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## Diminishing natural water resources: A threat to hill agriculture

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### Abstract

The study has been conducted in the mid Himalayas of Uttarakhand for the availability of water resources for domestic and irrigation usage. The study was conducted in four villages namely Deu, Dhoira, Jutaya and Nichiya of Kalsi block of Dehradun district. From each village, 25 respondents were interviewed for asking details about water resources. The respondents were asked about number of springs which have been dried for last 5 years, the causes for drying of natural resources, impact of spring drying on the livelihood of people and the means of overcoming water shortage, and Govt. Role in Village upliftment. From the results, it was found out that for last 5 years; about 4-5 springs have been dried up. The major causes of drying of natural water resources were reduced rainfall, hot weather and reduction in number of forest trees. The impacts of drying of natural resources were: more time is involved in water collection activity and unavailability of water for irrigation purposes. The means of overcoming water shortages were *naula* recharge and afforestation etc. The facilities provided by the Govt. Official as reported by the respondents were imparting training, agricultural related activities, loan related facilities and participation in self help group activities etc.

**Keywords:** Hill women, spring, water

### Introduction

Conservation and management of natural resources like water is the burning issue in the current scenario as many parts of the country are facing water scarcity. The advancement of modern civilization has a great impact on the usage of water. In recent years, the depletion of water resources has become a major area of concern for the government and local organisations. Depletion of natural water resources may lead to losses of ecosystem services in the countries (Nellemann and Corcoran, 2010) [5]. In addition to water scarcity, the problem of access to safe and potable water supplies is also very critical.

Deforestation and degradation affect 8.5 percent of the world's forest with 30% of the earth's surface already cropped (Nelson, 2005) [4]. Water is the most important natural resource and it is diminishing day by day because our natural water resources are not given due concern and proper management. They require maintenance in rainy season specially because debris, which is coming from the high hills, destroys the resources. The depletion of natural resources is caused by direct drivers of change (Nelson 2005) [4] such as forest and indirect drivers of change like demography, economy, society, politics and technology. In the hills of Uttarakhand, women are the main pillar around which the whole agriculture revolves as they have deep and intrinsic knowledge of different farming activities (Aggarwal, 2008) [1]. Generally women have knowledge both about the environment, its natural resources and their usage. The women are always leading in domestic and agricultural work, so they are the one who suffer more from adverse changes/degradation in the environment. As a consequence of deforestation, drying of natural water resources, there has been an extreme loss of ground water, which has enhanced the workload of women. This women centered study was done because the natural resources have a significant impact on women's life. So, this study has stressed upon the role of women in managing the water resources.

## Methodology

For collecting information from the respondents, the semi structured interview schedule was developed. Four villages from Kalsi block of Dehradun district were selected. From each village 25 respondents were interviewed. Thus, total sample was 100 respondents. The interview with respondents was taken personally at household level. The Research design was exploratory in nature. The data were collected through survey and In-depth discussion/Focused group discussion. Primary data were collected through Interview schedule (structured /semi-structured). The secondary data were collected through reports, literature published by various government/ non-government agencies and other sources. The information on various aspects like type and number of water resources available in the village, different uses of water resources, association and ownership of water resources, status of water resources and the means of overcoming water shortage and the government role in village upliftment. The appropriate statistical tool was used to draw the meaningful conclusions.

## Results

### Status of water resources in village

It is quite common from the findings that under traditional water resources, about 93% respondents reported that they have chasma/ naula as water resource followed by 51% who have gadhera (stream). About 6 per cent apprised that spring/dhara as natural water resource under traditional water resources. Women associated availability of water to the status of forest and by improving the situation of forest they can tackle the problem of water scarcity in the region (Bhatt, 2010) [2].



As far as conventional water resources are concerned, water tank was reported by 98 per cent respondents followed by 67 per cent respondents who gave information that pipeline is also available in the villages. In the study area, handpumps and the ponds were not present in the villages.

**Table 1:** Status of water resources in village

Traditional Water resources	Number	Use
Chasma / Naula	93 (0.93)	Drinking, Domestic
Gadhera / Stream	51 (0.51)	Drinking, Domestic
Dhara /Spring	6 (0.06)	Drinking, Domestic
Conventional water resources		
Water tank	98 (0.98)	Domestic
Pipeline	67 (0.67)	Drinking
Hand pump	0	-
Pond	0	-

### Causes of drying of natural water resources

In all the four villages about 2-3 water resources have been dried up. The focused group discussion was carried out

among the village women who reported various reasons for these unfortunate circumstances. The respondents (95%) identified landslide as one of the prominent reason for drying up of natural water resources. The springs/ streams may have been covered with the debris of landslide. It was followed by 88 per cent respondents who reported hot weather as cause of drying up of natural resources followed by reduced rainfall (76%) and reduction in forest trees (51%). In the hills, natural water resources like spring/naula/stream have been deteriorated and many of them have been dried up. (Bisht, 2010) [3], since the water in the natural springs is recharged through rain water and if the number of rainy days are reduced, the recharging of these natural resources is adversely affected. (Bhatt, 2010) [2].



**Table 2:** Causes of drying of natural water resources: N=100

S. No.	Category	No.	%
1	Land slide	95	95
2	Hot weather	88	88
3	Reduction in forest trees	51	51
4	Reduced rainfall	76	76

**Impacts of drying of natural water resources:** The natural resources of the selected villages are diminishing year by year due to reasons as discussed above. These resources are not only the basis of livelihood of rural people but also add to the forest eco system. There are a number of impacts of drying of these resources. It is clear from the table that all (100%) the respondents reported that there is no water for irrigation as a result of drying of natural water resources. It was further cited by 88 per cent respondents that now-a-days more time is required to collect the water as compared to the previous time. The excess time could be utilized in some productive work in the agriculture. About 84 per cent respondents apprised that there is less moisture in the soil as a result of drying of water resources. Nearly 76 per cent respondents told that their household work is affected due to drying of natural water resources.

**Table 3:** Impacts of drying of natural water resources: N=100

Category	No.	%
Loss of soil moisture	84	84
Shortage of water	65	65
More time consumed in water collection activity	88	88
Unavailability of water for irrigation purposes	100	100
Effect on household chores	76	76

**Means of overcoming water shortage:** In order to overcome the shortage of water, the rural people have apprised about various measures to reduce the water scarcity. Majority of the people (91%) reported afforestation/densification as a most popular means of overcoming water shortage.

**Table 4:** Means of overcoming water shortage: N=100

Category	No.	%
Check dam	22	22
Guhl/ tank/ naula recharge/ ponds	26	26
Trenches/ recharge pit	33	33
Afforestation/densification	91	91
Kachha pond/ stand post	36	36

**Govt. Role in village Upliftment:** In table 5, it is depicted that 87 per cent respondents have reported that there are Self Help Groups in the 4 villages, however they are not doing any income generating activity. The groups are meant only for collection of money which is utilized by the group members as and when required. As far as employment opportunities are concerned, about 76 per cent respondents have opined that they have been given opportunities for employment through trainings and skill impartment but negligible percentage has taken the benefits of trainings.

**Table 5:** Govt. Role in village upliftment N=100

Govt. Support	No.	Percentage
Agricultural and livestock related facilities	30	30
Loan related assistance	30	30
Formation of SHG	87	87
Employment generation opportunities through training and skill development	76	76

### Conclusion

It is clear from the findings that Chasma/naulawas the most common traditional water resource available in the villages followed by gadhera/stream. Under conventional water resources, water tank was available in all the villages followed by pipelines. As told by the respondents, the natural resources are drying up gradually, about 2-3 resources in every village have dried up out of 6-7 resources which is a major concern of thought. The most accepted causes of drying of natural resources are landslide followed by hot weather and reduced rainfall. The very first and foremost impact is that there was no water for irrigation purpose in the villages. Additionally people are telling that now they are taking more time in collecting the water from the source/pipeline as water level is reduced in the sources. As apprised by the respondents, the most accepted means of overcoming water shortage is plantation of trees i.e. afforestation. It was further concluded that government has facilitated formation of SHG and they have been imparted training on income generating activities.

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