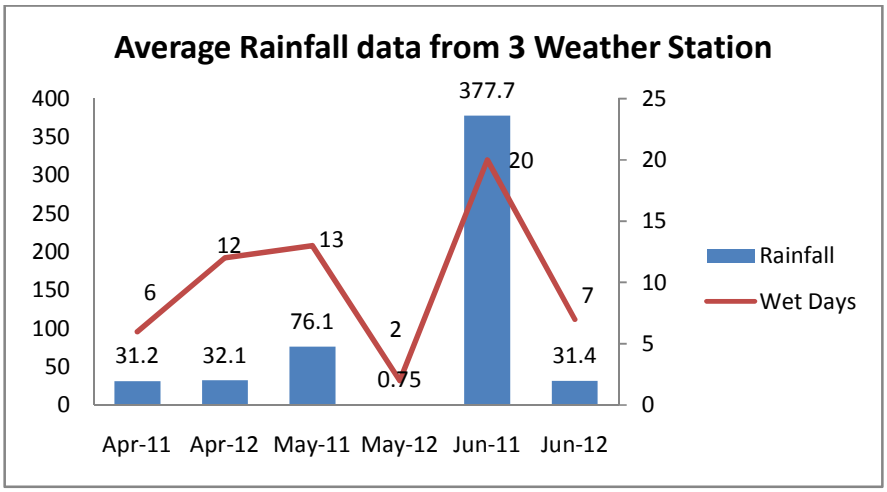
Spring Water Recharge Programme

A study of the post programme impact on the lives of the people in the Kumaon region

7/27/2012
CHIRAG

The summer of 2012 in the Kumaon region has been hotter and drier than any other summer in recent memory. Rainfall data from 3 different weather stations located in the region indicate that the rainfall in the summer months of April to June this year has been significantly lesser than last year. Even while the region was gripped by rampant forest fires and crop failure, CHIRAG has been receiving positive feedback about its Spring Water Recharge Programme in certain villages. We carried out a short discussion with the user groups in different villages to find out the impact that the increased water supply has had on their lives. We also analyzed geological and rainfall data to try and understand why certain springs had responded more readily to the intervention.



Some general information about the 5 springs that were surveyed for this study in July 2012:

- Discharge data from the springs has to be studied in the context of the rainfall data from the region. While numerically the changes in the LPM (Litres per minute) might be miniscule, when seen in the context of the almost drought like conditions during the summer months this year they gain significance
- All five of the springs are fracture type of springs with similar rock type- Phylite and Quartzite/ Gneiss/ Schist.
- Four out of the five springs that have been analyzed here belong to the Suyalbari region. This is intriguing and we haven't been able to satisfactorily explain this. A possible explanation may be that Suyalbari region lies in the fault zone and thus fracture springs are found in abundance here.
- Catchment Area of the spring ranged from 2 to 4.3 ha. In most instances (except Gajar) almost all of the catchment area fell under private land. In such instances terrace bunding and levelling were undertaken apart from construction of Khal and Contour Pits.

- Work on the Catchment Area such as plantation, pit digging, construction of Khals, Contour Trenches, Terrace repair etc was focussed on the dip slope and along the fractures. Better identification of the spring's recharge zone may be a factor that explains why certain springs have responded more readily to treatment.
- Out of the 5 springs (except Gajar) have experienced at least two complete monsoons since the work was completed. Our conversations with the villagers indicate that the soil is retaining moisture better post treatment. In certain villages terrace bunding and contour repair work done on existing barren fields has enabled farmers to use this land for cultivation. Going forth involvement of the community in maintaining and repairing the Khals, trenches and pits, terraces etc will be central to the success of the programme in a particular village.
- Other benefits include increased hygiene in the village and thus fewer reported instances of water borne diseases, availability of a separate drinking area for animals and the presence of an additional communal space in the form of the repaired Naula for villagers especially women to interact.

Balyali Spring

CHIRAG's intervention in *Balyali* village (Ramgarh Block, Nainital District) dates back to 2007 when it first initiated its developmental work in the area. From then onwards the village has undergone various developmental activities especially on watershed, community forestry and agriculture innovation, with substantial support from the organization.

With the inception of the spring recharge programme, a detailed social and geological survey was conducted in *Suyalbari* project area to select springs for treatment. During the visits, *Balyali Shivmandir Naula* (Shallow dugout spring) a natural water source was also surveyed, where it was found to be an ideal site for treatment. The spring is situated at oblige slope (towards dip slop). The water source (*Naula*) of *Balyali* is placed approximate 500 meter from main village, it is a perennial source, and was considered the main drinking water source. In the past the Balyali village had two water sources. *At the time of the initial survey one of the two sources had dried up and the other source was the only perennial water source in the village.*

As per the base line survey (conducted in summer 2009), the demand for water was 4 times greater than the supply in the lean period (the calculation was calculated on the bases of Naula Spring water discharge). After an extensive survey of the spring's geology, its catchment area and an evaluation of the community's needs and involvement the team decided to take up the challenge of reviving the spring with the twin objectives of sustaining the source discharge for longer and providing villagers with adequate water supply even during the lean summer season.

Spring Geology

Based on the collected information, the *Naula* has been classified as a fracture spring. The current seasonal discharge of the spring indicates that the aquifer is relatively medium with the low transmissivity, which is in accordance with the conducting role played by the fractures.

The spring is structurally controlled by a set of longitudinal fractures running in the direction of 110-290 degrees. The Phyllites are weathered and fractured as well as quartzite, and the general dip amount is 20°-44° towards 15°(i.e. towards NW to NE). And the contact between Phyllite and Quartzite has also seemed fractured. Main fractured trend in 110°-290°, and the spring is fracture controlled.

The catchment area of the Balyali Naula lies over the source and extends until top of the ridge. The catchment area primarily falls under personal land (cultivation and wasteland). After the identification, the recharge and discharge zones were surveyed in detail to select the treatment structures.

Geographical Area		**Catchment Area**						**Geology**				
Altitude (m)	**Area (ha)**	**V.P. (ha)**	**Civil (ha)**	**R.F. (ha)**	**Private (ha)**	**Total (ha)**	**Aspect**	**Type of source**	**Type of Spring**	**Rock type**	**Dip direction**	**Dip Amount (Degree)**
1314-1449	2.5	0	0	0	2.5	2.5	NW	Naula	Fracture	Phylite, Quartzite	NE	20-44

Details of the Work done on Balyali Spring

In the recharge zone, focus was laid on implementing water recharge structures like percolation pits and khals. Since part of the recharge zone is used for cultivation, other recharge measures like terrace bunding and levelling of the agricultural terraces inwards were used to facilitate recharge. In the discharge zone the focus was on establishing water harvesting structures like spring modification. Site-specific modifications were made to the traditional designs of the structures to improve their potential. The details of the recharge measures undertaken are given below:

S. No.	**Name of Work**	**Unit**	**Quantity**
1	Percolation pits	No.	302
2	Terrace Levelling (Cultivable)	Sqmt.	3764
3	Terrace Levelling (Barren)	Sqmt.	811
4	Terrace Bunding	Rmt	1500
5	Khal	Cubic Mts	9
6	Drainage of Khal	Rmt	10

The implementation phase in catchment area was started in December 2010 with the commencement of soil & water conservation measures. CHIRAG acted as the project implementation agency in the village and provided support material and technical guidance. All the community works was implemented with the help of the local community.

Community Feedback

CHIRAG started work on Balyali Spring-I in December 2010. Balyali Spring–I (or Shivmandir Naula) supplies water to about 35 families in the village. The spring was selected for intervention keeping in mind the needs of the village. The work involved tree plantation, construction of contour trenches, khal, percolation pits etc. On the day of the interview, 9 women from the village took time out from their busy routine to interact with us. The women told us that as long as they can remember there had always been a shortfall of water supply. Till about 2 years ago the village followed a quota system where in during the lean months of April, May and June each family was allowed to fill only 2 buckets of water from the Naula.

The gate to the Naula was closed and the keys were handed over to the families in the village one by one starting with the family closest to the Naula. There used to be long lines at the Naula as families waited for their turn to collect their share of water. Water from the Naula was primarily used for drinking purpose. Villagers also drew water from a Gadhera, which is located about an hour and a half away, when the water supply from the Naula proved insufficient. The water from the Gadhera had impurities and villagers used to fall sick due to water borne diseases frequently. The animals also used the Gadhera for drinking water. The government had fitted a pipeline to supply water to the households in the village but the supply was erratic and soon ran dry. Fights between villagers due to water supply were a common occurrence.

For the past two years (2011 and 2012) the families haven't had to travel to the Gadhera to get water even during the summer months. The travel time for the remotest household in the village has now been reduced to 15 minutes as the Naula has been continuously supplying water through the hot and dry summer. The time that the women save is now utilized for preparing the field and looking after the animals. Besides drinking water, the villagers are presently drawing water from the Naula for irrigation as well. The villagers use the Diggi to wash clothes and the Khal is meant for the use of the animals.

Village	**Source Name**	**Apr-11**	**May-11**	**Jun-11**	**Apr-12**	**May-12**	**Jun-12**
Balyali	Shivmandir Naula	3.5	3.85	4.25	4	3.75	3.75

More interestingly, the women also reported that a second Naula further down the hill which had remained dry for some 10 years has now started supplying small quantities of water as well. Since this second naula had been dry for a long time, farmers whose field is adjacent to this Naula are using its water solely for irrigation.

Gajar Spring

CHIRAG's involvement with the community in *Gajar (Ramgarh Block, Nainital District)* started in 1990 when it first initiated its developmental work in the area. In the past two decades the organization has implemented a host of developmental activities in the village in community forestry & fodder, water quality, preventive health, education and agriculture innovation.

Under the spring water recharge programme a detailed social and geological survey was conducted in *Kashiyalekh* project area to select springs for treatment. During the visits, *Gajar*, a natural water source was also surveyed. Due to the geology and layout of the spring, which was situated at oblige slope (almost dip-oblige slop), it was selected for the treatment.

The water source (*Naula*) is located in the middle of *Kafaldhari* hamlet. At the time of the survey, water was scarce all over the hamlet and the maximum water availability was 15-20 Litre per capita on each day of summer season. This is half of the WHO parameter (40 litre capita/day). Thus, the team decided to take up the challenge of reviving the spring so that the villagers can have adequate water supply in their village even during the lean season and the source discharge is sustainable for a longer period.

Spring Geology

Based on the collected information, the *Gadhera (*has been classified as a fracture spring. The current seasonal discharge of the spring indicates that the aquifer is relatively medium with the same medium transmissivity, which is in accordance with the conducting role played by the fractures.

The spring is structurally controlled by a set of longitudinal fractures running in the direction of Towards N-S/ NNW-SSE. The rocks above the spring are dominantly phyllite and have the alternate bedding of quartzite and phyllite, except a layer of gneiss has found on the top of ridge or

catchment. The phyllite bands show intense foliations conducive for recharge and storage of groundwater and also quartzite have more fracture and it also good for recharge and storage.
Rock foliations are dominantly north-east with an average dip amount of 25-35 degrees. With the above mentioned features, it seems that the recharge zone of the spring lies principally along the fracture lines above the spring.

Geographical Area		Catchment Area						Geology				
Altitude (m)	**Area(ha)**	**V.P. (ha)**	**Civil (ha.)**	**R.F. (ha)**	**Private (ha)**	**Total (ha)**	**Aspect**	**Type of source**	**Type of Spring**	**Rock type**	**Dip direction**	**Dip Amount (Degree)**
1857-2092	4	3	0	0	1	4	S	Naula	Fracture	Gneiss, Phyllite	NE	20-61

Details of the Work done on Gajar Spring

Work began on Gajar Spring – I in June 2011 and was completed in September 2011. Thus this is the second monsoon. The spring benefits 14 families in the village who earlier Families also rely on a handpump which is located nearby for water. The water from the Naula was used only for drinking purposes. The Naula has been a reliable source of water for all the families and has never run dry according to the villagers who we interviewed. Rain water tanks constructed under Swajal project have been particularly beneficial to the villagers.

Work	Unit	Quantity
Khal	Cubic metres	10.38
Drainage of Khal	Rmt	34
Contour Trenches	Number	100
Percolation Pits	Number	2100
Source Repair	Number	1

Community Feedback

Villagers tell us that while the Naula is a perennial source of water, during the summer season the availability of water has historically been low. During the months of May and June only about 3-4 canisters of water would be available in the Naula. However, this year the Naula has been providing 5-6 canisters of water even during the dry and hot spell in June that the region experienced. The

villagers also talk about how historically the spring required a few days of steady rainfall for any noticeable change in water availability. This year, though, a brief rainfall spell has drastically improved the water availability in the Naula. This may be because of the better retention of water in the soil due to the measures that were taken. Another indicator that demonstrates that the moisture retention in the soil has improved is the fact that the vegetation belt in the catchment area of the spring that used to dry up every June remained green throughout the summer. Discharge data from the spring indicates that last June the discharge was 0.5 LPM and this year it is marginally less at 0.45 LPM. What makes these statistics noteworthy is that the marginal decrease in LPM has been in a year when rainfall has been twenty times less than last year.

Village	Source Name	Apr-11	May-11	Jun-11	Apr-12	May-12	Jun-12
Gajar	Narada Naula	0.25	0.225	0.5 / 0.5	.33/.82	.058/.045	0.45

Bhadyun Dhara

CHIRAG has been working in Bhadyun village since 1995 and when the initial survey was done to identify springs for treatment in the Suyalbari area as part of the Spring Water Recharge Programme Bhadyun dhara (running spring) was selected for treatment due to the fact that the dhara is located in the middle of the village and has been the main source of water for the community. At the time of the survey, the village had primarily two natural water sources. The main source was a group of Noula (seepage-based springs) springs and an Infiltration well-based Hand pump situated in a gadhera at the southern part of village around 300m away from the village. The other source was a seasonal Dhara spring situated in centre of village, which had water only during the months of July – March. The dhara used to be a perennial about 30-35 yrs back, as told by the elders of the village and since then the discharge had steadily reduced until it became dry in the lean season. The Naula springs were perennial source of water mainly used for drinking water in summers. However, the Naula springs

also served as the primary source of water for the neighbouring village of Beduli, whose ancestors had built the Naula structures. Thus it was decided that the initial surveys will be conducted for the Dhara spring only and the Naula springs will be treated only after consensual agreements between the two villages about water sharing, implementation etc had been reached.

Approximately 20-30 years earlier, the Dhara spring started to show decline in discharge, especially during the summers, which are also the months of highest water demand. The discharge kept declining until the spring changed from a perennial to a seasonal water source. Incidentally, the villagers also report that during the same period, the Banj-oak forest above the spring was severely destroyed due to illegal lopping and tree cutting by the villagers. Though it first appeared as coincidental, later surveys by our team has shown that the erstwhile location of the Banj-oak forest was indeed in the recharge zones of the spring. The role played by forests (especially Oak forest) in improving recharge of springs has been an understudied topic; however most of the studies have shown positive correlation between the two phenomena. Thus it can be reasonably inferred that the destruction of the old Banj-oak forest may have contributed towards the decline in Dhara spring discharge.

Spring Geology

Based on the collected information, the dhara was classified as a fracture spring established along the axis of a set of parallel and closely placed fractured caused by the folding of the rock beds. The seasonal discharge of the spring at the time of the survey indicated that the aquifer was relatively smaller with medium transmissivity, which was in accordance with the conducting role played by the fractures, in otherwise low transmissive rocks of Phyllite.

The spring is structurally controlled by a set of longitudinal fractures running in the direction of North-west & South-East. The rocks above the spring are dominantly phyllitic with one or two small bands of Quartzite interspersing phyllite layers. The phyllite bands show intense foliations conducive for recharge and storage of groundwater. The phyllite bed shows signs of folding in a wave like format along whose axis are the fractures situated. The general dip of the rock foliations is dominantly north/ north-east with an average dip amount of 20-25 degrees. However, at the locations of the folds, the dip direction is varying from North-east to

North West. With the above mentioned features the recharge zone of the spring lies principally along the fracture lines above the spring.

Geographical Area		Catchment Area						Geology				
Altitude (m)	**Area (ha)**	**V.P (ha)**	**Civil (ha)**	**R.F (ha)**	**Private (ha)**	**Total (ha)**	**Aspect**	**Type of source**	**Spring Type**	**Rock Type**	**Dip direction**	**Dip Amount (Degree)**
1160-1377	2.3	0	0	0	2.3	2.3	N-W	Dhara	Fracture	Quartzite Phyllite	NE	20-35

Details of the Work done on Bhadyun Dhara

After the identification, the recharge and discharge zones were surveyed in detail to select the treatment structures. In the recharge zone, focus was given on implementing water recharge structures like percolation tanks/ponds/pits; brushwood checkdams and contour trenches etc. Since part of the recharge zone is under cultivation, other recharge measures like countor bunding and leveling of the agricultural terraces inwards were placed to facilitate recharge. In the discharge zone the focus was on establishing water harvesting structures like spring modification. Site-specific modifications were proposed to the traditional designs of the structures to improve their potential. The details of the proposed structures are given below:

S. No.	Name of Work	Unit	Quantity
1	Plantation	No.	1000.00
2	Grass Planting	Qtl.	6.00
3	Khaal	Cum.	192.66
4	Drainage for Khaal	Rmt.	169.00
5	Contour Trench	Rmt.	9.00
6	Brush wood Checkdam	Rmt.	2.00
7	Terrace levelling	Sqm.	2780.00
8	Terrace Bunding	Rmt.	940.00
9	Percolation Pit (Small)	No.	50.00
10	Percolation Pit (Medium)	No.	11.00

Community Feedback

Our interaction with the villagers at the Naula corroborated the account that was provided during the survey. The villagers recall experiencing severe water shortage during the summer of 2008. They had to bring water from the Kosi river to meet their daily water requirements. Villagers had to walk at least 5 kms to collect water. In the year before the Spring Water Recharge Programme was initiated the traditional source had dried up during the summer. Under the spring water recharge programme contour trenches, khals etc were dug up. Agricultural fields were levelled and plantation of Utis (Alnus Nepalnesis) and oak trees were done with the help of the community. Traditional sources of water naulas and dharas drying up. For the past three summers though the villagers have had a steady supply of water. The region received plenty of rainfall in 2010 and 2011 but even during the summer of 2012 when the region hadn't received any rainfall in the past 7-8 months villagers tell us that the source has been providing enough water to meet the needs of the families in the village.

Village	Source Name	Apr-10	May-10	Jun-10	Apr-11	May-11	Jun-11	Apr-12	May-12	Jun-12
Bhadyun	Bhadyun Dhara	0.8	0.5	0.4	4	2	1.9	2.5	1.75	1.25

The main benefit that the community has derived from this programme is that the work load of women has reduced considerably. Earlier they had to spend around two and a half hours to collect 15 litres of water. Now women from the remotest household have to walk only 15 minutes the same amount of water. The animals also have a hygienic source of drinking water nearby. Going forward, community members feel that there is a need to plant plants and trees with wider leaves in the recharge zone of the spring. The khal and contour trenches also need to be repaired so that the soil moisture content can be maintained.

Chopra Spring

CHIRAG initiated its development work in *Chopra* in 2007 and since then has executed various programmes on watershed, education, preventive health and agriculture innovation. With the inception of the spring recharge programme, a detailed social and geological survey was conducted in *Suyalbari* project area to select springs for treatment. During the visits, *Chopra Bhauna Noula* (Shallow dugout spring) a natural water source was also surveyed where it was found to be an ideal site for treatments, the spring is situated at oblige slop (towards dip slop).

The water source (*Noula*) of *Chopra* is placed approximate 1000 meter from main village and contains water all 12 months. There are three main water springs in the village that fulfil the water requirement of the village. The other two naulas (shallow dug out spring) dry up in the lean period, making the Bhauna Naula only source of water in the lean period. Also, there are two-'payjal' lines by the government, which also dry up in the lean period. However, water demand had increased steadily and as per a base line survey (conducted in summer of 2009) the water demand was 4 time greater then water supply in the lean period (the calculation was calculated on the basis of Noula Spring water discharge). The catchment area of the Bhauna Noula lies over the source and extends until top of the ridge. The main catchment area falls under private land (cultivation and wasteland).

Spring Geology

Based on the collected information, the *Noula* (Shallow dugout spring) has been classified as a fracture spring. The current seasonal discharge of the spring indicates that the aquifer is relatively medium with the low transmissivity, which is in accordance with the conducting role played by the fractures.

The spring is structurally controlled by a set of longitudinal fractures running in the direction of towards NE-NNE. The phyllite, schist and quartzite were found over the spring in alternating bands. The phyllite was more weathered than quartzite and quartzite was found to be much fractured and beds of phyllite were found to be generally thicker than quartzite.

Geographical Area		Catchment Area						Geology				
Altitude (m)	Area (ha)	V.P. (ha)	Civil (ha)	R.F. (ha)	Private (ha)	Total ha	Aspect	Type of	Type of Spring	Rock type	Dip direction	Dip Amount
1280-1407	2	0	0	0	2	2	SW	Naula	Fracture	Phylite, Schist,	NNE, NE	25-30

Details of the Work done on Bhauna Naula

After the identification, the recharge and discharge zones were surveyed in detail to select the treatment structures. In the recharge zone, focus was laid on implementing water recharge structures like percolation tanks/ponds/pits/sub surface checkdams etc. Since part of the recharge zone was used for cultivation, other recharge measures like terrace bunding and leveling of the agricultural terraces inwards were placed to facilitate recharge. In the discharge zone the focus was laid on establishing water harvesting structures like spring modification. Site-specific modifications were proposed to the traditional designs of the structures to improve their potential. The details of the work done under the Recharge Programme are listed below:

S. No.	Name of Work	Unit	Quantity
1	Khal	Cum	29.00
2	Drainage of Khal	Rmt	31.00
3	SS Checkdam	No.	1
4	Percolation Pit (Big)	No.	109
5	Naula Repair	No.	1
6	Terrace Levelling(Cultivable)	Sqm	10753.00
7	Terrace Levelling(Barren)	Sqm	3677.00
8	Terrace Bunding	Rmt	6350.00

The implementation phase in catchment area started in November 2010 with the commencement of soil & water conservation measures. CHIRAG was the project implementation agency in the village and provided support material and technical guidance. All the community works was implemented with the help of the local community.

Community Feedback

We visited the Bhauna Naula to talk to some of the villagers living in Chopra to learn from them how the Spring Water Recharge Programme had impacted their lives. The villagers told us that the water availability in the Naula used to be really low before the work began in November 2010. Fights between villagers over water were fairly regular, especially during the months of lean supply. Villagers had to queue up to draw water from the Naula during the summer seasons. The intervention done on the spring involved digging up percolation pits and Khal.

Surprisingly, the villagers tell us that last June the water levels in the Naula were lower than this year. This year despite very low rainfall in the months of May and June, the Naula has been overflowing with water. Our Source Discharge Data however indicates that the discharge in June '11 and June '12 were roughly identical. This is still remarkable since rainfall in June'11 was roughly twenty times more than rainfall in June'12.

Village Name	Source Name	Apr-11	May-11	Jun-11	Apr-12	May-12	Jun-12
Chopra	Bhauna Naula	7	11.2	15/13.5	17.5 /17	17.5/14	13.5/14

The villagers use the water from the Naula for drinking, cooking, bathing and washing clothes. Animals also use the over flow from the Naula for drinking. This year the supply has been adequate for all families. Families from neighbouring villages of Kool and Malla Chopra families also use the Naula for water. Another positive effect of the Spring Water Recharge Programme is that some farmers felt that the soil in their fields is retaining moisture better due to the terrace bunding and levelling that was done. Barren fields were also treated at that time and farmers have since then planted crops in them and harvested yields.

Improvements that were made to the Naula design such as the installation of a gate now prevents animals from accessing the water and thus the hygiene levels have improved. Earlier the area around the Naula used to be muddy and unhygienic, but due to the repair work done the area is dry and clean and villagers can now sit around the Naula and interact.

Nawali Spring

CHIRAG has been working in Nawli village since 1996. When the initial survey to identify springs for intervention was done it was found that Nawli dhara would be ideal due to the fact that it was situated at oblique slope. The water source (*Dhara*) of *Nawli* is located downward from main village (hamlet) or in other words it is in between two hamlets and was the main source of water for community. At the time of the survey, the elders in the village shared that the *dhara* was perennial, but in summer or so called lean period (April to June) the minimum discharge was less than 1LPM. The *dhara* used to be a main source of water for almost 5 centuries but post 1990 the discharge had steadily reduced and demand had been rising continually with the result that there was inadequate amount of water available for the entire village. The government got a pipe line constructed in 1995 to address the water scarcity problems but the problem of water supply in the summer months persisted. The villagers then constructed a water tank to collect the over flow from the source and this as well did not address the water scarcity problem. Thus, the team decided to take up the challenge of reviving the spring so that the villagers can have adequate water supply in their village even in the lean season.

Earlier, it was used for drinking and to carry out agricultural activities. During the lean period water, which percolated down from an aquifer, decreased to less than 1LPM and in monsoon it increased to 15-18 LPM depending upon the amount of rainfall and temperature. The catchment area of water source lies over the source and extends until top of the ridge, land used for cultivation land and the area that is looked after the Van-*Panchayat* falls under catchment area.

Spring Geology

Based on the collected information, the *dhara* has been classified as a fracture spring established along the axis of a set of parallel and closely placed fractured caused by the folding of the rock beds. The seasonal discharge of the spring at the time of the survey indicated that the aquifer is relatively smaller with medium transmissivity, which is in accordance with the conducting role played by the fractures, in otherwise low transmissive rocks of Phyllite.

The spring is structurally controlled by a set of longitudinal fractures running in the direction of Towards E-W/85°-275° & ESE-WNW/100-260. The rocks above the spring are dominantly phyllitic with one small bands of Quartzite on the top of the hill are interspersing phyllite layers. The phyllite bands show intense foliations conducive for recharge and storage of groundwater. The phyllite bed shows signs of folding in a wave like format along whose axis are the fractures situated.

The general dip of the rock foliations is dominantly north/ north-east with an average dip amount of 20-25 degrees. However, at the locations of the folds, the dip direction is varying from North-east to North West. With the above mentioned features, it seems that the recharge zone of the spring lies principally along the fracture lines above the spring.

Geographical Area		Catchment Area						Geology				
Altitude (m)	Area (ha)	V.P. (ha)	Civil (ha.)	R.F. (ha)	Private (ha)	Total ha	Aspect	Type of source	Spring Type	Rock type	Dip direction	Dip Amount (Degree)
971-1360	4.3	1.8	0	0	2.5	4.3	W	Dhara	Fracture	Quartzite, Phyllite	NE	15-40

Details of the Work done on Nawali Dhara

After the identification, the recharge and discharge zones were surveyed in detail to select the treatment structures. In the recharge zone, focus was laid on implementing water recharge structures like percolation tanks/ponds/pits; brushwood check dams and contour trenches etc. Since part of the recharge zone was used for cultivation, other recharge measures like countor bunding and leveling of the agricultural terraces inwards were taken to facilitate recharge. In the discharge zone site-specific modifications were made to the traditional designs of the structures to improve their potential. The details of the proposed structures are given below:

S. No.	Name of Work	Unit	Quantity
1	Plantation	No.	1500.00
2	Khaal	Cum.	240.00
3	Drainage for Khaal	Rmt.	496.00
4	Loose Boulder Checkdam	No.	7.00
5	SS Checkdam	No.	2.00
6	Terrace levelling (Cultivated)	Sqm.	3666.00
7	Terrace Levelling (Barren)	Sqm.	987.00
8	Terrace Bunding	Rmt.	1448.00
9	Percolation Pit (Medium)	No.	40.00
10	Percolation Pit (Big)	No.	10.00
11	Percolation Pit (Small)	No.	500.00

Work on the spring began in March 2010 with the commencement of soil & water conservation measures.

Community Feedback

We visited the Naula in July 2012 to gauge the impact the Spring Water Recharge Programme had on the lives of the villagers in Nawali. During the course of the interaction, villagers told us that the water level had fallen dramatically 8-10 years ago and they had to fetch water from the Gadhera for their daily use. The recharge zone for the spring falls under Van Panchayat and Civil Land. The community contributed to the construction of check dams, subsurface check dams, terrace levelling, contour trenches, tree plantation and other such activities.

At present around 17 families use the Naula to meet their water requirements. Villagers mention that even during the dry month of June 2012 families were able to draw around 200 litres per day each from the Naula. For washing clothes villagers use to go to Gadhera but for the past two years they have been using the Naula to wash clothes.

However, since the work started the villagers have had enough water for their use. Discharge data from the spring indicates that there has been a tangible improvement in the water availability.

Village	Source Name	Apr-10	May-10	Jun-10	Apr-11	May-11	Jun-11	Apr-12	May-12	Jun-12
Nawli	Jogi Naula	0.75	2.8	2.4	6.6	6	4.5	7	6	5.5

Villagers feel that a separate drinking corner for animals is required so that the Naula's water doesn't get contaminated.