Project Concept Note

Title of the Project: Enhancing the livelihood of remote villagers in Shivalik range, by building their adaptive capacity to cope up with the impacts of climate change.

Project/Programme Background and Context:

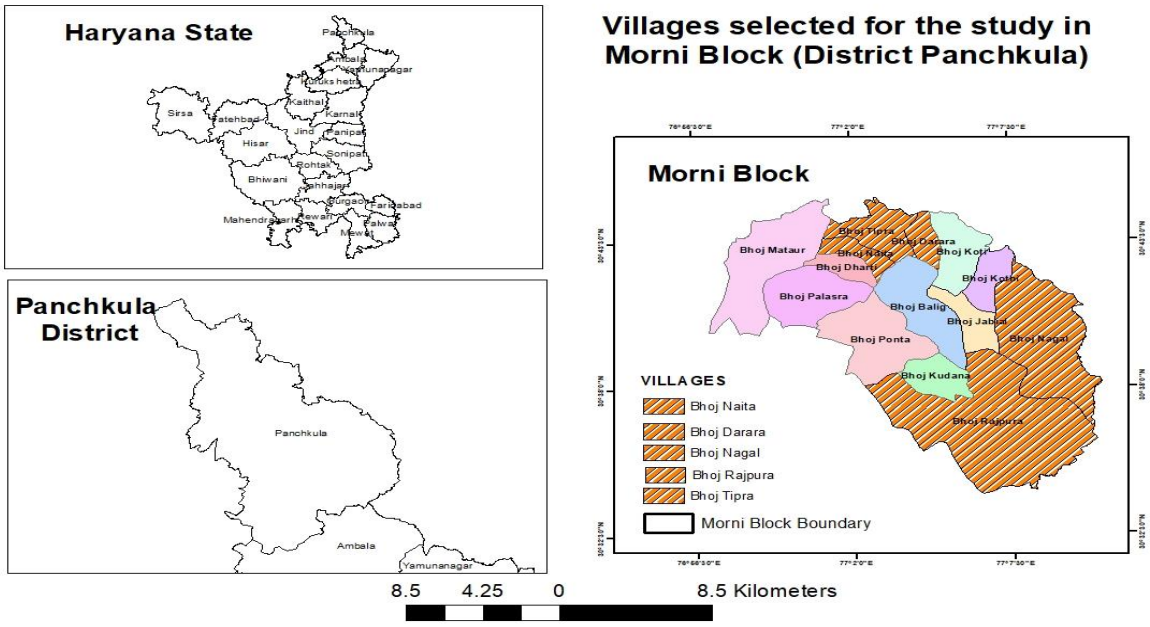
It is inferred that the mountains are most sensitive to all climatic changes in the atmosphere resulting into change in the mountain ecosystem. The climate change affects the productivity, due to untimely rains, change in rain pattern. The surface run-off is one of the main causes of soil resource loss and land degradation. Effects of climate change are more severe on farmers as they rely on weather dependent rain-fed agriculture for their livelihoods. The communities have limited livelihood options, adaptive capacity is low due to limited information, poor access to services, and inequitable access to productive assets. Changing weather patterns have significantly challenged the livelihoods of a community, experiencing resource degradation, food scarcity, lack of basic services, and increasing social inequalities. The changing climate is an additional burden to the poor people in the mountains who are already living in poverty, are vulnerable and excluded with predictions of additional risks to livelihoods and further inequity in the future.

Focus Area :Livelihood of Marginal Farmers

The climate change is currently taking place globally at an unprecedented rate and is projecting the pressures on natural resources and the environment. The impacts of climate change on water resources and livelihood are also being experienced by the marginal farmers of Haryana residing in the Shivalik hills. The Shiwalik hills in Haryana popularly known as Kandi area include Punchkula, northern part of Ambala and Yamuna Nagar districts. The soils of the area are marked with low fertility, poor water holding capacity and high permeability due to rolling topography with steep slopes and gravelly, boulder sediments. Although the average rainfall precipitation is pretty fair, around 1100 mm, yet due to subsurface run-off most of the water is driven to the rivers and streams. Surface run-off causes to create severe soil erosion hazard. The farmers of the area are able to recognize the problems rising due to changing climate, but they do not have the knowledge on how to mitigate or adapt to changing climate. This is resulting in less interest of youth farmers for agriculture.

Study Area

Haryana is situated in the North Western region surrounded by Himachal Pradesh from North, Uttarakhand from North East, Rajasthan from the South, U.P and Delhi from East and Punjab from North West.



Location of the Study Area

The present study area is located in the Morni Block of Panchkula district, Haryana. This area is not covered under the National Mission for Sustaining the Himalayan Ecosystem (NMSHE) which is one of the eight missions under the National Action Plan on Climate Change (NAPCC). NMSHE covers the 12 states in the Himalayas for implementation of climate change adaptation actions, undertaking vulnerability assessment and spreading awareness among the masses on climate change and its likely impacts. The Himalayan states include 10 hill states – Jammu and Kashmir, Himachal Pradesh, Uttarakhand, Sikkim, Arunachal
Pradesh, Nagaland,Manipur, Mizoram, Tripura, Meghalaya, and two partial hill states, namely Assam and West Bengal.

Scope of the Work

The project will be carried out in the five villages of the Morni Block. A preliminary survey was conducted in these villages and on the basis of this survey the five villages were selected for this project. The selected five villages of Morni Block have 13-15 hamlets in each village. The roads are not constructed, villagers have temporarily build the unmetalled roads for travelling. According to the preliminary survey in the area, it is concluded that the villagers are experiencing the impact of climate change in term of their crop productivity, youth migration in search of employment opportunities. The weed *lantana* is rapidly increasing in the area, replacing the indigenous flora. Moreover, due to untimely rainfall, the water scarcity for drinking and irrigation is also a major impact of climate change in the area. Also, the sufficient fodder is not available for the livestock throughout the year.

Under this project the livelihood options which would best suit in the prevailing climatic conditions will be provided to the villagers to sustain their livelihood. The

plantation of site suitable horticulture plant species has been proposed to be done in the selected five villages. Moreover, the water problem for the irrigation purpose would be addressed by providing them water storage structures (percolation tank & farm pond) for the irrigation. The fodder bank would be developed in each village to sustain the livestock and to reduce the burden on the natural resources.

Vulnerability of the area:

- Natural hazards including droughts.
- High temperature during summers.
- Erratic Rainfall and Hilly Terrain
- Shallow and poor soils
- Decrease in the crop productivity.
- Non-availability of fodder and erosion of land (landslides-loss of vegetation)
- Unavailability of drinking and irrigation water.
- Increase in weed flora/wild species (*Lantana camara*).
- Unavailability of market for their product.
- Poor infrastructure/roads.
- Migration of landless labour

Baseline Survey:

While developing the concept note, the survey was done of the villages which are to be covered under the project. The initial level of consultation was carried out with the communities/villagers of the study area, to envisage about the impact of climate change, the change in weather in past 10 years, change in forest density and environment in last 10 years, change in resource availability in last 10 years (fodder, water availability, water quality, soil fertility, soil erosion), reason for this change, their idea for improving the situation. Resource Consumption, Water Details (from where they get the water for drinking and agriculture purpose, how far is the water source), Population Details, Fodder Details (Fodder availability, number of member engaged in collecting the fodder) and Source of their livelihood.

In an interview with the villager about the climate change issue, it was revealed that the temperature had increased and rainfall had decreased in last 10 years. Their wheat crop productivity has declined in years, so some of the villagers have shifted to cultivation of vegetable, fruits ets. Moreover, tomato plantation which was successful, now due to rise in temperature, it is also not giving the good yield. There is problem of landslides and this problem increases in the rainy season.

The villagers suggested that government can provide the plant species which can survive in present climatic conditions, which require less water and are unpalatable species for animals. For requirement of adequate water for agriculture purpose, they need to have water storage structures, so that they may utilise this water for fulfilling their need of crop irrigation and this stored water can also be utilised for taking another livelihood option.

The project is necessary to strengthen the people living in these climatic conditions with the alternative so that they can cope up with the present environmental conditions and acclimatisation themselves with the changing climatic conditions.

Proposed Activities

Community-based Afforestation

- Agro-forestry will involve combination of trees, shrubs and bamboo on degraded forest patches, river bed, waste land and hill slopes.

Water Conservation, Harvesting and Management

- Small sized Check Dams.
- Construction of Water-harvesting Structures (Earthen / rock fill/masonry/ farm ponds).
- Reviving and Strengthening old irrigation system- construction of sub surface dam and laying of pipelines.
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Identified Income generating Activities.

- Creation of Self Help Groups.
- Establishment of Fodder Bank.
- *Baan* making from *Bhabbar* grass and cultivation of Medicinal Plants.
- Handmade paper recycling Unit.
- Establishing bio-fertilizer unit for promoting organic farming.
- Vermi-compost for improving soil texture, structure, aeration and nutrient content.
- Wild Bee Keeping , Mushroom cultivation & Processing.
- Training on post harvesting and processing of the products.

Infrastructure Arrangement for Quality Control.

- Establishing Mini Community cold storage.
- Providing mini-transport vehicles.

Training and Exposure Visits

- Training/exposure visits to markets
- Information dissemination on climate change and adaptation to the changes.

Case Study done in the Lower Shivalik :

Enhancing farmer's income to Multi fold's through sub surface water harness & management in Lower Shivaliks
(A case of Jabrot Village, Block Pinjor, Panchkula, Haryana)

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The aim of the project was to explore dynamic change in socio-economic condition of farmers through sub-surface dam. For achieving this aim following steps were taken. Conducting comprehensive survey to analyze the cropped area, fodder availability, productivity and cropping intensity including enhancement of the command area of subsurface dam in the study area. Second step was to explore change in quality of life of stakeholders in the study area and propose interventions.

The analysis was carried out on the basis of qualitative and quantitative parameters for primary socio-economic survey, with necessary secondary data. As per the methodology adopted; we conduct topographic survey designed with protection measures and conveyance system (1410 Rmt.) up to command area to provide supplementary irrigation to about 150 acre, of land without any consumption of energy. After designing the estimation part utilizing project funds, Rs. 12.5 lakhs during 2003 with 10% community contribution was also collected from stakeholders as labour. Further HDP underground pipe line was laid down with the help of NABARD grant (2.88 lacs) with 25% community contribution of stockholders in farmers' fields. Data collection was done conducting door to door survey of households, Socio-economic data, cropping pattern of the area survey and in utilizing to assist farm income or issues for interventions. Similar strategies could be tried in rainfed hilly/sub hilly areas of other states of the country where no possibility of ground water potential and irrigation dams/ canal system exist. Our project provides an alternative to give a boost to the economy of the region and uplifting the social status of the people. It also checks the depletion of ground water, energy saving and protect underground water and draining water through gravity.

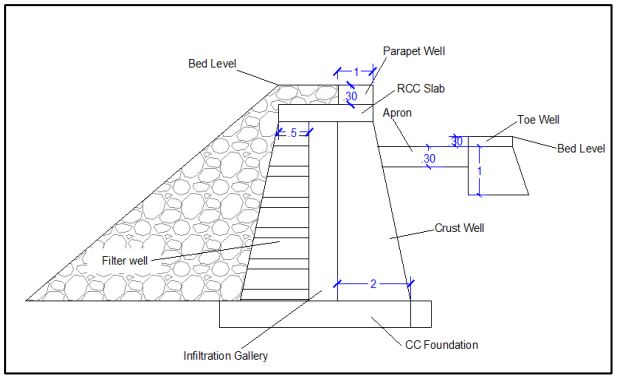
To conclude to explore tube well irrigation we need at least 10 deep submersible tube wells at the cost of 15 lakhs each (1.5 cr.) with 1 lakhs per year electricity charges and maintenance costing for 10 years costing about 1 cr. Our technique is savings to ground water and farmer's capital. After intervention cropping intensity was just double and income enhanced to more than 3 times. The farmers now grow cash crops like ginger, turmeric, tomato, coriander, cucumber onion seeds, garlic etc. They process ginger to **sonth** (dry ginger) and gain multifold profit through value addition.

Subsurface Dam Jabrot

The Subsurface dam Jabrotis situated on Jabrot torrent about 1.5 km upstream from village habitation at the head of Jabrot torrent near Gawai village. The infiltration gallery (subsurface dam) with a length of 11 m and 3.3 m depth across the torrent was constructed. The upstream wall of gallery was kept perforated with approximately 0.75 mm dia holes. The gallery was covered by a 30 cm thick RCC slab with 2 manholes to avoid any damage by boulders during flood. The filter comprising of locally available boulders near Infiltration Gallery at Jabrot, was filled behind the upstream filter wall of the gallery for obtaining filtered clear water. The RCC apron of 2m width and 20 cm thickness was provided at downstream of the gallery for strengthening of the subsurface dams. The 2 wing walls on either side were provided to avoid leakage of subsurface flow and check bank erosion. Below Figure 05 describes the cross section of dam;

The RCC NP2 pipeline of 250 mm in diameter and was laid at a 1385 m length up to the head of command area. From here onward the water was conveyed up to the command area through already existing distribution system (kuhls) in fields. The total fall of pipeline for 1385 m was 26 m i.e. 1.87 %.

The necessary protection measures including 11 retaining walls, 5 culverts, 3 RCC slabs, 7 crate wire structures and 17 manholes were constructed, to avoid any breakage, damage and de-silting to conveyance system and safely cross the run-off of the nallahs containing impure water. Two water storage tanks, which already existed in the path of the conveyance system, were utilized to store the water during lean period. The total project cost was Rs/- 12.50 lakh funded by the Agriculture Department, Haryana.



Cross section of Subsurface Dam constructed in Jabrot

The total cost of project, including the conveyance system in command area is Rs.15.50 lacs. Additionally, Rs.2.88 lacks are used for providing irrigation for about 65 ha. Area. If the area mentioned above, was irrigated through submersible tube wells, it would require at least 10 units of deep tube wells with the cost of 150 lacs, and an additional one lac per year as running cost per tube wells. So, for submersible tube wells, for 30 years, the total expenditure is expected to be 1x10x10= 100 lacs and 150 lacs installation cost, whereas the current project cost is 12.50 +2.88 =15.38 lacs without additional running cost.

It is conspicuous to mention that the attempts were made by the Haryana Public Health Department to install the tube well for drinking purpose in the village area. The drilling was done up to 210 m depth, but success was not achieved. Under these circumstances, this subsurface dam has been the only viable and efficient source of water for irrigation in the village. The project provides irrigation to about 150-acre of land. If the remaining part of unlined kohl can be replaced by RCC/UPVC pipeline and a separate RCC pipeline is laid from subsurface dam to head of the command area, the command area can be increased up to 250 acre.

Outlet of pipeline of ***Subsurface Dam*** *infields*

Changes in Cropping Pattern and production in project area

Crop yield, fodder availability in command area, consequential changes in the cattle population and milk production are some of the vital socio-economic parameters of a house hold/village. The status of each of the indicator before and after the program is presented as follows.

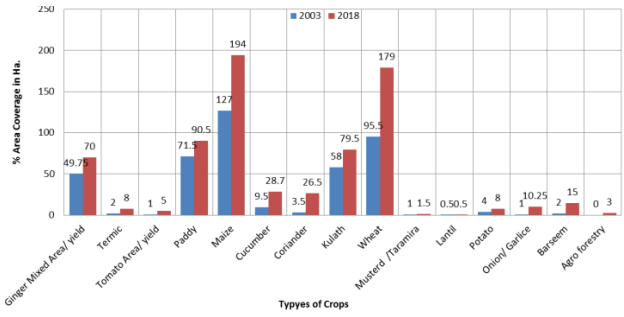
Figure no: 08 images of village Jabrot shows the wheat crops after introduction of irrigation system (Subsurface Dam)

Indicator in crop yields.

The main crops grown in the village under study area were wheat, Paddy, maize, Ginger Mixed, Termic, Tomato, Potato, Cucumber, Coriander, Kulath, Musterd/Taramira, Lantil, Onion/Garlice, Barseem, Agro forestry etc. After the Project, area under both of the crops (Rabi and Kharif) increases sizably in Jabrot (Table 02, 03). The increase in area under all

crops, specifically in Rabi crops, increases due to increase in availability and duration of irrigation water. In the project area, production area for wheat crop increases in sufficient coverage due to availability of supplementary irrigation in the area. As a result of efficiently available irrigated water, people opted to take more cash crops like Ginger Mixed, Termic, Tomato, Potato, Cucumber, Coriander, and were give preference for increasing area and the resultant yield. Due to lack of irrigation, wheat crop was marginally grown earlier but after project implementation, wheat crop in the area was increased to 14.32 ha. Additionally, Maize was increased from 10.2 ha to 15.52 ha, and paddy from 5.72 to 7.25 ha. (Table No. 02&03). Yield of rain-fed wheat in the village is 18.5q/ha. But after providing 2 or more supplemental irrigation systems, which could be possible after the Project, the wheat yield touched a new high of 35.5 q/ha. Major crops also showed considerable increase in yield i.e. wheat 191.89%, Paddy 182.46%, Maize 131.88% and Ginger 180% in Jabrot. As per table 2, 3, the data calculations show a similar magnitude of increase in yield % for other crops as well.

Comparison of type of crops for 2003 & 2018



The foregoing paragraphs also indicates that there were manifold increase in yield of the principal crop taken in area.

Images of village Jabrot shows the different type of crops after introduction of irrigation system (Subsurface Dam)