WaQuAC-NET Newsletter

Water Quality Asian Cooperation Network

http://www.waquac.net

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For Safe Water. Do Network.

Mr. Shimomura started for Laos as a Project Leader

Saitama City Waterworks Bureau has made technical cooperation for water supply sector in Laos through the years. JICA Capacity Development Project in LAO PDR was started in this August as compiling the all cooperation.

Mr. Masahiro SHIMOMURA was to be assigned as the chief advisor (project leader) of the project to Vientiane, the capital of Laos. Mr. Shimomura has been involved to work for Laos as a member of study team and a short term expert since Saitama City Waterworks Bureau (Saitama Kennan Water Supply Authority at that time) started cooperation for Laos in 1992. For three years from 2005, he worked for *JICA Project for Capacity Development on Non Revenue Water Control for Sanitation Company of the State of Sao Paulo, Brazil* as a project leader. Since returning to Saitama in 2010, he has actively contributed to WaQuAC-NET activities as the member. We held his send-off party and heard his talk about outline of the project and his enthusiasm for his work.

＜Mr. Shimomura's Send -off Party＞

Date; July 12, 2012

Place; Shinjuku, Tokyo

Participants; Mr. Shimomura, Mr. Arimura, Mr. Ishikawa, Mr. Yokoyama, Mr. Sasaki, Mr. Sakamoto, Mr. Shibazaki, Mr. Horie, Ms. Yamamoto

Mr. Shimomura

Q. What is name of the Project?

Capacity Development Project for Improvement of Management Ability of Water Supply Authority in LAO PDR

Q. What is contents of the Project?

The project aims 1) to develop capacity (in the field of management and utilization of data, and business planning) of pilot water supply utilities; Vientiane City, Luang Prabang Province and Kammuon Province, 2) to empower national authorities for regulatory capacity to monitor utilities, and 3) to spread outcomes of the pilot utilities to other utilities throughout the country through making guideline and establishing system of human resource development.

3 Project Sites

Q. How is water supply in Laos now?

Laos is LLDC (Least among Less Developing Countries), has a population of 6 million people and its water supply system can cover less than 50 % even in urban area. Although supported by many donor countries and organizations including Japan, Laos has still difficulties to make business plan and execute it appropriately; the reason may be because Laos has been passive for its development. I suppose this difficulty is a major cause to disrupt development of the country.

Q. How is relationship with Laos' counterparts?

Thanks to many Lao's counterparts have visited

Japan over the 20 years' cooperation period, we have good friendship. This project is also expected as phase 2 of the previous capacity development project conducted from 2003 to 2006.

Q. Supporting system in Japan?

The project is fully supported by Committee for Promotion and Consideration of International Expansion set in Saitama City Waterworks Bureau, which is headed by Mr. Kawashima. Our Mayer visited to Laos to attend seminar with members of city councilor last year, so the municipality itself is also ready to support the project. Furthermore, we plan to cooperate with Saitama Prefecture and private companies.

Q. What is your wish for the project?

I think it is important to change awareness of staff of water supply utilities from workers to top management, and also citizens who are users of water supply service by not seeking quick result but working closely with them. I would like to support them with strong will and confidence.

Best wishes for Mr. Shimomura's success

(By Ms. Keiko YAMAMOTO, WaQuAC-NET Office)

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Creating system to involve people
Wisdom and Power of Singapore

～Looking back to Singapore International Water Week (SIWW) ～

Mr. Gensuke ARIMURA
Water Supply Network News

SIWW was held in Singapore from 1 July to 5 July. It was only fifth holding, this event, however grew up one of the biggest water event in the world now. It was very powerful and seemed to surpass the "Wasser Berlin" that is traditional water event in Europe. Because it was too big and too many sorts to grasp the entire event, I felt necessity to send a team which consists of well versed water engineers and water business persons, and they also have to be good at English. I arrived on June 30. After I visited water treatment plant and attended the several meetings, I came back to Japan in the evening on July 6. Although I have had only limited information, I want to report the essences of this event based on interviews of the persons who attended it.

【Hall is Marina Bay Suns】

Marina Bay Suns was constructed in June 2010 and this is new land mark of the Singapore. Before opening, it was a notable topic to hold SIWW there. It is huge and multipurpose facility which consists of all elements. So "Tokyo Big Sight" or "Makuhari Messe" cannot become competitive with "Marina Bay Suns". If you are interested in Marina Bay Suns, you could check web site. It is a symbol of wealth in Singapore and facility itself has the ability to pull in more customers. I was so impressed by excellent idea and strategic intensive investment.

【Summary of SIWW meeting and in future】

Participants came from 104 countries and regions. As official announcement, 750 companies exhibited and 18,554 persons attended. It exceeds last year's records. Sixth SIWW will be held in 2014 not next year.

【Multiple event and synergetic effect】

SIWW was held with \`World Cities Summit\` and \`Clean Environment Summit\` at the same time. And it generated a synergetic effect. At first, I

thought that two events were held simultaneously with SIWW in order to liven up, because it had a limit to gather people by water business only. But actually it was totally contrary. ”Urban issue is getting stale and it includes water issue which can attract people, so it was held together with SIWW” said Panasonic representative who exhibited in World Cities Summit.

【Many meetings except SIWW】 The feature of this event was that IWA and UN official meetings and unofficial meetings were held at the same time. In other words, if we don’t attend these meetings, we can not access the world water information and we are left behind from world water trend. As one of those, I heard that meeting for fifth edition of WHO water quality guideline might be held unofficially during SIWW period. Generally, guideline is discussed by official members. However, at first, top engineers in the world exchange their views at the unofficial meeting. I heard that engineers from eight countries would attend the meeting, but actually there were six persons from six courtiers and also two persons from WHO head quarters. A top engineer from Japan also attended, I heard. Mr. Toru TOMIOKA, JWWA international department manager, gave a presentation on Japanese role of waterworks in Asia and other information in the IWA official meeting.

【Business Forum 】 Business Forum was a place of source of water business information from each country. Around 200 people attended in the Japanese Business Forum but regrettably almost all of attendance was Japanese. If Japanese would not change the way to participate the international meetings fundamentally, it means that we continue holding domestic forum for Japanese in the foreign country.

【Exhibitor from Japan】 More than 30 companies and organizations participated.

Meeting of Kyushu Branch

The fourth WaQuAC-NET Kyushu Branch Meeting was held joining Ms. Mina YARIUCHI who has come back to Japan tentatively from Vietnam at Tsukushi Kaikan in Fukuoka City on July 28. Participants were Mr. Nakashima, Mr. Yamashita, Mr. Onishi, Mr. Kagata, Mr. Akaishi, Ms. Yariuchi and Ms. Yamamoto. Other members were traveling to Asian countries. They discussed and exchanged information of their activities in the overseas.

New member; Mr. Akihiro ONISHI was introduced. He is working with Mr. Nakashima in Cambodia. He has a unique carrier as a wood cutter in Japan. We talked the importance of relationship between forest and water.

Mr. Kagata talked about his office; Council for Kitakyushu Water Business Promotion. He has felt a difficulty of the overseas advance of Japanese water companies. Now he trains three Vietnamese come from Hai Phong City about water treatment process. They are sent by the CLAIRE program.

CLAIRE stands for Council of Local Authorities for International Relations;

http://www.clair.or.jp/e/index.html

He was looking forward to visit Sendai City with them for observation of suffered area in August.

Mr. Akaishi changed his job to “TAKAGI” which is a production company of water purification equipment, shower devices and so on. He is expected to research applicable equipment for Asian countries. He visits Vietnam so often.

Main theme of Kyushu branch is to utilize private company’s power for improving water supply situation in Asia.

Mr. Nakashima is a top runner. He has been working at Cambodia for four years already. As you may know, “International Development Journal” July edition introduced his work in Cambodia, it is to join to the part of water supply in a local project of agriculture development.

Ms. Yariuchi said, “I want to strain every nerve at final year’s activity in the Vietnam Project as a coordinator and an expert of human resources development. (By Yamamoto）

MWA and WaQuAC-NET Signing in MOU

WaQuAC-NET and MWA (Metropolitan Waterworks Authority in Thailand) signed in MOU（Memorandum of Understanding）written about cooperation of improving personal ability in the safe water. As background of MOU, we have been building close relationship as follows. Continue to right column

18 persons in MWA participate in WaQuAC-NET as members. It is the largest number in the Asian countries. Since the beginning of WaQuAC-NET activity, MWA members have sent many questions to us. Then answers or comments have been exchanged among members. On the other hand, Mr. Sasayama and Mr. Sasaki went to MWA as water quality experts respectively. When Mr. Sasaki visited MWA in 2010, he met Governor of MWA and talked about holding the seminar jointly. Heavy flood crisis occurred in metropolitan area in Thailand last year. We exchanged opinions about methods for protection of water quality of drinking water. Continuously, we invited two MWA staffs as lecturers for the lecture about measures against flood crisis in April, 2012. And two MWA staffs also joined in the meeting which exchanged heavy disaster experience with staffs of Sendai City Waterworks Bureau. They observed the suffered area by the East Japan Great Earthquake and Tsunami too. This year, filter obstacle occurred in WTP of MWA in April, because a lot of algae grew up by contamination of raw water. Responding to the MWA’s request, Mr. Sasaki went to Bangkok and gave a special lecture for algae issue on August 24. He was sent as official trip from Yokohama Waterworks Bureau. We would like to say our thanks for supporting our activities by MWA and Yokohama WWB.

MWA requested following cooperation to us.

1.Training of algae issues at Yokohama WWB.
2.Second special lecture by Mr. Sasaki.
3.Seminar in Bangkok

After above activities, MWA want to make a SOP for the protection of algae obstacle.

(By Yamamoto)

Safe water supply in rural area of Northern region in Ghana, and study of possibility of introduction of slow sand filter.

Mr. Daisuke SAKAMOTO

Kokusai Kogyo Co.,Ltd

1. In Ghana as Japan Overseas Cooperation Volunteers

I was dispatched to Ghana as a water resource development junior expert of Japan Overseas Cooperation Volunteer (JOCV) for Guinea Worm Eradication Program (GGWEP) operated in the rural area of Northern region of Ghana, for 2 years from the end of March, 2008. Guinea Worm (GW) is a disease that person is infected when he or she drinks pond water contaminated by larva of GW directly. GW is not a fatal disease. However, if person is infected, full grown GW (approx 1 meter) comes up from foot and so on completely with strong pain. It takes for one month to remove GW. Most of cases, children are infected with GW, and during time of removing GW from their body they cannot go to school. One of the solutions to eradicate GW is that local residents access to safe water (not to drink the pond water directly). I had worked in the field of safe water supply especially for technical aspect with the purpose of improvement of safe water accessibility of local residents, and eradication of GW.

Picture1: Guinea Worm

2. My activities and safe water supply in Northern region in Ghana

Safe water supply coverage in rural area of Northern region was about 58% (CWSA 2006). This means at least 42 % of local residents in rural area use only pond and stream for drinking water. It was very shocking scene for me when I saw, first time, a woman fetching pond water for drinking, sweating under the blazing sun. This experience is one of my strong motive powers to work in the field of water.

Picture2: woman fetching pond water under the blazing

There are rainy season and dry season clearly in the northern region. During rainy season, residents can get safe water from rain water. The problem is dry season. During no rain period and in case that people do not have borehole, it is only way to rely on pond as drinking water source. Figure 1 shows annual trend of relationship between rainfall level and number of GW incidence. The onset of GW is after one year drinking the water contaminated by GW larva. Therefore it is considered that many local residents drink pond water during dry season by figure 1. It is said generally that one of reasons of low coverage rate of safe water supply is low successes rate of drilling well in Northern region. . On the other hand, there were so many villages that have to use pond water, though villagers had

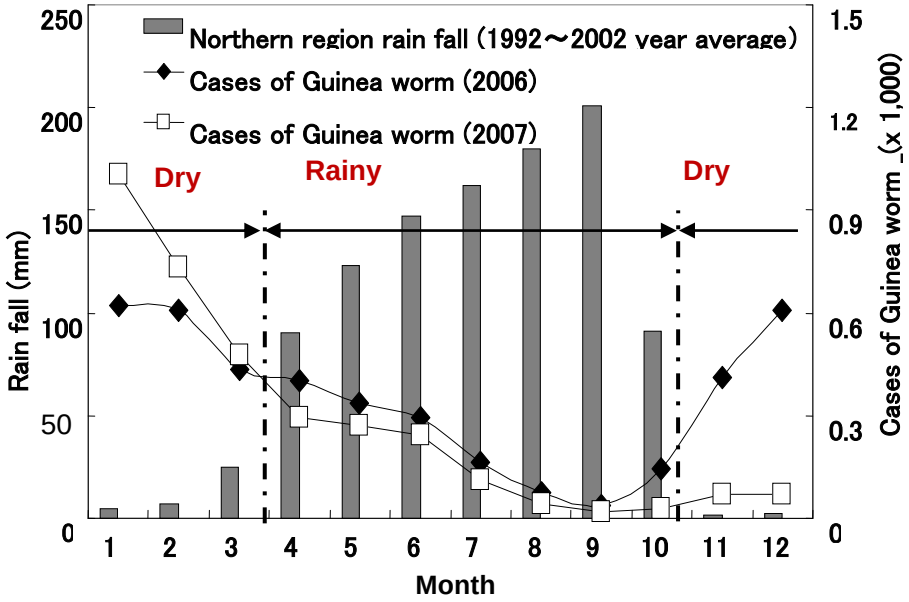

Figure1: Annual trend of Rainfall and cases of GW

the bore holes with hand pump and / or small water supply system, because villagers could not repair water supply facilities when they broke them. My activities were to repair the broken facilities, and also to strengthen existing O&M system of water supply facilities in order to keep sustainability. Besides these activities, I was thinking that if villagers could get safe water from pond as water source, it would contribute to solve water problem in this area. During my stay in Ghana, although it was not my main activity, I studied about the possibility of installation of slow sand filter for pond water as water source. I would like to report this study briefly below.

3. My activities and safe water supply in Northern region in Ghana

In general, target raw water of slow sand filter is for low turbidity. Turbidity of pond water in Northern region is very high, so it was thought that treatment of pond water by slow sand filter was difficult. Therefore, I thought that roughing filter might be used as pre-treatment to reduce turbidity (Table1).

Table1: Pre treatment for turbid water [1)]

Turbidity	Pre-treatment
20-100 NTU	Sedimentation
20-50 NTU	Roughing filter
50-200 NTU	Coagulant + Sedimentation + Roughing filter

I prepared simple treatment experimental system and then I implemented treatment experiment with support from local residents. Table 2 shows results. Result of roughing filter installed before slow sand filter could not satisfy the drinking water quality in turbidity and E.coil. On the other hand, the result of slow sand filter plus coagulation and sedimentation showed good treatment performance.

Method of above is 1) adding coagulant into raw water tank, 2) stir by manual work, 3) accumulated sludge in the tank, 4) flow the top layer water of the tank into slow sand filter

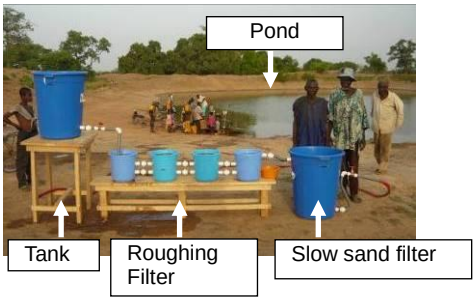

Figure2: Treatment experiment system

<Experiment condition>

- Roughing filter: Diameter of 5-30mm of gravel was used as material of roughing filter; Depth of filter is 20cm.
- Slow sand filter: Depth of lower bed is 15cm of gravel, and depth of upper bed is 30cm of sand.
- Filtration rate: 4 − 5 m per day
- Water quality test was conducted after 3 days of operation
- Water quality test was conducted at Tamare City Water supply facility

Table2: Results of water quality check

	Water standard	Raw water	Roughing fitter	Slow sand filter
Color (TCU)	0–15	47.8	32.6	15(1.1)
Turbidity (NTU)	0-5	96	61	29(2)
General Bacteria (Number / 100ml)	0-10	3,200	360	110(56)
E Coils (Number / 100ml)	0	540	67	19(11)

** Value inside ( ) shows result of Slow Sand Filter plus Coagulation and Sedimentation*

I concluded that when slow sand filter is used for treating pond water, consideration of following measures including sustainability aspect is needed.

(1) Treatment process of combination of coagulant, roughing filter and slow sand filter is needed to fulfill the drinking water quality standard.

(2) All operation of facility is required by manual work including stirring coagulant. Mechanization of facility is practically very difficult considering ability of O&M. Support to train operators for O&M for long period is also needed.

(3) Purified water should be sold. Cost of O&M (purchasing coagulant, labor cost and etc) should be covered from revenue by tariff.

(4) Cleaning filter is needed regularly, for example skimming of upper sand layer. These works also should be conducted by manual works.

(5) For practical application of this system, operation of pilot facility should be carried out using actual pond water by the process shown (1). And more steps such as confirmation of effectiveness of purification, continuous training for operator, set of water tariff, sale of purified water, and grasp of income (by selling purified water) and expenditure (purchase of coagulant, salary for operator and so on) should be also conducted. Then applicability and condition of application should be clarified as purification system of pilot facility including a point of view of sustainability.

4. Closing remarks

Although water supply situation of rural area in Ghana has been improved, there are still many people who have to drink unsafe water like pond water. This situation is not only in Ghana but also in many countries in Africa. My study as to introduction of slow sand filtration in Northern region in Ghana was only limited in my private study. I would like to continue to work diligently so that many people can access and drink safe water sustainably.

Finally, I would like to express my appreciation to many people who supported my activities in Ghana, and people in Ghana who accepted me warmly, though I can not speak local language in Ghana, and helped every time. I love Ghana.

<References of roughing filtration and slow sand filtration>

1) L.Huisman,W.E. Wood: Slow Sand Filtration, WHO, 1974.
2) M.Wegelin: Surface Water Treatment by Roughing Filter, SKAT, 1996

Question & Answer Corner

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

Q: Small black particles came out from tap in some supplied areas. Why did quality of tap water change? I am researching the reason. Could you help us? (Mr. D.V, Cambodia)

A-1 The dissolved iron/manganese are oxidized by the chlorine and it settled in the pipe as insoluble oxidize. The iron/manganese is supposed to be from raw water. Usually, particles of iron/manganese (absorbed in turbid) are removed by water treatment process mostly. And dissolved iron can be removed by the process easily too. However, the dissolved manganese removal is difficult so that the specialized manganese removal treatment is required.

According to the monitoring result of alkalinity, the water quality of raw water seems not to change a lot. Please check the following parameters by the accumulated monitoring data; such as iron, manganese (total and dissolved), pH, and residual chlorine.

(Mr. Yukio KUDO JWWA)

A-2 Manganese is oxidized by chlorine. The reaction is rather slow. Portion of manganese can be removed in sedimentation and filtration after oxidizing. But most of manganese is in excited state. *Excited state is the state that an atom or a molecule has higher energy but not enough to change its form. Manganese in excited state is finally oxidized after long hours under reaction with chlorine. Then, manganese oxide, including hydroxide, is settled in pipe. Manganese deposition will be much amount after many years. That amount depends on concentration of manganese in treated water, water flow, temperature, residual chlorine, etc. In "12.79 Manganese" of WHO guideline for drinking water quality 3rd edition, additional comment is mentioned as follows:

"The presence of manganese in drinking-water will be objectionable to consumers if it is deposited in water mains and causes water discoloration.

Concentrations below 0.05-0.1mg/l are usually acceptable to consumers but may sometimes still give rise to the deposition of black deposits in water mains over an extended period; this may vary with local circumstances."

For the case of Yokohama City, manganese concentration in treated water is 0.0001-0.0005mg/L. Manganese oxide is deposited for long years even though manganese concentration is quite low. And manganese deposition sometimes comes out from tap when water flow is remarkably changed. For your case, manganese concentration is 0.001-0.04mg/L. So, manganese deposition can be formed easily. We cannot realize no manganese deposition in pipeline network while raw water contains manganese. But we can reduce amount of deposition by removing manganese in treatment process. The most popular way is using manganese sand (green

sand) in rapid sand filter. For good removal, pre-chlorination is recommended for enough long contact time of chlorine. *Manganese sand is coated with manganese oxide. Manganese in excited state is oxidized on that coating easily. Manganese oxide coating works as catalyst for reaction.

(Mr. Hiroshi SASAYAMA
Yokohama WWB)

A-3 Your case seems typical drinking water problem, it is called as 'red water' in Japan. From my experience, almost all heavy metals including iron and manganese can be removed by the combinational use of pre-chlorine, intermediate-chlorine and manganese sand if the treatment process is working sufficiently. On the other hand, if pH is lower than 7.5 and more likely in case of lower than 7.0, iron contained in pipe dissolves into supplied water and re-settles inside of pipe of distribution line. The uncoated GP (Galvanized steel Pipe) enhances the dissolution of iron and causes the 'red water'. Mortar lining pipe is also damaged, when seal coat exfoliates and mortar dissolves.

Settled iron/manganese in pipeline can break away easily by the sudden change of water flow speed or flow direction, and causes the large scale 'red water (black water)' problem.

The effective countermeasures are;

1) To renew the pipe from uncoated pipe to lining pipe.
2) To coat the pipe by rehabilitation, if 1) is difficult.
3) To add alkali at the outlet of filter basin to keep the pH 7.5 in case of low pH.

I succeeded to reduce metal concentration by the procedure 3). The pH value was raised from 6.6 to 7.4, the concentration of metals at the tap was dramatically decreased, e.g., from 0.087 to 0.023mg/L for copper, 0.015 to 0.005mg/L for iron, 0.014 to 0.004mg/L for zinc, 0.002 to less than 0.001mg/L for manganese. It was the case of groundwater, so it might not be so effective for surface water.

In your case, pH seems relative high, but sometimes it shows lower value in April and May. The addition of alkali in this period could be effective for improvement water quality. But the settled iron remains in pipeline, so that the solution of 'red water' problem will need certain time period. There is a method to flush out water in pipe forcibly by drainpipe, but it has a risk of complaining by users.
The explanation to the people is essential.

(Mr. Akihiko ODASHIMA
Kitakami City WWB)

A-4 The deposition of Black particles of iron and manganese in the pipeline has been very popular in our network before. You know, in our case we have ever met big problem of iron and manganese, because the water source of the upstream area was changed by the activity of hydroelectric dam. The flow of river became slower, so concentration of manganese and iron was increased. The treated water had high concentration of iron and manganese. Manganese concentration was around 0.07 – 0.1 mg/L and iron was around 0.05-0.1mg/L.

It 's the reason of deposition in the pipeline.

At that time we did not apply manganese sand, pre-chlorination and increasing of pH value.

Since August of 2009, we applied all of the process mentioned above, so treated water is better now. At present, the treated water quality as follow:

Mn < 0.02 mg/L

Fe <0.05 mg/L

However, we still have a plan to check deposition frequently and clean the pipeline, if necessary.

(Ms. Tran Thi Minh Tam)

Introduction of New Members

- **Mr. Kazuhiko WATANABE (Japan)**
- **Mr. Manabu SUGINO (〃)**
- **Ms. Kanae KAWAMURA (〃)**
- **Ms. Nagisa KOZUKA (〃)**
- **Mr. Akihiro ONISHI (〃)**
- **Mr. Supitcha BUAPHIBA （Thailand）**
- **Mr. Sorakrit NUNDUANGKA (〃)**
- **Mr. Wisoot WEETEEPRASIT (〃)**
- **Mr. Auttapol KORDACH (〃)**

We welcome new member any time. Please contact us

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Next Activity

December, 2012	Newsletter No.16
January/February,2013	Training on Algae issues (supporting)

-Word Explanation-

M O U

MOU is shortened form of “Memorandum of Understanding”, that is a non-legally binding agreement between the organizations. Between WaQuAC-NET and the Metropolitan Waterworks Authority (MWA) of the Kingdom of Thailand, it was agreed to cooperation for individual capacity development for supplying safe water. The outline is described as the following.

1. Principle of Cooperation

WaQuAC-NET promotes to exchange technology, knowledge and information on water supply field in individual base. MWA supports WaQuAC-NET activity and both parties aim to develop the personal capacity and self-help effort.

2. Cooperation program

We dispatch the trainees and experts interactively. We hold seminar, workshop and lecture, and carried out other cooperation organized by both parties. These activities are not only for Thailand and Japan but also for neighboring countries.

3. Implementation

Assistant Governor (Water Resources and Quality) in MWA and WaQuAC-NET secretariat make a plan for cooperation program and after approval by governor of MWA, both parties carry out it. The details of each activity are discussed by both parties. (By Yamamoto)