

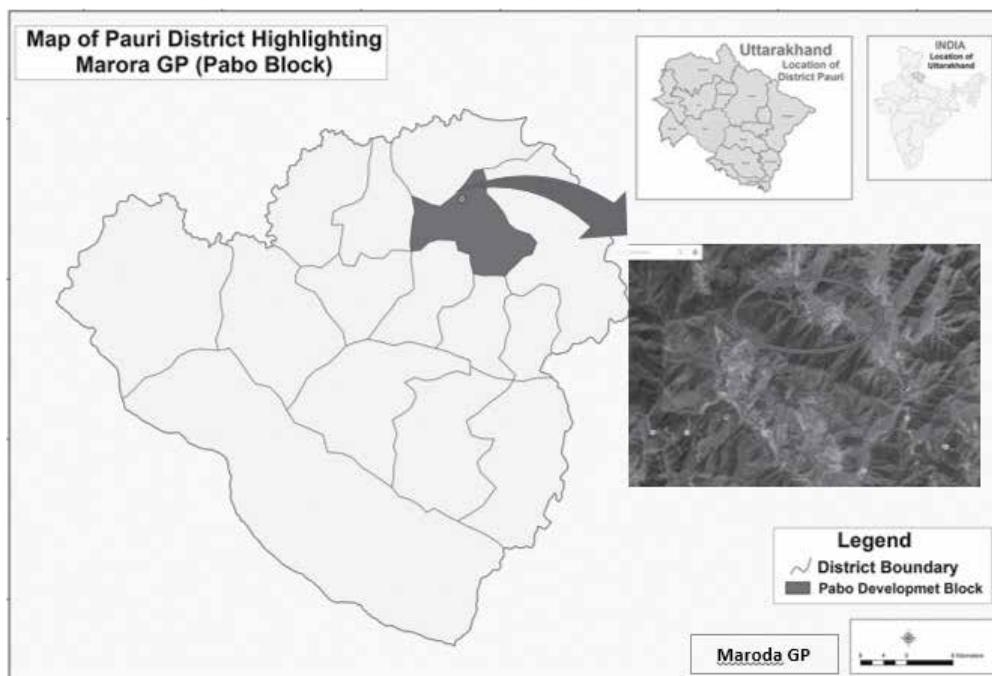
# Regeneration of Barren Lands by Local Communities - An Opportunity for Sustainable Livelihoods

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## 1 . Geographical and Demographic Profile

The Maroda Gram Panchayat is located in the Pabo Block of Pauri Garwhal district in Uttarakhand which comes under the western Himalayan region (zone-1). It is located 30°08.627' N, 078°53.013' E, at an elevation of 1200-1600 mts.<sup>1</sup> above mean sea level.

Figure 1: Map of Pauri District Highlighting Marora GP (Pabo Block)



The region has a sub temperate to humid climate which remains pleasant throughout the year. During winters the climate is very cold and the area is covered with dense forested slopes.

It receives erratic rainfall generally commencing from mid-June and extending till mid-September. Occasional rainfall is also experienced during

<sup>1</sup> Source: Field GPS Readings

winters. Average rainfall in the District is ranging from 121.59 mm (2011) to 81.09 mm (2014).<sup>2</sup>

As per Census 2011, Maroda village consists of 156 households spread in an area of 300.34 ha with a population of 643 persons<sup>3</sup>. The major occupation of the village is rain fed agriculture. Due to erratic rainfall in the region, agriculture is becoming unremunerative leaving behind hardship for farmers to feed their family.

## 2. The Rationale for the Initiative

Hill and mountain habitats have five overarching specificities. They are: (i) inaccessibility, a product of altitude and terrain coupled with inadequate access infrastructure that hinder mobility, imposes isolation and “closeness”; (ii) fragility, a product of altitude, steep slopes, and other associated biophysical conditions that prevents higher intensity of land use, and limits both the physical and economic scope of input use; (iii) marginality, that results in limited and low payoff options and high cost of upgrading resources; (iv) diversity resulting from a high degree of spatial, temporal, physical and biological variability over short distances that at one level makes it difficult to achieve economies of scale but at the same time offers potential for higher productivity and specialization; and (v) niche which implies potential for products and services having a comparative advantage over the plains.<sup>4</sup>

Farmers from the village have migrated to urban areas or to the plains, which is a result of fragmentation of landholding and environmental degradation leading to water and fodder scarcity, impacting viability of agriculture and livestock related livelihood options that remain the mainstay of the hill economy. The families of farmers cultivate crops in limited area for just fulfilling their family needs resulting in increased area of fallow land in the region. Due to subsistence livelihood, migration and remittance economy operates in the region. Therefore, there is a need to develop and improve agricultural standards of the region, to enhance the livelihoods of the village community.

However, the landholdings of the farmers is fragmented and therefore not viable for commercial production as it requires more labor resulting in increased cost of cultivation. Further, since the agricultural fields are terraced, small, modern agricultural implements cannot be used. Thus, apart from focusing on increasing productivity, there is a need to aggregate the landholdings and take a common activity, which decreases the above mentioned challenges, supplement agricultural income and improves livelihood of the community.

<sup>2</sup> <http://hydro.imd.gov.in>

<sup>3</sup> Census of India 2011

<sup>4</sup> Source: W.S. Jodha, Mountain Perspectives and Policies, ICIMOD, 1999

In this direction, Integrated Livelihood Support Project (ILSP) was launched in the year 2012 but due to flash floods in 2013, the project actually started its activities in 2014 in the location post restructuring of the project. ILSP was launched in a participatory mode; the main objective of the project was to reduce poverty through developing livelihood of the villagers in the Micro Watershed (MWS) area. Under the project, community decides and plans the development activities to be carried out in the Gram Panchayat and they themselves implement the decided activities. At gram panchayat level, Gram Panchayat Watershed Development Plan (GPWDP) is prepared which enlists the different activities decided by the community and the budget allocated for each activity. Along with watershed activities, sustainable agriculture was given importance to increase livelihood options at producer group level. The community of Maroda Gram Panchayat proposed establishment of collective orchard of pomegranate through the project in the untended/abandoned lands of the village so as to develop an income generating source. The ILSP project team facilitated the community in taking forward the initiative by providing technical support and guidance.

### **3. Prevailing Issues**

The hilly regions of Uttarakhand have certain key features that make it different from other Himalayan states of the country and highlight its potentials for development. In the hilly regions of the state, majority of the population resides in the rural areas. These hill rural areas offer tough working and living conditions for its inhabitants. The area does not provide conducive terrain for the development of industries or other sources of employment generation, resulting in the hill districts of the state having agriculture as their mainstay. The tough environmental and geographical remoteness of the hilly areas has pose challenges for the farmer. This has further led to the challenges for agriculture which is marked with problems of poor technology, lack of irrigation facilities, poor land structure and fragmented land holdings. Due to these problems, the agriculture in these areas is subsistence in nature. The major issues which prevail in these regions are mentioned as under:

1. Migration.
2. Increased man animal conflict.

#### **3.1 Migration**

Migration poses challenges in the rural areas resulting in risk of losing the younger, most vital and dynamic share of the workforce. As per the Census 2011, males constitute 42.77% of the population and females 57.23% and 11.82% of the population is under the age group of 0-6 years<sup>5</sup>. This clearly

shows that the village has more females than males. In another study, it is revealed that majority of the migrants from the households of Pabo Block are males<sup>6</sup>.

Pauri Garwhal is one of the districts in Uttarakhand which has shown negative growth rate but the urban growth rate in the district has registered in positive. (Source: Census of India 2011) which is indicative of decreasing trend of rural livelihood options. The decadal growth rate in Pauri has declined to negative 1.41%<sup>7</sup> in 2011 as compared to census 2001. The detail of the growth pattern of the population in the district is shown in the table given below.

Table 1: Growth rate of Rural-Urban population in Uttarakhand during 2001-2011

District	Persons		Males		Females	
	Rural	Urban	Rural	Urban	Rural	Urban
Pauri Garhwal	-5.49	25.37	-5.02	19.20	24.88	41.69

Source: Dr. Prashant Kandari, 2013

These inferences clearly reveal that migration from the hill regions has been triggered from the villages and resulted in increase in area of fallow/barren land. Further, these untended lands are covered by resilient and invasive weeds and shrubs (such as Lantana and Parthenium) that are very difficult to clear. Such factors have caused a perceptible decline in agriculture, which is still the backbone of rural economy. According to the Ministry of Agriculture, Government of India, the net sown area in the state has declined by around 10% in 2013-14.

### 3.2 Increased Man Animal Conflicts

The tracts of untended land have given birth to another problem: increased Man-animal conflicts. There is a marked rise in incidences of conflicts with wild animals. Populations of wild boars and monkeys, too, have increased and have made farming more difficult. Adding to this, leopards have started descending the slopes and wandering into human settlements in search of food. The wild vegetation that has infested vacant farmlands is providing camouflage for leopards and the prey alike. As per a study conducted in Pauri Garwhal District, man animal conflicts have been recorded under high category between 900 and 1500 m altitudinal variations, and in Pauri district, Pabo block is the worst affected, it comes under high conflict zones based on severity and frequency of human and livestock kill by leopards. Under the study digital elevation model was re-classed into 30 classes at 100 m altitudinal intervals. Grids of 2X2 Kms were generated for entire Pauri district. Around

<sup>5</sup> Census of India 2011

<sup>6</sup> Source: Dr. Prashant Kandari, 2013

<sup>7</sup> Census of India 2011

50% grids reported to have high human conflicts (Table 2) which clearly shows that 49.54%<sup>8</sup> of area has witnessed human-leopard conflict. Grids are categorized as low, medium and high conflict zones.

Table 2: Zone wise Human-Leopard Conflicts in Pauri District

Categories	Number of Grids	Low Conflict Zone		Medium Conflict Zone		High Conflict Zone	
		No. of Grids	% Area	No. of Grids	% Area	No. of Grids	% Area
Human-Leopard conflict	109	19	17.43	36	33.03	54	49.54
Overall Conflict	1006	365	36.28	435	43.24	206	20.48

Source: International Journal of Science, Engineering and Technology Manoj Agarwal et al, 2016, Volume 4 Issue 2

As the area is covered with shrubs which are hiding places for the wild animals, the community proposed to restore these areas. Through the restoration of these barren lands the shrubs and resilient weeds are being removed and the hiding spaces for wild animals are being reduced. In addition, the area can sustainably be used for fruit cultivation.

## 4. Need of Collective Action

The landholdings in the hilly regions of Pauri district are fragmented and the landholdings are scattered in different small patches. The entire patch of area is not available as a contiguous area; therefore, there is a scope for collective community efforts for horticulture based interventions, and promotion of cluster based approach for such intervention. The selected area for the establishment of collective orchard was identified covering the barren lands of 80 farmers in the village.

This collective approach was needed to allow the village community to work together and reap the bulk harvest and provide a platform wherein they will be able to share their day to day chores. This initiative has helped in orchard establishment and land preparation activities in a collective manner, the work load on the field being divided equally amongst the land owners and community members.

Further, the collective farming had helped in marketing of the produce providing easy access for buyers and reach to the market. This will help in fetching good price for the harvest and provide a livelihood opportunity for community at village level itself.

<sup>8</sup>. Source: Manoj Agarwal et al, 2016, Volume 4 Issue 2

## 5. Why Pomegranate Orchard

The fruits grown in Uttarakhand have seasonal and location advantages as these crops mature at least three weeks earlier than in other temperate areas of the country i.e., Himachal Pradesh and Jammu and Kashmir. To implement the innovation various fruit crops were considered for cultivation which suits the temperate climate of the region. These included stone fruits, citrus and pomegranate. After several rounds of discussions between community and the MDT (Multi-Disciplinary Team) pomegranate cultivation was taken up because of the properties of the pomegranate mentioned below:

- A variety locally named as Dadim/Daru is commonly found in the area which is sour in taste, therefore, in place of Dadim, Bhagwa variety was selected for commercial purpose in the region, due to its sweeter taste and bigger size of fruit than Dadim variety.
- The pomegranate plant is robust in nature which suits rainfed condition of hilly regions.
- The plants are easy to propagate through vegetative propagation.
- Life cycle of pomegranate plant is upto 25 years.
- Early fruit bearing (3 year onwards after plantation) as compared to other fruit crops.
- It is an off-seasonal harvest in the prevailing climate of the region, which will fetch a good price to the farmers.
- Irrigation is required mainly at the time of fruit bearing stage.
- The plant requires average of 8 ltrs./day/plant of water during fruit bearing stage i.e. during Monsoon period in Uttarakhand (June September).
- Production per plant is 4-5 kg/plant of a 3-4 year plant which increases to 20-25 Kg/plant after 9-10 years of the age of plant.
- Shelf life of pomegranate is more as compared to other fruit crops grown in Uttarakhand.

## **6. Strategies Adopted in Implementation of Innovation**

Under the project a series of activities were carried out to implement the pilot project in the MWS areas. In this direction, village community with support of ILSP Multi Disciplinary Team initiated the Pilot Project and started it from May 2015 in Bhandaru hamlet of Maroda Gram Panchayat (Pabo Development Block) in Pauri District. Collective orchard of Pomegranate was established in 8 ha barren land in the village. This is the first innovative initiative under collective farming by community that is being carried out in such a large scale in the region. With the active efforts of the community, plantation of 2000 pomegranate saplings was done in the month of August 2015. The steps taken to implement the innovation are mentioned below:

### **6.1 Problem Identification**

After inception of integrated livelihood support project to implement participatory watershed development component, a series of participatory rural appraisal (PRA) exercises were carried out to identify the different problems, issues and possibilities in Natural Resource Management (NRM), agriculture and other village based interventions with the help of community. During the PRA (Participatory Rural Appraisal) exercises, it was found that the agricultural land was depleting and there was increase in the barren land.

Farmers generally grow staple food crops for own consumption, the vast majority of farmers do not reach self-sufficiency. Farmers also indicated that they normally grew sufficient grain and pulses for about three to four months consumption and had to rely on remittances or wages from the Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS).

Further, farmers also claimed that they have two main issues that prevent better yields: low and erratic rainfall, and wild animals. Farmers complained that they are losing half of their crops to wild animals such as wild boars, deer species etc.

### **6.2 Community Mobilization and Decision Making**

The village Gram Pradhan, Mr. Prabhudayal Singh, took the lead to start the initiative in his Village Panchayat, in the month of April 2015. Community members joined in to implement the initiative in the month of June 2015.

### **6.3 Identification of Site and Beneficiaries**

A hamlet named as Bhandaru Tok is situated in Maroda Gram Panchayat covering an area of 8.00 ha. The area, about a decade ago, was a major

producer of cereals and traditional millets but as mentioned earlier the whole land in the hamlet has now turned into barren. The particular area belongs to 80 families of Maroda Village. The suggestion of site and beneficiary selection was carried out with the help of Gram Panchayat and the community. The farmers were selected on the basis of contiguous patch of land. Second criterion of selection was need based. The farmers who intended to take up the initiative were prioritized.

## 6.4 Layout

The layout design was prepared by community with facilitation of MDT team of ILSP. Pits were dug having a depth of 60-70 cm at a spacing of 5X5 mts. The planting distances recommended are 4 x 4 meters or 5 x 5 meters. Through proper training and pruning of the trees, these distances provide sufficient free space for inter culture operations. There was better air circulation and also better interception of sunlight.

## 6.5 Land Preparation

The entire patch of land was covered with shrubs of Lantana and Parthenium and other weed species; it took the community 8 days to clear the entire area under the leadership of Gram Pradhan. Pits were dug at a spacing of 5 X 5 mts. for pomegranate saplings.

## 6.6 Manuring

The farm yard manure was applied in the dugout pits. After that fertilizer single super phosphate was applied. Also insecticide was applied to prevent the growth of ants and termites were applied before planting of the saplings.

## 6.7 Planting Material

Community placed the demand for 2000 saplings of Bhagwa variety (Tissue Culture plant) of pomegranate for the plantation. ILSP MDT team facilitated the procurement of saplings.

Table 3: Characteristics of the Bhagwa Variety of Pomegranate

Name of variety	Breeding method	Parentage	Important characters
Bhagwa	Hybridization	Ganesh X Guleshah Red	Attractive red rind, arils – bold size, red and sweet. Released by MPKV, Rahuri, The average fruit size is 400 Grams.

## 6.8 Mulching

Since the area was barren inter-cultural activities were difficult. Therefore post plantation weeding and maintenance was an issue in the orchard. To avoid these issues 100 micron thick mulching sheet of 60X60 cm was provided for each plant. This helped in:

- Reducing labor cost for weeding.
- Reducing the weed problem in 60X60 cm. area around the plants.
- Increasing and retaining the soil moisture level by reducing evapotranspiration, which will help the plant growth especially during dry season.

## 6.9 Plantation

In the month of August 2015 the plantation of 2000 sapling of pomegranate of Variety Bhagwa (High quality tissue culture plant) was carried out under technical supervision and guidance of MDT of the ILSP project.

## 6.10 Irrigation

Water was collected from available perennial water source which was located 900 mtrs away from the project area. High Density Polyethylene (HDPE) pipelines were used to collect the water from the source to the Low density Polyethylene (LDPE) tanks which were constructed at different locations of the collective orchard in order to serve water for irrigation to the entire 8 ha area. MDT team of ILSP demonstrated the collection of water from this source.

With this effort community has supplementary irrigation facility for entire farm, and also have the 75000 liters harvested water in 3 LDPE tanks. To increase water use efficiency, the project provided low cost gravity based drip irrigation system to the collective orchard site, so that the community could understand and know about the comparative advantage of new technologies over the traditional irrigation system.

## 6.11 Skill Development

To enhance the capacity of the community, onsite training for pruning was carried out which has provided an increased capacity of the community in taking field activities on Pomegranate Plantation.

## 6.12 Watch and Ward

With an equal community and project contribution watch and ward activity is also carried out. In order to support and increase the community's efforts to reap a good harvest, the project provided barbed wire fencing for the prevention of damage to the plantation from wild boars and other animals. Community is successfully taking care and maintaining the collective orchard.

## 7. Outcomes

The pilot project was initiated with an objective to provide a livelihood opportunity to the community therefore the outcomes of the initiative were well set before the initiation of the project which are mentioned as below:-

- Reuse of cultivable wasteland
- A new option of Agro based livelihood in wasteland
- Collective farming will increase cooperative essence among community
- Low risk of Man-Animal conflicts
- Easy to impart technical inputs
- Subsistence farming to commercial farming
- Collective marketing with help of community based organizations
- Increase in biomass of watershed area; therefore help in mitigating climate change
- Increase in other livelihood activities- transport, packaging material, value addition, seasonal labour requirement

## 8. Institutions Involved

The Uttarakhand Watershed Development Unit (UWDU) through Government of Uttarakhand has received a credit from International Fund for Agriculture Development (IFAD LOAN -856-IN) for implementation of Integrated Livelihoods Support Project, (ILSP) for the period of 2012 to 2019 but due to natural calamities the project started in 2014 and which is now upgraded till 2021. The UWDU is PIA for Project Component -2: Participatory Watershed Development.

Under the Integrated Livelihood Support Project, PSWMD (Project Society, Watershed Management Directorate) has the responsibility for implementing component-2 (i.e. Participatory Watershed Development). To implement component-2, Watershed Management Directorate (WMD) is using processes that have been established through a series of watershed development projects in the state, but with an increased focus on food security, livelihoods

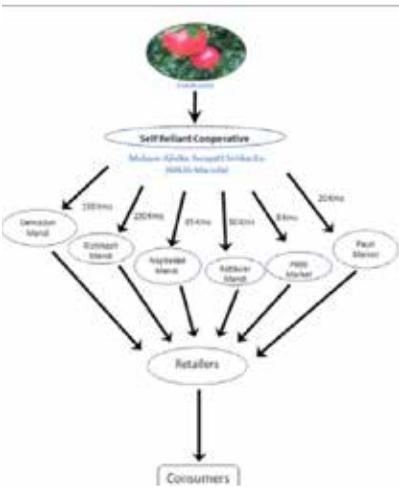
and market linkages. The project will protect and improve the productive potential of the natural resources in selected watersheds, alongside the promotion of sustainable agriculture with formation of PGs and LCs, and with improved access to markets.

### 9. Market Linkage

Integrated Livelihood Support Project initiated the identification of the market potential for the agricultural and horticultural produce with other watershed activities to enhance the livelihood opportunities of the marginal farmers under the project component Access to Market. Maroda Gram Panchayat is one of the 6 Gram Panchayat of Bidoli MWS where in 62 producer groups have been formed having 7223 member farmers with support of the project. Further a cooperative society was registered under the Self Reliant Cooperative Act 2003 named “Molyyar Ajivika Swayatta Sehkarita Maroda” for supporting the market linkage activities for agricultural and horticultural produce for the area. Molyyar Ajivika Swayatta Sehkarita has already started the collection, grading, value addition activities from past one year from different producer groups of Bidoli MWS.

Farmers from the different producer groups are the board of members in the Cooperative Society. They have responsibility for management as well as business activities carried out by the Cooperative Society. The proposed supply chain for pomegranate is shown in the figure below:

Figure 2: Proposed Supply Chain for Pomegranate from Maroda Gram Panchayat



Source: Market Survey

## 10. Sustainability & Replication of Innovation

This pilot project was the collective orchard in the region; viewing the successful orchard development, farmers from different villages visited the orchard and showed their interest in developing the collective orchard in their villages too. As a result this year, 26 ha of barren land have been brought under collective orchard development and establishment with the help of community participation. Considering the hill state's climatic conditions, walnut is another such fruit which has various advantages like:

- It is less susceptible to damage from wild animals
- It requires less irrigation
- Walnut has long shelf life; prompt marketing is not a need

Therefore, after the successful initiation of pilot of pomegranate plantation in Maroda Gram Panchayat other communities has shown interest for plantation of walnut under the same model, in response to this plantation of walnut has been carried out in 10 ha of barren land in two gram panchayats, namely Maroda and Ulli.

Table 4: Details of Established Collective Orchards in FY 2015-16

S. No.	Name of activity	Gram Panchayat	Area (Ha)	No. of Beneficiaries	Estimated harvest after 3 years(kg)	Estimated harvest after 6 year(kg)
1	Collective Pomegranate Plantation	Maroda	8.00	80	6000	
2	Collective Plantation of Walnut	Maroda	5.00	34	-	1750
3	Collective Plantation Walnut	Ulli	5.00	38	-	1750
4	Collective Pomegranate Plantation	Bidoli (Chula)	2.00	14	2400	
5	Collective Pomegranate Plantation	Masso Masshetha	3.00	23	3600	
6	Collective Pomegranate Plantation	Masso Thapliyal	3.00	28	3600	
<b>TOTAL</b>			<b>26.00</b>	<b>217</b>	<b>15600</b>	<b>3500</b>

In the table 4, the estimated production after 3 years of plantation of pomegranate will be around 15 tons which is estimated to fetch an amount of about Rs 12.48 Lacs. at the rate of 80 Rs/Kg. This will help enhance the livelihood of the member farmers.

## 11. Conclusion

This initiative is an achievement as the community members have come together and initiated the process to earn and enhance their livelihoods.

Agriculture in hilly regions of Uttarakhand is mainly rainfed, besides small and fragmented land holdings, which are posing a serious threat to entire agrarian economy of the hill districts of Uttarakhand. This model of collective orchard farming in the abandoned land is an example for the entire state. Through this model of collective farming the threats of climate risk and non availability of labourers for farm operations will be drastically reduced.

There is a need of timely intervention from institutions like State Agriculture Universities (SAUs), International Council of Agriculture Research (ICAR) institutions, State Agriculture Department and other NGOs which is essentially required to keep farmers and their families to continue horticulture/agriculture not thinking of migration from their ancestral homes.

The process has begun in earnest but the mere production of pomegranate and walnut is not sufficient for the growth of livelihood. The community is also thinking of developing processing units at the Gram Panchayat Level, which will help them fetch more income. In the meanwhile, the MASS (Molyaar Ajjivika Swayatt Sehkarita)-Maroda is establishing its business and supporting in marketing of the farmers produce, on their path to self-sufficiency.

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