WaQuAC-NET Newsletter
Water Quality Asian Cooperation Network
http://www.waquac.net

Volume 40 issued on April 15, 2019
For Safe Water, Do Network.

Question & Answer Corner

Q : How should I do a leakage investigation at the location where pipe is below the groundwater level (high groundwater level)?

(by Mr. Y.K, Sri Lanka)

A1: Answerers
Mr. Oda Hiroto
(Fukuoka City Waterworks Bureau OB)
Mr. Ooe Kitaru
(Fukuoka City Waterworks Bureau)

1. Water leakage investigation method

The most common method of water pipe leakage investigation is to detect the sound of water leakage from the leakage point.

There are other methods, such as a method using radar waves and a method of injecting gas into a water pipe for investigation.

2. Comparison among leakage detection methods

The main methods are as shown in Table 1.

3. Leakage investigation method of water pipe where groundwater level is high

The acoustic survey to locate a leakage point using an acoustic bar or a leak detector is the most commonly adopted at present. However, this acoustic survey will be very difficult to detect leakages because this method requires very high skills especially when the points to listen are limited, or groundwater level is high (where leakage sound is difficult to transmit).

For this reason, as shown in Table 1, it is considered that the correlation method using a correlation type water leak detector and the tracer gas method are effective for the leakage survey where the groundwater level is high.

However, these methods are not widely used in developing countries for the following reasons:

1) The cost of the survey is high.
2) Listening points (valves, taps, etc.) rarely exists within 200 meters.
3) In the case of correlation method, leakage cannot be detected unless the pipe information such as material, diameter and length etc. are clearly identified.

＊ The smart ball method has not been so popular because it is still new in its development.

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Table 1. Comparison of currently used methods

Survey method	Details	Effectiveness in places where groundwater is high	Assess-ment
1. Acoustic Survey method	Locate a leakage by a leak sound transmitted from a pipe to a road surface, a valve, a plug, etc. using a acoustic bar or a leak detector	Not suitable under the environment where leak sound is hard to transmit (hollow condition, underwater, PP or VP pipe) due to the limited locations to do listening, and limitation of the operator's hearing.	△
2. Correlation method	Use multiple leakage sensors installed directly on a pipe or valve, plug. Locating a leakage points by time gap among leakage sounds captured by each sensor at some points.	Effective even the groundwater level is high, if the exact pipe length is clear and the survey target distance is less than 200 m.	○
3. Tracer gas method	Inject gas, which does not cause any problem to water quality, into a pipe. And locate a leakage on the ground surface by detecting the gas leaked from leakage point.	Possible to identify leakage that cannot be detected by ordinary acoustic survey. Also effective even the groundwater level is high.	○
4. Under-ground radar method	Locate a leakage by the differences in dielectric constant between of the surrounding ground and wet ground due to leaked water	Unsuitable when the groundwater level is high because it is a method to identify the leak location by capturing changes in the ground wet condition.	×
5. Smart ball method	Insert a hearing sensor (ball shape) into a pipe and let it flow through the pipe. And detect a leakage location by information recorded during this time.	Since it has been developed overseas, there are a few results in Japan. It will be an effective measure also for high groundwater level places because it is not susceptible to the surrounding area of the pipe.	△

From the above, under the situations that effective water ratio (revenue-water ratio) is low, the most effective measure is to strengthen patrols, detect existing leaks quickly and repair them immediately.

For example, since there are many unpaved places in developing countries, leakages can be detected on the ground, if there is a certain level of water pressure and leakage as depending on the burial depth of a pipe. (Photo 1)

In addition, bubbles may come to the water surface at crossing with waterways. (Photo 2)

Photo 1: Leakage on the ground

4. Issues about leakage when groundwater level is high

1) In terms of leakage at high ground water levels, the most worrying thing is the possibility of water contamination; especially under the

Photo 2: Bubbles on the water surface at crossing points of waterways

Photo 3: Underground water flowing into pipe

Photo 4: Piping work (rep airing leakage) in water

condition that there is constantly quite low water pressure in a pipe, or when the water pressure drops to low (possibly in developing countries). The underground water may flow into a pipe and the tap water be polluted. (Photo 3)

2) Repairing leakage and piping work at the place where the underground water level is high, it is essential to work properly with water replacement work and dry work. However, in developing countries, those works are often carried out in water by hand. In such cases, it is doubtful whether water leakage repair work or piping work can be done completely. (Photo 4)

5. Considerations

If the groundwater level is assessed to be or become high, it is necessary to take measures to prevent a pipes from floating when it becomes empty; secure a minimum burial depth of pipe. In addition, it is necessary to install accessories such as valves for enabling to stop water in emergency such as accident.

As described above, when effective water ratio (revenue water ratio) is low, “Ad-hoc responses” (a method to find out existing leakage and repair it immediately) is effective as immediate action. Thus, the early detection of underground leakage is as very important as the immediate repair of leakages found on the ground.

However, with few pipe accessories, it is very difficult to conduct planned leakage prevention surveys and identify leakage points.

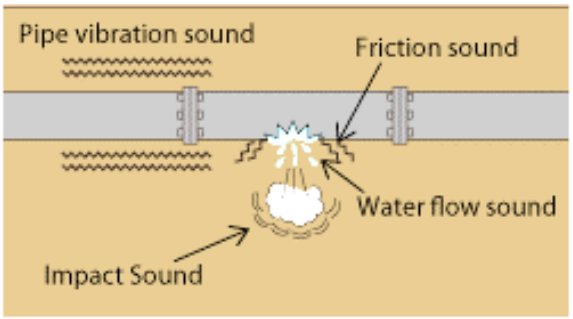
From this point of view, it is urgently necessary to install pipe accessories at appropriate places. With such an initial investment, economical and high-quality maintenance can be possible in the future as a result.

A2: Answerer

Mr. Sekimoto Shinichi
(Kyowa Engineering Consultants Co.,Ltd.)

I think the question seems to intend to capture the leak sound on the ground surface using a leak detector.

Leak sound is accompanied by a complex sound composed of the four elements; running water sound, impact sound, friction noise with a pipe, and pipe vibration sound as shown in the figure. If the underground water level is higher than the burial depth of a pipeline, it will be very difficult to detect correct position of leakage by acoustic survey using a leak detector because it is similar condition to a leakage in a swimming pool (a space is created around the leakage hole



Fig; Generation mechanism of the leakage sound

due to leaked water, and filled with water looking like a pool). This is because the each component of the leakage sound, in particular the impact sound, is wiped out. For example, if you use a hose to jet water to a wall, you will find the place where a big sound "Bacha, Bacha" generates; the wall which the water splashes against. However, with the same amount flow, if you dip the tip of a hose into a water-filled pool, the sound will change to a small sound “Buku Buku” You won't know where the sound is coming from. Such a leak-in-pool detection requires careful and time-consuming work and skilled experience, and often it cannot be detected. If leak sound is propagating to the valves or meters near this pipeline, it is possible to identify the leakage position by a correlator.

By the way, when the road is paved with asphalt and the pipe is buried under the road surface as in Japan, the road surface acoustic survey using a leak detector is efficient. Conversely in many cases in developing countries, when pipes are buried on the shoulders of the road or under the embankment, it is not recommended to use the sound detection method using the leak detector. The reason is that soil plays a role of a cushion and silencer and it is difficult to capture the leak sound on the ground surface.

In Nyeri water & sewerage company in Kenya, instead of this acoustic survey, they use an ultrasonic flowmeter (UFM) as a main method of leak survey. Excavate every approximately 100 m, and set an UFM, then check the passing flow rate to narrow down the location of the leakage. From the upstream to the end of the pipe, they repeatedly work to track down the amount of leakage completely by flow measurement.

Verification of passing flow rate using UFM

If the surface condition at the leakage survey of your question is not paved with asphalt etc., I recommend not to persist only in acoustic survey with a leak detector, but to apply a method of narrowing the leakage point by flow measurement with ultrasonic flowmeter. If it is easy to arrange a hand digger worker, the flow measurement method is even more effective. In this way, it is important to select an efficient survey method according to the local situation.

A 3 ：Answerer

Mr. Matsuoka Yasuhiro

(Yokohama Water Co.,Ltd.)

The case of question can be surveyed by conventional leakage survey (acoustic survey). The pipe laying condition might decrease the sound of leakage, but we can detect anyway. However, if the pipe is really in a water, it will be difficult. The following figures, from 1 to 4, depict the conditions of pipes in underground. The usual condition of underground water is shown in Figure 1.

The condition of the question is described in Figure 2. We often hear the similar question in

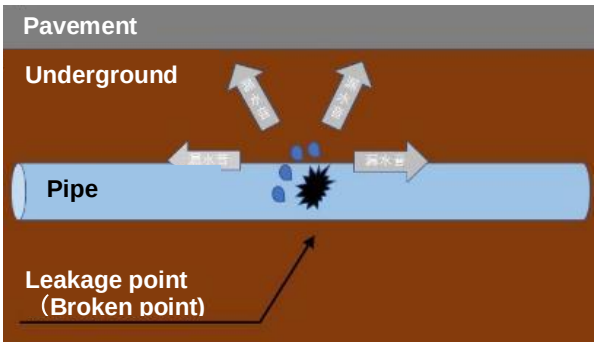


Figure 1　Normal Pipe Laying Condition

developing countries. Our usual answer is “Is your country (survey area) under water? If not, we can do it”.

The basic theory of leakage survey is to hear the water spraying sound generated by leakage. The sound reaches to your ear or equipment through the pipeline or ground.

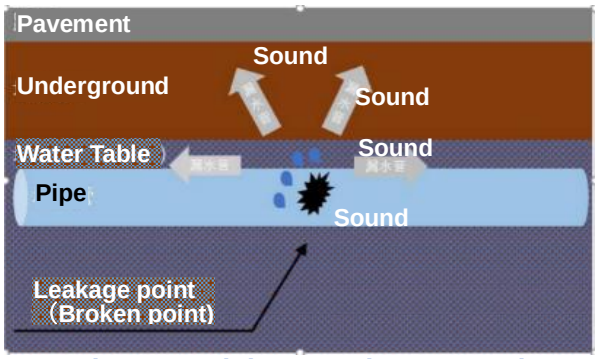


Figure 2 High Groundwater Level

We can detect the leakage as far as the spraying sound is there. Even if it is under the underground water table, it is not fully saturated by the water. It is the mixture of particles water and soil, and there is sound of spraying water. On the other hand, the cases shown in Figure 3 and Figure 4, where the leakage point is fully inside the water, there is no sound of leakage. In the case of Figure 2, the leakage water generates the sound of spraying on soil and stones. Sometimes, the sound may not be so clear and difficult to find. Therefore, you would better take more time for the survey or, repeat the survey in such area.

Figure 3 shows the condition that the leakage point is fully submerged in water of leakage, effluent, etc. It is called “Pool”. The leakage water cannot generate any spraying sound, therefore, we cannot detect the leakage point by usual procedure (acoustic survey). Furthermore, we cannot know such situation happens from the ground surface. So that, we shall survey regularly and wait for the leakage to come to the surface or leakage sound to become sonic due to loss of “pool” water.

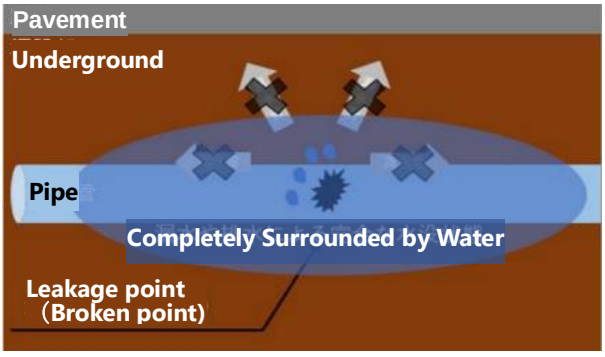


Figure 3 Pipe is in Small Body of Water

If you cannot reduce NRW, cannot find any other leakages, should doubt such condition, and you need really to find out the leakage, we recommend you to conduct the water flow measurement in short distances so as to narrower the potential area of leakage point. This procedure has been used successfully in Nyeri City in Kenya.

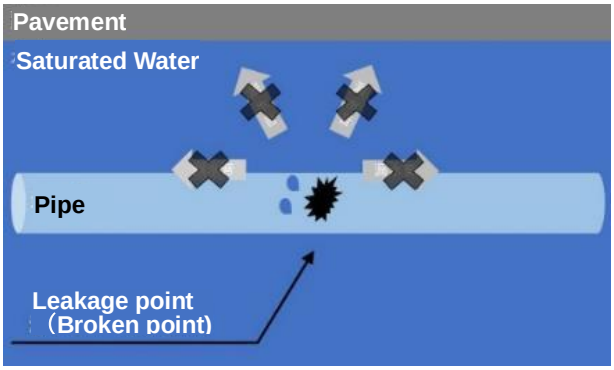


Figure 4 Pipe lays in Water

Figure 4 shows that the water pipe is laid in water. It is different from the case in Figure 3, because we cannot expect any surface leakage and future sound creation. We had better replace the pipe, or we can measure flow rate in short distances. I have seen such condition shown in Figure 4 in Southeast Asian countries. The pipe was in a waterway. You can imagine easily the problem of such condition.

I explained four types of pipe buried condition. I would like to request you to remember that there is no leakage survey method and equipment shall be applicable for all cases. It is very basic that the leakage survey needs time to spend with

combination of multiple methods and instruments.

Please remember that it is very difficult to find out every leakage point at one survey. It is because of the case of Figure 3, disturbed by outer noise, or too small leak sound.

Leakage will occur again. So, you need to conduct regular and stead leakage survey in order to lower and keep the NRW level. Leakage survey is not so eye-grabber but very essential in water supply business. Please utilize the knowledge to improve your business.

A 4: Answerer
Mr. Takahashi Junichi
(Tokyo Waterworks International Co., Ltd.)

The question is that acoustic survey is not easy to detect leakage at the area of high groundwater level. On the condition that the leak sound is hard to occur, I would like to write the situations of resin pipe (PVC, PE) leakage.

1) Leak sound: The volume of the leak sound is smaller as the water pressure is lower. In the contrary, the higher the water pressure is, the bigger the leak sound occurs.
2) If the pressure is high to some extent, leak sound in high frequency band is easy to occur. If acoustic survey is difficult, it is assumed that the pressure is less than 1 bar. When it is less than 0.5 bar, depending on the shape of the leak hole, leak sound cannot be heard without approaching closely to the leak point.
3) Water leaks of PVC and PE pipes are relatively low in frequency bands. Although low frequency sound can be transmitted longer distance, leak sound of PVC and PE pipe is originally small, thus do not transmit.
4) Even if the water amount of leakage is large, the sound may not be loud.
5) The smaller the leak hole size is, the smaller the leak sounds.
6) Non-metal pipes have a slower sound transmission speed and shorter distance than metal pipes.

As described above, acoustic survey of resin pipes (PVC, PE) under low water pressure has difficulties. However, since leak sound is still generated, sound detection method can work. The followings are the possible measures to enhance the effectiveness of the acoustic survey method.

[1]	Increase detection points closer to possible leak point. (installation of valve)	Increasing the number of valve is also good for flow management because there are quite few valves on distribution network of developing counties.
[2]*	Bore a hole to make a contact point to pipe by acoustic bar.	(See descriptions below for the details)
[3]	Increase water pressure by a pump or a pressure tester.	With higher pressure, leak sound is be increased inevitably.

＊[2]

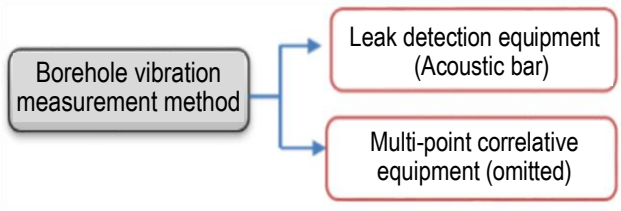
1） Terms related to acoustic survey

Acoustic survey: 1) listening survey of meters, public taps or valves using an acoustic bar, and 2) detecting survey of leak sound which is transmitted to the ground surface using a leak detector.

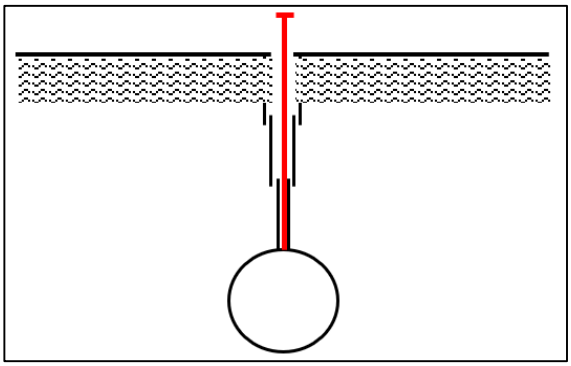
Photo 1: Checking leakage at meter, public tap and valve.

Photo 2: Detecting leak sound transmitted from buried pipe to the surface.

2) Referential case : The method is to detect leak sound transmitted along pipes by a vibration-sensing bar inserted and touched at the top of the large diameter pipe through bored hole. This method uses a metal vibration-sensing bar inserted into bored hole, so called “borehole vibration measurement method”. The following equipment is used for this method.



Detection by leak detection equipment (acoustic bar) is carried out as shown in the figure below. First, drill a borehole with reducing its diameter every 1m depth, and insert a vibration sensing bar (D 9mm, steel stick) to touch the pipe, then put a leak detector on the stick to check whether leak sound exists and how big.



A5: Answerer

Mr. Nakanosono Kenji

(GOODMAN INC.)

A metal pipe (DIP, SP) and resin pipe (PVC pipe, HDPE pipe, etc.) are mainly used as underground pipe, especially in developing countries. In the conventional water leakage survey, the acoustic survey is popular. This method is done by listening to the sound which is transmitted from the leakage point via a metal pipe. In many developing countries where resin pipes are often used and water pressure is low, it is difficult to locate a leak point by using conventional acoustic survey.

Recently, a tracer gas method that can be used for resin pipe has been developed. I have done leakage surveys that could locate leakage points with the HT (Hydro Tracer) method as one of a tracer gas methods. The targets were water supply pipe of mid/large diameter, transmission and distribution pipe (D900mm, 300mm), and service pipe (50mm to 20mm), agricultural waterway pipe (500mm, 900mm), and watering pipe of a golf course (100 mm-150 mm). We could identify underground leakage point using a gas detector because the gas comes out immediately above the leakage point especially in the area where the underground water level is high.

However, it is difficult for the gas to come out directly above a concrete pavement. Since the gas comes out at the joint part, we can assume that the branched points of that line as the possible leakage point. It will be easy to detect if the ground is grass, fields or wasteland, etc. because the gas comes out directly above.

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We welcome any opinions, and questions to this Q & A Corner.
Please contact us.

Supporting water supply in Nepal

Mr. Saiki Takashi (JICA Expert)

1. Introduction

I am a JICA WaSH (Water, Sanitation and Hygiene) Expert working for Ministry of Water Supply of Nepal since December 2017. The main objective of my assignement is to strengthen the capacity of Nepalese Government Officials working in the WaSH sector and to effectively implement JICA supported water supply projects. Here, I would like to share my activities. I also present a report at the Knowledge Sharing Seminar held in Nepal as a part of the follow-up to the JICA's Knowledge Co-creation Program in Kathmandu in February 2019.

2. Current situations and my activities

I presented my findings through "Report on Research Results of Water Supply Facilities in Biratnagar Metropolitan City, Nepal" to the government officials and engineers working in WaSH Sector of Nepal in that Seminar.

Biratnagar is an industrial city located in the south eastern part of Nepal. As located near the Indian border, it has always been one of the major trading hubs of Nepal. Trade and commerce are one of the major occupations for the people of Biratnagar. The census 2011 showed that only few cities had more than 200,000 inhabitants in Nepal; including Biratnagar. After the transformation of the country into the federal structure, Biratnagar became a capital city of the province. This has further triggered the migration of people from nearby districts in search of better opportunities. The population has been increasing rapidly more than the future projection.

Field survey in Biratnagar
(Second from the right is Mr. Saiki)

The main objective of my research is to understand the situation of water supply facilities in the metropolitan city, as a representative city of the Terai area and to identify the main challenges in water supply including operation & maintenance and administration.

Basically, this research focuses on three aspects; a) complying with the water quality standard; b) measuring accurate quantity of water produced; and c) collecting water charges firmly and setting the proper tariff which enables sustainable management of water utility. These are the most important issues to be visualized for good management of water supply in the Biratnagar city.

Water is a basic need for humans' survival. Water-borne disease is one of the major cause of deaths of people in developing countries. Thus, it is a primary responsibility of government to provide safe drinking water to its people. To achieve this objective, water utilities must maintain the quality of water to meet the international or national standards. Customer complaints can be one of efficient indicators to understand whether Nepal Water Supply Corporation (NWSC) Biratnagar is supplying the sufficient safe drinking water or not. During the research, I found the complaint rate for water service in the city is 13% in a year. According to my experience, this percentage is far more compared to Japan, one of which is roughly 1% in water services. This means that customers

Presentation at the seminar

have a lot of complaints and are not satisfied with tap water in Biratnagar. Thus, NWSC Biratnagar needs to identify main cause of complaints from the customers and make necessary improvements.

Further, on the water quality side, I explained causes of complaints concerning water quality. We checked the situation of residual chlorine from reservoir to customer's tap. Residual chlorine at the reservoir was 2.0 mg/L and at the customer's tap was 0 mg/L. This decrease in quantity of residual chlorine at a distance of roughly 1.5 km is due to leakages in the route. To overcome this problem, it is necessary to detect leaks and repair or replace pipelines as early as possible.

The second basis of the research was "accurate measurement of quantity of water produced". During the survey, I found master meter was not installed or dysfunctional. Information on the total amount of water produced from deep tube wells were not managed satisfactorily. According to NWSC, Non-Revenue Water (NRW) in Biratnagar is about 40%. This shows that NWSC is losing its substantial amount of revenue, which could have been used for improvements in water supply facilities. NWSC needs to keep all records of production and distribution so that accurate value of NRW is calculated. This high percentage of NRW must be reduced gradually so that maximum amount of water can be sold.

In the process of leakage repair, the most important thing is "locating and repairing the leakage in the supply network immediately". This activity needs to be carried out continuously until the NRW rate drops significantly.

After the declaration of provincial capital, infrastructure development in Biratnagar has taken a pace. Construction activities for roads and drains within the city adds to NWSC's burden. According to NWSC Staff, the ongoing road construction has damaged pipeline at many places. Another cause of leakage is installation of unnecessary bends. If those bends were not installed, there would be less chances of leakage. Leakage also occurs due to improper management and the construction methods followed during laying of pipes. So, there is an utmost need to improve the construction methodology and management of pipelines.

Thirdly, NWSC needs to revise their tariffs to make it sustainable to perform daily operations and supply safe drinking water to the people of Biratnagar.

Finally, challenges were described using the concept diagram as analysis of task hierarchy of water supply management including O & M. The major challenges can be classified from the areas of, the management as the basis; facilities and administration in the next; visualization and quantification, and finally information management in Biratnagar. Only after resolving the low-level challenges, higher-level challenges can be settled. I recommended NWSC to analyze these challenges and prepare solutions.

3. My impressions

I work for water supply in South Asia for the first time. I saw a water supply depending on culture, customs and social conditions, which are different from the ones I have experienced before. In addition, people face the shortage of water in many parts of the country due to lack of

proper management. They are concerned about hygiene issues as there is a prolonged storage time. Also, staff are classified strictly between manager level and worker level. In the rural, I saw each worker doing single task like excavation work, connection work and valve operation respectively.

Looking at the scene, I remembered that I could see similar scenes in the Waterworks Bureau in Japan at the time I started to work in my hometown.

The use situation (pattern) of public tap
※ In the case of a large-scale facility, water supply by natural water is not enough, and it is used after being stored in a tank once

Revisit to Nepal

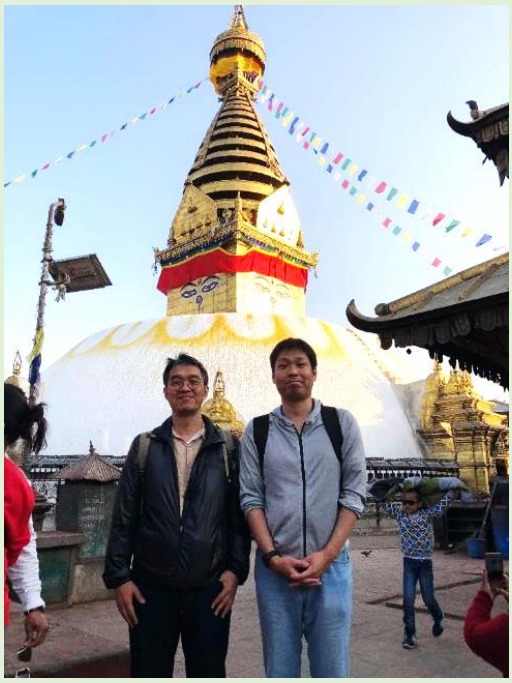
Ozaki Noboru,
Sakai City Waterworks and Sewerage Bureau

Our member Mr. Ozaki used to be a long-term expert working in Nepal. He wrote about the earthquake in Nepal in Newsletter Vol.29. This time, he revisited Nepal to see Mr. Saiki, and posted an article about the visit. (WaQuAC-NET Office)

Hello, I am Ozaki, dispatched to Nepal as a technical cooperation expert from 2006 till 2008. I visited Nepal to see Mr. Saiki last November. I would like to write here about another purpose of my visit; situation after the earthquake.

The city of Kathmandu seemed to be the same as before the earthquake. As looking closely, we could recognize that some buildings have been rebuilt, or reinforced with supporting sticks, however, it does not change much from 10 years ago. The cityscape is of complicated narrow roads and brick buildings. Although the temples of the world heritage site seem to be finally starting the reconstruction, I suppose that the reconstruction of residential areas have been hastened.

In terms of "reconstruction", it may be necessary to widen the roads and to make the buildings anti-quake. However, when there are neither evacuating housing nor financial support



At a Buddhism pagoda in Nepal.
(from left) Mr. Ozaki and Mr. Saiki

for housing rebuilding, it is difficult to say, "Be patient because we need to rebuild a better city." I was made to think how we can “Build back better”, in the situation where people faces to survive now.

Traffic jams and air pollution in the city are getting worse and urban sprawl spreads to the wider area, I feel. I suppose that population influx into the capital has progressed due to the earthquake. In Kathmandu, where there is little water, the water supply has come to a more severe situation. I would like to expect Mr. Saiki's contribution.

Report of Tohoku Meeting

★ In responding to the invitation from Ms. Yamamoto of WaQuAC-NET Office, I took part in Tohoku meeting for exchanging information and opinion with Tohoku members at Sendai on January 14, 2019 Participants were 4 people, Dr. Ishibashi, Mr. Tate, Ms. Yamamoto and me. Since it was very first time for me to meet Dr. Ishibashi and Mr. Tate that time, I had big anxieties and small expectations as I got on the Shinkansen bounding for Sendai. Of course, the result was completely different. Big anxieties disappeared as soon as we got together because of nice personality of two people. I felt pleasant excitement during talks with three experienced members, and I myself talked a lot too… And soon, it was coming to the time to say goodbye with so huge impression and decisive influence on the way of my life at just hit my turning point.

It was very big new encounter after a long time and a very meaningful exchange meeting.

I learned lots of important things: have a dream and keep striving for it, keep challenge for the public good without seeking for a reward, keep challenging against disaster or issues in developing area based on our experience gained up to now and then improve ourselves and so on.

Moving from Saitama to Sendai by Shinkansen,

(From left) Mr. Tate, Ms. Yamamoto, Mr. Shimomura, Dr. Ishibashi

having a three-hour lunch meeting at a restaurant in the station, and

got to return by Shinkansen without getting out of the station.

With such a first experience, it has become another rare valuable experience that I could share the idea how a person should be and also the near future activities of WaQuAC-Net among four members. ***(By Mr. SHIMOMURA Masahiro, Saitama City Waterworks Bureau OB)***

★ We have declared that "WaQuAC-Net monitors the reconstruction of the suffered area, Tohoku by the Great East Japan Earthquake" on our website. However, we couldn't make a chance to go to Tohoku since 2014. And this time, I could visit Sendai City with Mr. Shimomura for exchanging information of the reconstruction including water system mainly. There are three WaQuAC-Net members in Tohoku. But Mr. Watanabe who works for Sendai City Waterworks Bureau, unfortunately got the flu just before our meeting and couldn't join.

Summary of the meeting is as follows;

Dr. Ishibashi had returned tentatively from Kohn Kaen University, Thailand and could join this meeting. When he was young and an assistant at Tohoku University, he had investigated the damage to the water supply facilities in Sendai City and Ishinomaki City by the Miyagi prefecture offshore earthquake in 1978 as a member of study team. And they summarized the measures of water supply facilities and etc. The report was published in Japan Water Works Association (JWWA) Magazine No. 542.

The Ishinomaki District Water Supply Authority (IDWSA) had been hit by several earthquakes over the last decades. Through these experiences, it had strengthened the countermeasures against earthquakes. And then, IDWSA has made efforts to deal with

earthquake disasters as a key organization of the JWWA Miyagi Prefecture Branch.
Mr. Tate had been dispatched to IDWSA from KANAGAWA Water Supply Authority (KWSA) as support staff for the reconstruction of damaged system for two years since April 2012. He returned to KWSA once in April 2014. But one year later, surprisingly he quitted KWSA and became a permanent staff of IDWSA, because he wanted to work until completion of the reconstruction work. Sueyama WTP of which Mr. Tate worked for the construction, was completed in February 2018.
Mr. Shimomura was interested in the reconstruction of Ishinomaki City, as Saitama City Waterworks Bureau had supported emergency water supply for citizen and emergency rehabilitation for distribution pipes of IDWSA.
This year is the eighth year since the Great East Japan Earthquake occurred, and temporary housing will be removed, and various support projects are scheduled to end. I think that we should know the progress of reconstruction projects and how those projects brought residents to recover their safe and comfortable life.

（By Yamamoto Keiko, WaQuAC-Net Office）

Eight years
after Great East Japan Earthquake‼
Let's check how reconstruction
has progressed in coming June.

Member's news ♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪♪

Attendance to graduation ceremony

Ishibashi Yoshinobu
Professor of Khon Kaen University, Faculty of Public Health

Graduation ceremony of Khon Kaen University was held twice in the morning and afternoon at the convention hall on campus on December 7, 2018. Approximately 6,000 students from 23 faculties graduated and approximately 1,600 master and doctoral students completed. Undergraduate students, graduate students and faculty members wore the same gown. The situation was really spectacular.
As Khon Kaen Univ. was established with the intention of the Royal Family, the ceremony followed the rules of the Royal Family. Princess Sirindhorn handed a diploma to approximately 7,600 students in a solemn atmosphere. I felt that work was a hard work. Royal Guards carried

With my master course completion student

sabers and guns and watched the ceremony without moving. Many police officers and soldiers were in charge of security outside the ceremony hall. Graduates were practicing carefully and repeatedly for one and a half days to receive a certificate from Princess.
I was at the forefront just like last year. At the time of attendance, attendees were restricted from taking photographs and using toilet. Thai faculty members seem to have escaped from attendance that they have to endure for a long time

There were many shops on the campus, such as flowers, stuffed animals that imitate graduates, toys, and food stalls. It was like a festival. Unusual traffic congestion occurred in Khon Kaen.

In the week before and after the graduation ceremony, photographs were taken in each faculty and many parties were held. The university was full of festive mood.

Report of WaQuAC-Net General Meeting 2019

WaQuAC-Net General Meeting 2019 was held as follows.

Date: February 15, 2019

Place：Yaesu, Tokyo

Participants：Mr. Arimura, Mr. Morita, Mr. Nakanosono, Mr. Sasayama, Mr. Sekimoto, Mr. Shichijo, Mr. Shimomura, Ms. Yamamoto

Subject:

1. 2018 main Activities: Exchange meeting of members in Thailand and Cambodia were held in February and March respectively. Three Japanese members participated. In Thailand, three seminars in MWA, PWA and Kohn Kaen University were held. In Cambodia, trainings for algae and water quality analysis were held as follow up in March. Totally, more than hundred participants including non-members joined these activities. (More detail, see Newsletter vol. 37).

Mini Talk 11 was held with the theme of “Finance and accounting of water utility for engineers (2nd)”. Instructor was Mr. Kuroda and 14 people gathered and studied finance. This theme will be continued in the mini-talk.

Number of members: The number of present members are 75 people living in foreign countries (32 in Thailand, 28 in Cambodia, 5 in Vietnam, 3 in Myanmar, 3 in Indonesia, 1 in Laos, Philippines, Zambia, Kenya respectively.) and 68 people in Japan. Totally, there are 143 members. (As of February 15, 2019)

2. 2019 activity plan: As usual years, Kyushu branch general meeting and the Osaka meeting are planned. As special event, a visit to Tohoku area for monitoring the progress of the reconstruction in the eighth year after the Great East Japan Earthquake is scheduled in June. In addition, we plan that related persons will visit in Vietnam; Thua Thien Hue Water Supply Company, which celebrates the 110th anniversary this year, and dispatching experts to Khon Kaen University, Thailand.

After general meeting, new-year party followed. Participants enjoyed to drink, eat and talk. It was a time which everybody had a fun in so busy days.

(By Yamamoto, WaQuAC-Net Office)

Introduction of new members

1. Dr Sujithra Kaushaliya Weragoda (Sri Lanka)
2. Dr. Nuttaporn Pimpha (Thailand)

We welcome new members anytime
Please contact us

WaQuAC-NET Newsletter Vol.40
Issued on April 15, 2019
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Next Activity

April 26	Mini talk on GIS utilization
June 15 – 17	Visiting Tohoku
June 15	Newsletter vol.41 in Japanese
July 15	Newsletter vol.41 in English