

VILLAGE WATER SECURITY PLAN



UPPER KITAM AND MIDDLE KITAM GRAM PANCHAYAT WARD
Manpur Kitam Gram Panchayat Unit
Gram Vikas Kendra, Namchi, South Sikkim

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Introduction

Ensuring rural water security is amongst the most important duties of governments or any related organizations worldwide. With increasing population, degrading health of watersheds and impacts of climate change, this is now emerging as one of the biggest challenges to sustainable development and livelihood of the people. Though the Himalaya are a source of countless perennial rivers, the mountain communities who depend mostly on spring water, have started facing drinking water scarcity with alarming frequency. Most of the mountain springs are rainfed and have low discharge in the rainseason. Due the impact of climate change rainfall became more erratic and seasonal, winter became warmer, which all are affecting valuable water resource of Sikkim. Government of Sikkim has started spring rejuvenation works to revive the drying spring in the Sikkim through the program *Dhara Vikas*. This program is implemented through Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), a national flagship program of Government of India. National Rural Drinking Water Program (NRDWP) and Rural Water Supply Scheme (RWSS) are the two Govt. program in Sikkim working in rural water supply. The Village Water Security Plan (VWSP), is a joint initiative of Rural Management and Development Department and German Technical Cooperation GIZ to secure rural drinking water in the drought prone areas of Sikkim. Conservation, management and equitable distribution of water resource to the rural communities is the key message of VWSP. The planning of VWSP can be done in a participatory approach involving scientific knowledge. relevant

Village Profile

Gram Panchayat Unit	Kitam Manpur
Gram Vikas Kendra	Namchi
District	South Sikkim
Target village for Village Water Security Plan	Upper Kitam and Middle Kitam
Total Household	56+46= 102
Total Population	540 (approx.)
Number of local water sources	2 springs (seasonal)
Number of water sources from other village which is used for water supply in village	2 springs (perennial)
Agricultural pattern	Seasonal (Pulses, vegetables and Maize in rainy season)

Observation

Upper Kitam and Middle Kitam are the driest villages in the Manpur Kitam GPU under Namchi *Gram Vikas Kendra* in terms of availability of water resources and annual rainfall. These villages in particular, lack in perennial water sources. The villages are located on top of the hills with no forest cover. The human habitations have grown substantially here habitation has been grown

up to the top of the hill while most of the water sources are located below the hills, so the gravity flow to the top of the village is not possible from these local springs. Geologically, Hilltop usually do not have water sources. The villagers of Upper and Lower Kitam draw water from the source located in the adjacent village. Agriculture is primarily rainfed and the crops grown in the village mainly consists of legumes (pulses) and vegetables. The total population of both villages is around 540 with 102 households. Two local springs which is seasonal in nature are the only drinking water sources located in these villages.

Historic trends of Water

Year	Source	Usage
1970s	Two Springs ➤ Kuwapani Souce in Middle Kitam ➤ Kuwapani Source in Upper Kitam	➤ Drinking, Day grazing, Low land Paddy field
1980s	➤ Local source became seasonal ➤ Villagers draw water from other source – Mickhola source	➤ Household use door to door water connectivity ➤ Some household in the Upper Kitam used to fetch water (head load) from Musay Dhara
1990s	➤ Channel from Manpur Khola was constructed ➤ Increase number of pipelines in source ➤ Water supply system from Mickkhola of cost 1.87 Lakhs was sanctioned and implemented	➤ Paddy used to cultivate till middle Kitam, using water from Channel. After some year due to landslides in different places channel broke down in several places. ➤ Decline of paddy and vegetables
2000s	➤ Public Pipeline (Govt. supply) ➤ Private pipeline	➤ Two times water supply in a day. 15 minutes water supply each day in morning and in evening only in public pipeline. ➤ Villagers started keeping less livestock
2013	➤ Public Pipeline (Govt. supply) Private pipeline	➤ Two times water supply 15 minutes/HH in rainy season and one time water supply 15 minutes/HH in dry season.

Observation

Water scarcity in the 1970s and 1980s indicates that these villages are drought prone. Water intensive agriculture was started since 1990, when irrigation channel was constructed and linked to Kitam from Manpur stream. Paddy used to be grown in Middle and Lower Kitam.

Paddy cultivation was discontinued after the irrigation channel was destroyed by a landslide some years later. The probable option that can help enhance the livelihood of local people is to repair the irrigation channel and revive the paddy field. The Water supply system was constructed in 1990s which has several leakages due to rusting. With the increasing population, the existing water supply system is unable to meet the demand. Although, being a rural area, Kitam has a timely water distribution system like in a town. This informal self management system is good example within the community.

Different Water Sources and its Discharge trends

Intensity 1=Low discharge; 2 =Medium discharge ; 3=High discharge ;

Source	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kuwapani Source, Upper Kitam	-	-	-	-	-	2	3	1	1	-	-	-
Kuwapani Source, Middle Kitam	2	2	1	1	1	1	3	3	2	2	2	2
Mickhola I, Water supply source to upper Kitam	2	2	1	1	1	1	3	3	2	2	2	2
Mickhola II, water supply source to lower Kitam	2	2	1	1	1	1	3	3	2	2	2	2
Buddhey Kholsa	2	2	1	1	1	1	3	3	2	2	2	2
Manpur Khola	3	2	2	2	2	3	3	3	3	3	3	3
Chunbhatti, Bul Khola	3	3	3	3	3	3	3	3	3	3	3	3

Observation

The discharge trend in the table above indicates that, the lean period of most of the springs and streams of Kitam and its nearby area is from March to June. The local springs are seasonal and do not have sufficient water to cater the requirement of the villagers. The Mickhola springs, which are the major sources from where they have the current water supply system in the village even do not have sufficient water in the lean season (March to June), but the same springs have plenty of water during the monsoon season. The alternative solution to ensure water security in the village is to construct large water storage facilities, on the top of the village and store the excess monsoonal discharge of springs and distribute water in a timely manner. The three streams Buddhey Kholsa, Manpur Khola and Bul Khola (Chunbhatti) located

in the adjacent village are underutilized (untapped) streams. The Chunbhatti source is the only source which has similar discharge throughout the year. It was learned from the community that the Chunbhatti source is located 12 Km away from the village. The villagers of Kitam has already paid some advance money (to draw water) to the land owner of the source which is located in the private land. According to the community perception the Chunbhatti springs have potential to serve the requirement of the villagers of Kitam. The measurement of lean period discharge of this springs is suggested.

Water Requirement analysis in one household in two different seasons

Activities	Rainy Season		Lean Season		Water Requirement	
	No of Buckets/Gagri/Jar	Volume (in ltrs)	No of Buckets/Gagri/Jar	Volume (in ltrs)	Rainy Season (in ltrs)	Lean Season (in ltrs)
Drinking per day	4	12	6	12	48	72
Bathing per day	8	12	8	12	96	96
Washing dishes and cleaning home	5	12	5	12	60	60
Washing clothes per day	200ltrs		200ltrs		200	200
For cattle per day	50 liters		70 ltrs		50	70
Watering in Kitchen garden, green house per day	50 ltrs/day		70ltrs/day		50	70
Total					504	518

Observation

How much would be the actual requirement of water in a village per household in the two different seasons? Will it be any difference in water demand in the two seasons? The main target of this tool is to find out the water consumption by a household in a day in two different seasons. It was felt that the villagers had not provided correct information, expecting larger water supply project in their village. We had decided to take this information as water requirement instead of water consumption. One thing was clear that water requirement in the two villages will be more in lean season, because weather becomes severely hot and dry, accordingly, the water requirement will be high - in drinking, watering in kitchen garden, for livestock, etc. The water requirement they have suggested is more than the international and national criteria. So the water consumption analysis of individual households is suggested to get the correct information.

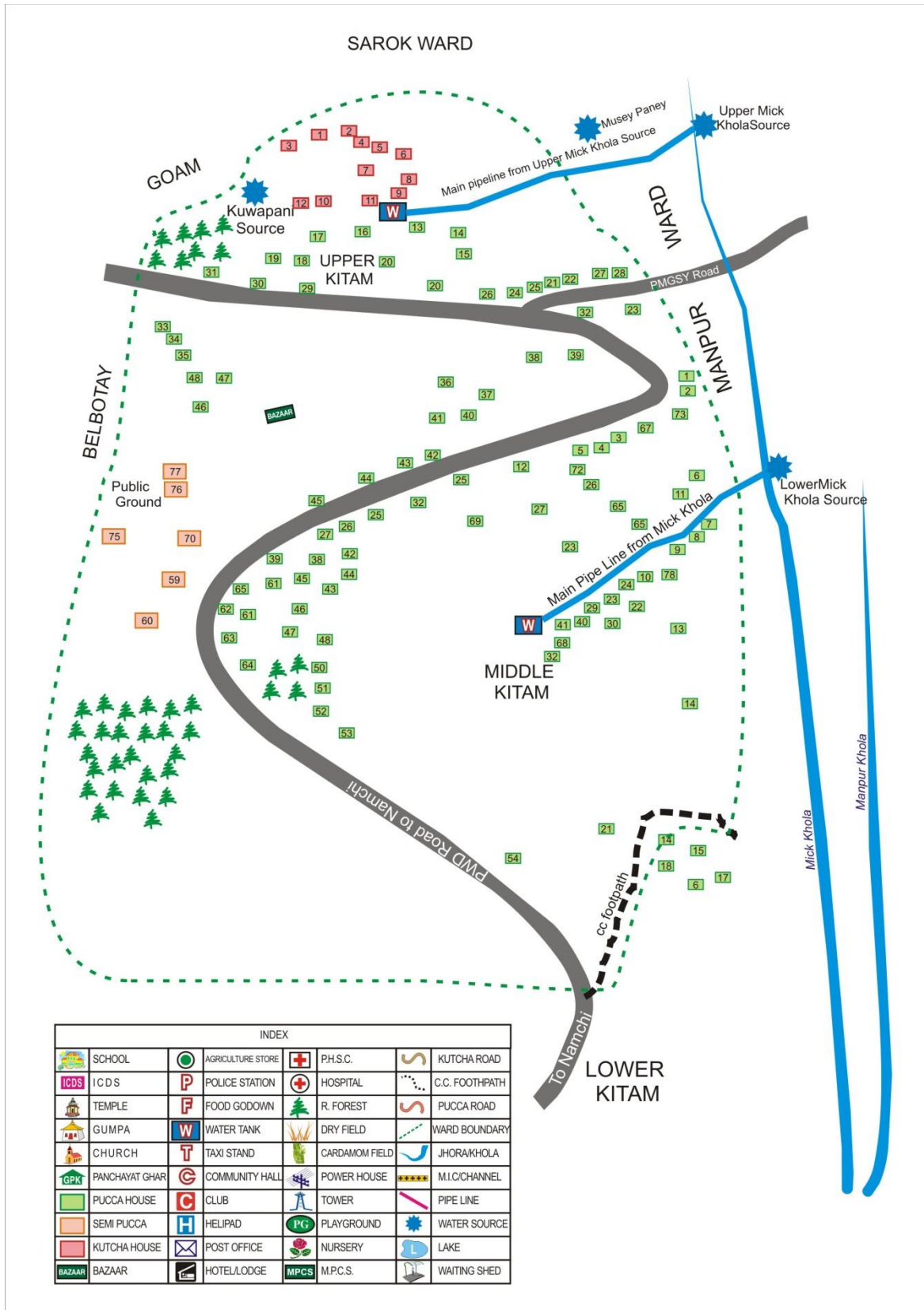
Existing Water Management System in Village

1. Barefoot Engineer – a plumber under RM & DD is a dedicated person for the water distribution in the village. He is a key person to open and close water distribution valve from the main tank. Valve is opened two times in a day at 6-8 am/4-6 pm time slots from the main tank. Each household will be provided water for 15 minutes. From November to July it is opened only once a day.
2. 5-10 household in the village do not have big storage facility in their homes.
3. Water through pipeline distribution is available for around 80% households, and 20% household do not have direct water supply system in their household. 12 household in Upper Kitam do not have direct water supply in their household. They fetch water from Musey Pani springs from the adjacent village.
4. Role of Village Water and Sanitation Committee (VWSC) of Kitam is to collect monthly fee of Rs. 20.00 per household for maintenance of water supply system and for the payment to the person responsible for repair and maintenance of the water supply system.
5. Cluster wise water user committees have a dedicated person to take care of water distribution in the two villages. There are source wise informal committees, too.
6. In case of major repair works, all the dependent households do voluntarily for repairing.
7. Presently, all the activities are carried out under the umbrella of VWSC.
8. Aid to strengthen informal committees and their linkage with VWSC is suggested.

Observation

Upper Kitam and Lower Kitam have well-functioning water management committees. The committees are managing water distribution in the village in all the seasons. Even in the social event, they manage water and divert surplus water to the needy household. In addition, they have good maintenance and operation system in the village. Advancement of the existent management practices is suggested.

Mapping of water resource and its dependence household



Observation

Upper Kitam, Middle Kitam and few households of Lower Kitam totally depend on Mickhola source in Manpur. Mickhola source is a local stream located in the Manpur Ward, 1.5 Km away from the village. The source is connected to the village through the pipeline system. Two water distribution tanks having the volume of 9000-10,000 liters, located in Upper and Middle Kitam are the only storage community tanks available in the village for the water storage. The volume of the tank is not enough to cater the present requirement of the village, since it was designed looking at the requirement of more than 20 years ago (1990). The 12 households in Upper Kitam (reflected in red colour) are the most vulnerable households, since they are not connected by any water supply scheme till date. Since these 12 household are located in the hill top where gravity flow from the Mickhola stream is not possible, they used to take water from Musey Dhara located in the border of Manpur and Upper Kitam ward which is a local spring having very low discharge. Kuwa Pani source in Upper Kitam is the local seasonal spring having very low discharge. To provide uninterrupted water supply to these village alternative water supply systems, local spring-revival programs, roof top rain water harvesting at the household-level is suggested

People's perception for water security

What	Where	How	Target
Revive Channel from Manpur Khola	Manpur Khola to Belbotey =9 km	Major Repair of the channel. Feasibility study required	400 Household, 2 GPUs Revival of paddy fields
Water supply through pipeline connection from Bul Khola at Chunbhati, Rong Bul	Salaybung-Boomtar-Kopchey-Mickhola-Manpur-Kitam-Goam-Sarok are the targeted village	Source already purchased by Kitam villagers, paid around Rs. 10, 000 to the land owner to the source. Pipeline connection from source to village	285 HHs (entire GPU)
Rainwater Harvesting Dhara Vikas	Mickhola Source, Kuwapani Source, Musey Pani	Checkdams, Community water tank, Dharavikas, Landuse development, terracing Contour plantation	Upper Kitam, Lower Kitam , Middle Kitam

Observation

The community perceptions reveal that Chunbhatti source at Bul Khola is the potential source for the water supply in entire GPU, throughout the year. The community has purchased the Chunbhatti source, Bul Khola from the private land owner of the source to secure their drinking water. Since it is 12 kms away from village, huge sums of money is needed for it. If the villages get the water supply from this source, around 180 households will be benefitted.

Additionally, if the repairing works old existing irrigation channel in middle Kitam is done properly, it will help the locals to revive the paddy cultivation and other vegetable production in village.

Water Consumptions at household Level

Activities	Household 1, Upper Kitam	Household 2, Upper Kitam
Water users	8 members, 1 Cow	8 members
Options for Drinking Water	Fetch water twice a day from springs which is half km away	Fetch water twice a day from springs which is half km away
Water Consumption and storage	60-80 LPD is the daily consumption No roof water harvesting system	40 LPD in monsoon 80 LPD in dry season Roof Water Harvesting
Water uses	3-4 times in a month washing and bathing in the springs in the lower part of village	
Cultivation	Pulses and Maize	Pulses and Maize

Observation:

Water consumption in a household is lower than international water consumption limits which is also based on NRDWP norms

Onsite Observation

Table A1: Water source and its water users

Name of springs/stream/lakes/pond	Name of place where this source is available	Number of household dependent in this source	Places where this spring's/lake's/Stream's water supplied	Nature of source (perennial/seasonal)	Land owner (Private, forest, Khasmal or Gaucharan)	Threats in water sources
Kuwapani source (it is basically small pond from which community from upper Kitam fetch water)	Upper Kitam	4-5 household fetch water from this source, no direct pipeline to the household	Upper Kitam	Seasonal	Private land	Open source, no filtration techniques was used. Chances of getting contaminated
Musey Pani Source	Manpur ward	12 household from upper Kitam fetch water from here throughout the year. These 12 household is considered as vulnerable household.	Upper Kitam	Perennial	Private land	No filtration techniques was used
Mickhola (1)	Mickkhola RF, Manpur Mickhola boundary	46	Upper and Middle Kitam	Perennial High volume discharge only in monsoon	Forest Land Mickhola RF	Open springs, no filtration system, no storage tank in source
Mick Khola (2)	Mickkhola RF, Manpur Mickhola boundary	56	Upper kitam and 6 household of lower kitam	Perennial High volume discharge only in monsoon	Forest Land Mickhola RF	Open springs, no filtration system, no storage tank in source

Buddhey Kholsa	Sarok village, near Mickhola	Horticulture firm and 6 household of Manpur	Horticulture firm and 6 household of Manpur	Perennial High volume of discharge only in monsoon season	Forest Land Mickhola RF	Open springs, no filtration
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Table A2: Information of water sources and its catchment

Spring name	Coordinates	Discharge (in lpm)	Type of tank and its size, available in water source (if any)	Weather over flow is there? If so, how much (in lpm)?	Catchment description	What kind of intervention is possible for water augmentation, conservation, distribution and quality improvement	Night water of springs which is not used (considering 8 pm to 5 am)
Kuwapani Source	Lat: 27°7.405' Long: 88°20.642' Alt: 973m	2 Lpm	Small tank around 1500 liters not in used.	No overflow.	Slope:>45 degree Land owner: private Land use: Sukha bari Density of land cover: very few plants Rock Type: on consolidates Sediments	Not possible to do any intervention. It is recommended that water in springs can be stored in tank, filter and use it.	Fully utilized
Musay Pani	Lat: 27°7.588' Long: 88°20.831'	4 lpm	No tank in the source. Community can directly	No overflow/ storage tank is below the source	Slope:>45 degree Land owner: Private Land use: Sukkha bari	High volume storage tank with filtration can be made below the source	Not Fully utilized

	Alt:923m		fetch water from source		Density of land cover: Very low land cover Rock Type: unconsolidated sediments		
Mickhola Source	Lat: 27°8.248' Long: 88°20.747' Alt:1020m	250-300 lpm	No tank in the source	Overflow mostly in rainy season to November.	Slope:>50° Land owner: Forest Land Land use: Forest cover Density of land cover: Thick undergrowth, few tall trees Rock Type:phyllite	Storage tank to be built to reserve overflow till November.	Not totally used in monsoon season
Mickhola Source (2)	About 100 m below the Mickhola source 1	More than 300 lpm	No tank in the source	Overflow mostly in rainy season to November.	Slope:>50° Land owner: Forest Land Land use: Forest cover Density of land cover: Thick undergrowth, few tall trees Rock Type:phyllite	Storage tank to be built to reserve overflow till November.	Not totally used in monsoon season

Table A3: Alternative options for water supply in village

What would be the alternative options	Where it is	What to do	Who will get benefitted	How many household will be benefitted	Distance (in meters if any)	GSP coordinates of potential options (springs, lakes, streams, river)
Tapping of water from Bul khola and Manpur khola From Chinbhatti Rongbul	Rong Bul, Namchi	Water tapping from these two streams.	Kitam- Manpur GPU and Sarok Shyampani GPU may get benefitted	Around 700 household get benefitted	Around 11 kilometers from the Kitam Village	27°9.211', 88°23.399' 1212 m
Tapping of water from Buddhany Kholsa and Mick Khola, and construction of series of storage tank to store surplus water in monsoon season till November.	Near Mickhola	Construction of storage tank to store surplus monsoon water	Kinatm Manpur GPU	Around 500 HH	2 Km	Lat: 27°8.248' Long: 88°20.747' Alt:1020m
Revive of channel from Manpur khola to Upper Kitam for the irrigation	From Manpur Khola to Belbhotay	Major repair of channel which is connecting to Manpur Khola to Kitam Village	Kitam Manpur GPU	Household of Middle Kitam, Lower Kitam, Belbhotey, Manpur Goom	9 km	
Source conservation and protection works at Mickhola source by implementing Springs shed development works.	Mickhola source	Implementation of Dhara Vikas Program	Mickhola	All water users	2 km	

Observation

The local sources of Kitam village will not fulfill the demand of all the household of Upper, Middle and Lower Kitam, since the local sources are seasonal and discharge is very low in monsoon season. The Mickhola Source which is the perennial one located in adjacent village has plenty of water during monsoon, which simply flows as surface runoff. A mechanism should be developed to use the surplus water in dry season by developing series of large volume resevoirs connected to each other for water storage. For the sustainability of the water sources, *Dhara Vikas* works in the upper catchments is suggested. While it needs to note that the slope of the hills is very steep and it is more than 50 degree in the catchment of Mickhola; in such steep slope digging trenches and ponds to trap the rains and surface runoff during rainy season may seem a difficult task. It is suggested to design a series of Check Dams along the fractures above the Mickhola source. Buddhey Khola which is just 100 meters far from Mickhola can be similarly treated and water in the monsoon can be stored in the tanks.

Alternatively, if the water from the Chunbhatti source, Bul Khola can be drawn from pipeline, it can solve the drinking water purpose of most of the villages in and around Kitam. Discharge trends of chunbhatti source is given below.

Discharge of Chunbhatti source, Bulkhola during lean season

Month	Discharge (in LPM)	Expected coverage (in person) @ 75LPCD
October 2013	780	14976
November 2013	540	10368
December 2013	480	9216
January 2014	390	7478
February 2014	300	5760
March 2014	240	4608
April 2014	180	3456
May 2014	180	3456
June 2014	360	6912

Conclusion

- Upper Kitam and Middle Kitam village have domestic water scarcity because they do not have perennial water sources of their own; local sources are seasonal.
- With their own effort the communities have identified a perennial source which is 12 kms away from the village. The advance has been paid to the land owner of the source at Bul. The source is perennial and it is not utilized by any other village during the survey and has discharge more than 500 LPM (litres per minute). The source have a potential to meet the current water demand of Kitam villages. Manpur Khola is in-between this source and the village. Linking Manpur khola with this source in same water supply system can add better values – to existing agricultural pattern.
- Mickhola Source which is in the reserved forest is the only perennial source from which villagers are getting water. In rainy season, the volume of the water is more than sufficient. A mechanism has to be developed to store or harvest excess monsoonal discharge from this spring. Discharge of Mickhola source decreases in lean season and it is not sufficient that period. Spring revival activities are suggested in the catchment of Mickhola springs. Construction of Check dams is the viable option.
- Repairing old irrigation channel which links Middle Kitam, Belbotey, Lower Kitam and other adjacent villages have the potential to revive the paddy fields and vegetable production in these villages.
- Conclusively, looking at the micro-level planning, roof top rainwater harvesting system need to encouraged in the village level. For the 12 households which do not have direct pipeline water supply in their homes, roof top rainwater harvesting system will be the alternative solution.

Action Plan

Sl. No	Activities	Suggested Organization/Program	Target	Funding source
1	DPR preparation for water supply system from Bul Khola to Manpur Kitam and storage tank in the Mickhola to store monsoon discharge of Mickhola springs	GIZ can facilitate. DPR can be prepared by Engineers from RM&DD	Water Supply system, estimate preparation by extensive field survey	GIZ-CCANER
2	Field visit and DPR preparation for the revive of old channel from Manpur Khola to Manpur Kitam GPU	GIZ and RM&DD block level Engineer	Extensive field visit and DPR preparation	GIZ CCANER
3	Field survey of all the villages from FGD and PRA which are in between Kitam Manpur and Bul Khola source.	GIZ can facilitate. Kharel and Pem Norbu along with Block level staff of RM&DD	PRA, FGD	GIZ CCANER
4	DPR preparation of recharge of springs and stream in Manpur Kitam GPU	GIZ, RM&DD	Mickhola Stream, Buddhay Khola, Bul Khola, Manpur Khola	GIZ CCANER
5	Construction of series of storage community tank to store rainy season discharge of spring in Mickhola stream	GIZ RM&DD	Mickhola, Buddhay Khola	MGNREGA
6	Training to the Block level officer/Engineer for water security plan and recharge of springs activities ect	GIZ	Block level officer nominated by RM&DD	GIZ CCANER
7	Tapping of water from Chunbhatti Source Bul Khola to Manpur Kitam GPU. Implementation of DPR prepared by GIZ involving block level Engineers	GIZ , RM&DD, NRDWP	Implementation of DPR for tapping of water from Bulkhola	NRDWP, RWSS, RM&DD
8	Repairing of irrigation channel	RM&DD, GIZ, MGNREGA	Implementation of DPR for the revive of channel	MGNREGA, RM&DD