WaQuAC-NET Newsletter Water Quality Asian Cooperation Network **Vol 54**
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For Safe Water, Do Network, August 8, 2022

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Report on the10th WaQuAC-Net Webinar

A Study on Non-Revenue Water Reduction -Theory and A Case Study in Phnom Penh City Capital of Cambodia

Report：Mr. Natsuki Iwao
（Kyoto City Water Supply and Sewerage Bureau）

1. 10th Webinar Overview

Mr. Pharith

Phnom Penh Water Supply Authority (PPWSA) of Cambodia achieved 6% NRW rate in 2006, which is a remarkable reduction compared to 72% in 1993. While many countries have the issue of NRW, this figure is superior to that of Japanese water authorities that supported Cambodia at that time. At this 10th webinar, Mr. Chenda PHARITH, a PPWSA staff member, was invited as a lecturer and presented the management of NRW in PPWSA receiving immense praise based on the contents of his master's thesis at Toyo University. In the presentation, factors that caused NRW in PPWSA were analyzed. The study concluded that the most effected factor was the Connection Density in a kilometer pipe length and the Leakages Frequency Index (LFI) found the highest on pipe diameter of 63mm.

LFI = Leakage Frequency / Pipe Length)

In the comments on the presentation, the content focusing on reduction of the commercial losses, necessity of continuous maintenance and current NRW ratio was shared

The presentation of the case study at PPWSA was very interesting and helpful for measures against NRW. The content was so rich that there was not enough time to fully discuss the major common issues among each country. Please take a look at the presentation materials of this webinar *.

* Presentation materials: It is put on the Reference of the WaQuAC-NET Web page. (Please check from the link below)
https://www.waquac.net/english/data.html

2. Contents of the event

> Meeting: Online (ZOOM)
> Date and time: 30th April 16: 00～17: 30
> Lecturer: Mr. Chenda PHARITH
> Moderator: Mr. Natsuki Iwao
> Technical support: Ms. Mina Yariuchi
> Participants: 22 WaQuAC-NET members

1) Cambodia: H.E. Ek Sonn Chan
   Ms. THOR Kounthy,
2) Indonesia: Ms. Indrastuti,
3) Kenya: Mr. Kamuruana Christopher,
4) Myanmar: Ms. Ei Khaing Mon,
   Mr. Zaw Win Aung
5) Thailand: Ms. Khodseewong Sirapat,

Ms. Wasana Watanakul

6) Japan: Mr. Jin Igarashi, Mr. Toshiki Horie, Dr. Mari Asami, Mr. Yoshinobu Ono, Mr. Ken Tsuji, Mr. Noboru Ozaki, Mr. Koichi Matsubara, Mr. Shozo Okada, Ms.Taeko Miyashita, Dr.Yasuhiko Morita, Mr. Hiroshi Hirowatari, Mr. Shinichi Sekimoto, Mr. Kazunori Nakai, Ms. Keiko Yamamoto

> Organizer: WaQuAC-NET

3. Comments on the presentation (summary)

・ Based on the fact that aging pipes and meters can easily have errors, it is very important to continue steady effort by recording leakages, analyzing their reasons and replacing aging meters for reduction of the commercial loss.(Mr. Hirowatari)

・ What is the current NRW ratio in Phnom Penh? What is the major issue of the commercial losses?
Why the flow rate and pressure show a similar trend? In Japan, they usually show the opposite. (Mr. Sekimoto)

・ The NRW ratio for the last 3 years has been 8 to 11 %. (Mr. Chenda)

・ I am very proud to see good presentation about one of the measures to find the reason of the water losses. One of the reasons for the apparent losses is a problem in maintenance. Also, the real water losses ratio can be much higher than the nominal value. (H.E.Ek Sonn Chan)

4. Results of post questionnaire (summary)

■ Opinions/comments on the contents

・ It was so precious to have his excellency!

・ PPWSA is famous for NRW management, I hope they can maintain this good point.

・ It was fascinating and impressive study about NRW in Phnom Penh.

・ The specific content helped my understanding well. I understood the collaboration between Cambodia and Japan for improving the technology.

・ It's very effective for me.

■ suggestions to improve online event

・ The time was a bit exceeded from the original time table, however it was great webinar.

■ Impressions on this event

・ It is improved my knowledge about NRW.

・ I am very happy to see you all interest for Cambodia case.

・ Self-introduction for each participants at the

Figure1 Participants of the10th WaQuAC-Net Webinar

beginning was good. It was good to know who are the participants in terms of networking purposes.

・ The topic of this seminar was very interesting.

・This event can improve my knowledge and share new information for water supply management.

■ Ideas on topics for planning in future events

・ Talk about sanitation aspect which is also influence the water quality

・ Expect a history of NRW reduction by H.E. Ek Sonn Chan

・ Paper on full lifecycle costs of urban sanitation systems

・ Status and issues about transfer of waterworks from public to private section (especially in Africa)

・ The result of non-revenue water management in Cambodia. The problem and the solution.

(End)

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Member Self-Introduction

Ms. Marie Grace UMUHOZA
From Rwanda

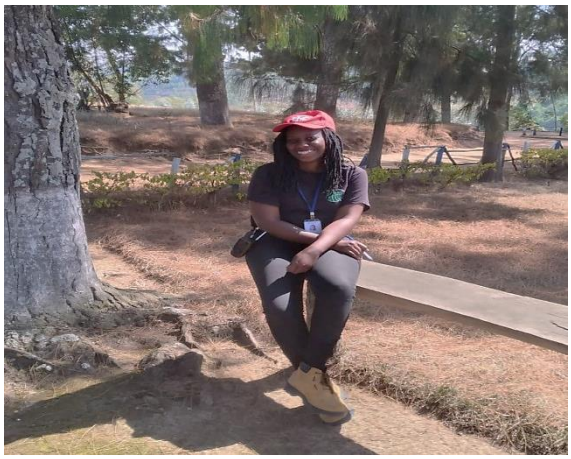

Figure 2: Ms. Marie Grace UMUHOZA

1. preface

I am Marie Grace UMUHOZA, I am a Rwandan certified project management professional and I hold a bachelor's degree in Water and Environmental Engineering awarded by the University of Rwanda, College of Science and Technology. I have been interested in water supply since I was young. I grew up seeing my elder siblings fetching water every morning before attending their school. They took almost one hour to fetch water whose source was far away from homes and in most of the times they attended their class late and tired.

As I grew up, I realized that there was no water supply scheme in our village and I learnt that developing a water supply scheme requires both knowledge and financial resources. Then I decided to start acquiring the needed knowledge in order to give my contribution to my country and I completed my bachelor's studies.

2. Water supply in Rwanda

According to the last population census of 2012, the total population of Rwanda was 12 million and was expected to reach 22,086,371 by 2050. 11.7% of Rwanda people live in the City of Kigali which is the capital city of Rwanda. Rwanda is strongly committed to ensuring that Sustainable Development Goals (SDGs) are understood and owned both at national and local levels and across stakeholders. Ensuring clean water and sanitation for all is the 6th goal among 17 SDGs that Rwanda is committed to achieve. The EICV5 (Integrated Household Living Condition
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Survey) conducted in October 2016/to October 2017 revealed the following:

1)The Percentage (%) of Population using safely managed drinking water services is 87.2% at the National level, 96% in urban while it is 85% in rural areas

- At the national level, the percentage of households with access to improved source of water is 87%. (The international definition of an improved water source includes protected springs, public standpipes, water piped into dwelling/yard, boreholes, protected wells and rainwater collection.). In urban, it is 96% while in rural, it is 85%.
- At provincial level, Kigali city ranks the first with the highest percentage of households (96%) using improved water sources. The higher percentage of households in Kigali rely on piped into dwelling /yard (34%) and public stand pipes (46%) for their water.
- At the national level, 34.4% of households are within 200m of improved drinking water source, while it is 60.2% if a threshold of 500m is applied.
- In urban areas, 70% of the households are within 200m of an improved drinking water source. The percentage is 87% in EICV5 if a threshold of 500m is applied.
- In rural areas, 25.8% of households are within 200m of improved drinking water source, and 54% of the households are within 500m of an improved sater source in EICV5.
- In Kigali City, 63% of the households live within 200m of an improved drinking water source. The percentage is 81.5% in EICV5 if a threshold of 500m is applied.

Much efforts and investment are being provided in various projects of construction and rehabilitation of different water supply infrastructures. However, one of the challenges for most of the water service providers operating in Rwanda, is related to high rate of NRW and there is a need to improve the quality of the water supply services to a satisfactory level for the users. For example, insufficient water supply and a large volume of water leakages that brings about intermittent water supply in some areas. Most of such intermittent water supply is through “Rationing” by which the water service providers intentionally supply water for specific days in a week in order that the water allocation of limited water sources is rationalized.

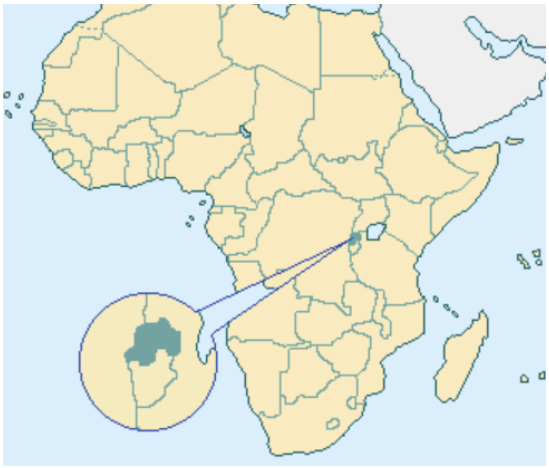

Figure 3: Location of Rwanda

3. My work

I started working for Water and Sanitation Corporation (WASAC Ltd), which is an entity set up to manage all water and sanitation services in Rwanda. Since I have been employed as District Water and Sanitation Support Engineer, I am based in Ruhango District. It is one of the eight districts of the Southern Province of Rwanda. It covers an area of 626.8 km^{3}and its population is currently estimated to 366,557.

My main job responsibilities consist of collecting

and ensuring proper entry of data on water and sanitation access at District level; preparation of a rehabilitation plan of the aging water supply networks, assisting the district in the design studies, preparation of bill of quantities, specifications, and cost estimates for water supply and sanitation projects and monitoring the implementation of those projects from beginning to end. I am also involved in ensuring that all district water supply systems are properly managed through regular monitoring of the service level of private operators contracted to manage rural water supply systems.

One of the greatest achievements that I and my team made so far as District Water and Sanitation Support Engineers working for WASAC is the elaboration of an inventory of all rural water supply systems and calculated the coverage using minimum budget, which led to the availability of data. The collected data have been used by WASAC, Districts and other development partners for planning for rehabilitation of old water supply infrastructures and for construction of new water supply schemes. To achieve that activity, Water and Sanitation Corporation (WASAC Ltd) ltd through its Department of Rural Water and Sanitation Services (RWSS), organized various trainings for District water and Sanitation Support Engineers.

The trainings were prepared and supported by Japan International Cooperation Agency (JICA) under RWASOM project. One of the trainings provided was the one which took place on 25th - 27th September, 2019 at WASAC Headquarters, Kigali. The trainings had the objectives of helping District Water and Sanitation Support Engineers to understand the activity of Data collection and updating existing data related to the rural water infrastructures to keep the developed Database always updated. That training consisted of theoretical and practical sessions. The facilitator was JICA expert ''Mr. Jin IGRASHI''. He instructed us about the use of both Garmin GPS and Tablet (through the installed SW Map) in data collection at field and how the Qfield installed in the tablet can be used in updating the existing data and in collecting data for newly constructed water supply systems. The trainer also provided the information about the basic operation of QGIS.

Recently another training provided to District Water and Sanitation Support Engineers was the one prepared and supported by JICA under the project for Rural Water Supply Services and Infrastructure Management Development. That project involved mapping of key facilities and mapping of water supply systems that were not yet mapped in order to make a water supply system expansion plan. The activity required us collecting the information to be mapped (location and attribute information) at first; in the previous project, the location information was obtained by GPS and the attribute information was described in the survey paper.

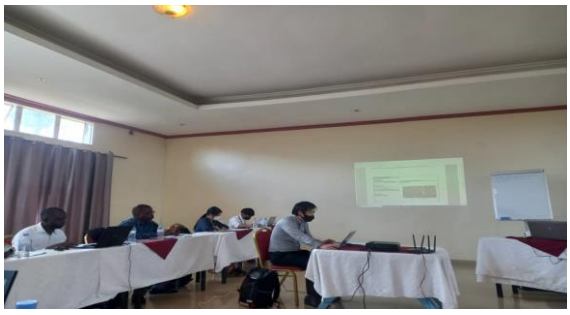

Fig 4: District support engineers in a training which took place in Kayonza District-Eastern province of Rwanda

Due to the fact, that location information and attribute information were managed by different tools, human error was often involved in the final process of linking location information and

attribute information, resulting in a lot of re-work. Therefore, the said project decided to use Qfield, an Android application, to manage location and attribute information on one device in order to reduce human error in the process of linking location and attribute information. It is in that line that the technology transfer training on how to use Qfield and QGIS level-up training was planned and provided to District Support Engineers, to enable them to manage the Data Base of each District after the completion of the said project.

The data collection related trainings have been very important to the District Water and Sanitation Support Engineers, as they have been able to gain more skills on how to use Garmin GPS and Qfield in data collection and how to use QGIS to analyze the data from the field.

Countrywide, various water supply projects have been then planned based on the data collected. For example, in Ruhango District, which is my current workstation, 50% of the mapped water supply schemes have been immediately rehabilitated, and new pipelines of more than 150km length have been constructed and completed.

4. WaQuAC-Net

Being part of WaQuAC-Net members is a great opportunity for me, as I believe that I will learn from experienced water professionals from successful countries and assess how that experience can be applied to the case of Rwanda with the aim of proposing solutions to the mentioned challenges that the water supply sector of my country is still facing.

5. Hobbies

Singing in a choir is a fantastic and creative outlet and a great social activity that I like. It helps me to boost my social life and when I am feeling a bit down after a tough week, singing in a choir give me an emotional lift and makes me feel good .

Fig 5: Singing in concert and sharing life with my choir mates once in a weekend

I do also like to play with kids as one of the most effective tools for building strong relationships with kids and relaxing with them. Playing adds joy, vitality, and resiliency to my relationships with them. It heals disagreements, resentments and hurt. It is an activity which makes me a stress-free person.

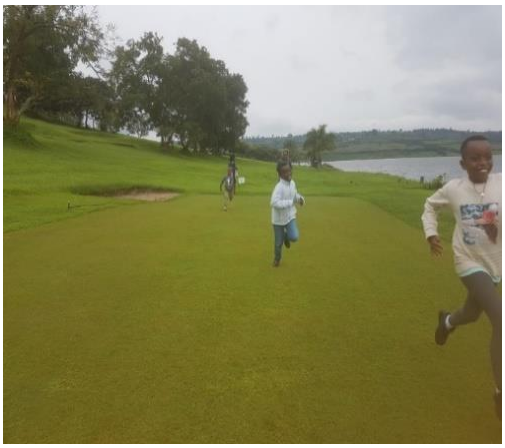

Fig 6: Playing with my sister's kids near Lake Muhazi located in the Eastern Province

Report of the11th WaQuAC-Net Webinar

Development of a small water treatment system for supplying safe drinking water to people in the rural area

Report: Mr. Hiroshi Sasayama
(WaQuAC-Net Expert)

1. Contents of the 11 Webinar

Date and Time: 12 July, 2022
17:00-18:30 (Japan),
15:00-16:30(Vietnam,
Thailand, Cambodia),
13:30-15:00 (India),
13:00-14:30 (Pakistan),

Mr. Takebe

Lecturer：Mr. Shigeru Takebe
（FUYOU Consultant Co.,Ltd）
Commentator:
Mr. Hiroshi Sasayama（WaQuAC-Net）
Moderator：Ms. Mina Yariuch （WaQuAC-Net）

Participants（30 members）
Cambodia：Ms. Thor Kounthy,
India：Mr. Sandeep Pandharkar
Japan：Mr. Hiroshi Ishiwatari, Ms. Maki Suzuki,
Mr. Noboru Ozaki, Mr. Kazunori Nakai,
Mr. Yoshinobu Ono, Ms. Taeko Miyashita,
Mr. Masayoshi Yokoyama, Mr. Keisuke Fujii,
Mr. Kiyoshi Miyauchi, Mr. Natsuki Iwao,
Dr. Mari Asam, Mr. Syozo Okada,
Ms. Keiko Yamamoto
Pakistan：Mr. Muzaffar Abbas
Thailand：Ms. Wasana Watanagul,
Ms. Sivilai Kitpitak
Vietnam：Mr. Nguyen Manh Tuan, .
Mr. Cao Huy Tuong Minh, Mr. Chau Ngoc Long,
Mr. Mai Xuan Tan, Mr. Nguyen Thanh Nam,
Mr. Nguyen Quang Phuong,
Mr. Nguyen Quoc Anh, Ms. Huynh Thi Mau Thin,
Mr. Huynh Thi Cam Phuong

2. Outline of the Presentation

In rural area of Vietnam, getting safe water is rather difficult because of a few good water sources and/or inappropriate water treatment.
Mr. Takebe has conducted the experiment to develop an effective water treatment system.
The required performances are the removal of iron and manganese, stable supply of safe water, a simple mechanism that local residents can operate, and inexpensive cost for both construction and operation.

The experimental system consisted of raw water tank, mixing tank for coagulation, sedimentation tank with inclined plate, pre-sand filter tank, slow sand filter tank and clear water tank.
Its capacity was 100m^3/day. It was built in Bien Hoa, Dong Nai Province, Southern Vietnam.

The experiment was carried out under 20 to 40 m^3/day of treatment rate with PAC as coagulant and calcium hypochlorite as disinfectant.
Pre-sand filter was back washed once a week. The surface of slow sand filter was scraped and sand was washed once three months.
Sludge was drained when necessary. The system was operated 24 hours a day from February 2016 to March 2017.
Turbidity of slow sand filtered water showed a good result, 0.4 NTU as maximum while turbidity of raw water varied from 20 to 200NTU. Iron of slow sand filtered water was less than 0.1mg/L though iron of raw water was higher than 1.8mg/L, upper limit of quantitation.
Dissolved manganese of raw water was less than 0.3mg/L and it was well removed by slow sand filtration except rainy season.
As a result of the water quality examination of the sand filtered water, all of them met the

Vietnamese drinking water quality standard (109 parameters). It is found that this system can supply safe water stably without serious trouble of operation. After the experiment, the system was transferred to a village in Dong Nai province. But the village people did not accept the treated water from the system even though its water quality ensured the national standard.

Mr. Takebe recognized the need to raise the awareness of people on disinfection and water treatment system. In the near future, he said to try to support the safe water to 1 thousand population in the area.

PDF of the presentation, please access from below.

https://www.waquac.net/pdf/data/data_20220712.pdf

3. Comments by the commentator

I have been in Vietnam from 2011 to 2014. That time, Vietnamese government aimed to diffuse water supply system in rural areas. But installed facilities were not good enough and charged persons were not well trained. Some years after building, some of such facilities did not work well.

It is very difficult to supply safe water stably in such areas. There are some important points to achieve it in the lecture. First, construction cost and operation cost must be inexpensive as well as possible. Second, its operation and maintenance should be easy under lack of well-trained personnel. Third, Chemicals can be stocked for some weeks easily because transportation is not easy. As the condition of rural areas in Vietnam, power supply is not stable enough. And electricity fee is rather expensive in people's daily life. These points should be also considered.

The treatment system shown in the lecture used slow sand filtration. Slow sand filtration is effective method to treat water in tropical region, in other words, high water temperature area. Southern Vietnam is just in tropical region. The system adopted an appropriate technology. The most interesting point of the experiment is using chemical sedimentation and pre-filtration. It can reduce load to the slow sand filter and expand its running time with good removal of iron and manganese.

A question to the lecturer: People of a community might consider save electricity fee with interval operation of the treatment system such as stopping operation in the night time. Can anything wrong happen on slow sand filtration by such interval operation of the system?

Answer: There was no problem during short term stop of the system in the experiment. Some influence might occur when such interval operation

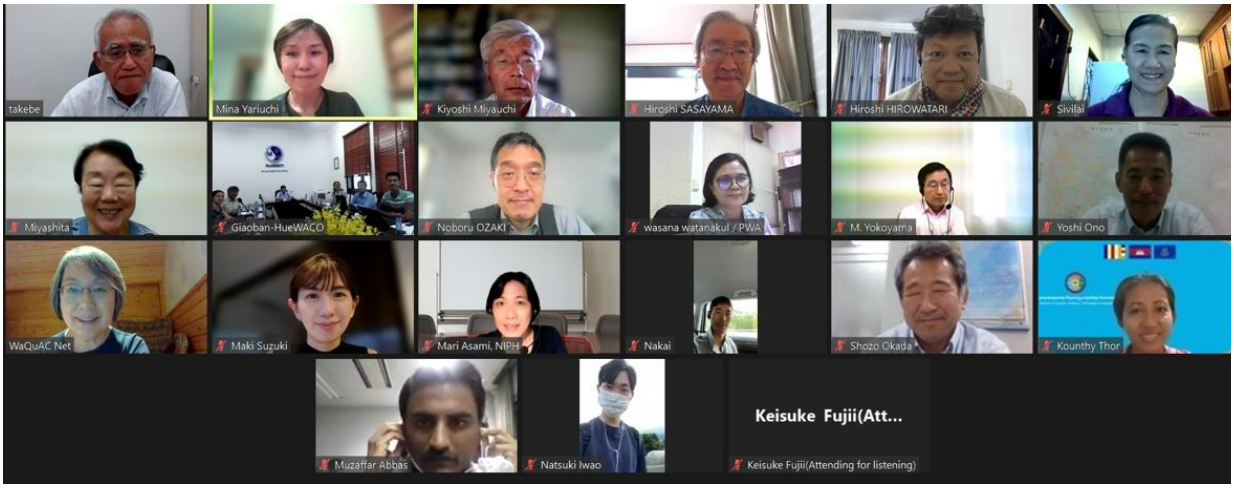

Fig.7: Participants of the 11th WaQuAC-Net Webinar

is carried out in long period.

4. Q&A

Q: Why village people did not drink water from the treatment system. Is drinking bottled water popular?

A: Some people wanted water from a tap. But parents of children denied and requested more filtration process. Their custom of no drinking from a tap directly is a key point, I think.

Q: Does slow sand filtration need more area than rapid sand filtration?

A: It is right to obtain the same amount of treated water in the same time because filtration rate of slow sand filter is quite slow compared with the rate of rapid sand filter.

Q: I understood that biofilm at the surface of slow sand filter can remove iron and manganese. How do you get microorganisms to produce the biofilm? What is the maintenance of the biofilm?

A: Microorganisms exist in the sand and water from the first. They increase naturally and produce the biofilm. Maintenance is just scraping the surface of biofilm.

Q: How cheap is the building cost and operation cost of the system compared with a conventional system?

A: This system was made of steel plates to evaluate its function as an experiment. Its building cost was 20,000USD (As of 2016). Material of facilities can be changed to FRP or others that is cheaper than steel. All materials were prepared in Vietnam. It is also important for sustainable system.

Q: Are there any arsenic problem of water supply in Vietnam?

A: I heard that there was an arsenic problem in some groundwater in Vietnam.

5. Result of post questionnaire

(1) Your opinions/comments on the contents

☆ I understood that getting reliability of local people and replying to their request of safe water were not easy.

✧ Useful subject for small community that cannot access safe water yet.

✧ This system is useful by its simple design.

✧ I'm interested in water treatment method that works with low technology and costs inexpensive.

(2) Any suggestions to improve online event

✧ It was very smooth facilitation including interpretation of Q&A session and response to questions.

✧ Good.

✧ I wanted more time to understand slow sand filtration and discuss on diffusion of such system.

(3) your impressions on this event

✧ I was happy to attend the webinar.

✧ Studying the same topic between participants from water supply in other countries and Japan, and staff members of international aids is very nice way. I wanted more explanation about the background that why this topic was selected as webinar theme, because I don't know much about water supply.

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Welcome party for Mr. and Ms. MINAMI

On July 15, 2022, Welcome party for Mr. and Ms. Minami was held in Shinjuku, Tokyo. Mr. Minami passed the examination of JICA Junior Adviser and moved to Tokyo from Kagoshima Prefecture. He was a staff of the Water Works Bureau in Kagoshima City and experienced a Japan Overseas Cooperation Volunteer in Nepal. At JICA, he is expected to work for water supply in Africa.

At first, we planned to hold a face-to-face party. But COVID-19 has increased quickly again, and

it was said seventh wave of COVID-19. Therefore, the party was held with a minimum number of participants while preventing the infection of COVID-19. The party was very friendly, talking the topics about athlete life, favorite ramen noodle, and newly married life. It was a very good opportunity to get to know Mr. and Ms. Minami. We look forward to their support

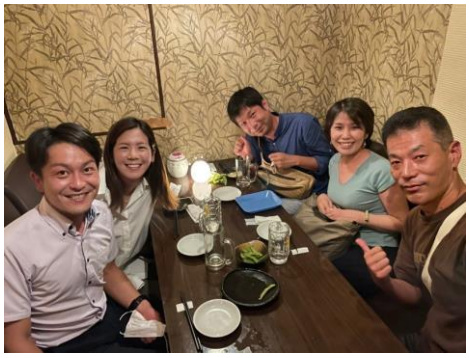

Fig.8: from left, Mr. Minami, Ms. Minami, Mr. Saiki, Ms. Yariuchi,

at WaQuAC-Net! I couldn't meet Mr. and Ms. Minami and Ms. Yariuchi for 2 years and several months directly, due to COVID-19. It was first time for me to meet Mr. Ono. After the party, I realized that it was important to meet and talk face-to-face. (Responsibility: Mr. Saiki)

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E-Mail; waquac_net@yahoo.co.jp
(Yariuchi, Yamamoto)
URL:https:/www.waquac.net/english/index.html

Next Activity

September: The 12th Webinar
"H.E. Ek Sonn Chan talks about the history of PPWSA"
Octover15: Newsletter vol.55 (in Japanese)

Introduction of new members

○ **Maki Suzuki (Japan)**

We welcome new members anytime.

Wac Wac Brief News

☆Collaboration Project on improvement of water supply in rural communities in Khon Kaen Province, Thailand

Dr. Ishibashi who is a former professor in Khon Kaen University and a professor emeritus in Tohoku Gakuin University, was able to visit Khon Kaen, Thailand in June this year. He has been working as member of the collaboration project in Khon Kaen Province. But he couldn't go to Thailand, because of COVID-19. This time, he could participate in a meeting with other members from Khon Kaen University, Khon Kaen Training Center (PWA) and the regional office in the Ministry of Environment to discuss future plan and project directions.

Fig.9 The project Members

☆ Resumption of KPG Overseas Technical Training

Kanagawa Prefecture Government Overseas Technical Training, which had been suspended by COVID-19 since 2020, will resume in September this year. Ms. Thitima Sangpraphakorn from MWA, Thailand has passed the examination. She is scientist in Water Quality Analysis Division who works with GC/MS and HPLC. She will come to Japan in coming September and have 6 months training on water supply and water quality management in Yokohama City and other cities.

☆Ms. Marie Grace UMUHOZA will visit Japan from Rwanda in September this year.

She will study at master course in Toyo University for two years under the JICA Program.
We are looking forward to seeing her in Japan.