigenous people and leads to displacement.	None	The project area does not have indigenous population.
11.	rational/Administrative: Coordination of activities with other agencies; large timeliness of technical inputs and their proper scheduling, Issues related to planned intervention in desired outcome due to unavailability of timely inputs .number of on-going projects/programme	All actions as planned are being taken up	<ul style="list-style-type: none"> <li>• The Executing Entity (E.E) has ensured proper co-ordination of activities with all the relevant stakeholders. This involves various stakeholders viz. State/district government departments, research institutes, training institutes, media, etc.</li> <li>• The E.E is a national level organization with sufficient manpower to ensure technical parameters and proper scheduling of activities/events.</li> <li>• Advance planning is done to take care of availability of timely and quality inputs for proposed project activities.</li> </ul>
12.	Financial: Cost escalation leading to increased costs for goods and services	None	The cost escalation aspect was incorporated in the project document for sanction. Accordingly, the sanctioned amount for various activities is expected to take care of cost inflation, if any.
13.	Environmental: Natural Hazards (flood, drought, storm surges, and storms) may hamper project implementation.	None observed so far.	The programme is seeking to reduce the effect of natural hazards through capacity building and awareness creation among the farmers. However, certain activities may be at risk due to the hilly topography of the region.



14.	Participation of stakeholders and required cooperation from government, private and technical institutes.	All relevant stakeholders as envisaged in the project document are being involved.	All the relevant stakeholders have a substantial participation in the project activities. The State/District Government have representatives at the state/district level committees. Various research/training institutes are also the members of these committees. Research Institutes like Krishi Vigyan Kendra (KVK), VPKAS – Almora, CITH – Mukteshwar, etc are also training the farmers. HESCO/BARC services are being utilized for identification of spring rejuvenation sites. International Centre for Integrated Mountain Development (ICIMOD), Nepal has visited the project area for information exchange and learning. The E.E is also utilizing the services of State Bank of India (SBI) for the project activities. The NIE regularly monitors the project implementation.
15.	Technical ineffectiveness of recharge measures	Risk of Services of competent technical resource persons are being utilized to minimize any technical risk ineffectiveness	Use of Modern technologies viz. use of isotopes to execute area specific water recharges measures. This is tested and proven technology in hills. This is introduced with the help of scientific organization called BARC. This is now ready for replication and thus risks associated with this will be minimum.
16.	Delay in aquifer recharge leading to partial achievement of project results	Aquifer recharges activity ongoing as per phasing.	The spring rejuvenation activity is being implemented as per the phasing schedule.
17.	Project benefits captured by Elite group	A well defined criteria in place for participant selection	As highlighted earlier, the identification of beneficiary families is being done through a consultative, participatory and transparent process.



The report has been prepared as a part of project's third-party evaluation and impact assessment phase. The report has been prepared with the help of active participation of local communities, the consultation with relevant project staff, the timely collected data by BAIF's team, and primary data and stories collected during the field visit.

The project paves the path for successful climate change resilience for the hill communities in Northwestern Himalayan region of the Indian Himalayan region.

