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Introduction

The Rural Village Water Resources Management Project (RVWRMP) supported by the Government of Nepal (GoN) and the Government of Finland (GoF) is continuously engaged in building capacity of beneficiaries and coping with the risks from climate change through sustainability measures in constructed infrastructures, since 2006 in ten districts ie Achham, Baitadi, Bajhang, Bajura, Dadeldhura, Dailekh, Darchula, Doti, Humla, and 6 hill VDCs of Kailali District.

RVWRMP is a water resources management project which, in addition to water supply and sanitation, supports community-based irrigation, micro-hydro power, improved cooking stoves and water mills, number of environmental improvements as well as home gardens, sustainable livelihoods and institutional capacity building activities. Multiple Use Systems (MUS), a combination of two or more water based services from same water source is the first priority of the project interventions. Climate change and risk reduction is a crosscutting theme in the project.

User's Committees (UC) plan, implement and operate village level schemes as prioritized and identified in Water Use Master Plan (WUMP). UCs are supported by the Support Organizations/Persons (SO/SPs) and the District and Village Development Committees. The project is under Department of Local Infrastructure Development and Agricultural Roads (DoLIDAR) under the Ministry of Federal Affairs and Local Development (MoFALD).

Background

What are the signs of climate change?

Climate uncertainty has resulted either "too much water" or "not enough water" in the water resources of the country. Some of the most prominent effects of climate change have been in the water resources sector, which means the investment on this sector is very vulnerable and uncertain for the continued services. The following picture depicts the rural scenario in the Far West region (FWR), where the average annual rainfall has been decreasing since 1983. The most notable impact of climate change has been on the winter average rainfall, where the declining trend can be clearly seen in Figure 1 below.

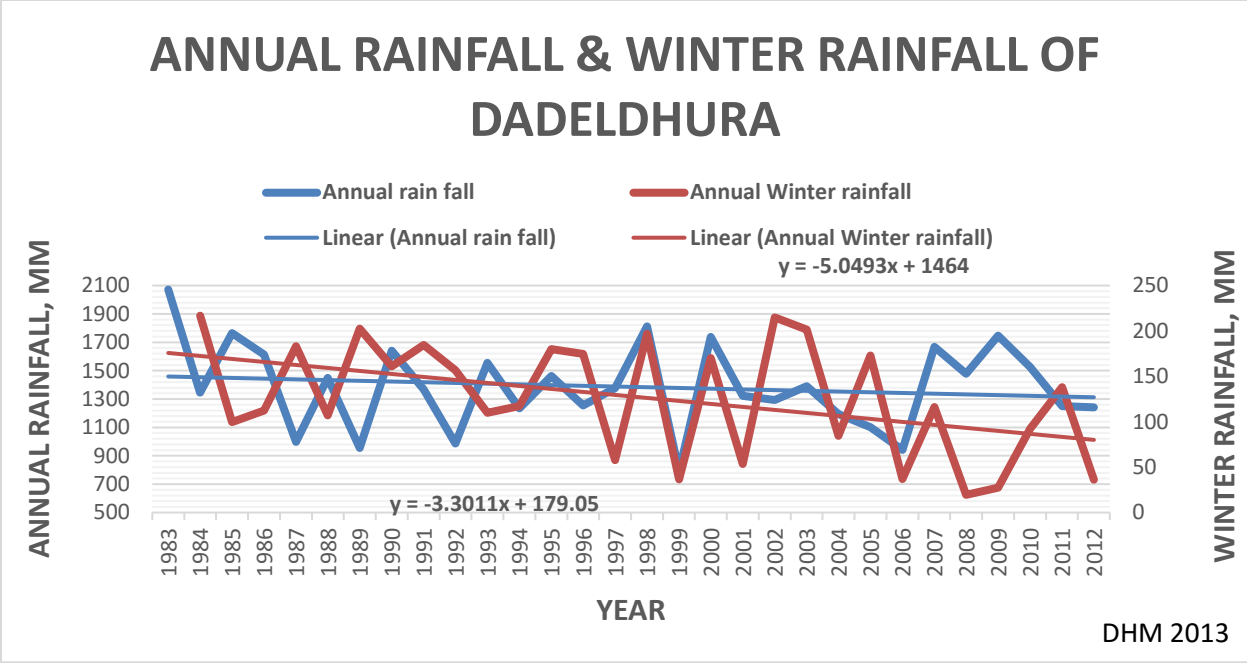


Figure 1: The decreasing annual and winter rainfall trends in Dadeldhura

The effect of less rainfall is clearly visible in water sources discharge in the districts of the FWR.

Sample data of Bajura project VDCs (Figure 2 below) shows that the water discharge at sources have been found decreasing. These sources were measured for water supply project implementation. The source data was taken three times – during the water use master plan (WUMP) preparation, at the time of the detailed feasibility and recently (April 2016). The trend shows that the source discharge decreasing for various reasons.

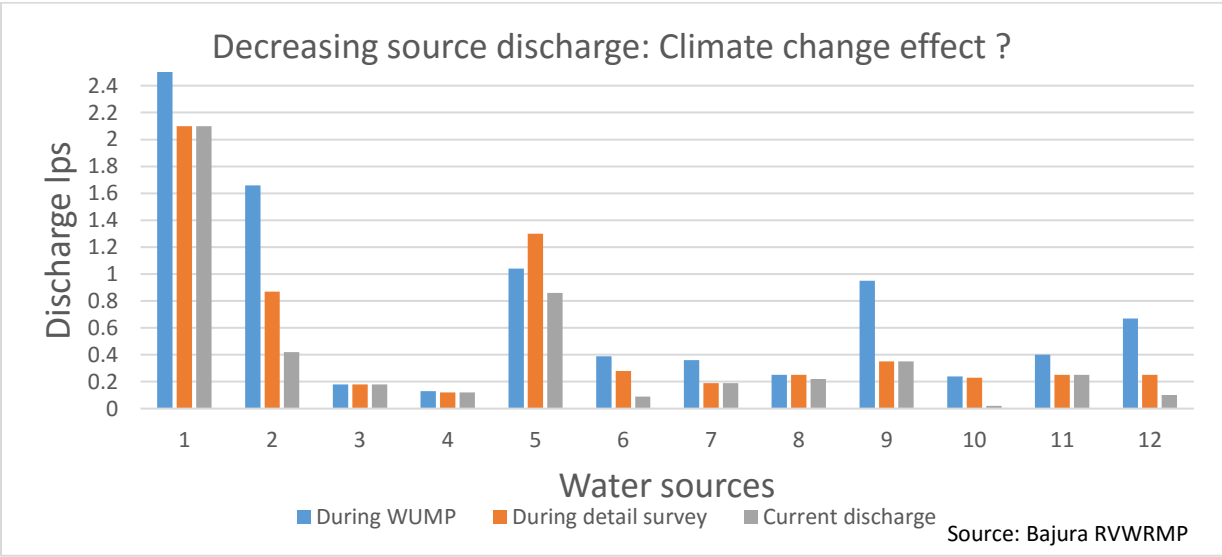


Figure 2: Decreasing source discharges in RVWRMP VDCs in Bajura

If we see the scenario in Kotbhairab VDC of Bajhang (Figure 3 below), almost all the WUMP prioritized scheme sources have been decreased within one year. In general, the water resources have shown a diminishing trend due to various anthropogenic, and in some cases natural causes.

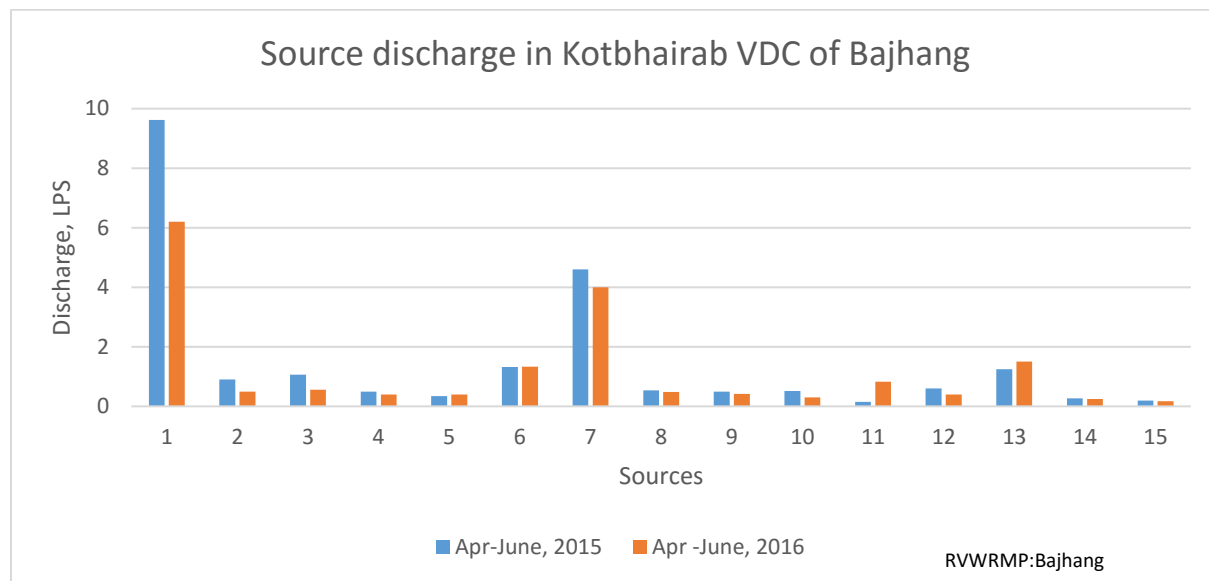


Figure 3: Source discharge in Kotbhairab VDC, Bajhang

What are the impacts of the decreasing of discharges?

Sources are drying up, which means less water for different purposes, especially domestic purpose. Much of the rural population lacks the capacity, technology, finance and management for sustainable use of water resources. Decreasing water resources has resulted in fewer opportunities in livelihoods and the food sector, and it has inhibited hygiene improvements. This will also affect the GoN target of ensuring basic water supplies to all by 2017. In addition, the Department of Water Supply and Sewerage plans to increase yard connections, which will be very challenging in the face of these drying source trends.

Less water has resulted in:

- Increasing drudgery and hardship for women and children in fetching water from far off points (including sexual harassment risks).
 - Poor nutritional level and food security, as agriculture is hard hit.
 - Increased health problems due to poor hygiene and degraded quality of drinking water.
 - Increased migration in search of work.
 - Other basic services like schooling and health care are also hard hit.
 - Large investments required for different water supply options.
- Less water leads to conflicts in use of available water resources, especially in water supply and irrigation. This is often the reason for water source disputes during registration of the sources, as per the Water Resources Act 2049.
 - Water demand is continuously and consistently increasing so the previously sufficient water is now insufficient.

- On the other hand, a short but intense rain has caused too much water at the one time, resulting in flooding, washing away infrastructures and sources, landslides and soil erosion, which are furthermore aggravated by changes in land use patterns. It has also contaminated the water sources and piped water supply services, by run-off water getting access to sources and water supply structures. The quality of water is being degraded through contamination.

What are the options for coping with the risks of climate change?

In the face of the above mentioned scenario in the rural areas of project districts, RVWRMP is continuously and consistently improving its coping methodologies to enhance the sustainability of the constructed infrastructures through the following activities

1) Design:

- The design software of the water supply schemes have been updated to encourage the multiuse concept and water reuse through animal drinking troughs.
- The practice to use the discharge amount in the month of Phagun (Feb-March) rather than the peak dry period for designing the pipe sizes (This should be checked for dry flow). Beneficiaries will be able to have more water for 9 months and for 3 months they will manage with different options to reduce the demand. The reservoir capacity has been increased to accommodate more water during times of more discharge at sources.
- Information collection during the detail feasibility survey has an environmental component, with climate and risk issues, which further will be used for designing the system.

2) Technology:

- RVWRMP is using climate smart technologies for water supply systems such as gravity system, solar lifting, hydraulic ram pump lifting and rain water harvesting systems. These are all renewable resources and the system is affordable, can be operated and maintained locally with technical knowledge imparted to VMWs through technical trainings.

3) Source catchment protection and conservation:

- The design software is also equipped with the source conservation and protection elements, through 3R (Recharge, Retain and Reuse) options.
- Supporting recharge of sources through pits and ponds continues to be practiced.
- The project has supported establishment of multi-purpose nurseries at VDC level to produce both vegetable seedlings and plant saplings. These in turn are used for plantation at the source catchment and for nutritional purposes.
- Using prayer flags and representation of deities in the source area discourages littering around the area (making the source area a holy place), hence protecting the source and reducing water contamination.

4) Structure modification:

- The project has been modifying the water supply structures to reduce the external contamination, especially fecal matter entering in to the water supply system. Constructing cut-off drains before the structures to safely divert the surface run off and raising the inspection cover are some of the practices found suitable to reduce contamination.

5) IWRM: Multi use services:

- The allocation, monitoring, management and optimum utilization of available water at sources for the benefit of the beneficiaries is the prime component for sustainability of the constructed services. The project has been practicing bottom up planning through preparation of the Water Use Master Plan (WUMP) of each project VDCs before interventions. The WUMP is the entry point of the project support. The available water at source is planned for multi uses - water supply and micro-irrigation, irrigation and energy, irrigation and improved water mills and so on. MUS schemes have been found to be very more sustainable as they are linked with general livelihoods of the beneficiaries.

6) Water based livelihoods:

- The schemes have been designed to include water based livelihoods as far as possible with the provision of irrigation through the same scheme. The overflow of water from the reservoir tank is collected to irrigation tanks, which are used to irrigate vegetable fields through designed pipe networks. The project has promoted less water demanding technologies and crops, such as drip and sprinkler irrigation technologies with water smart crops. This has supported the retention of people in the village.

7) Step by Step (SbS) capacity development:

- Affordability and appropriate technologies to keep the schemes operational and well maintained are basic requirements for sustainability. The beneficiaries must have enough knowledge to operate and maintain the system. The project has been imparting practical skill based knowledge through different technical trainings for construction, operation and maintenance. Similarly, increasing the capacity of the beneficiaries in management and skill enhancement for smooth operation is a basic condition in the project. Whatever the size of the scheme, capacity building activities are in same number as guided by the step by step manual. This will support coping abilities in uncertain situations.

8) Local level financing through cooperative:

- The project is supporting and promoting establishment of cooperatives at local level to collect the savings and provide credits to numerous income generating activities in the service area. Every scheme has an operation and maintenance fund established and the project is promoting that these funds should be kept in the accounts at local cooperatives. Cooperatives in turn allocate 5-10 % of their net income for maintenance of the schemes under their jurisdiction. The cooperative is a means to finance the maintenance cost as a credit, if needed.

9) Institution:

- All scheme related activities are planned, implemented and operated by user committees formed from the actual beneficiaries. This committee is registered under the Water Resources Act 2049 to have the status of a lawful institution. This committee is further linked with FEDWASUN, VWASHCC and government organizations at the district for future support, if required.

10) Behavior change and social acceptance:

- Water safety and operation and maintenance (O & M) plans, tippy taps for hand washing with soap, improved nutrition intake through vegetable production for home consumption and safe sanitary practices are some of the activities practiced for behavior change. They have been accepted by the community, as means to improve the general sanitary condition of the area. Declaration of an open defecation free zone, chhauhut free VDC declaration and non-open grazing area around source are general practices.

11) Transparency, accountability and participation (TAP):

- In order to increase the ownership and improve the service delivery by UCs, transparency is maintained from the very beginning of the project cycle with full and meaningful participation of females, Dalits and other members of the society. Structures are designed for gender, child and disable friendliness, which supports the environmental sustainability and sustainable services.

Conclusion

RVWRMP has targeted safe drinking water for everyone, everywhere and on a sustainable basis to all beneficiaries of the project VDCs. To achieve this target of full coverage with sustainable services, it has devised numbers of activities (above) with climate change and risk reduction integrated from capacity development to construction and maintenance of the system. Environmental sustainability is the crosscutting theme of the project.