

PROCESS DOCUMENTATION AND IMPACT EVALUATION OF SILVOPASTURE DEVELOPMENT BY VANPACHAYAT IN MANAR VILLAGE (CHAMPAWAT, UTTARAKHAND)



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Certificate

This is to certify that **Mr. Aditya Mandloi**, IIFM - PGDFM 19-21 assigned to **BAIF Development Research Foundation** worked on the project titled "**Process Documentation and Impact Evaluation of Silvipasture Development by Vanpachayat in Manar Village (Champawat, Uttarakhand)**"

He has completed his internship successfully during the period 01/05/2020 to 30/06/2020.

This is to wish him best for all his future endeavors.

Regards,

Rajashree Joshi
Chief Thematic Program Executive
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Declaration

This is to certify that the project report entitled “**Process Documentation and Impact Evaluation of Silvipasture Development by Vanpachayat in Manar Village (Champawat, Uttarakhand)**” is completed by Mr. Aditya Mandloi for The BAIF Development Research Foundation is his original work. The project has been carried out as his summer internship under my guidance for the partial fulfilment of Post Graduate Diploma in Forestry Management at Indian Institute of Forest Management (IIFM), Bhopal

Reporting Officer,



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Our college faculty, Dr Ashish David sir suggested me to apply Theory of Change and made me understand the difference between Impact Assessment and Impact Evaluation.

My immediate senior and now an IIFM Alumna Prakriti Pandey was always there to boost my morale and providing me with needed resources for drafting this report. She also advised me to develop a better TOC diagram and suggested to incorporate Social Capital in the structure.

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EXECUTIVE SUMMARY

Water, food, fuel and pasture for livestock are some of the remarkably basic needs of the people around world. At the first look, they seem attainable. However, in one of the most parts of the Himalayan region vulnerable to climate change, these needs are a luxury. Global climate change, bad ecological practices, overgrazing, mismanagement of commons, etc have also contributed to such misery. The problem is parallel to other rural areas of India. To combat this, we need a combination of scientific and best of the rural practices, active mobilization of people, funds, skilled individuals and an implementing agency.

In a situation like this in Manar village of Uttarakhand, BAIF Research and Development Foundation came up with an intervention. It was to carry out silvopastoral activities by Van panchayat in the degraded community forest of the village. The process was carried out systematically with effective participation of people which is documented comprehensively in the report. Special attention was given to women's participation, decision making and their leadership roles in the journey. Stories like 'Ban Amma ki Kahani' are included to testify the case.

The report discusses how the outputs of the intervention have led to solid outcomes like climate change resilience, gender inclusion, ecosystem restoration, better living standards and formation of social capital.

Further, by analysing the success of silvopastoral activities and identifying factors behind it, various strengths of the project are listed. The document also includes future perspective of how the current mobilization, social capital and a matured forest be leveraged to ensure better livelihoods of the community. A simple set of recommendations are included at the end that will help like-minded NGOs and government agencies to carry out a similar intervention.

INTRODUCTION

Manar of Pati block is a beautiful village in the Himalaya at an elevation of 5000-6000 ft. Uttarakhand. The village has 90 households and a population of about 700. It is situated at a distance of 20 km from the district headquarters, Champawat. Champawat is a small district in North-Eastern Uttarakhand is surrounded by Nepal in East, Pithoragarh in North, Almora in West and Nainital in South.

Manar is a mainly mountainous region with little proportion of plains and terai. The primary livelihood in the area is agriculture and livestock rearing. Agriculture is rain-fed and only 10% of total agricultural land is irrigated. The farms are terraced and scattered. People only sow a single crop in a year (majorly wheat). The village is surrounded by dense forest which is a habitat for several wild animals. These wild animals often attack and destroy the crop; thus, affecting farm productivity. This often is a perpetual grievance called out by the villagers.

However, forests here give more than they destroy. They are a major source of fuelwood, fodder for domestic animals and other NTFPs. The subsurface flow of water from the forests also ensure running of streams seamlessly. Hence, providing water for domestic use, farming and recreational activities. But the increasing population and inefficient planning in Manar had put a burden on forest resources. There was a rise in deforestation and unchecked grazing of domestic animals. This led to a scarcity of fodder, fuel and water. Climate change abetted damage to the existing ecosystem. The pine trees replaced good old broadleaf trees like Oak, Kharsu, etc which further worsened the soil quality and water availability.

Moreover, women in the village had to walk for long distances (5-6 hours every day) to obtain fodder-fuel and water. It had an impact on the health of both women and cattle. Women were subjected to drudgery while cattle produced less milk due to low-quality fodder. This eventually degraded the economic conditions of the people and forced them to migrate to other areas for better jobs. The fields were left barren and looked much like those fallow forests.

OBJECTIVES

1. To demonstrate the effectiveness of silvopastoral systems in making a village resilient from climate change.
2. To organize and build the capacity of women to develop and manage silvopastoral land effectively.
3. To demonstrate and promote silvopastoral systems as an economically viable activity.
4. To ensure better economic and social conditions of the community while managing silvopasture.
5. To develop social capital in the community during silvopastoral activities.

ABOUT THE ORGANISATION

BAIF Development Research Organisation is a national level NGO, registered under Public Trust with head office at Pune, Maharashtra. It is governed by Gandhian values and a blend of development research, capacity building and improved quality of life.

VISION

Building a self-reliant rural society assured of food security, safe drinking water, good health, gender equity, low child mortality, literacy, high moral values and a clean environment.

MISSION

BAIF's Mission is to create opportunities for gainful self-employment for the rural families, especially disadvantaged sections, ensuring sustainable livelihood, enriched environment, improved quality of life and good human values.

This is being achieved through development research, effective use of local resources, the extension of appropriate technologies and upgradation of skills and capabilities with community participation. BAIF is an apolitical, secular and professionally managed organisation.

BAIF's work has resulted in many trailblazing initiatives which have been adopted as benchmarks and which have shaped policy formulation at the national level. These initiatives cover dairy animal production and management, tree-based farming systems and various appropriate technologies.

The BAIF Programmes are in the form of a nexus between various rural development initiatives and a strong applied research programme. Sustainable Rural Development through generating rural livelihoods and through management of natural resources: this is achieved through various core thematic area programmes and various cross-cutting components.

Research for Development: to study contexts and develop appropriate technologies and solutions for rural development. BAIF Team also works on various emerging thematic areas and these programmes are then mainstreamed. Today, BAIF is working in 13 states across the country covering 1,64,835 villages in 318 districts.

BAIF UTTARAKHAND

BAIF started its journey in Uttarakhand in 1994, headquartered in Champawat. It took on the field of animal breeding with 8 cattle breeding centres in order to improve the breeds of cattle increasing their milk productivity. Out of the 5500 heifers of cows and buffaloes, 3500 were milking. The potential was huge but wasn't being realised. This was because of the lack of good green fodder in the vicinity of the village. The community forests were in a bad state and poorly maintained.

To address this blockade, Van Panchayats were recognised as potential units to cater to the need of good quality fodder in villages. A project entitled "Development of Silvopasture on Van Panchayat in four Villages of Champawat District in Uttaranchal" was planned to demonstrate Van Panchayat as a suitable source of fuel and fodder through its effective management by the village community.

The plan was actualised by increasing the capacity of women groups to regenerate Vanpanchyats with good quality annual and perennial grasses and fodder trees through the principle of silvopasture. Further, to independently manage it and use the developed resources for the benefit of community.

BACKGROUND

CLIMATE CHANGE AND AGRICULTURE

Agriculture contributes 16% of GDP in India while employing 49% of the population. So, even if we ignore the GDP part, the difficulties in the agriculture sector are bound to sway half of the Indian population, directly.

Agriculture production is majorly affected by local weather and climate change. The changes in air quality, precipitation and temperature would continuously impact crop growth. (Kumar & Gautam, 2014) Today, we are still able to get hold of our food supplies. But climate change is sure to have a snowball effect. There will be an increase in droughts, floods and storms in agricultural regions with untimely rainfall. These extreme weather situations will impose severe risks and potential crop failure. In India, where the increasing population is already putting pressure on the environment, climate change is an additional freight. The existing conflict between ecological and socio-economic systems will also intensify.

A study (Guiteras, 2009) show that the crop yield will decrease by 4.5-9 % in the short run(2039) while almost 25% in the long run(2070-99)

CONDITIONS IN INDIAN HIMALAYAN REGION (IHR)

Himalaya region is one of the most affected places by climate change. With melting glaciers and extreme weather events, it has become one of the most fragile ecosystems in the world. IHR supports 5% of the Indian population in 18% geographical area of the country. It also holds 69% of India's freshwater resources and various biodiversity hotspots.

However, residing in resource-rich areas doesn't benefit the people here. The communities struggle hard to create livelihoods and their daily needs. The socio-economic progress is moving at glacial speed. Agriculture here is practised mainly on

meagre holdings of terraced and sloping lands. Thus, people depend heavily on natural resources and fodder from the forests for their livestock. But with population pressure and climate disturbance working together, depletion of natural resources is exponential. Those societies whose livelihoods completely depend on natural resources and are at maximum vulnerability.

DRUDGERY OF WOMEN

Women play a significant role in the rural economy of India. Women amount to 37% of the working population in agriculture. They play diverse roles but mostly drudgery-prone agricultural activities including weeding, harvesting, sowing, grain cleaning, etc. This requires them to be in awkward positions like squatting and bending for hours. Moreover, in hilly areas, they have to walk to several kilometres in search of green fodder. Thus, a majority of the women farmers contribute more in agriculture as compared to their male counterpart. (Singh A. , 2015)

The main occupation of the people in Uttarakhand is agriculture followed by livestock rearing however, agriculture being rainfed in nature the importance of livestock in the state is more. Livestock rearing in the state is mainly women dependent and due to decreasing productivity of livestock and declining feeding resources like grasses, women are put to hardship as they are one who has to fetch fodder from forests, miles away from their villages or graze cattle or bring fuel from forest areas but in turn, they are not getting rewards as the activity is uneconomical due to less milk in cattle and buffalos and increasing unwanted drudgery in their day to day life. All the activities pertinent to livestock from feeding, aftercare and milking is done by women. (Khadatkar, Potdar, Wakudkar, & Narwariya, 2014)

SOCIAL CAPITAL

The poor condition of the rural community is generally justified in terms of lack of skills, resources and education. But this is not always true. Sometimes, even after having all the required capital (human and money), people aren't able to coordinate among themselves.

Some typically remote rural areas with a small population, scarcity of resources and no government support do better than regions living in the bounty.

Here comes the need to build social capital. It refers to the networks of relationships among people who live and work together in a particular society. Thus, enabling their society to work efficiently. Social capital doesn't fully depend on natural conditions. Policies and guidelines should provide a stage for the locals to work collectively. It must encourage them to form better bonds and a stronger community.

Especially when the socio-economic and environmental framework is drafted, the foremost activity to do is to build on existing social capital and strengthen it. (Wiesinger, 2007)

FODDER AVAILABILITY AND MILK PRODUCTION

There is a definite correlation between milk production and quality green fodder. The good quality green fodder is not only essential for milk production but also reduces the cost of milk production and maintains the dairy animals' health better than other synthetic/manufactured feeds. Although Uttarakhand is famous for its rich vegetative cover, fodder availability is a situation for concern. The state is facing a fodder deficit of more than 50 % and it becomes more acute and goes up to 70 % when we go for hilly districts. According to census 2003, the real shortage of fodder in the state is about 118.36 mt. (47.02%) per annum. (Singh & Singh)

Out of total fodder produced in the state 70 per cent of fodder comes from the forest (42% grass and 28% tree leaves) which directly shows the dependency of fodder on forests. Keeping in view the dependency of people on forests for fodder and fuel government of Uttaranchal has allocated 50,000 ha of land to 12000 villages in form of community land called as "Vanpanchayat" (Total no of hill villages 15000) to the villages which are being managed by villagers to meet out the fodder and fuel demand of villagers and almost sufficient to fulfil the fodder requirement of the state. However, due to improper management and lack of technical know-how among the villagers, an immense number of van panchayats are unable to fulfil the fodder demand in the state.

VAN PANCHAYAT AND COMMUNITY FORESTS

Out of several village commons, there are forests sustainably managed by community in India. Mainly referred to as village forests or panchayat forests, managed by Van Panchayats.

Van Panchayats in Uttaranchal were formed in 1921 after various conflicts and compromises between state and the people. The state has about 6069 Van Panchayats that manage 405,426 hectares of forests. It constitutes around 13% of the total forest area in Uttarakhand. Although, they are still struggling to be a fully democratic and self-governing forest management institutions. In a false attempt to decentralize power, Van Panchayats, the Forest Department introduced 'Village Joint Forest Management'. This enables the Forest Department to be a dominant partner in managing the village commons.

In the short run, this system has led to an anarchical behaviour in the villagers. Being a major stakeholder, their decision-making power wasn't benefitting the community. That's where the NGOs comes in. They played their role as a bridge between government and Van Panchayat. Several NGOs build the capacity of villagers and helped them work in sync while managing the resources efficiently. (Mukherjee, 2003)

COMMONS

It was in 1968 that Garrett Hardin wrote Tragedy of the Commons. He described it as a situation where people act to maximize their self-interests from share or common resources. Thus, exploiting the resources exponentially rather than using it sustainably.

Such that it caters to the common good of society for the long run. He advocated the entry of private players and government into these resources for efficient management. (Hardin, 1968)

'Therein is the tragedy. Each man is locked into a system that compels him to increase his herd without limit -in a world that is limited. Ruin is the destination toward which all men rush, each pursuing his own best interest in a society that believes in the freedom of the commons.' (Hardin, 1968)

Contrastingly, we see 'environmentalism of the poor' where people on the ground defend their surroundings (commons) from the market and the government. (Guha, 2000) This was the subtle idea behind the works of Robert Wade and Elinor Ostrom.

Robert Wade in *Village Republics* stated that the likelihood of commons being successful run by a community depends on various factors. These were

- Size of the resources
- Technology being used
- Relationship between resources and user group
- properties of resources group like - (Hardin, 1968) size, sub-groups, ethics, etc.
- Relationship between user and state

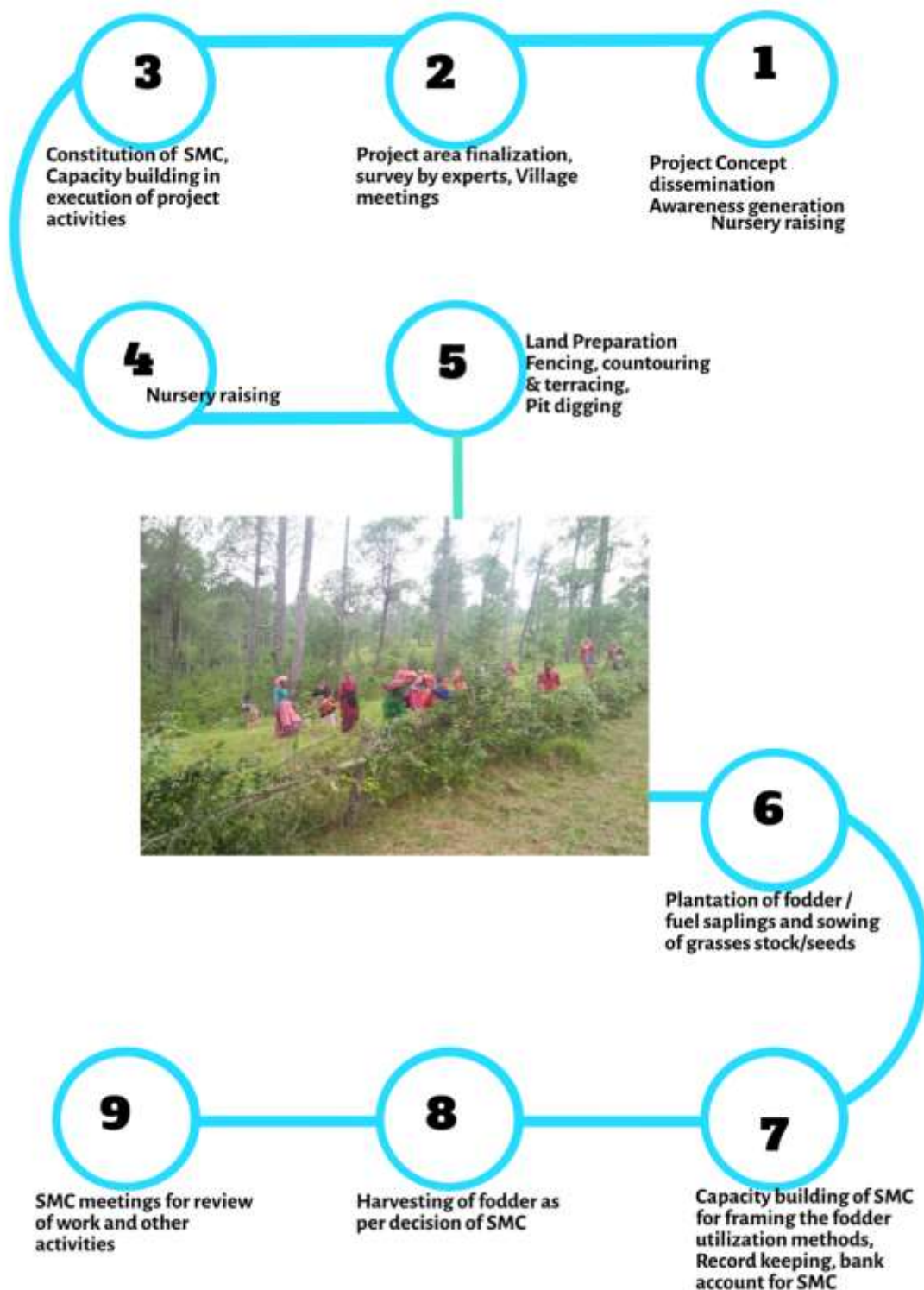
Such that the smaller the size of resources, clearly defines boundaries, efficient use of technology, the smaller size of a user group and better relations with the state would yield successful results. (Wade, 1989)

Elinor argued that the 'tragedy of the commons' is a very specific model. It can't be generalised to the commons of the whole world. she came up with **8 Principles for Managing a Commons** (Ostrom, 2011)

1. Define clear group boundaries.
2. Match rules governing the use of common goods to local needs and conditions.
3. Ensure that those affected by the rules can participate in modifying the rules.
4. Make sure the rule-making rights of community members are respected by outside authorities.
5. Develop a system, carried out by community members, for monitoring members' behaviour.
6. Use graduated sanctions for rule violators.
7. Provide accessible, low-cost means for dispute resolution.
8. Build responsibility for governing the common resource in nested tiers from the lowest level up to the entire interconnected system.

They both believed that privatization or central regulation may sometime work but it is not the only solution. Many times a community comes together with a brilliant solution. Thus emphasising on 'freedom of the commons'

PROCESS



The steps and procedures for silvopastoral activities are recorded below. These are general steps to carry out silvopastoral activities with a few anecdotes from Manar village.

1. Area Survey and Rapport Building

Initially, 20 van panchayats with an area of more than 200 ha were surveyed and village meetings were organised to see the people's response and finally, six van panchayats were shortlisted. One of them being Manar.

2. Criteria for Selection of Vanpanchyats

- a. People's response and participation in the program
- b. Availability of fuel and fodder in the village
- c. BAIF's presence in the area
- d. Suitability of proper aspect and direction of the Vanpanchyat
- e. Approach and connectivity to the road for input supply and proper monitoring
- f. Pre-existing flora and vegetative cover of the Vanpanchyat

3. Problem Faced during the Selection of Vanpanchyat

- a. The dominance of inflective people in the area
- b. Encroachments by people
- c. Less decision-making ability in women
- d. Misinformation about common/ community land

4. Site Selection

Initially, six Vanpanchyats (Patan, Gureli, Desli, Gambhir gaon, Manar gaon and Sui) varying in total area and located at different altitudes were shortlisted to be developed in community Silvipasture out of which four (Paten, Gureli, Gambhir Gaon and Manar Gaon) were finally selected depending upon



Figure 1: Project Area Survey

- the interest of the people especially women
- the suitability of the area to be developed as Vanpanchyat
- sufficient manpower available in the village

- sufficient livestock
- a considerable problem of fodder in the village.

5. Formation of Silvopasture Management Committee

After selection of Vanpanchyats, group meetings were organized in the selected villages to make people aware of the program and their role in its implementation and management. People showed good interest as the number varied from 13 in Gureli to 46 in Patan in initial group meetings.

Meetings were organized and gradually people started realizing the importance of forest conservation. They were informed that their forest comes in the category of ‘Van-panchayat’. A woman of the village Manar named Smt. Bhagirathi Devi showed keen interest and actively conducted regular meetings with other women. The representatives from BAIF also attended the meetings, motivated people and shared information with them.



Figure 2: SMC Meeting

Seeing her concern and interest, Bhagirathi Devi was selected the ‘Sarpanch’ of the Van-panchayat. Her husband Shri Diwan Singh further supported her and started guarding the forest.

As a result of good enthusiasm and interest among the people, the silvopasture committees were formed soon. All the villagers belonging to that particular village were registered as members of Silvopasture Committee and through their consent office bearers were elected. Later on rules and by laws were formed together by all the members and working strategy was decided.

Table 1: Names of Silvopasture Management Committee

<i>S.No</i>	<i>Village</i>	<i>Name of Silvopasture Management Committee</i>
1	Tyarshun	Kali Pal Chara Samuh
2	Goshani	Unnati Chara Samuh
3	Manar	Jaisindh Narsingh Baba Chara Samuh
4	Khalkandiya	Bhalemal Baba Chara Samuh
5	Narsighdanda	Durga Chara Samuh
6	Dingdai	Ganga Chara Samuh
7	Suyalkhark	Bhagwati Chara Samuh

6. Work Execution Plan

It was decided by the pasture committees that all the physical work involving labour for the development of Vanpanchayat into community Silvipasture will be done by members of the Silvipasture committee. These workers would be from the village itself and would be paid a fixed amount against each activity from the Silvipasture management committee.



Figure 3: Work Execution Plan

7. Training and Capacity building

Initially, farmers were trained for the smooth implementation of activities. This would help increase the work efficiency of beneficiaries and the main implementing power. Training and capacity building is done from time to time as per need of the project and 'Activities' calendar by an expert in the field. However, this is a regular feature and every month. There is a training cum meeting to review the progress and prepare a plan for next month.



Figure 4: Training and Capacity Building

8. Ranking of Fodder Trees and Grass Species by Villagers

Inventory of fodder trees and grasses were prepared by the villagers. The preferences for plantation in their van panchayat was ranked separately in all the four van panchayats so that people can get fodder of their choice.

For Manar, there were three best ranked trees for fodder.

- Baanj
- Khursu
- Kadam

The other common fodder species were

- Aangu (*Fraxinus micrantha*)
- Khadik (*Celtis australis*)
- Bheemal (*Grevia optiva*)

- Reengal (*Arundinaria falcata*)
- Robinia (*Robinia pseudoacacia*)
- Cham Khadik (*Carpinus viminea*)
- Quairal (*Bauhinia variegata*)
- Oak (*Quercus leucotrichophora*)
- Phalyant (*Quercus glauca*)

9. The Physical Work Execution Process

a. Fencing and ward and watch – In the initial phase, fencing was done by the bushes and trees branches which were obtained during clearing and shaping of existing trees. Later, Rambas and wild rose were planted to prepare a live hedge which can protect the newly planted trees and grasses from open grazed animals. 'Cattle preventing' trenches were also dug at few places which would check the entry of open grazed and wild animals in van panchayats along with conservation of soil and moisture in the van panchayat.

All the van selected panchayats were guarded by chowkidars throughout the day who was paid by Silviculture Management committee. He was responsible for checking entry for grazing or cutting of grass around the year. People were also motivated to construct social fencing.



Figure 5: Fencing

b. Land clearing and shaping – This included removal of unwanted thorny plants to make space for plantation of grasses and fodder plants

c. Contouring and terracing – The undulated land was shaped well through the formation of contours and terraces for plantation of trees and grass plantation respectively.

d. Pit digging – Through proper layout, pits were located in van panchayat and were dug before the monsoon. Next, after exposing to the sun, pits were filled along with manures.



Figure 6: Pit Digging by Women

e. Arrangement of planting material – Looking into the requirement of fodder saplings and stock material of grasses, demand was

placed well in advance to the agencies supplying the inputs. During initial years planting material was sourced from outside but later effort was made to grow and prepare the planting material locally.

f. Nursery raising – Selected progressive farmers were encouraged to go for nursery raising so that requirement of plant material can be met from villages itself. The nursery for monsoon grasses was grown in April whereas nursery for winter grasses was sown in October-November. Quite after some time, farmers showed interest in fodder trees nursery as well.



Figure 7: Nursery Raising

g. Plantation of fodder trees – Plantation of fodder trees was done in 1st forte night of July. However, it varied according to the rains.

h. Gap filling of fodder plantation – Mortality up to 20 % was noticed during the first two months. The dried plants were replaced during the same season. The second filling was done during the next planting season to pack up the gaps due to mortality during summers.



Figure 8: Gap Filling

i. Stacking of planted saplings – Planted saplings were supported with stakes to avoid collapsing due to strong winds.

j. Plantation of grasses – After plantation of trees, the plantation of grasses was done.

k. Intercultural operations – Intercultural operations included weeding, pruning, manuring and irrigation during stress. These operations were carried out regularly to avoid the competition of the planted grass/tree with existing weeds and protect the plant from adverse conditions.

l. Harvesting of grasses – Grasses are harvested collectively by the beneficiaries.

m. Mode of distribution of Grasses – Once there was considerable growth, the forest was opened periodically at a particular time during harvesting season. Villagers were allowed to enter and carry a headload of fodder. For each time they



Figure 9: Distribution of Grasses

entered into the van panchayat, they paid Rs 10/- which was deposited in Silvopasture management committee bank account. The time and duration of opening of the forest for harvesting purposes were decided by SMC members and all beneficiaries together. Mostly it was done during lean season when fodder is scarce.

n. Mode of payment and beneficiary contribution – To empower people and to increase management capacity of the working force it was decided that project will not pay directly to members for the physical and labour work being done under the Vanpanchayat. The pasture management committee would raise bill for the work done from the project and after verifying the activity will forward the asked money to the bank account of that particular committee.

Later the committee would withdraw the asked amount from the bank and payment will be made to members on the basis the work they have done. It was also decided by the committee members that 10% of their earnings will be deposited as a contribution to raise a sustainable fund to be used post project.

o. Present Status (Progress report) – Under the project, four van panchayats have been covered with a total area of 35 hectares. Individual bank accounts of SMC's have been opened in the bank. Manar alone has a lush forest of 11.2 hectares flourishing in the village.

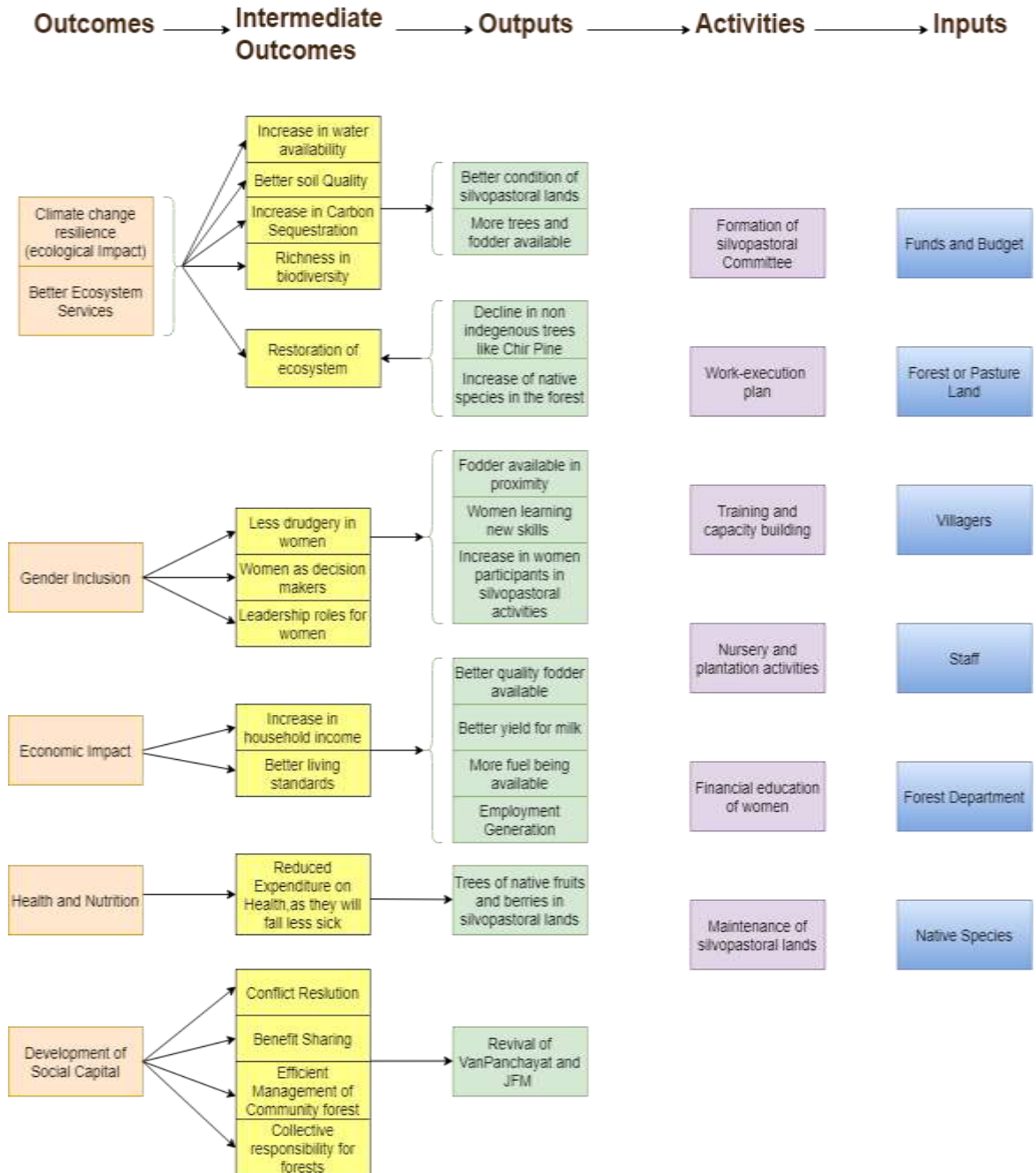


Figure 10: Present State of Forest in Manar

Table 2: Present State of Planation Activities in Different Villages

Details of Fodder Plantation under Climate Change Adaptation Project Khetikhan, Champawat									
S. N.	Name of Van Panchayat at (Community Forest Land)	Village	Plantation						Area (Ha.)
			Year 2017	Year 2018	Year 2019	Total No. of Plantation(No.)	No. of Survive Plants till May 2020 (No.)	Rec har ge Pit (No.)	
1	Gambhir Gaon	Manar	3500			3500	3023	50	10
2	Tapnival	Tapnival	2500		4000	6500	5182	50	10
3	Pardhyani	Goshani		6000	6105	12105	10405		10
4	Tyarshun	Tyarshun		1750	3250	5000	4340	32	10
5	Manar	Manar		3500	2076	5576	4590	80	11
6	Khalkandiya	Khalkandiya		2550	1000	3550	2685	62	10
7	Narsinghdanda	Narsinghdanda		1000	2000	3000	2502	52	13
8	Lamoti	Bhagana Bhandari			4000	4000	3800	100	12
9	Dhamisun	Dingdai			5000	5000	4753		10
10	Kaknaula	Bhagana Bhandari			4000	4000	3853		10
11	Suyalkhar	Suyalkhar			4000	4000	3542		10
12	Dingdai	Dingdai			4000	4000	3658	50	10
13	Punawe	Suyalkhar			4000	4000	3512		10
		Total	6000	14800	43431	64231	55845	476	136

THEORY OF CHANGE



METHODOLOGY

The report aims to explain how silvopastoral activities in a village can help it becoming resilient to climate change. During the long process of silvopasture, from saplings to forest, how auxiliary activities help in elevating the living standard of people. This also includes the building of social capital and gender inclusion.

We carried a comprehensive survey and got it answered by some of the residents of the Manar village. To select the respondents, convenience sampling was used. It is a non-probability sampling method where the sample is taken from a group of people easy to reach. In addition, this type of sampling method does not require that a simple random sample is generated, since the only criterion is the willingness of an individual to participate.

Moreover, pre and post photographs of the location were used. Video and telephonic interviews were conducted to understand the social construct, feelings of the villagers and success stories. To assist this, we had previous progress reports of the work as well.

LIMITATIONS OF METHODOLOGY

- As the survey and interviews were done remotely, there is a possibility of error in the report. Not being at the site location takes away the feel and deep insights one could get.
- The carbon sequestration is found by secondary data and calculations and not by real observations and sampling.

EVALUATION FINDINGS

OUTPUTS

- **Better condition of silvopastoral lands**

A total of 7560 fodder trees and 4 ha of cultivated fodder was planted in 35 ha area. With Manar alone having around 2300 fodder trees in 11 ha of area. The formerly barren land transformed into lush green space filled with trees, shrubs and grasses. Thus, more trees were available for fodder for the villagers. Besides, due to various soil and water conservation adopted by the team, the vegetative cover increased in the form of new grasses and trees.

- **Increase of native species in the forest**

The fodder trees planted Banj, Phalyat, Bhimal, Robinia, Khadik, Chamkhadik, Angu, Quiral, Reengal, Phaia, Mongal, etc. These trees were indigenous multi-purpose trees providing leaf fodder, fibre and fuelwood. It also increased the native fruits and berries bearing ability of the new forest.

Moreover, the non-indigenous trees like Chir pine were regulated which was of no cultural or economic use to the villagers.

- **Better quality and accessibility of fodder**

As the above-mentioned trees were planted, the quality of available fodder improved drastically. The new fodder was fresh, profuse and nutritive with a heavy yield. It had a quick regrowth in a short duration of time. Also, the fodder was just available in the proximity of the village i.e. in their forest. It was as if getting the feed for their cattle from the backyard.

- **Better yield for milk**

Villagers witnessed a significant amount of increase in milk yield by their cattle. This was due to the increased quality of fodder from the newly developed forest.

- **Increase in women participation in silvopastoral activities**

Smt. Bhagirathi Devi showed keen interest and actively conducted regular meetings with other women. The representatives from BAIF also attended the meetings, motivated people and shared information with them. Seeing her concern and interest, Bhagirathi Devi was selected the ‘Sarpanch’ of the Van-panchayat.

Further, BAIF involved women for plantation and digging trenches for water conservation. BAIF purchased broadleaf trees like Oak, Kharsu, Pagar, Kafal, Shehtoot, Khadeek from Forest department and let the rural women plant them and take care of them. Bhagirathi Devi created an additional fund for plantation.

- **Women learning new skills**

It was suggested by BAIF that the people should prepare their own saplings for the forest as they do for their farm crops and the fund that went to the forest department, would be given to them. The people were distributed with polythene bags in which they grew seeds of different forest trees collected by women and set up a small nursery in the area. Besides women also began sowing walnut,



Figure 11: Small Nursery in Vanpachayat Land

malta, lemon and plum in these polythene bags. The saplings were ready to be planted within 6 months. 50,000, 1.5 lakhs and 3 lakhs saplings were ready during the first, second and third year, respectively. Women began selling and planting these saplings and it became a source of livelihood for them. They took proper care of the plants.

- **Employment generation**

Till now, under the project, a total of 246 person-days have been generated in 4 panchayats. People have received more than five lakh rupees as wages against their contribution to physical work in the development of silvopasture. People have contributed 10% of their savings to respective SMC's to develop a sustainable fund for the management and maintenance of VAN Panchayats. Total of more than 45,000 has been collected in SMC's as a sustainable fund.

Manar Gaon specifically generated 1526 person-days of employment and has Rs 8992 in their contributed fund.

INTERMEDIATE OUTCOMES

- **Increase in water availability**

The growth of trees has turned the land into a dense forest. Due to this, the subsurface flow of water within the soil increased. Thus, recharging the existing streams of water with a greater amount. The streams that had dried in the past rejuvenated.

- **Better soil quality**

The planted trees increased the soil's ability to absorb and retain water, maintain organic matter in the soil, produce nutrients for plants and moderate soil temperatures. Planting trees on the land that was heavily overgrazed help break up the soil structure and improve the rate at which rainfall infiltrates the soil.

- **Increase in Carbon sequestration**

Forests sequester more carbon than any other terrestrial ecosystem on earth. Taking an average of the biomass of Uttarakhand for 11 hectares. It would be 1.28 tonnes of carbon. By multiplying with a factor, we get carbon sequestration of 0.64 tonnes of carbon/year (according to IPCC 2003)

- **Richness in Biodiversity and restoration of ecosystem**

With the greenery coming into the landscape, habitats were prepared for a lot of wildlife and birds. Birds like Verditer Flycatcher, Kalij Pheasant and Jungle Murgi started appearing in forests. Villagers also had sighting of Barking Deer in the vicinity of the forests. These species of birds and animals will further help in pollination and spread of the forest.

Improved soil quality, recharged river streams, growth of native species and the return of wildlife has restored the natural ecosystem of the area.

- **Less drudgery in women**

The fodder and water were available in proximity to their homes. It rescued women from walking for kilometres to get fodder for their cattle and water for the household. This reduced the hardship of women and saved their time and energy, as a lot of such household work of women goes unnoticed.

- **Women in leadership roles and as decision-makers**

We saw women like Ban Amma (Bhagirathi Devi) driving an initiative and taking charge of silvopastoral activities. Bhagirathi Devi penalized the villagers whose animals grazed in the forest area. And within 1-year greenery started appearing in the forest. She also helped in creating an additional fund for plantation.

Other women who learned various skills like planting, digging trenches, maintaining accounts during the course became confident and more aware. They also made a nursery for their forest such that the nursery fund was directed towards the village and not the forest department.

- **Increase in household incomes and better living standards**

Better yield enabled the villagers to have surplus milk that they can sell or even consume. This increases their household income and living standards. In addition, the employment generation in the midst of silvopastoral activities also created an extra income source for some households.

- **Benefit Sharing and conflict resolution**

Contrary to the tragedy of commons, People of Manar and other villages showed how freedom of the commons can work well in a practical world.

Problems arose when people took their cattle to graze in work-in progress forest. Bhagirathi Devi then started a system of penalising the Villagers whose cattle used to damage the forest by eating the growing trees. This helped in two ways, it curbed the cattle grazing in the area and it also helped the Ban Aama create a fund for additional plantations of trees in the Forests.

Along with Rambas and Wild Rose were planted to prepare a live hedge which can protect the newly planted trees and grasses from open grazed animals, people also made social fencing. Social Fencing encompassed looking down upon people for not complying with the rules. A community barrier where members police themselves to prevent the rule-breakers. This developed a collective responsibility in the society, a prerequisite of managing community forest efficiently.

OUTCOMES

• **Climate Change Resilience**

The ability to anticipate, prepare and respond to various disturbances and hazardous events related to climate is climate change resilience. Being more climate-resilient means better ability to sustain livelihoods by assessing the current change and responding accordingly.

The Himalayan region is one of the most vulnerable in the world to climate change, has to respond even quicker. The silvopasture in many ways has enabled the villagers to do it. The recharging of streams and improved soil quality helped them in agriculture. The fodder that was available readily for their livestock improved their health and yield. Thus accelerating the socio-economic progress. Natural resources are being managed in a way to benefit everyone yet leveraging them for better productivity. Such that with increasing population, the stress on natural resources remains low.

Further, with more grasses, forage and trees, more carbon is sequestered in the form of wood. This indirectly lowers the carbon concentration of our air on Earth.

• **Better Ecosystem Services**

Enhanced ecosystem services provide a better quality of life for the individuals and the community. Forest filtered the air out of various pollutants. Clean drinking water was readily available in fast pacing streams. There was a significant change in local weather with summers being less hot due to the vast area of forest, leading to climate amelioration. The richness of biodiversity contributed to the increase in pollinators.

This indirectly translates into an improved lifestyle of people enriched with better accessibility of resources and good health.

• **Gender Inclusion**

Women are altogether more dependent on forests to run their lives. Right from lighting the Chulha to feeding their livestock, forest act as a resource. The better its accessibility and quality, better is the condition of women. Women now don't have to walk for 4 -5 kilometres just to get some fodder for their cattle. They can devote that time for some other productive thing or rest for a while.

Women participated in plantation activities and learnt the nitty-gritty of proper plantation. They started with digging trenches in the initial stage and ended up setting a nursery a few years later. Women of Manar also came forefront in leadership roles like Ban Amma to manage the village forest. This process mobilized them and turned them into confident individuals. They now could speak and ask for things they deserve and think unapologetically for a better future.

• **Economic Impact**

Better quality fodder resulted in better rather surplus milk yield. A household was able to sell that create an additional income source. Some of the households also took extra cattle to generate more cash. The earnings from employment during silvopastoral activities helped people's economic state.

There is now a constant need for WatchGuard in the village. This way it came as a permanent job for landless labour to uplift himself/herself economically.

• **Development of Social Capital**

When the human capital capitalizes on his networks to make the society works efficiently, it makes a reliable social capital. In a way that we can reap the fruits from its establishment. People in Manar had to set up norms of benefit sharing and resolved the conflicts aroused due to self-interests. The process of making social fencing also united them to work for a collective cause.

This established social capital can be used to work on various developmental projects with harmony. These projects would progress swiftly due to already mobilized community with strong bonds. The tragedy of commons become freedom of the commons in a practical world, Manar.

Furthermore, looking into approach and concept, there came a huge demand for assistance in other vanpanchayats of adjoining villages to be developed into silvopasture. Thus, extending the social capital to other villages.

TESTIMONIALS

EK BAN AAMA KI KAHANI (THE STORY OF A FOREST GRANDMOTHER)

In the Himalaya and near the border of Uttarakhand, there is a small village called Manar. It is situated near Lohaghat town in Champawat District of Kumaon region. At a height of 1700 meters (5577 feet) above mean sea level, it has been affected badly by the effects of Climate change since the last 20-25 years. In the year was 2003-04, the population of Village was merely 690. Villagers were living a very hard life, having to go 4-5 km to fetch water for drinking and daily use. While the forest surrounding the village was depleted to the level of being non-existent.

In 2004 the NGO named BAIF started its work in a nearby village called Khetikhan. Bhagirathi Devi approached an NGO and told them the problems the village was facing. She volunteered for the betterment of the situation. Thus, we see an example of self-empowerment in the village. Bhagirathi Devi, a woman who decided to do something about these problems instead of crying and cribbing over them.

BAIF with the funding of DST (Department of Science and Technology), started a project of planting trees and also in fencing the land, and improved techniques of Afforestation. Gradually



Figure 12: Van Amma (Bhagirathi Devi)

the land cover of the forest started increasing. Bhagirathi Devi even started a system of penalising the Villagers whose cattle used to damage the forest by eating the growing trees. This helped in two ways. It curbed the cattle grazing in the area and also helped the Ban Aama create a fund for additional plantations of trees in the Forests. BAN AAMA then went a step further and got elected as the SARPANCH of the Village.

Today, after 15 long years, The BAIF Project has been handed over to the Villagers and as the Sarpanch, Ban Amma is the Head of the Banpanchayat. the total forest area is at 11.2 Hectares. Ban Aama is still not done and wants to increase the land cover even more



Figure 13: Ban Amma with NABARD Officials

Today this has led to a two-fold benefit for the Villagers i.e. they get fodder for their cattle nearby to their Houses and also because of extended Tree cover the older springs have been rejuvenated.

Even Today, the Villagers and Ban Amma are dedicated to the cause; they contribute Money every month for the betterment of the Forest. In case of emergencies like Forest Fire, Trespassing, Theft etc, Ban Aama Personally takes initiative to solve the problem.

All this was possible because one lady had the vision and determination of recovering the lost Forest area. We salute the spirit of our BAN AAMA Bhagirathi Devi. She indeed is a Hero of the Forest and has won a lot of Awards and Accolades for her extraordinary efforts. We wish her even more success in the future.



Figure 14: Van Amma sharing her experience with the community

BAIF has been Successful in replicating this model in various other locations.

LINKING OF OUTCOMES TO SDGS

Linking Outcomes to Sustainable Developmental Goals

For Silvopastoral Activities



No Poverty

Livestock started yielding more milk. Thus increase in income and one dimension of poverty was taken care of.



Good Health and Well-being

The drudgery of women was reduced. Better fodder available for livestock and wild nutritious fruits for people.



Gender Equality

With women participating, taking leadership roles and making decisions, gender equality is ensured.



Clean Water and Sanitation

The streams were recharged due to sub-surface flow of water through forests. Thus clean drinking water was available



Climate Action

Enhanced ecosystem services, better natural resource management, better carbon sequestration and climate change mitigation.



Life on Land

Improved soil, ecological restoration by increasing native species and more sightings of native birds and mammals.

STRENGTH OF THE PROJECT

• **People's Participation (especially women)**

The implementing agency only comes into the picture when people are willing to participate. Else, it is a flop show. It will only start with the initial push from the implementing agency running like a pilot project. For a project to be successful on a larger scale, people's participation is utmost important. All the villagers came up to make the silvopastoral committee with one member from each household. They maintained their equity and participation.

This was especially seen in women coming forwards and taking a lead in the initiative. Women joined the Silvopastoral Management Committee, became a sarpanch and did the ground work.

• **Timely Completion of Activities**

The activities that were scheduled were duly completed in time. Timely completion of activities gives a sense of achievement to the people. They are then motivated to move further seeing regular tangible results. On the contrary, if the projects are laid back on their deadline, people lose their morale and think it as a waste of time.

• **Selection of Grasses and Trees**

The selection of grasses and trees become really important in a silvopastoral system. BAIF and villagers refrained from Alien Invasive species like Chir pine but went for native species like oak, kharsu, pagar, kafal to restore the ecosystem.

• **Maintenance Done Well**

The most difficult part of a project is to sustain it and to keep it up and running. Growing a wild forest was relatively easier than to maintain it as it is. The villagers with BAIF did a great job in guarding the forest, rationing the fodder and keeping a check on its growth.

A few months later the plantation, a meeting was called where BAIF representatives were also invited and it was decided that every family will submit Rs. 50 to 'Van Suraksha Samiti' (Forest Protection Committee). With the savings, a guard would be employed for Rs. 2000 monthly salary. For the next 12 months, grazing by domestic animals was completely restricted. Bhagirathi Devi penalized the villagers whose animals grazed in the forest area. And within 1-year greenery started appearing in the forest.

• **People's Ownership**

With a heavy self-interest prevailing in the world, it is hard to take ownership of a community resource. All humans want to do is exploit it to the maximum. But in Manar, villagers took the ownership of their land and pledged to make it green and filled with fruits, forage and fodder. This sense of ownership made them fight with the individuals not respecting it. Thus, making an aura of upholding the commons for greater good.

- **People's Eagerness to Grow**

In 2004 when BAIF started its work in a nearby village called Khetikhan, Bhagirathi Devi approached them and told them the problems the village was facing and volunteered for the betterment of the situation. They were ready to address a problem and find a solution for that. Whenever a situation came up, villagers were ready with some or the other solution. Be it fencing of the silvopastoral land, guarding it or making a new nursery, they were always proactive.

FUTURE PERSPECTIVE

- **Acquiring New Skills**

In the course of this project, women learned to dig pits and trenches and planting meticulously. Now, they can get some training of financial literacy of keeping the records and make Self - Help group of women of the village. Such that when NRLM (National Rural Livelihood Mission) and MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act) come together to do some work and improve livelihoods, Champawat has a base to stimulate its progress.

- **Formation of Cooperatives**

As the milk yield increased for the village the surplus milk can be sold under a cooperative with decent quality controls. This way the villagers will get to sell more while commanding better prices.

As the forest is in mint condition, honey culture can be inducted in surrounding areas. This can make an interesting and promising source of alternative livelihood option

- **Expansion of the forest**

In talks with some of the women of Champawat, they suggested expanding the forest beyond its boundaries. With this, the women also demanded flow of credit for the respective operations. I would suggest converting more village area or wasteland into prosperous green forests. Such that people can take maximum benefit from that.

- **Use of Indigenous Cattle**

Instead of injecting cows with jersey semen, BAIF can identify native studs in the region and let the cows the breed with him. This will again restore the ecosystem and revive genetic diversity in domestic animals. Such a measure will not only affect positively on yield and health of livestock but also prevent the diseases to saturate in domestic animals. The diseases thus will take a ginormous amount of time to transfer from domestic and animals to humans. And we may pass a chance of risking another pandemic.

RECOMMENDATIONS OF LIKE-MINDED NGOS/ GOVERNMENT OFFICIALS

COMMUNITY MOBILIZATION

The most crucial thing is to mobilize the community. When the people of a village are convinced to work for an objective, intervention processes move faster. They are ready to make temporary sacrifices for the final good that is expected. An NGO or a government official needs to make villagers realise the importance of a particular intervention and benefits they will get after it has matured.

This mobilization and formation of social capital will help in governing of these commons effectively. It will be easier to do conflict-management and benefit-sharing. The freeloaders and trespassers will be adequately penalised.

INCORPORATING 'GOVERNING OF COMMONS' IN RURAL EDUCATION

Often the students in the village aren't aware that resources can be managed by the community, almost independently, with little help from other organisation. They need to be educated about it through various success stories and cases where a community has efficiently managed their resources.

If not in formal education, NGOs can go to school and educate children about it, such that it is instilled in the people right from childhood.

FINANCIAL SKILLS

As the silvopastoral activities take in the participation of women, they should be acquainted with basic financial skills. Some of these would include opening and maintaining a bank account, keeping the records, etc. In addition to imparting them with skills, women would feel confident in taking decisions in life.

NURSERY

As in the case with Manar, women or villagers can be motivated to set up their own nursery for plantation. In this way, the money given to the forest department for putting up nurseries can be diverted to villagers. Thus, helping them with extra income and employment generation.

PLANTATION NATIVE SPECIES

Plantation should be majorly done for native species of that area. It will produce better results in terms of growth and pasture stock. Native species also help in restoring the ecosystem. Hence, improving soil quality, recharging streams, giving better livelihood options, increasing wildlife biodiversity and enhancing ecosystem services.

PROPER MAINTENANCE AND CHECKS

It is always easier to get a project started and doing the initial bits. The harder part to maintain the initiative until it is matured enough to become a daily habit of a community. Plantation in the forest land along with pit digging, pruning, fencing, etc is the first phase. The next phase is to maintain it. One should devise a proper mechanism to manage the forest when it has attained considerable growth. The cash for the guard and other maintenance activity should flow seamlessly through the villagers. This part of the program should also have to be agreed upon previously. Else, the project will be like any other plantation activity.

MAKING SUB-AREAS FOR GRAZING

If the forest area is large and plantation is done in stages, the grazing of livestock can also happen in these sub-areas. They can be first allowed to graze in one area for some time and then progressively be allowed to other areas. This would save the new saplings to be eaten and be turned into a big tree. The sub-areas can be divided using a live fence.

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Questions

CLASSMATE
Date: _____
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I) FUNDS and BUDGET.

- 1) कितना Fund आया?
- 2) कहाँ कहाँ से आया?
- 3) किन-किन ज़रूरतों से आया?
- 4) और कुछ अलग जानकारी?
- 5) क्या समस्याएँ आईं और उनसे कैसे निपटा?

II) वन पंचायत की ज़मीन

- 1) ज़मीन का माप (Measurement)?
- 2) ज़मीन की स्थिति?
 - a) 2004 में → DST के समय?
 - b) BAIF के समय?
- 3) ज़मीन पूरी उपलब्ध थी?
या कोई अतिक्रमण था?
- 4) यदि अतिक्रमण था, तो कैसे हटाया?

III) गाँव

- 1) गाँव को उसी समय - 2004 में, क्या स्थिति थी?
- 2) गाँव वालों को किस तरह जोड़ा?
- 3) क्या क्या परेशानियाँ आईं?
- 4) शुरूवात में, कितने लोग तैयार हुए मदद करने के लिए?
- 5) बाद में, लोग कैसे जुड़ते गए? (कितने)

(IV) STAFF - BAZF

- 1) BAZF के कितने लोग उसी इय Project से जुड़े?
- 2) कौन - कौन, और उनकी क्या-क्या Duties और Responsibilities हैं?
- 3) वर्तमान स्थिति क्या है - BAZF के सदस्यों की?

V FOREST DEPARTMENT.

- 1) क्या Forest Dept का कुछ योगदान रहा?
- 2) या उन्कोमें कुछ परेशानी लाने की कोशिश की?

VI.) SILVOPASTORAL COMMITTEE (अमिति)

- 1) कब बनी?
- 2) कैसे बनी?
- 3) क्यों बनी?

4) Committee किस तरह से विकसित हुई?

5) कौन सदस्य बनें?

6) सदस्यों को कैसे शामिल किया?

7) अमिति को क्या-क्या जिम्मेदारियाँ थीं?

8) अमिति के गठन में क्या समस्याएँ आईं?

VII) WORK EXECUTION PLAN

- 1) कब और कैसे बना? पूरी जानकारी
- 2) क्या समस्याएँ आईं?

VIII) NURSERY and PLANTATION ACTIVITIES

- 1) Nursery कब और कहाँ बनाई?
- 2) पौधों का चयन कैसे किया?
- 3) बीज कहाँ से आए?
- 4) Nursery बनाने में कितना समय लगा?
- 5) Plantation कब शुरू हुआ?
कितने चरण में हुआ?
कितना समय लगा?
- 6) औसत Survival Rate क्या था?
- 7) कितने साल में 'जंगल' बनता दिखने लगा?
- 8) गाँव वाले ने कैसे योगदान दिया?
- 9) इसमें BAF का क्या खास योगदान था?
- 10) Nursery और Plantation के दौरान क्या समस्याएँ आईं?

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IX) TRAINING & CAPACITY BUILDING

- 1) ट्रेनिंग किसने दी?
- 2) ट्रेनिंग किन-किन लोगों को हुई?
- 3) ट्रेनिंग किन-किन कामों (विषयों) पर हुई?
- 4) ट्रेनिंग कब दी?
और कितने समय के लिए दी?
(महीने / सप्ताह)
- 5) क्या समस्याएँ आईं?

X) FINANCIAL EDUCATION

- 1) महिलाओं को FINANCIAL EDUCATION मिला?
- 2) क्या महिलाएँ उत्सुक थीं?
- 3) क्या समस्याएँ आईं?

XI) MAINTENANCE

- 1) कैसे किया? कितने लोग लगे?
- 2) Funds कैसे आते हैं?
- 3) क्या समस्याएँ आईं?

XI) CONFLICT AND BENEFIT SHARING

- 1) गाँव के लोग — किस तरह से कारदा उठाते हैं?
- 2) क्या गाँव वालों के आपस में झगड़े हुए?
- 3) किस विषय या बात पर झगड़े हुए?
- 4) झगड़े कैसे सुलझाए?
- 5) आस-पास के गाँव किस तरह से प्रभावित व प्रेरित हुए?