





Water, Sanitation and Hygiene in Jitpur Phedi, Nepal

Analysis of the current situation concerning water related issues

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Final Report – Orientation Internship

Report Type:	Problem Analysis
Author:	Marco Wiemer
Educational Institute:	HZ University of Applied Sciences
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Course:	Orientation Internship (CU11022)
Supervisor:	Bram Verkruysse
Host Organization:	Volunteers Initiative Nepal (VIN)
On-Site Supervisor:	Dr. Laxmi Ghimire
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Foreword

This report is the result of my orientation internship within the study of Water Management in my 6th semester. My research was a problem analysis of water related issues in a community near Kathmandu – called Jitpur Phedi.

I was accommodated (4) at a very kind host family. At this point thanks to Saila Dai (3) for the great cooking and his family to take care of me. The lovely evenings full of music and singing will stay in my memory for the rest of my life. Special thanks to Saila Dai's daughter Sunita – she actually took the photo which won the first prize (3) from the international office at HZ. On the picture I am trying to cook some traditional German food on an open fire – because it was for 10 people, I got help from the kids with cutting the vegetables and potatoes. The first prize is hanging on a wall in my room now – it is the photo printed on an 80x60 canvas.

Furthermore I want to thank my supervisor at VIN, Dr. Laxmi (1), for showing me around in the community and to let me help him at the health post (2) which is next to the school. I consider my assistants there as a personal enrichment. Although it is hard to see people suffering and not be able to help them as much they would need. I was touched especially about a woman that came to the health post once a week for getting new bandages on her open infected wounds that originate from a kidney operation. She suffered for weeks and in the end she died. I respect the work and time that Dr. Laxmi spend in the communities to improve the life quality of the people.

I am also thankful to the chairman of VIN – Bhupendra Ghimire. He always responded e-mails very quick and it was interesting to chat with him. I wish him all the best in further leading the organisation.

Furthermore my best wishes go to the rest of the staff of VIN. Including Shradha Shakya for being of help in all kind of matters and also taking me to see an orphanage. I want to thank Dinesh Khatiwada for have taken me to Sundarijal to show me the Melamchi project and a hydropower plant. During the survey with Vincent Harris we got help from Neelam Bhattrai, Sunila Gurung, Sujit Maharjan and Saruh Manandhar – thank you for your translations and help to interview the people.

During my investigations about the water infrastructure I got help not only from Dr. Laxmi, but also from Dipendra Phuyal, local citizens and kids from Pasmane (5) that know their district very well. Additionally I want to pay respect to the people (6) who have to work at the dumping side day for day.

Last but not least I thank my supervisor Bram Verkruysse. He was in Nepal himself some time ago. This is good because he can understand very well how things are going in Nepal.

All in all, Nepal was a very interesting place to work, although not necessarily the easiest place to work.

Marco Wiemer



Vlissingen, January 2014

Abstract

This problem analysis was done to investigate current issues in the field of water, sanitation and hygiene in the community Jitpur Phedi. The community is connected via two streets to the nearby city Kathmandu. Basic infrastructure such as a health post, schools, a village development committee shops and mobile carrier coverage is available. Power supply is available as well, but inconsistent. Issues concerning water quality are wrong installed distribution systems and not maintained water storage tanks. Regarding water quantity a lot of water is lost because of leakages anywhere in the distribution network. Apart from that, fresh water resources within the community could be sufficient to supply the population. The conducted survey revealed following issues: a lack of direct water access, inconsistent water supply, lack of private water storage tanks, limited use of purification techniques and grey-water is often not used any further. Moreover, garbage disposal is not coordinated and a threat to the population and the environment.

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Acronyms

DPSIR	Driving Forces – Pressures – State – Impact – Responses (Method)
ECDCs	Early Childhood Development Classes
MDG	Millennium Development Goals
ODF	Open Defecation Free
Terai	Name of the lowlands in Nepal
UNEP	United Nations Development Programme
VDCs	Village Development Committees
VIN	Volunteers Initiative Nepal (host - organization)

Abbreviations and Symbols

L-R	From left to right
L	Left
Μ	Middle
R	Right
MLD	Million Litres per Day

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Chapter 1: Introduction

1.1 Purpose of the Research

This research is carried out as an orientation internship within the Bachelor of Water Management of the HZ University of Applied Sciences and was executed for the "Volunteers Initiative Nepal" (VIN) in Nepal.

The place where the research has been executed was Jitpur Phedi. Jitpur Phedi is a community located North-West to Nepal's capital Kathmandu (see figure 1). It is a one hour bus ride from the city. Around 6000 people live in the community. Due to the close distance to Kathmandu and the fact that it lays on a main street the supply for the community is rather good. The benefit for the people is also that for more serious health problems the hospitals are reachable within an hour. This could be only too long in case of emergencies. In the centre of Jitpur Phedi are a few shops, restaurants, a police checkpoint, a school and a health post (see figure 1).



Figure 1 L-R School with the building on the right being the health post; Location of Jitpur Phedi (googlemaps); Police checkpoint in the centre

Although Jitpur Phedi is rather developed in comparison with remote areas, problems with water, sanitation and hygiene still exists. Drinking- or waste water treatment is not present except the local business that produces bottled water. An authority for water management is also not existent. Furthermore, uncontrolled rubbish disposal which can lead to serious water quality problems is still happening. According to the Village Development Committee (VDC) of Jitpur Phedi, the community has been declared to be an open defecation free (ODF) area but is not yet fully realized, although VIN already helped a lot with building toilets within the community.

In 2010 the United Nations declared that human have a right to water and sanitation in order to realize all human rights. VIN is aiming at realizing this major right. Thus, the purpose of this research is to analyse water related problems that exist in the community. After this analysis further steps can be taken to improve the situation in Jitpur Phedi.

1.2 Background on Water, Hygiene and Sanitation in Nepal

Nepal is a landlocked country, disconnected from any oceans or seas. Nepal has only two neighbouring countries: in the north the boarder to China and in the east, south and west the border to India. The landscape of the country is very diverse. There are basically 3 different zones reaching from the lowlands (Terai) in the south, to the hill area northwards and having eight of the ten highest mountains on earth in the mountain area in the north. Regarding water, Nepal is abundant of fresh water resources. Most of the fresh water resources coming via rivers from the glaciers in the Himalayas and feed 70% of the Ganges River in India. These glaciers are threatened by climate change (Babel & Wahid, 2008). But problems of water distribution exists already, although other reasons are responsible for that (see chapter 3.4).

A weighty water distribution problem exists in the capital city Kathmandu. People depend on the public water supply because it is either free or cheap. Bottled water is too expensive for the majority for everyday use, thus many people go everyday with canisters to the distribution spots and wait (see figure 2 L). One big plan to provide freshwater to Kathmandu valley is the "Melamchi Water Supply Project". The aim is to divert 170MLD from Sundarijal with a possibility to add 170MLD from the Yangri and Larke rivers. (Anon., 2008). Unfortunately this project has stopped so far, mainly because of financial issues which is commonly known to be caused by corruption. On spot a certain progress is visible. By now the tunnel is already started (see figure 2 M) and huge pipes have been delivered (see figure 2 R). In front of the tunnel a collection of barracks for workers were built – they are empty now. Only two Chinese guards from the Chinese contractor are left to protect the construction site



Figure 2 L-R People in Kathmandu waiting to get water; Tunnel entrance melamchi project; Pipes for melamchi project

The government built up health posts in communities which are connected to the national infrastructure. On one hand these health posts are free of charge, but on the other hand these health posts are very basic. For example there is not always a real doctor available at these locations and it is normally not open every day. Furthermore, the facilities do not offer any possibilities to do blood or urine tests. Even when a severe diagnostic is made at the health post, medication is only available for symptomatic treatment.

Concerning the sanitation in Nepal the organisation Nepal Water for Health (NEWAH) stated that it is may possible to reach a coverage of 50% of the people to gain access to sanitation facilities by 2015, but it is unlikely that a 98% coverage will be achieved by 2017 (Pandey, 2010). These two aims are both written in the Millennium Development Goals (MDG) for Nepal by the United Nations Development Programme (UNDP). Moreover, many VDCs have been declared an ODF area. To close up this chapter it should be also mentioned that within Nepal a cast system - similar to the one in India, exists. This includes the cast of the untouchables, although the rules are less rigid nowadays.

1.3 Mission of Volunteers Initiative Nepal

"VIN mission is to empower marginalized communities, with a focus on women and children, through enhanced educational programs and community training to promote equality, economic well-being and basic human rights" (VIN, 2013)

The NGO was founded in 2005 from people with different professions. They are offering internships, volunteering programs and trekking. Main focus of VIN lays on Community-based projects.

Concerning the topic water, sanitation and Hygiene the organization is doing awareness campaigns, support health posts, provides men power through their internship and volunteering programs and helps building toilets to stop open defecation. In Jitpur Phedi, VIN has built >90 toilets by now, which still leaves about 200 households having no own toilets.



Figure 3 L-R Health check at a school; the school yard with a tap for drinking water; Women empowerment class; a boy at an orphanage supported by VIN

There is also one governmental health post for the community, which is greatly supported by VIN. The organization is hiring a doctor, provides interns as well as volunteers for assistants, covers additional medicine and has built up a basic laboratory to analyse blood and urine samples. During the awareness campaigns the health post is always promoted as a place people can go on each Tuesday, Thursday and Sunday for no costs. They are also told to go there better sooner than later for example in case of wounds because of the danger of infection.

In order to check pupils, Dr. Laxmi is visiting schools from time to time to have general checks concerning teeth, hygiene and infections (see figure 3 L). Additional VIN is organizing so called work camps were pupils get told about personal hygiene such as how to brush teeth, nutrition and awareness in different kind of topics. Recently VIN also tries to make people aware of controlled rubbish disposal. The pilot project has started in one of the districts of Jitpur Phedi.

As mentioned above VIN is also doing women empowerment (see figure 3 - 3rd picture from R) and give early childhood development classes (ECDCs). Women empowerment is necessary because the man is still most of the time the leader in the family and the woman are often lack of education. It can be seen rather often that a woman is carrying a lot of things and the man walking with her has his hands empty. Another problem is when women are divorced and have to live alone. For these problems women empowerment teaches woman basic education, health, independence, initiative, self-motivation and technical skills.

1.4 Research Questions

1.4.1 Aim

The aim of the research is to make a problem analyse of the current situation in the community of Jitpur Phedi concerning water distribution, water treatment, sanitation and hygiene and to come up with recommendations for improvements.

1.4.2 Problem Analysis

Due to a low level in income as well in education combined with political issues in Nepal, the community of Jitpur Phedi is facing problems in water allocation, sanitation and hygiene. As a result, water related diseases are very common. The main aim in Nepal is to stop open defecation throughout the country by building toilet facilities. However, there are more matters that need to be solved such as the water distribution, (waste)water treatment, garbage disposal, sustainable agriculture, law enforcement and education. To achieve all these tasks an effective collaboration between NGO's, Government and the people is indispensable.

1.4.3 Main Questions

[1] How does water supply in Jitpur Phedi work?

[3] What are the issues the population in Jitpur Phedi has to cope with?

1.4.4 Sub Questions

- [1.1] What water sources are used?
- [1.2] How does the water get distributed to the households?
- [1.3] What are possible solutions for the improvement of the water distribution network?
- [2.1] What is the status of the water distribution network regarding water quantity?
- [2.2] What is the status of the water distribution network regarding water quality?
- [2.3] What purification techniques are commonly used?
- [2.4] How many people are aware of hygiene in the community?
- [2.5] How does the waste get managed?
- [2.6] What is the status of toilet constructions in Jitpur Phedi?

1.5 Structure of the report

The research on water, sanitation and hygiene in Jitpur Phedi is divided into two parts. One fieldwork concerning water allocation and a survey on water related issues.

The first part of the report will describe the methods used in the project. After that the results of the two topics will be shown after each other. The conclusion and discussion will be shown in the third part of the report. This document will end with a chapter of recommendations for future developments in Jitpur Phedi. A summary of the whole is provided in the abstract at the beginning of the report.

4

Chapter 2: Methods

2.1 Water Allocation

A sketch was created of districts and approximate locations of water sources and water tanks in the area. In the network are critical points marked which were classified with the *Sanitary Inspection Survey* (SIS) provided by the framework of WaterAid Nepal (WaterAid, 2011).

2.2 Survey on Water, Sanitation & Hygiene

The questionnaire (Appendix I) was developed in cooperation with nurse intern Vincent Harris and got approved by on-site supervisor Dr. Laxmi Ghimire. Main aim of the survey was to get to know about the needs of the people who are living in the community of Jitpur Phedi. In particular, the aspects of water quantity, water quality, sanitation and hygiene.

To ensure a certain coverage of households the survey team was divided into two groups. Each group consisted of three people. One person was responsible for the quality of the survey and was able to answer subject-specific questions. The other two persons were Nepali volunteers who carried out the survey by translating the questions to the respondents.

Before the survey was carried out a test run was done. On the first day both groups went to the same unit to do the interviews and observations together. This is indispensable to have comparable data sets at the end.

2.3 Problem Analysis

To analyse the causal chain of the situation in Jitpur Phedi the DPSIR-framework is used as a tool. This abbreviation stands for **D**riving Forces – **P**ressures – **S**tate – Impact – **R**esponses. It is used to structure the interplay between the environment and socio-economic activities (Agu, 2007). This approach is utilized to figure out the cause and the cause behind the cause for the problems at the community in order to come up with possible responses in the chapter of recommendations. A schematic drawing of a DPSIR is provided in Figure 4.



Figure 4 Schematic drawing of the DPSIR method

Chapter 3: Results

3.1 Water Allocation

The community is located in a hilly area which is widely used for agriculture. Most of the water origins from the hills in the vicinity which are covered by forests and protected by the military.



Figure 5 L-R Part of the village including farming terraces; People working on the field; Protected forests are on the Mountains in the background – where most of the water comes from

In general there is no authority for water management in the community. Money from the government for basic infrastructure is given through the VDC. On request they informed that they do not have any data concerning water distribution in the community. The water distribution in Jitpur Phedi is very simple. Small plastic pipes get connected to a spring or stream. These pipes lead to water tanks in order to store water. From that point pipes get distributed to households or public taps. All water flow is gravity driven – there are no pumps used in Jitpur Phedi. The waste water normally just flows down the hill at the point it was used. When fresh water is not running anymore people of concern go and try to find the problem themselves. If money is needed for repair, concerned people collect it by themselves or ask the VDC for support. In following parts the water distribution and its problems are shown in detail, in the sequence the water travels.

3.1.1 The Sources

In Jitpur Phedi only groundwater or streams that are a result of a spring are used as a source. Rain water harvesting is not done, because during winter time almost no rainfall occurs, whereas during the monsoon in summer heavy rainfalls occur and are causing many floods (World Weather, 2013).

Sources are used are either natural springs, maintained springs or natural streams. Groundwater can be a very good source because it is filtered through the ground. Nonetheless, despite the low turbidity of springs they could be still contaminated either with natural occurring substances or by human activities. However, the quality of the groundwater cannot be determined within this research. It can be assumed springs from more uphill from the protected forest are cleaner than streams and springs downhill where agriculture is present which partly uses fertilizers and pesticides. Moreover, downhill the likelihood of contamination through open defecation or rubbish disposal is much bigger.



Figure 6 L-R Small and muddy spring; Spring with walls; Start of pipe from a stream; Protected spring

Figure 6 shows different locations from where water is taken. Some sources are very small and turbidity of the transported water can arise already at the beginning as seen in the left picture. That access point can also be easily get stuck with clay or debris.

The picture next to it shows a spring which is protected by a wall of bricks and is also covered on top. In this case the groundwater can access the pipe with a low turbidity and with the least amount of pollution caused over ground.

In the third picture from the left the access point is at a stream. To prevent debris coming into the pipe, a small grid is placed on the access point. In this case the structure was found open with a lot of debris in it which lead to a blocked pipe entrance (figure 7 L). The stream before this access point is at many places shallow and stagnant. In consequence these places are rich in nutrients and the water is warmer which can be beneficiary for bacterial growth (figure 7 M).

The last picture in figure 6 is a protected spring. Walls were built and additionally barbed wire is placed around it to protect the source from trespassing. For some reason this spring is not covered, it is more like a small pond which can easily get polluted. Furthermore there is also a leakage at the bottom of the construction which causes quite some water loss. At the pipe entrance a grid is placed right in front of it to prevent debris from entering the distribution system.

These are not all sources that are in the area, but they are always similar to one of the four types described.



Figure 7 L-R Debris blocks the access point; Stagnant water in the stream; Damaged spring

3.1.2 Water Transport via Pipes

From the sources mentioned above are always pipes made of plastic going downhill to one or more storage tanks. In most cases the water sources have small quantities, thus normally several different water sources end up in the same storage tank.

Because there is no authority taking care of the system and the pipes are placed by non-professionals many problems occur over time. First of all a vast amount of pipes is placed over ground along small paths. This makes them vulnerable to damage from the outside and it can happen that they do not keep in place. In consequence the water flow can be disrupted. The most common problem seen in the field are leakages of the pipes which causes a major water loss but also a certain pressure loss.

A maintenance plan is not available. Thus, leakages only get fixed if there are over ground along a popular path or they are discovered when people are investigating why they are not receiving water anymore.

Figure 8 expresses the most common problems of the pipe system. Quite often leakages are discovered but not repaired sufficiently as shown for example in figure 8 L. As visible in that picture it is often fixed with a piece of a plastic bag.

Second picture from the left presents another common problem. Pipe connections can lose their link and then water is not flowing further at all. To solve that people putting stones on the connections, but even this does not guarantee that the parts will stay together. The third picture from the right also shows a leakage at a connection of two pipes. This problem was encountered very often, because no proper sealing is done.

Problems with roots as shown in the right picture can also occur. In this case a group of men (about 15 people) did not receive water at their households anymore. They were searching along the whole connection – from the source to their tap. Several parts of the system had to be dug out and tanks had to be opened. By the end of the day they found the root which was causing the water blockade (see figure 8 R). They were surprised by the size, but it was not their first time to take out roots. If they do not find a root they usually find pipes full of sediments and debris.



Figure 8 L-R Broken pipe not sufficiently repaired; Connection between pipes lost; Connection leakage; Pipe blocked by roots

3.1.3 Water Storage Tanks

The water from the pipes will all end up in a storage tank, except of some pipes that are for agriculture purpose only – they are normally discharged directly to the fields. Tanks in Jitpur Phedi can be very different. They differ in material, size and the time they were built. Depending on the distribution network, a sequence of tanks is sometimes used. The first tank(s) are for collecting a large amount of water with the aim to have a stable water supply. Afterwards the water goes either to public water taps, private water storage tanks or just directly to households without an extra storage.

Figure 9 shows the most common designs of water storage tanks. Especially the private water storage tanks can be seen everywhere in Nepal, although in different sizes (see figure 9 R). They are painted black mainly to block most of the light from the inside. This is important because algae and bacteria growth need to be under control. For the big tanks white is a more suitable colour (see figure 9 - 3rd from the L) – the concrete walls are thick enough



Figure 9 L-R Big brick water storage tank 13000L; Old cylindrical concrete tank 5000L; New cylindrical concrete tank 5000L; Private water storage tank 500L

8

to block the light from the outside. The white colour will reflect most of the light so that the tank is not heating up as fast as it would with a black painting. This is of importance because bacteria grow faster in a warm environment.



Figure 10 L-R Damaged tank cover; Leakage at tank; Inside a tank; Settling tank

Several deficits for the water tanks were encountered. First of all the big water storage tanks often have been found open. The main reason therefore is that people often check if the reason that they do not have water is because the tank is empty. After opening the tank the people are not aware of the fact that they have to close it again. This causes debris and other pollutants entering the water storage tank (see figure $10 - 3^{rd}$ picture from the L). Moreover, when light comes into the tank organisms such as algae can grow and provide organic material to other organisms. Also in some cases the cover is simply damaged as shown in the picture on the left.

As it is an issue for earlier steps in the distribution chain, leakage happens at some water storage tanks as well (see figure 10 - 2nd from the L). Leakage has been discovered only at old tanks.

The right picture in figure 10 is a surprise. It is the only settling tank built in Jitpur Phedi. The water enters on the right side and travels in a circle. During this movement bigger particles settle to the ground. At the end of the circle the upper layer of the water flows to the middle of the construction where it is further transported. In consequence the turbidity of the water is reduced.

Of course the water travels further after the tanks but this is not part of this research. This has to do with the quantity/diversity of the distribution system and in general the chain of transport mentioned so far have the major impact on the water quality.

3.2 Survey on Water, Sanitation & Hygiene

The survey is about seeing the progress of VIN's work in the community and the needs of the people. Within this questionnaire different problems are addressed. They can be categorized as follows: water quantity and quality, hygiene, diseases, waste management and the use of the toilets.



Figure 11 L-R Saruh Manandhar & Sunila Gurung with Vincent Harris; Having a rest in a nice district; Discussion with people about their needs; The author himself; Sujit Maharjan & Neelam Bhattrai during an interview

102 households have been interviewed in the 9 units of Jitpur Phedi. On average about 12 households in each unit. The results are shown hereafter.

Water Quantity & Purification

The first questions of the survey were about the direct water access for the households and about water availability. These are key factors in daily life. It can show if the people have difficulties to access fresh water for the purpose of drinking, cooking, personal hygiene, laundry and may to flush the toilet.





Figure 13 Chart shows the percentage of people having direct access to fresh water

Figure 12 Chart presents the water availability in percentage

Direct water access is defined as an access point which is located on the property of the respective household and commonly only used by the members of the household.

As shown in figure 13, the majority of the people do not have a direct water access. These people have to go to public taps or eventually to small springs that are present nearby. Furthermore in some cases people are taking water directly from a stream. People who do have a direct water access sometimes have also a water storage tank which will be the content of the results later on. When people have a direct water access they usually do not have a proper tap, but a pipe which they close with different materials and open it when they need it.

Direct water access is important for people. When families do not have a direct access they are meant to spend time for the water transport every day, which is normally done by either the women or children. Additionally, in case households do not even have a public water tap nearby they have to walk small paths to springs or streams. This poses risks of personal injuries during the transport. The chart presented in figure 12 is about water availability in both cases – direct water access and public access. Water availability is concerning the daily life and eventually expenses of the households. When water is frequently not available people have to postpone activities and in matter of fact also sometimes have to buy bottled water to serve their needs.

About half of the people have irregular water flow on their sources. The timespans told reach from few hours up to a day without water supply. The other half of the people is provided with water 24 hours. Sometimes because they have an own water storage tank.





Figure 15 Usage of different types of storage in percentage



The majority of the people does not have a water storage canister or tank (see figure 15). These people transport water in jars or cooking pots. This makes the people more vulnerable to a not regular supplying source of water. People with storage capacities store the water either in canisters or tanks. Canisters are commonly used by the people who do not have a direct access point to fresh water.

In figure 14 different methods that can be used to improve the quality of the water are shown. The most popular way to do that is to boil the water in order to kill pathogens. This method is easy to apply, although it requires resources such as wood, coal or electricity. These requirements are the reason that boiling the water is actually not done much, because it is expensive. Wood is not allowed anymore to take from the protected forests nearby. This has been done to avoid further desertification of land and to protect the habitat for flora and fauna. In consequence the prices for wood got higher over the time. Moreover electricity is a problem. Because the power supply is limited and there are scheduled blackouts for each unit. In total there is no electricity for 12hours each day.

Another method which is used from 15% of the households interviewed are filters. These filters are cotton filters as a tube. The disadvantage is that the filter material needs to be changed frequently, otherwise it can even lead to a worsening of the water quality. SODIS is not applied by any households that were interviewed. It is a method which uses solar radiation to kill pathogens in the water. One important factor for this method is that the water has to have a low turbidity to be effective. In general most of the households do not use any method to improve the water quality.

Up next in the survey is the re-use of grey water. The idea behind is that water that was used for example for laundry, washing dishes, personal hygiene can afterwards still be used to flush the toilet or eventually for irrigation (depending on the quality of the effluent).

Figure 16 shows that most people do not use their water further after they used it. It simply gets flushed away next to the house. But still, about 25% do know about the possibility to re-use. The re-use of grey water would be suitable especially for the households who do not have regular water supply.



Figure 16 Use of grey water by households in percentage

<u>Hygiene</u>

Hygiene is important to avoid that pathogens spread among people. One measure to avoid spreading is to wash hands on a regular bases with the use of soap. Due to awareness campaigns people make use of soap especially after defecation. During the interview 96% of the people are telling that they use soap regularly (see figure 18). But the observation that was made is that few of these households do not even have soap (see figure 17). This observation was done first by looking at the toilet facilities and then asking the people directly were they have their soap.



Figure 18 Households which make use of soap



Figure 17 Present evidence of soap

Waste management

Garbage is one of the biggest problems in Nepal - it can be seen everywhere along roads, rivers and basically at every place where human beings have access to. Besides the open disposal, a lot of waste is simply burned, no matter what the content of the rubbish is. This is worsening the air quality especially in Kathmandu which is already very bad due to traffic, industry, dust and the fact the Kathmandu lays in a valley. Besides that, a big amount of garbage is brought to dumping sites in the vicinity of Kathmandu. One of these dumping sites is located rather close to Jitpur Phedi. Every day big trucks (with logos that they are sponsored by Japan) bring garbage from the valley along the road that goes through Jitpur Phedi. The dumping site is located along a river and consists of several hills. Local people were indicating them because the old ones are actually covered by vegetation and visually already a part of the natural landscape.



Figure 19 L-R Volunteer at local health post; (uncontrolled) landfill gas venting; River along the dumping site

The danger is not only the pullulated soil and polluted groundwater but also that toxic (liquid) waste can end up in the main river which is right next to it and supplies people and nature downstream. Apart from the environmental damage, people who are working there day for day, get injuries on a regular bases and have a wide range of health problems which the local health post cannot fully cope with. These people are working there to scavenge any resources that might be of value for themselves or for the purpose of selling it to others. During the work they do not wear any protection which makes them vulnerable to toxicants, any kind of sharp materials and medical waste such as used syringes. Among these people are also children, old people and their animals.



Figure 20 L-R People scavenging after new delivery; one worker at the dumping site; One of the children working there

Back to the survey. VIN started a project in one of the districts of Jitpur Phedi - called Dalagaun. It includes the provision of garbage drums and rising awareness of the people. Except that district, not much work has been done in Jitpur Phedi concerning this topic.





Figure 21 percent of households with clean surrounding



Firstly, the surrounding of the household was observed if it is free of waste. This can reflect people's awareness of the necessity to deal with rubbish that they discharged. In 20% of the cases the surrounding was free of waste (see figure 22), but only 4% of the households actually have a garbage bin (see figure 21). In consequence most of the rubbish simply ends up at the hillside, which was observed as well as shown in figure x. If rubbish is not disposed to the nature people are burning it - 44% (see figure 23).



Figure 23 Pie chart shows what households do for garbage disposal

Sanitation



Figure 24 % of households having operational toilets



This part is mainly about the toilets from the households. Households having a toilet account for 62% of the people being interviewed. This amount does not reflect the overall percentage of people having a toilet in Jitpur Phedi, because the aim was to have a certain balance in order to get results from people of different social classes.

The majority - 97% - of the toilet constructions were operational (see figure 24). The ones that were not operational had either a problem with a blocked pipe entrance or the underground storage might be even full. Further investigations of the cause for the problem was not done.

In the next figure (figure 25) the percentage of clean toilet facilities are shown. 45% were not considered to be clean, in most cases because certain amounts of stool were visible.

In the end of each questionnaire people were asked about their impression of the toilets. In conclusion the ones that own one appreciate it and the ones who do not have a toilet either want to build one themselves or are waiting for support.

Chapter 4: Conclusion & Discussion

4.1 Water Allocation

Within Jitpur Phedi plenty of water is available. The overall problem is that the water it is not properly distributed and there is almost no water treatment applied. Additional, the places where the water is taken from are often not appropriate and allow a pollution right at the beginning of the distribution network. Furthermore, pollution occur also in the network itself – through pipe leakages or not closed water storage tanks. This is a results of a missing managements and no division of responsibilities among the people.

Water loss within the network is greatly impacted by lacks but also by random disconnects. This happens because links between pipes are over ground and not often properly fixed. Thus, the links often loosening. During the investigations one sedimentation tank was found in Jitpur Phedi. It only serves at one out of many pipelines and is not as useful as it could be because of pollution that happens afterwards. The majority of the water storage tanks observed would need a cleaning. Solids and debris have accumulated over the years and are a constant supply of nutrients for microorganisms and macro invertebrates.

4.2 Survey on Water, Sanitation & Hygiene

The survey revealed several short comings within the community of Jitpur Phedi. First of all, the majority still does not have a direct water access. During the survey it was difficult to figure out how far people have to walk to get their water, because of several contradicting answers. However, another issue is the not constant water supply, which affects about half of the households. This is partly linked to the deficit of private water storage tanks but also linked to the poor water supply infrastructure. To counter that problem people's awareness of reusing water has to be improved because it is not done much yet. Besides boiling water not many end-pipe-solutions to purify water are known or their application wrong (e.g. cotton filters). The awareness of people to hygiene is partly existent. Soap is used in most households, but many toilets were observed no to be clean.

Furthermore, garbage disposal still is threatening the water quality. In the community all the rubbish produced does not go to a dumping side, but is disposed everywhere without any controls. This can affect the ground water quality, the water quality in streams and also affect the water quality in the big river – especially during monsoon, when a lots of open disposed rubbish gets flushed into the river bed.

The survey itself should be considered to be an indication of problems but not as representative study. This is because certain aspects caused errors during the survey. Although, a test run was done for a week – where both groups go together – differences in interviewing arose. One problem is that the interview was written in English and no translation into Nepali was written down before the survey. In result, the translations were always made live during each interview. This caused different translations which lead to different kind of answers. Moreover, it seemed that the questions were not formulated as precise as necessary and allowed a wide range of answers. In the end people were might biased because they knew we are from VIN which means that they might get improvements after a while.

Not all survey results have been used either because of non-representative data or not relevant points. This is the result of a lack in experience in doing a survey.

Chapter 5: Recommendations

Hereafter a list of recommendations for improvements of the current situation:

- develop maintenance plan for existing water distribution system
- decide responsibilities within that maintenance plan
- improve water inlets at the water sources (add covers, filters, locks ect.)
- remove water inlets that are not directly connected to a spring
- fix pipe leakages properly
- remove unused pipes
- clean up water storage tanks and check covers and locks
- after improvements check water quality
- discuss implementation of basic water purification systems
- educate people on possibilities to re-use (grey) water
- educate people on basic water purification techniques
- increase water availability for inhabitants through improvements mentioned above and maybe through extending the existing network
- analyse if SODIS is an effective method after having water distribution improved
- continue support for toilet construction to achieve ODF
- check if some toilet facilities have a leakage
- extend campaigns for garbage disposal



Figure 26 Women carrying collected fire wood home

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Water, Sanitation and Hygiene: Survey at Jitpur Phedi, Nepal

Name of the head of the family:

Number of household members (adult/children):

Unit:

1) Do you have direct access to water?

Yes

If yes, which type?:

If no, where do you get the water from? :

No

2) Is water available at all time?

Yes

If no, how many hours is it available?:

No

3) How do you purify your water?

No purification Boiling Filtering SODIS other

1

4) Do you have a water storage container?

Yes No

If yes, which type?:

5) Do you make reuse grey water?

Yes No

6) Do you own toilets facilities? :

Yes

If yes, which type? :

If no, where do you normally go?:

No

Year of the toilet construction:

7) Is the toilet supported by VIN?

Yes No

- 8) What do you do for the maintenance of your toilet?
- 9) Does everyone in the family use the toilet?

Yes No

If no, what is the reason?:

10) For those who use the toilets do you use them at every time? :

Yes No

If no why and how often do you use it? :

11) Do you flush the toilet with water after use?

Yes No

12) Do you wash your hand after use? :

Yes No

If yes with or without soap:

13) How many times family members have been sick in (who and witch type) :

3

The last week:

The last month:

This year:

Optional question: Are some people in the family who or have suffer of diarrheas/dysentery diseases?

14) How do you manage your waste inside the house and their evacuation:

15) What are your impressions about the toilet construction how did it improve your daily life:

Observations:

I. Do you notice a direct water access?

Yes No

II. Do you notice a water storage container?

Yes No

If yes witch type:

III. Is the toilet well maintained?

4

Yes	No
IV.	Are the toilet facilities operational?
Yes	No
If no v	why:
V.	Is there evidence of water and soap use after toilet use?
Yes	No
VI.	Is the surrounding look free of waste
Yes	No
VII.	Do you notice a waste collector close to house?

Yes No

VIII. Other observations!