

**Case study on Community Base Adaption on Water Crisis
at Bhaktapur**

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submitted to:

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Introduction

Climate change is considered to be one of the most serious threats to sustainable development, with adverse impacts expected on the environment, human health, food security, economic activity, natural resources and physical infrastructure. Global climate varies naturally, but scientists agree that rising concentrations of anthropogenically-produced greenhouse gases in the Earth's atmosphere are leading to changes in the climate. According to the Intergovernmental Panel on Climate Change (IPCC), the effects of climate change have already been observed, and scientific findings indicate that precautionary and prompt action is necessary. While mitigation has traditionally been the pivotal issue for many climate change experts, adaptation to the effects of climate change is now acknowledged as necessary.

Talking about national scenario, Nepal contributes only 0.025% of carbon emission on global level which is very least where as other country contributes much percentage of carbon emission and greenhouse gases. Emitting the least carbon in the global perspective our country is the most vulnerable zone for the climate change. It is reported that Nepal's temperature is increasing steadily about 1.8°C and in 2006 it was reported warmest year in record (Shrestha *et al.*, 2012).

So, the possible alternatives for the developing nation like us would be the adaptation techniques to deal with the problems. There are various problems that are arising due to the climate change. As problems are arising so people are also adapting there life in such a way which can support their livelihood so, as we cannot mitigate the problems and the impacts of the climate change but we can of-course adapt life in such a way which can support our livelihood. Also various people are practicing this autonomously or knowingly. Nepal being the country which is being affected the ministry of Nepal has introduced National Adaptation Plan of Action and the Local Adaptation Plan of Action in the local and National level and they are trying to implement into different parts of the country.

Objective of the study:

- To explore the perception of local people about climate change.
- To know the situation of water crisis due to climate change.
- To study about the adaptation techniques used or can be used to cope the situation.

Water crisis

Around 35 year's old tourist guide

Imaginary name: Ravi Dongol

Water crisis

Case studies

Case I

Imaginary name: Sushma Shrestha

This case study is totally based upon the discussion that we have made with local people of Bhaktapur. Among which Susma Shrestha is one; a master student in physics said that there is a problem of water in Bhaktapur. A community has been witnessing seven years old water crisis. Previously, water was available in house itself but it is no longer the case. People did not use dhunge dhara and tube well usually for drinking water. For household proposes as water was available in home itself. But now dhunge dhara and tube wells are dried; though there is a little water in some tube wells. Also people have to draw for more than an hour to fill one bucket of water from that tube well and it remains packed throughout the day. Rich poor will manage their water demand by buying jar water but poor have to suffer. We were curious to know about how they are fulfilling their agricultural water demand i.e. for irrigation. For irrigation, she used sewer mixed water from Hanumanti river (Dhal Ko Pani).

She was familiar with the term climate change and she explained that climate change has impact on various sector like agriculture, water resources. Regarding the water resources, she further added that there's double crisis of water due to climate change, in monsoon due to over flooding of water and in dry season due to scarcity of water.

We came to know that autonomous adaptation is done to address the water crisis. They are using temporary rain water harvesting for domestic purpose. To address this issue, awareness programs should be launched by different organization and explain them about rain water harvesting; as this is not seen in Bhaktapur. And the promotion of common storage tank should also be made as Bhaktapur is an old city and it does not have enough space.

Case II

Around 80 year's old man

Imaginary name: Harkamaan Shrestha

When we were having conversation with Mr. Harkamaan Shrestha, permanent resident of Bhaktapur ; about climate change, water situation, rainfall pattern and their coping mechanism to water crises we came to following things, which is explained below :

Previously around 2035- 2045 B.S. , there was a high flow of water in rivers and due to underground pressure , water flow dragged up to corridor (Kausi) without using motor. But at present, community is facing water crisis since last 12-13 years.

Water supply provides water once in 10 days, only for 1-2 hours. He also shared his opinion that water crisis is due to increasing population in Bhaktapur and due to low rainfall now days in Bhaisak and Jestha. Previously, there used to be a fluent rainfall so there was a flow of water in sources.

On our question why there is low rain fall these days?, he smile and added that “we have to ask with God. From this we can say that he was not known about the term climate change. Also he added that elite people can even buy a car for them but poor has to suffer for water.”

We came to know that, to cope with this crisis; community has collected fund to install common storage bank above the ground. They charge rupees five for one bucket of water and that collected amount is again used to fill water to the storage tank. Also, few houses have done rainwater harvesting in temporary basis to meet their water demand. We came to know that none of organizations has trained them on rain water harvesting; it is done in autonomous manner.

Case III

Around 35 year's old tourist guide

Imaginary name: Ravi Dongol

We have prepared this case study based on the basis of discussion with permanent resident of Bhaktapur; who is tourist consultant by profession. We had a discussion about Hiti (Dhunge Dhara), its status, climate change, water situation at present and past. We have found that on the Hiti, which is within the Bhaktapur Durbar Square has stopped its flow since 20-30 years ago.

Previously, before 20-30 years, the flow of water was for twenty four hours but it sounds a myth at present. And the Bhaktapur Durbar Square is facing the water crisis since 10 years. When we ask him about climate change and water crisis, he explained that water crisis is due to high population and increasing number of houses. From this we can analyze that they are not familiar with the term climate change and its relation with water.

To meet their water demand they buy jar water; as KUKL supplies water once in a 5 days. Also, to cope with the water crisis people are asking help from their relatives in other locality. They go to their relatives in other locality for washing clothes, bathing and filling jar.

We also came to know that, there is not even temporary rainwater harvesting within a Bhaktapur Durbar Square. And neither any organization has brought awareness program to address water crisis and to promote rain water harvesting. And there were not any efforts from the community level as well to address this crisis problem within Bhaktapur Durbar square.

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Around 29 year old house wife

Name: Bins Ratan

She had faced various problems due to water crisis. Before the water was available in taps. But now, she explained how she has to be in a queue for hours. For 1 bucket full water she has to stay ½ hours in the line of tanker water. The problem that she has been facing induced before 4-5 months, before there was no crisis. As she has agricultural land so she has also been facing problem. To minimize the problem or crisis, she collects rain water, but there is a problem of storage. She also mentions that she stores rain water in 500 liter and 1000 liter drum. Since only these don't fulfill demands besides this, she buys tanker water. According to her the crisis induced and increase due to urbanization, hot weather.

Case study v

Around 55 years old

Imaginary name: Teknath Pradhan

He was also facing various problems due to the water crisis. So he began from the past. The past scenario of water was quite good. He explained the water used to be available in the taps all day long, the force of water used to rise up to terrace before 10- 12 years ago. But now he experiences less water.

According to him the increasing crisis is caused because the water source is same but population is increasing. To manage the problem he said that they buy water and they had also constructed community tank by collecting money from the community for the storage of the water. 80 houses are dependent in this water.

People were not much informed about climate change; they heard it only on TV, newspaper. They think the main problem of crisis is the population increase. They were affected in farming due to water crisis which affected their economic status and their culture.

According to him in Newar community, the festival "Sitinakha" is celebrated to clean the water wells and taps in dry season, but now he mentions there is no water what can we do? He said still it is celebrated but there is no water. Low level well was dumped because there was no water and it has no use of it but again the well was dogged.

He said for the rainwater harvesting there is no place. To solve the problem they said they need greenery, forest, reducing industries pollution. They collect rain water in drum for washing clothes, and for other purpose.

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38 year old lady

Alternative solution

There is always a solution to every problem. From our visit to Bhaktapur, we found out that there is a crisis of water. So there are some alternative solution we can suggest addressing that problem. They are listed below:

- Rain water harvesting
- Restoration and recharge of ponds
- Formation of Common Storage tank on Open Space

a. Rain water Harvesting

As we know that the annual average rainfall of Kathmandu Valley is 1600mm/l. So the Bhaktapur itself lies in the valley. There is a possibility of rainwater harvesting. Autonomous rainwater harvesting has been practiced within the area but we can promote permanent rain water harvesting to address their problem.

b. Restoration and recharge of ponds

As we know that the Bhaktapur city is famous for its cultural beauty and religious importance. There are many pond and well within the area which are in the stage of deterioration and they are dried at present condition. Thus, these pond and well should be restored by linking it with people's religious belief. They should be cleaned and maintained so that the ground water recharge can be done through this open land. It could fulfill the water demand of people during the dry season.

c. Formation of common storage tank on open space

From our field visit we have found that there is lack of space on Bhaktapur as it is being one of the oldest city. There is a problem of storage of water in Bhaktapur, though we can make a common storage tank on the available open space on specific ward so that we can address their water demand.

Conclusion and recommendation

Malthus theory is an evidence that population increases on geometric ratio but the productivity in arithmetic i.e. Land remains constants. Similar is the causes of water crisis in Bhaktapur. Increasing number of population and households, accelerating trend of urbanization, poor management of watersheds are the major causes of water crisis on Bhaktapur. And all these factors are accelerating the climate change. So we should address this problem in time otherwise, we shall be ready to face its impacts in future.

Here is the recommendation to address this problem and they are listed below:

- a. Practicing rainwater harvesting
- b. Awareness programs on watershed degradation
- c. Discouraging people for concrete land
- d. Encouraging for greenery
- e. Encouraging different organizing for providing the training programs on rainwater harvesting