WaQuAC-NET Newsletter

Water Quality Asian Cooperation Network

http://www.waquac.net

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For Safe Water, Do Network.

Vol. 37 Contents

Question & Answer Corner

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

Q: Can I utilize the "ultrasonic sound technology" for controlling the algae?

（Ms. C.N. Thailand）

A: We could not find some cases on actual use of ultrasound technology for controlling the algae in the lakes and reservoirs in Japan. However, there is a report on two type’s experiments. We translated it into English under the responsibility of WaQuAC-Net.

Title: The measures for inhibiting water bloom* in a reservoir by using ultrasound device.

Organization which conducted the experiment: Japan Water Agency (JWA)

Conference which the report was presented: National Conference of Japan Water Works Association (JWWA) in October, 2017.

Result: Through the experiment, they confirmed the effect of inhibiting water bloom by ultrasound method.

* Water bloom is called AOKO in Japanese. It is the situation that plankton increases remarkably and spreads, and the surface of water in a lake and reservoir is covered in special blue green color. It is caused by *Microcystis* and *Anabaena* mainly.

Ultrasound method is supposed that it is useful for inhibiting AOKO in a shallow lake and reservoir. On the other hand, circulated aeration method, which is popular for inhibiting algae in Japan, can be used effectively in 15-20m depth lakes and reservoirs.

The following is an abstract of the report on the inhibition of water bloom in a reservoir by using ultrasound device.

(translated by WaQuAC-Net)

1. Background

Landscape disturbance and moldy odor problem have occurred due to abnormal growth of blue-green algae in the dam lakes where eutrophication has progressed. As the measures, circulated aeration method has been widely applied in Japan. To apply it effectively, however, it is necessary to ensure the circulation layer of 15m to 20m around. In a shallow lake, it is difficult to use circulated aeration method. Japan Water Agency (JWA) has been conducting experiments of shading method or drying method for shallow lakes. This time, as the new measures, experiment using the ultrasound technology method was conducted against water bloom. We report the result.

2. Principle of ultrasound method

Ultrasound device used in this experiment transmits ultrasound waves of low frequency (23~50 KHz) from the tip. It causes resonant oscillation of algae cells and vacuoles in cells. It can damage gas bubbles and cell membranes. And then the growth ability of algae is inhibited by destroying the vacuolar membranes.

Operating the ultrasound device at the early stage of algae growth can prevent algae from floating accumulation.

3. Experiment using small glass water tanks

1) To verify the capability of ultrasound device, an experiment using a small glass water tanks (90L x 33W x 18H cm) was carried out.
2) Conditions of the experiment: The glass water tanks were set beside the window. Room temperature was 28℃. Output of the ultrasound device was set to be effective even at the points of 30m to 400 meters away.
3) Control group without ultrasound device was also tested as controlled experiment (blank) to clarify the effects of ultrasound irradiation.

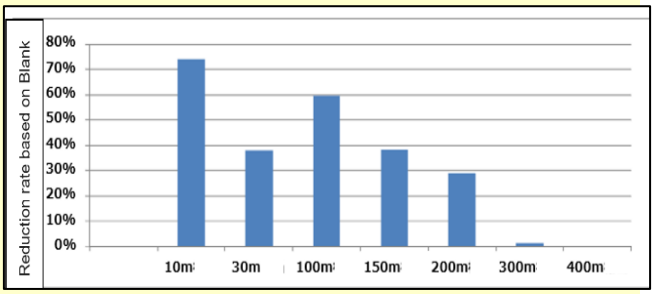


Figure1 Relationship between corresponded distance for ultrasound output and reduction rate of Chl-a

After 5-7 days-ultrasound irradiation, the reduction ratio (the reduced Chl-a* concentration with irradiation compared to the Chl-a concentration in blank) is showed in Figure1. Irradiation distance within 200m was verified as effective distance. *Chl-a: chlorophyll a

4. Experiment at the compartment which was made in the dam lake

The dam lake which used for the experiment was constructed for water supply with a total water storage volume of 10,000,000 m^3, a flooded area of 808,000 m^2, a water depth of about 21.6 meters. The water quality of the dam lake is no good and AOKO occurs easily, because the dam lake takes water from the downstream of the Tone River. To carry out the compartment experiment, two large water tanks (3 m × 3 m × 2.5 m) enclosed by the seat and completely separated from the dam lake water were installed; one tank for the test, and the other for the control (blank). And ultrasound irradiation was implemented for 10 days at the large test water tank. Two large water tanks were observed. The device is solar power type with little running cost. The change of the concentrations of Chl-a in the compartments during the experiment period is shown in Figure 2. The tank with ultrasound irradiation had significantly different from the control tank in the day 6. On the 8th day, it was confirmed that almost algae in the tank with ultrasound devices died and settled down.

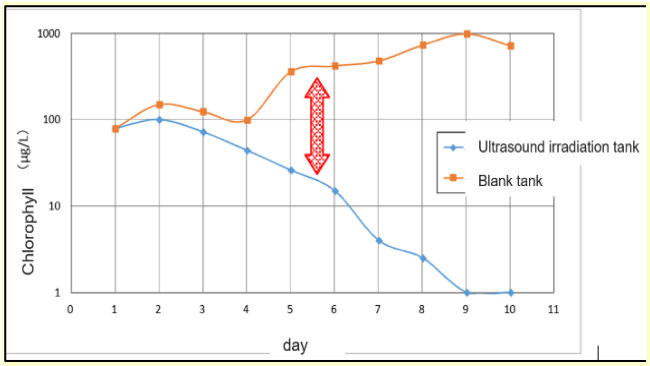


Figure2. Change of Chl-a concentration

5. Conclusion

The inhibition effect of water bloom by using ultrasound device was confirmed through the experiment. As future study, we are planning to experiment whether ultrasound method can inhibit the water bloom which produce color, moldy odor, fresh water red tide and so on in specific area such as a cove where circulated aeration method does not work effectively.

****

Introduction of Overseas Member-1

Ms. Ei Khain Mon

YCDC, Myanmar

Mingalar Par!!! (Hello)

Ms. Ei

WaQuAC-NET members.

First of all, I want to say thank you to Ms Mina Yariuchi and Ms Keiko Yamamoto encouraged me to WaQuAC-Net Newsletter.

I met Ms.Yamamoto in 2013 Waterworks engineering training in Japan. She was one of the trainer for helping the action plan. I am working with Ms. Yariuchi who is an expert of human resources development in JICA technical assistant team since 2015. She is also introduced me WaQuAC- NET which is the one of the best place for exchanging experience in the field of water quality.

I am Ei Khaing Mon, Assistant Engineer of Engineering Department (Water & Sanitation) from Yangon City Development Committee.

I graduated the Bachelor's Degree of Engineering (Civil) from Technical University (Pathein) in 2005. After that, I got the master degree of environmental engineering from Yangon Technological University in 2007. From that time, I started to be interested in water quality analysis and water treatment system. While I have been attending the master course, I started to work as Sub Assistant engineer in the Department of Upper Myanmar Water Supply under Ministry for Progress of Border Areas and Development Affairs until 2012. In August, 2012, I was transferred to the Engineering Department (Water & Sanitation) EDWS of Yangon City Development Committee and I have been working as Assistant Engineer until now.

From that time, former head of department of EDWS assigned me in water quality monitoring section and also assigned as counterpart of JICA Master Plan study team for greater Yangon improvement project. From this time, I had been started to interest in water quality changes of water sources from Yangon City. At that time, EDWS didn't have owned laboratory for water quality analyzing and if we wanted to test the water quality, we took our samples to the laboratory from Health Department of YCDC and National Health laboratory (NHL) from Ministry of Health and Sport. It made postpone to our water supply works and we could not get accurate data for current supply water. Therefore, in 2014, we could start a water quality monitoring laboratory in small room of City Hall which situated on the third floor of the head office of Yangon City

Development Committee. At that time, we had nine (9) staffs and could monitor 13 parameters. Our target is to analyze the quality of our water sources and the quality of tap water periodically. After two years later, we moved our water quality laboratory to the YCDC new office building and upgraded. Nowadays, we are able to monitor 26 parameters which include physical, chemical and bacteriological parameters and we have 12 staffs for water quality analyzing works and periodically monitor the quality of our water sources.

Ms. Ei, the second from the right

Moreover, our laboratory staffs can apply TOT (training of trainers) to other staffs to become a new laboratory staff. In 2016, there are five mini laboratories can be established at the water sources and water treatment plant with the partially supported of JICA technical assistant project. Mini labs are managed by main laboratory and they can perform daily monitoring and submit water quality data to the main lab.

As a section head of water quality monitoring section, I review and analyze all of the water quality data and write up as monthly and yearly report to the head of department. Analyzing the seasonally changes of water quality found that our water sources have many problems. So that, water distribution system of Yangon City is facing water quality related troubles. Therefore, to promote the existing water supply system, water quality monitoring section cooperate with other water supply sections by using the water quality data. Therefore, I realize that water quality monitoring is the one of the important role for getting a good water supply management system Furthermore, our YCDC cannot distributed drinkable water to the city in present, so we are facing many water quality issues from our customers recently. Consequently, I am willingness to improve our water quality management system which can support to increase the income of our department. What is more, people of Yangon City use much more money to get a drinkable water. So, I'm strongly believe that good quality of water can improve the daily life of people in Yangon City.

Its makes me much more deeply interested in my routine works of water quality monitoring. And, I want to participate the improving works of water quality management fields of my department.

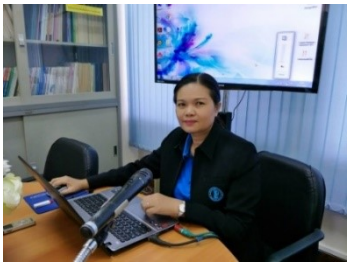
Fortunately, I got an opportunity to study at Master Course of Water Utility Management in Tokyo University assisted by JICA. It was one of my dream to become a water professional engineer. So, I will try my best for studying the advanced knowledge on water quality management fields and apply it to my department. I also want to keep in touch with the WaQuAC-NET group and want to exchange and study more on different water quality experiences from different places.

Water Quality Monitoring Labo

Introduction of Overseas Member-2

Ms. Wasana Watanakul

PWA, Thailand



Ms. Wasana

Hello, My Name is Wasana Watanakul. I am working as a Director of Khon Kaen Regional Training Center 2 (RTC 2), Provincial Waterworks Authority (PWA) in Thailand. I was once a counterpart in NWTTI project phase II in Thailand which was held on September 1, 1994 – August 31,1999. This project had been in cooperation of Metropolitan Waterworks Authority (MWA), Provincial Waterworks Authority (PWA), and Japan International Cooperation Agency (JICA).

PWA Head Office

PWA of Thailand has waterworks with various scale more than 300 water treatment plants, of which the capacity ranges from1,200 m^3/day to 1 M m^3/d. Raw water of water treatment process includes groundwater and water from rivers, lakes and reservoirs. We have met that river water, which is the main raw water, is generally high in turbidity while lake and reservoir water are always suffered from algae problems. Besides, groundwater have often high concentration of iron and manganese. In the process of river water treatment, water treatment plants use the rapid filtration system that is composed of baffled channel flocculation basins, horizontal flow sedimentation basin, and single-layer sand filters of declining-rate type to remove particles from water. Solid alum and gas chlorine are most commonly used in the process. Moreover, the wastewater lagoon sludge treatment is also used in water treatment system.

Rapid mixing chamber

Water purification plant

Getting JICA scholarship to work with JICA gave me very fruitful knowledge in both smart working techniques and valuable experiences.

Seminar in Khon Kaen Regional Training Center (at that time)

The knowledge, techniques and system which I learnt in Japan for four months around, January to April 1997 were more precious than those I obtained in my work in my country. Beside this, the Japanese work culture like discipline, hardworking, and punctuality, always made me

impressed.

During my training period in the field of water purification, luckily, I got the chance to visit many purification plants in Japan such as Kanamachi Water Purification Plant in Tokyo Metropolitan Waterworks Bureau, Nishiya Purification Plant in Yokohama Waterworks Bureau, Murano Water Purification Plant in Osaka Prefecture Waterworks Department, Laboratory Control Center in Sapporo City Waterworks Bureau, and etc.

Mr. Tawatchai, MWA, Mr. Sasaki, Yokohama , Ms. Wasana, PWA

Moreover, when I was on holiday there, I was taken to visit many nice places in many regions of Japan such as Sapporo, Osaka, Nagoya and Kyoto by the Japanese experts who were once worked with the NWTTI. Not only learning a lot about Japanese cultures, for example, the way of Japanese tea and Japan's amazing and interesting way of life but it was also my first time skiing! Living for a short time in Japan was one of the most wonderful experiences for me.

Party at Sapporo staff's home

Returning to my country after the end of the second phase of NWTTI project, as the role of the director in a RTC 2, Khon Kaen, PWA, I have transferred what I experienced and learnt from the project to my colleagues. And I hope that JICA will provide another great scholarship for PWA, Thailand at a future time.

Special Lecture; "One Day with Dr. TAMBO - What will Happen Next Era?"

On April 24th, 2018, Dr. Tambo special lecture was held from 10:00 to 15:30 at Gakushikaikan, Tokyo. After the World War 2, he has contributed the set-up of the sanitary engineering in Japan. And also, he has towed the international water field. Dr. Tambo gave the lecture for more than 250 audiences.

I joined the Dr. TAMBO Norihito Special Lecture. The content of the lecture was full of his views and experiences. According to his lecture, "today's modern social infra -system such as water services probably won't be able to maintain until 2050. Japan is going to be a first country to face the population reduction society and this situation should be chance for us to develop new social system. If we cannot build completely "new post-modern" system by 2100, Japan will have no way to survive. These ideas have been said since almost 15 years ago. Dr. Komiyama expressed Japan as "an advanced country on issues". When I studied in Canada, my English teacher said the same idea, too. Could Japan have changed since then? I renewed my mind that it's necessary for us, younger generation, to take over pioneer's passion and be proceeding with it.

(Mr. Sugino Manabu)

Introduction of Wastewater Treatment Method: SSCM

KIJI Masato

Mr. KIJI

1. Introduction

I am KIJI Masahiro, a new member of WaQuAC-Net. I am an engineer who belongs to a private consultant company. I've been involved in water quality improvement in dam lakes in Shikoku region, Japan. At the residential area located in upstream of dam lakes, a lot of domestic wastewater and small-scale industrial wastewater are discharged without treatment. I had been concerned about this problem and wanted to solve it as a water quality engineer.

To promote a wastewater treatment system to the mountain area of Shikoku region, I studied a water treatment technology which satisfies following requirements; (1) low cost of equipment and operation, (2) simple ways of operation and maintenance, (3) compactness for installation in residence, and (4) function of advanced treatment which was not only BOD removal, but nitrogen and phosphorus removal for water quality conservation in dam lakes. The water treatment method with above mentioned requirements can be also applied to developing countries.

I introduce this wastewater treatment method and my activities in developing countries instead of my self-introduction.

2. Slanted-Soil-Chamber Method (SSCM)

Generally, oxygen is difficult to dissolve in water; therefore, progress of aerobic purification process in water phase is very difficult. To compensate this difficulty, usually aeration is implemented to feed oxygen into water phase; however, aeration technic consumes a lot of electricity and expenses. By the way, the strongest self-purification action occurs at the soil surface which contacts with the air. Therefore, I imitate this condition for water treatment and apply thin soil layers for water purification. In the application of soil layer to water treatment, there are 3 water flow directions; (1) vertical flow, (2) horizontal flow, and (3) diagonal flow. I selected a diagonal flow and employed a slanted thin soil chamber filled with soil and spongy carrying support. I named this water treatment device as "Slanted-Soil-Chamber Method (SSCM)". In this method, water is purified while passing through this slanted thin layer structure.

Figure 1 shows a scheme of slanted soil chamber. Figure 2 is an application example of SSCM to treat kitchen wastewater in my house.

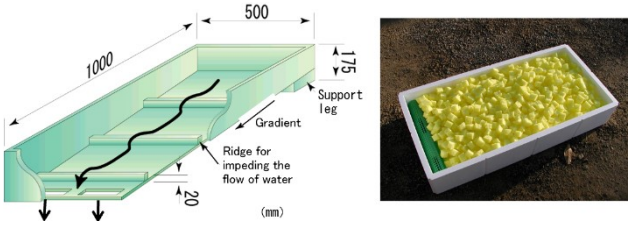


Fig.1 Slanted soil chamber and it's filled with sponge carrier.

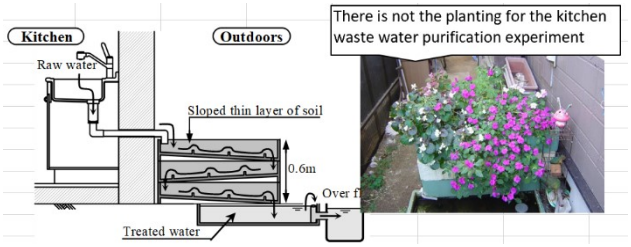


Fig.2 The kitchen waste water purification without using electric power and using it as a flower bed.

3. Water purification function

3.1 Operation

What you need to do is just introducing raw water (waste water) to the uppermost stream of SSCM device. Raw water soaked up between spongy carrying supports by capillary action permeates and flows into unsaturated soil layer contacting with air. This contact between water and air

increases oxygen supply to water phase, then aerobic water treatment process is accelerated.

3.2 Retention time and solid-liquid separation

SSCM shows unique water purification characteristic in comparison to a conventional water treatment method. In the treatment process in water phase, pollutants are conveyed by water flow. However, it is necessary to keep pollutants in the water treatment device until pollutant is treated enough (in the case of activated sludge method, it is necessary to retain water until activated sludge to be removed by precipitation).

Figure 3 shows BOD removal ratio and retention time in the experiment using soy source brewery wastewater. The result of nine-fold replicated SSCM treatment shows that about 100% of BOD is removed with 30 min of retention time. In case of conventional activated sludge method, about 8 hours of retention time is necessary. Therefore, it is said that the necessary retention time of SSCM is much shorter than conventional activated sludge method.

This difference can be explained by an efficient contact between pollutants and microorganisms as well as efficient liquid-solid separation. It is easily expected that SS is removed by physical filtration. Soluble matter is removed by biosorption. It is also known that biosorption completes about 30 min in conventional activated sludge method.

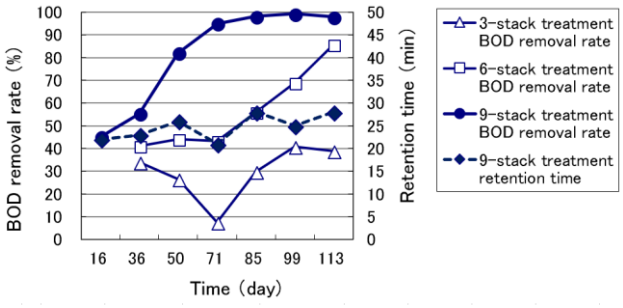


Fig.3 Change in BOD removal rate and retention time

3.3 Aerobic purification by soil organisms

Organic pollutants separated from water receive strong aerobic decomposition by many kinds of soil organisms such as bacteria, earthworm and etc. in SSCM device.

4. Demonstration experiment

4.1 Treatment of domestic wastewater

The test in Figure 2 started in 2001. The water quality was measured monthly for 4 years and 4 months. The total treated water volume was 144 m^3, and the daily average treated water volume was 92L. The result showed that organic pollution, total nitrogen (T-N) and total phosphorus (T-P) were treated simultaneously, and the purification effect lasted for a long time without maintenance. This treatment device is still in use.

Table 1 Average quality of raw and treated water and removal rate

Conditon	W.T. (℃)	SS (mg・l^{-1})	BOD (mg・l^{-1})	COD_{Mn} (mg・l^{-1})	T-N (mg・l^{-1})	T-P (mg・l^{-1})
Raw water	18.1 ±5.7	153 ±80	819 ±820	542 ±671	30.6 ±25.4	5.88 ±4.7
Treated	16.4 ±7.4	34 ±21	86 ±69	51 ±40	5.3 ±2.8	0.70 ±0.4
Removal rate	— —	74% ±17%	83% ±13%	80% ±16%	73% ±16%	81% ±14%

Figure 4 shows example of domestic water treatment in Indonesia. Raw water (Right) and treated water (Left) after four-fold replicated SSCM treatment.

Fig 4

4.2 Sewer water treatment in Nepal

In Kathmandu of Nepal, the waste water treatment plant (WWTP) cannot use aerator during dry season because of the shortage of electricity. However, because of the advantage of SSCM which does not need aeration, small demonstration experiment was implemented in WWTP of Kathmandu. This experiment started in winter; therefore, effect of water treatment was not increased until spring. However, CODcr removal ratio showed 90% at the end of the

experimental period. Local officer seemed impressed with this result saying “It is my first time to see such clean treated water”.

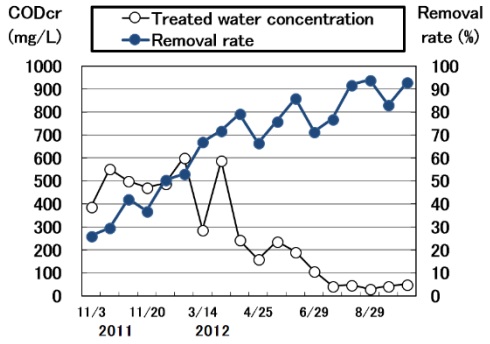


Fig.5 Change in sewerage treated water concentration and removal rate in Katmandu

4.3 Treatment of organic wastewater in Sri Lanka

It is completely impossible to apply slow filtration method to purify water if BOD of raw water reaches 5 mg/L to 10 mg/L. However, water pollution is serious problem in the developing countries in association with economic development. Thus, pollution of water source becomes worse, which reminds us of the old days in Japan. I applied SSCM treatment for a pretreatment of slow sand filtration process. Raw water quality was; Turbidity 13.5 NTU and BOD 37mg/L, on the other hand, SSCM treated water quality was; Turbidity 0.0NTUand BOD 7mg/L. Currently, only SSCM method is employed for water purification.

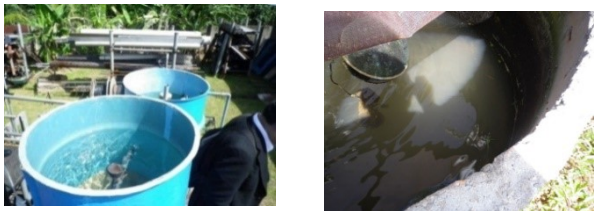


Fig.6 Photograph of the raw and treated water for drinking water in Sri Lanka.

4.4Treatment of heavy metal wastewater in Bangladesh

In Bangladesh, SSCM device was installed near tube well which is contaminated by heavy metals. Residents use this tube well water after the treatment of SSCM. Table 2 shows the result of the treatment. After application of SSCM, residents said that they could cook white rice for the first time with treated water.

Maintenance of SSCM device was done by residents by washing spongy carrying support. Table 2 indicates that maintenance results in recovering treatment capacity of SSCM.

Arsenic (As) removal is occurred by a synergetic effect of Iron-Bacteria method (ref. Osaka meeting lecture, Dr.FUJIKAWA, 2014) in addition with solid-liquid separation property of SSCM method. The reason why As removal ratio stayed 70% is that iron concentration was not enough in raw water.

Table 2 Matterial balance and removal rate,

R:Raw water, T:Treated water

		Arsenic (mg/L)			Iron (mg/L)			Manganese (mg/L)		
Drinking water standard	Bangladesh	0.05			0.3 – 1.0			0.1		
	Japan	0.01			0.3			0.05		
Result of polluted well water purification	Conditon	R	T	Removal rate	R	T	Removal rate	R	T	Removal rate
	2015.7.4	0.22	0.15	31%	6.17	0.65	89%	0.76	0.17	78%
	2015.10.4	0.20	0.06	70%	3.45	0.00	100%	0.63	0.03	95%
	2016.3.2	0.18	0.06	66%	5.29	0.07	99%	0.64	0.03	95%
	2016.4.2	0.21	0.07	66%	5.81	0.05	99%	0.70	0.03	96%
	2016.5.2	0.13	0.05	63%	3.60	0.49	86%	0.60	0.16	74%
	Inhabitants washed a sponge carrier.									
	1	0.18	0.05	72%	5.64	0.00	100%	0.60	0.00	100%

5. Conclusion

I believe this SSCM method will encourage developing countries to become self-independent in water quality purification because the method can be developed by local materials and operated by local residents.

I had chance to introduce SSMC method to trainees from developing countries as a lecturer when JICA and KOICA jointly conducted trainings about restoration of fresh water environments from 2004 to 2007. I heard this SSCM method was appreciated among trainers. WaQuAC-Net is aiming for information exchange platform for the people involved in water sectors in developing countries. I couldn’t be happier if SSCM method considers being a one of water quality improvement technics and solves hygiene issues in developing countries.

*** Special Articles: Trip to Thailand and Cambodia for deepening membership***

WaQuAC-NET dispatched three members to Thailand and Cambodia to work and communicate with our members in both countries, and tightened membership and deepened friendship; trip period was from Feb 23 to Mar 7, 2018 by Mr. Shinichi Sasaki (biological expert) and Ms. Keiko Yamamoto (WaQuAC-NET Office), and Mar 26 to 31 by Ms. Yasuko Kamegai (expert of water quality analysis and purification) respectively.

Part 1 Seminar in MWA

Lecture on Cylindrospermopsis by Mr. Sasaki

On February 26, a seminar was held in Metropolitan Waterworks Authority (MWA) of Thailand, in which we gave lectures and Q&A on past cooperation and occurrence and measures of ***Cylindrospermopsis****. A representative of MWA explained mutual cooperation up to now such as; signing the MOU for mutual technical cooperation in 2012, two training courses on biological measures for MWA biologists at the Yokohama Waterworks Bureau, joint research of organisms in MWA's water source in 2014, and four times presentations by MWA members at the Annual Conference of the Japan Waterworks Association since 2014.

Regarding *Cylindrospermopsis,* MWA side made reported about its occurrence in the water source and actions taken by MWA last year. Mr. Sasaki provided a lecture that characteristics of the algae, and what is necessary and important for MWA to be prepared for its possible future occurrence. The seminar was attended by Mr. Wisit (former Deputy Governor), Mr. Chaiwat (Deputy Governor for R&D and training), and nearly 40 staffs in charge of water quality management.

*a kind of blue algae. Mainly glow in the tropics. It is said to produce Cylindrosparmopsin, a kind of cyanobacterial toxin, which causes organ diseases via the oral route, and paralysis caused by neurotoxicity by skin contact.

Part 2 Seminar in PWA

Briefing activities and cooperation of WaQuAC-NET

We held the first seminar in PWA (Provincial Waterworks Authority) on Feb 28 in cooperation with Ms. Puangtong Wangdan, Director, Water Quality Control Division of PWA.

PWA is responsible for water supply service in urban areas of the provinces except capital Bangkok area, where MWA is responsible for one of. During technical cooperation projects, namely "NWTTI (National Waterworks Technology Training Institute)", implemented in two phases from 1985 to 1999, MWA and PWA worked together under the support of JICA, in which four training centers were established and strengthened in their training and development capacity; one was central training center (CTC) under MWA, and three regional training centers (RTC) in three provinces (Chiang Mai, Khon Kaen and Songkla) under PWA.

After completion of the projects, considerable Japanese experts and Thai counterparts kept in touch personally. MWA and PWA, however, have

not jointly operated NWTTI; MWA has owned CTC while PWA has owned RTCs (Regional Training Center) of 3 prefectures.

After the establishment of WaQuAC-Net in 2008, many MWA staff members became our members through former counterparts of the projects, promoted exchanges to conclude in signing MOU with MWA on mutual technical cooperation at the flood crisis of Bangkok in 2011, and have continued technical cooperation activities as mentioned above. On the other hand, we have not built cooperative relationship with PWA until now.

In a relationship of our member Ms. Sivilai of MWA, Ms. Puangtong, Director of PWA Water Quality Control, became a member and we were able to hold a seminar for building cooperative relations with PWA.

In the seminar, Ms. Sivilai explained the activities of WaQuAC-Net and cooperation with MWA in Thai language, and Mr. Sasaki explained that the water source survey is also important in PWA. About 30 young water quality staff members participated in the seminar and were eager to listen. During the discussion, it was mentioned that there are many water supply utilities all over the country under PWA, of which conditions are different and have individual difficulties on water qualities. Through this seminar, we felt that it is necessary to know more about the current situation of PWA in order to build a cooperative relationship. Several young staff members gathered after the seminar, and asked about WaQuAC-NET actively. Although it was a challenging opportunity, we have to consider what we will do next with PWA. After returning home, we got membership applications from several PWA staff members.

Part 3

Visit to Khon Kaen RTC2 of PWA

Mar 1 is Thai holiday. When we arrived at Khon Kaen Airport flown from Bangkok, a woman accidentally noticed Ms. Sivilai. She was a former counterpart of NWTTI, Ms. Wasana Watanakul. It was the first time for them to meet again since the project time. ***What a coincidence!*** Ms. Wasana invited us, including Dr. Ishibashi for dinner on that day. We talked about NWTTI's old stories and the purpose of this visit to Khon Kaen. She promised to attend the seminar at Khon Kaen University, which was planned the following day immediately.

Since it was a full moon, there was a special occasion at the Buddhist Temple. After the dinner, we went to a nearby temple, and walked around a pagoda 3 times with others, and did pray.

After that, Ms. Wasana took us to Khon Kaen RTC, where we found the character of NWTTI at the entrance. It was so impressive to me. Also, I feel happy to hear that Khon Kaen RTC was properly maintained and still utilized for various trainings.

Sign of NWTTI at Khon Kaen RTC

Training Room

(Part 1 to 3 by Yamamoto)

Part 4

Lectures at Khon Kaen University and subsequent activities

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

Prof. Ishibashi

On March 1 and 2, 2018, Ms. Keiko Yamamoto, representative of WaQuAC-NET, Mr. Shinichi Sasaki and Ms. Siwilai Kitpitakk belonging to MWA visited Khon Kaen University, Faculty of Public Health (PH-KKU). On this occasion the university asked them to give lectures. The title of Ms. Yamamoto was "International Cooperation for Water Supply and Sanitation" and the title of Ms. Siwilai was "Water Problems of MWA Influenced by Global Warming". As Ms. Siwilai talked about algae including *Cylindrospermopsis* which are currently growing abnormally in reservoirs in Thailand, Mr. Sasaki supplemented the algae in detail. There were many participants outside the university in the lecture meeting. A gathering was held with main participants after the lectures. Ms. Yamamoto predicted that many projects and networks might start at this gathering.

Ms. Sivilai give a lecture

In fact, I also joined the projects involving participants and got the opportunity to present at a couple of seminars. If WaQuAC-NET did not make a chance to join the projects etc., there might have been no new progress. Here, I would like to introduce some activities after the lecture meeting.

Cooperative relationship with Regional Training Center (RTC)

There are three training centers (RTC) supervised by Provincial Waterworks Authority (PWA) in Thailand. One of them is in Khon Kaen. Director is Ms. Wasana Watanakol, and Mr. Sasaki taught her at the NWTTI project of JICA. I was invited to the RTC seminar held in early April and introduced present water situation and water quality problems such as musty taste and odor, trihalomethane and *Cryptosporidium* in Japan to PWA staff members working in each area. RTC and Khon Kaen University have not interacted until now. Ms. Wasana came to university ten days after the seminar and discussed the relationship with Dean of PH-KKU and faculty members teaching water works including me. RTC and PH-KKU decided to promote exchange. The contents were teaching by faculty members at RTC, RTC staff participate in seminars at PH-KKU, responding to student's practical questions, training, collaborative research and so on. In addition, RTC also showed interest in the water purification plants in villages, suggesting that RTC and PH-KKU consider safe water supply methodology. Currently, we are in a hurry to conclude MOU for mutual cooperation.

The seminar at Khon Kaen RTC

Participation of improvement projects on community water supply led by Regional Environmental Office (REO), and others

At the request of REO director Mr. Virunpob Supab (Ms. Siwilai's class mate at the university) administrators in late March. I became a collaborator for this project at the workshop.

In addition, there is Nong Khod Lake in the suburb of my university, which is a place of recreation for citizens. However, storm water and domestic wastewater flow into the lake, and eutrophication with *Microcystis aeruginosa* as dominant species has occurred, and the citizens are suffering. The eutrophication in this lake is also the research subject of my graduate student. I was involved with the countermeasure projects that PH-KKU, the Provincial Office of National Resources of Environment, above mentioned REO and others have been investigating projects for one year.

Meanwhile, I was called by Dr. Jutamas Kaewsak who was also participating in the lecture meeting. She teaches water works at Mahasarakham University. I gave a lecture on Japanese advanced water treatment on April 20. Regarding the above mentioned *Cylindrospermopsis*, there is no activity at the moment, but I intend to act while watching the progress between Ms. Siwilai and Mr. Sasaki.

Nong Khod Lake

Water purification facility at Khon Kaen University

On the other hand, I was invited by my colleagues to experience village life during the holidays of Songkran, known for the watering festival. I was surprised by the poor management and operation of the water purification plant in the village, and I was strongly aware of the necessity of infrastructure development.

Part 5

Visiting Umeyama's Office in Bangkok

On Mar 3 (Sat), our member Mr. Umeyama came to pick us up at the hotel we stayed at in Bangkok as promised. As I got off to the lobby from the room, there was Mr. Saeki who was assigned to Nepal. I was trying to meet Mr. Umeyama but I have Saeki! This is because Mr. Saeki came to buy from Nepal to Bangkok and contacted Mr. Umeyama. Thanks for your coincidence, four people went to the office of Mr. Umeyama.

Mr. Umeyama has been assigned to Bangkok since last year and has launched an environmental consulting company in collaboration with a local company to investigate soil and groundwater pollution and purify it and do sales activities.

Because he has completed AIT (Asian Institute of Technology) graduate school in Bangkok, he is so familiar with Thailand. Since the Thai government embarked to regulate soil and groundwater pollution with enacting ministerial ordinance in 2016, and as a good opportunity for business, he worked hard with the cooperation of friends in the AIT era. After hearing his activities, we moved to a nearby Thai restaurant recommended by Mr. Umeyama and talked over lunch.

Umeyama's Office

Talks over lunch

その 6

Meeting and Algae Training in PPWSA,

After visiting Bangkok, we moved to Phnom Penh, Cambodia from March 4th to 6th. Mr. Ma Noravin, Director, Production and distribution Department, PPWSA helped us for our all stays. On 4th, Sunday, he took us to projected area for new water treatment plant of PPWSA (Phnom Penh Water Supply Authority). It is located in northern Phnom Penh. New WTP will take raw water from Mekong River. Projected production capacity will be 390,000 m^3/d constructed into two phases from 2019-2022 and 2023-2025. When the construction completed, Total production capacity will be 1 million m^3/d around. Project cost is estimated 225 million us dollars.

Mr. Ma Noravin

Planned intake point

Land for new WTP

On 5th, we had courtesy call to Dr. Sim Sitha, Dirctor General and several deputy director generals. We discussed WaQuAC-Net cooperation. After that, Yamamoto observed new facility, “onsite electrolytic-chlorinator” for generating sodium hypochlorite which taken in consideration of safety instead of chlorine gas. High quality salt is imported from China. Young engineers in charge of O&M said it runs smoothly so far.

Electrolytic device

Piled sacks of salt

Biological training for water quality staffs by Mr. Sasaki was held for 2 days, 5th and 6th at Nirot WTP and Punpreck WTP. Firstly, they took samples raw water at inlet point, sedimentation tank and filter. After sampling, they moved to laboratory and trained how to identify algae and small creatures using microscope.

Sampling

Water Quality Staffs at Niroto WTP

(part 5,6 by Yamamoto)

Part 7

Welcome Party for Thai Members

We held a welcome party for members from Provincial Waterworks Authority of Thailand (PWA) at Asakusa, Tokyo on May 24th in the early summer. Members are Ms. Wasana Watanagul, the director of Regional Training Center 2, Khon Kaen and 4 her colleagues. I have ever been working with her while I was a JICA expert of NWTTI project in Thailand about 20 years ago. She was a staff for water quality management as same as me at that time. So, we worked together for training courses and the improvement plan of a small scale water supply system. They came to Tokyo as a private trip this time. We thought that this is a good occasion to see each other as WaQuAC-Net members. Ms. Yamamoto, Mr. Kagata, Mr.Sasaki (also a former NWTTI expert), and Sasayama joined the party from Japanese members. We talked and talked with laughing a lot. 3 hours passed in a moment and we promised to see them again at Khon Kaen and said "good by". (by Sasayama)

Part 8

Follow up cooperation in PPWSA, Cambodia

KAMEGAI Yasuko

1. Background

Dr. KAMEGAI

It has been past about 10 years after closing of JICA project on "Capacity Building for Water Supply System in Cambodia phase1" triggered the launch of WaQuAC-Net. As an activity of the milestone, it was decided to review a status and provide supplementary or updating training program to laboratory staff members in PPWSA. As part of the activity, I, who was a water purification and water quality expert at that time, was dispatched as an WaQuAC-Net expert from March 26th to 30th, 2018.

2. Activities

PPWSA has willing to obtain ISO 17025 which is quality management system for laboratory and calibration agency and has started preparation. On the other hand, now the number of young and new staff is increasing. For these reasons, in this time, I conducted the training on water quality analysis technology, the update of SOP and confirmation of the usage and the training on quality control technology, as the main activity, and summarized the recommendations. Last of all, I submitted the report including activity result and recommendations to Director General, Dr. Sim Sitha.

3. Activity Result and Conclusion

3-1 Present laboratory condition

At the time of Phase 1 project, there were six laboratory members as our counterparts. But now, only three members out of six remained because the other three have retired or transferred to another department. While, younger staff members increased to 6. There are some young members have potential to become a leader. Veteran staff transfers technology well to young one. Therefore, I think that laboratory work is going well. PPWSA seems to supply quality water on the basis of good relationship between lab and production. The lab checks raw water quality and give direction of the dosing rate to the production section. They ensured the good communication and good cooperation. This is one of the most important missions of lab of water supply entity and it is going well.

3-2 SOPs usage

SOPs have been translated into Khmer by staff. But, these were prepared in 2006 with the help of JICA experts and have not been updated. These SOPs were prepared for the practical purpose. Therefore, these are weak in the field of quality control (QC). The more description related QC is necessary for meeting ISO requirement.

3-3 ISO17025 Accreditation

The top management wants quality assurance to improve customer satisfaction. ISO 17025 requires both quality management and technical management. Even if the requirements of quality management are general, the technical requirement is very challenging to PPWSA laboratory. Important basic ISO technical requirements are as follows.

1) Ensure traceability, 2) Measure QC level, 3) Define QC level, 4) Keep record, 5) Assure staff members' capability, 6) Train staff members.

Since PPWSA is also aiming to acquire ISO 9001. In order to become familiar with the concept of quality control and its operation method, it is probably the shortest path to get ISO 9001 first and then go to ISO17025 after all.

4.Acknowledgement

During the stay in PPWSA, all members took care of me with the deep heart. I would like to say thank you for all staff members. Especially, Dr. Sim Sitha kindly welcomed and allowed me to work and walk around PPWSA. Dr. Visoth gave me a task and encouraged me. Mr. Ma Noravin assisted me and provided the suggestions of ISO in PPWSA. The improvement of total PPWSA performance is a hope of all of us. We want to cooperate continuously.

I would like to say special thanks to Mr. Heng who was intensively working with me and all lab members, I enjoyed a lot at lab work after 12 years.

Thank you very much and hope to keep the progress and our good relationship.

Meeting with DG and Deputy DGs in PPWSA

Introduction of new members

- Mr. Okamura Akinori (Japan)
- Mr. Job Kangicu Fundi (Kenya)

We welcome new members anytime
Please contact us

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

Next Activity

August 26 Kyushu Blanch General Meeting
September 14 Osaka Meeting
September 15 Newsletter vol.38 in Japanese
October 15 Newsletter vol.38 in English