JICA Project Brief Note (Version.1)

Project for Strengthening Capacity of Institutional Management, Operation and Maintenance in State Water Corporations in Sudan

July 2017

Water treatment plant in Wadi Halfa in Northern State

Project Site map

1. Background and Problems of the Project

The Republic of Sudan is located in the eastern part of Africa, and Sahara desert, which is the largest desert in the world, spreads through the northern and western part of Sudan. A large agriculture belt is developed along both sides of the Nile River. The country is 1,880,000 ㎢ (approximately 5 times of Japan). The population is 40,230,000 (1/3 of Japan). The GDP of Sudan was 84 billion US dollars, and the GNI per capita was 1,840 US dollars in 2015. The main industry of Sudan is agriculture, livestock and edible oil are exported. In addition, gold and crude oil are exported as well.

In 1990, the access ratio for safe water was 65% in Sudan. But due to civil wars, the ratio was down to 57% in 2000. This was almost the same as the average of the Sub-Saharan countries. According to The Quarter Century Strategy for Water Supply (2003-2027), the Sudan government aims to increase the access rate to 100% by 2027. Based on this strategy, various kinds of water supply facilities projects are on-going in Sudan.

Before 1995, the Public Water Corporation (PWC), currently Drinking Water and Sanitation Unit (DWSU), under the Ministry of Water Resources, Irrigation and Electricity had responsibility and authority on water supply works in Sudan. However, in 1995, the large part of the authority was transferred to each State Water Corporation (SWC) through the Government's decentralization policy. With this policy, the responsibilities of PWC became limited only to the scope of national policy formulation and large scale projects across several states.Though the SWCs were empowered, human resource development had not been enoughly conducted. This situation caused difficulties in construction and maintenance of facilities for the drinking water supply sector in Sudan.

In this context, Japan International Cooperation Agency (JICA) conducted the "Project for Human Resource Development for Water Supply" from 2008 to March 2015 and "Capacity Development Project for the Provision of Services for Basic Human Needs in Kassala".JICA supported human resource development in the water sector. The annual attendance of trainees in 2015 exceeded more than 2,000 in the whole country and JICA contributed to the steady reinforcement of the training system.

However, the operation and maintenance system of drinking water supply facilities in Sudan still has many problems. In the background, there are various factors such

as lack of funds due to a low water tariff and lack of a business plan based on the facilities operating results. To improve the water supply system further, not only the training system but also improvement of the works themselves. A reality-based improvement plan should be formulated and implemented. Knowledge and experience from the improvement activities must be shared through training courses.

In this context, the Sudan government made a request to conduct "the Project for Strengthening Capacity of Institutional Management, Operation and Maintenance in State Water Corporations" (the Project), in order to strengthen capacity in the drinking water supply sector.

Water Yard of White Nile State

2. Approach for Solutions to the Problem

(1) Project Purpose and Output

The overall goal, project purpose and output are summarized in the following table. There are 5 outputs, output 1 to output 4 are mainly activities in the two pilot states (Kassala and White Nile). Regarding output 5, the DWSU shall share project information and results with the other SWCs. The project period is from March 2016 to January 2020, the project will be implemented in 3 phases (Phase 1 : March 2016 to July 2017, Phase 2 : September 2017 to February 2019 and Phase 3: March 2019 to January 2020). This brief note summarizes the Phase 1 activities and results.

Project Summary
【Overall Goal】 Institutional management and O&M capacity in Non-pilot SWCs is strengthened.
【Project Purpose】 Institutional management and O&M capacity in pilot SWCs is strengthened.
【Output】 1. Monitoring capacity of water supply facility in pilot states is improved. 2. O&M methods for urban water supply facility is improved in pilot SWCs. 3. Management capacity in pilot SWCs is improved. 4. Communication between pilot SWCs and customers is enhanced. 5. Knowledge and data sharing among SWCs are enhanced.

(2) Basic Policy of the Project

This project is carried out dividing it into the 3 phases. Phase 1 is the preparation stage and phase 2 is the development stage. Regarding phase 3, the project shall be implemented mainly by the counterparts themselves as for activation and a follow-up stage. The relation among the outputs is shown in Figure 2-1. The project activities are conducted through the PDCA (Plan, Do, Check, Action) cycle at each stage. The PDCA cycle is the base of all activities in the project. It is necessary to train this approach to counterparts. Each output is closely related. All the results will be shared through the activities of output 5 for all the states.

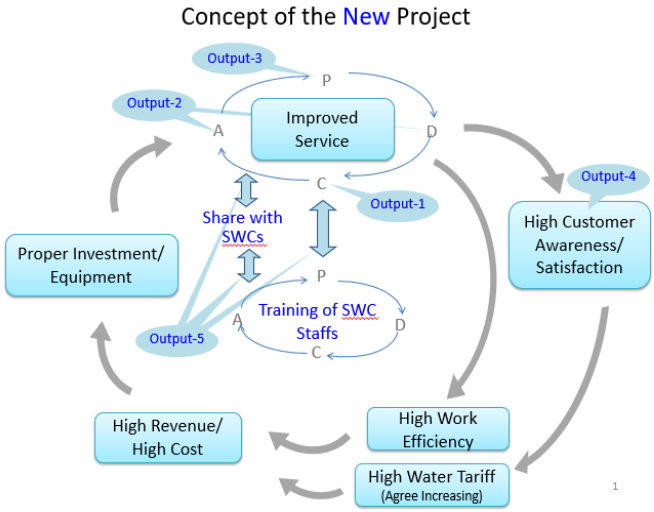


Figure 2-1. Basic approach of the project

Although it is extremely important to strengthen the ability of the SWCs as they are responsible for water supply in Sudan, to develop the capacity of all SWCs is not an easy challenge. The main reason is lack of information sharing system and insufficient communication in the organization. To tackle these problems, the project prepared posters with the figure shown in Figure 2-2 and posted it at each SWC and DWSU. The project explains this basic approach to SWCs at Joint Coordinating Committee (JCC) and Joint Seminars repeatedly emphasizes the importance of communication and sharing information.

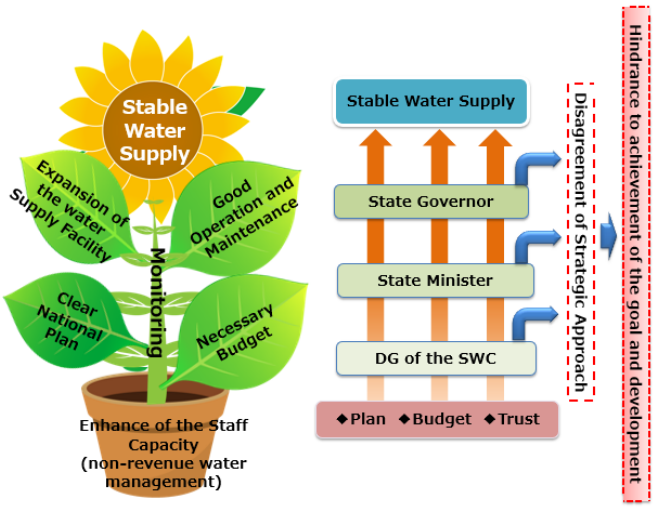


Figure 2-2. Basic approach of the project

The JICA Experts and counterparts regularly visit the 10 states including the two pilot states and carry out capacity assessment of the SWCs periodically. Using the results of the capacity assessment (described later), the project succeeded in designing activities to encourage their self-help efforts from the beginning of the project.

3. Results of each Output

(1) Monitoring the Water Supply Facility (Output 1)

Output 1 is that the capacity of monitoring water supply facilities is improved in the both pilot SWCs. Since drinking water in Kassala city depends 100% on the groundwater, establishment of a groundwater monitoring system is very important for the sustainable drinking water supply there. Therefore, the project decided to install monitoring facilities to observe the groundwater level. 15 sets of monitoring facilities were installed in phase 1 and the remaining 10 sets will be installed in phase 2. As a result, Kassala SWC can monitor the actual fluctuation of the groundwater level of various observation wells. Besides, to observe the water supply volume, a remote monitoring system was installed at 2 water treatment plants in Kassala.

All the wells were rehabilitated to be cleaned to increase the accuracy of observation (Figure 3-1). After rehabilitation of the wells, water level indicators with protection boxes were installed at each well (Figure 3-2). Regarding the protection box, concrete base frames were installed at several wells at the beginning. However, the cost of this system was higher than the other boxes; and finally, steel boxes were installed at the remaining observation wells to reduce the cost of the installation which is borne by the Sudanese side.

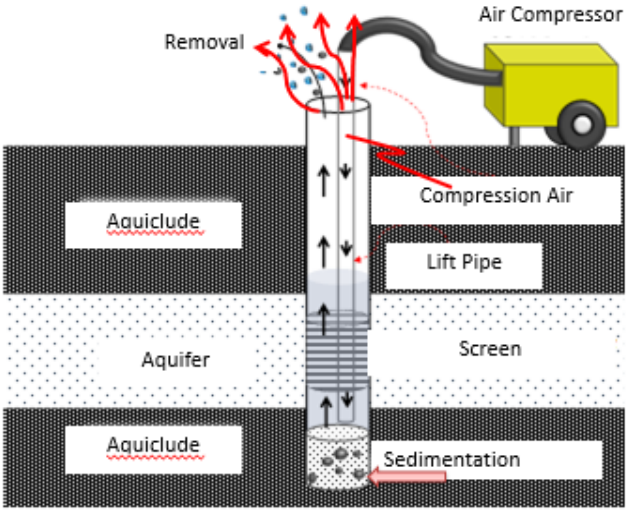


Figure 3-1. Rehabilitation of observation wells by airlifting method

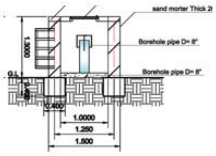
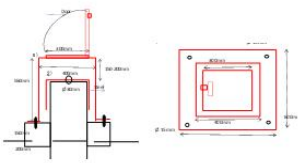
	Initial Design	Modified Design
Picture		
Design		
Cost	4,500SDG	2,000SDG

Figure 3-2. Design of protection facility for well

Figure 3-3 shows the water level fluctuation of an observation well which was constructed at around 50m from an irrigation well. The figure shows that the water level of the observation well fluctuates in conjunction with the operation of the irrigation well. It also shows the declining trend of the water level.

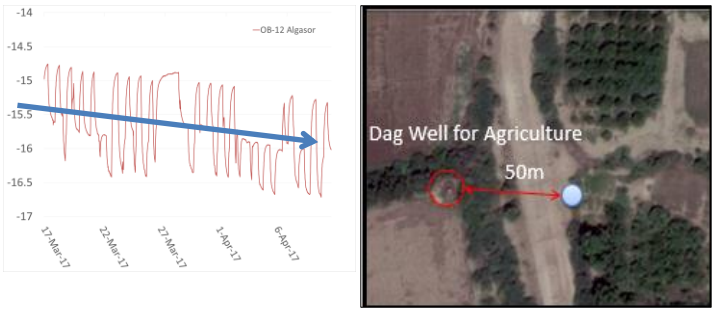


Figure 3-3. Record of water level of an observation well which is affected by irrigation well

Training for monitoring by Japanese expert

It was confirmed that the groundwater level in 2017 dropped largely in comparison to 1982 (Figure 3-4). The data shows the decline of groundwater level is caused by not only increasing of drinking water production but also rapid increasing of irrigation water consumption.

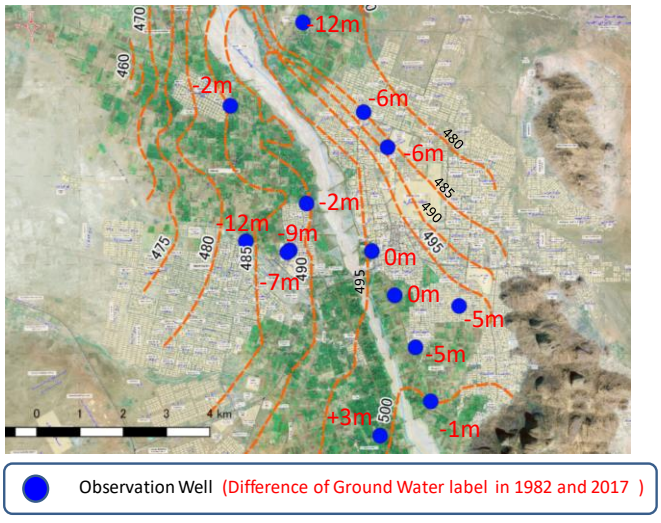


Figure 3-4. Difference of water level between 1982 and 2017

Figure 3-5 shows the achievement degree of the counterpart in output 1 of the Kassala and the White Nile SWCs. The achievement degree means how voluntarily the counterparts worked for each output. This degree is estimated through regular monitoring of the two SWCs performancementioned above. The indicator of output 1 consists of item 1.1 to 1.3. In this figure, 3 items are set as the horizontal axis. This achievement degree is decided through discussion between the JICA Expert and counterpart every six months and shown as a percentage (%).

It is clear that each achievement degree of the counterpart is improved in phase 1. This approach is adopted for all other outputs as well.

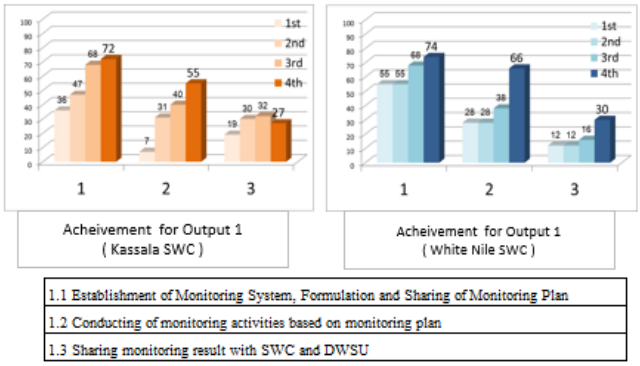


Figure 3-5. Achievement for Output 1

(2) Operation and Maintenance of the Water Treatment Plant (Output 2)

Output 2 aims for the operation and maintenance of urban water supply facilities to be improved in the pilot SWCs. There are 2 operating water treatment plants which were constructed by the Japanese Grant Aid project in Kassala city. In the phase 1, the Project carried out reinforcement of the ability for operation and maintenance mainly at the water treatment plants in Kassala City.

In general, there are challenges such as functioning chlorine injection units well, and preparing enough spare parts. For the capacity development of the counterpart, the JICA Experts are carrying out on-the-job training, seminar, examining the degree of understanding, and holding regular meetings (Figure 3-6).

Operation and maintenance training by Japanese experts in water treatment plant

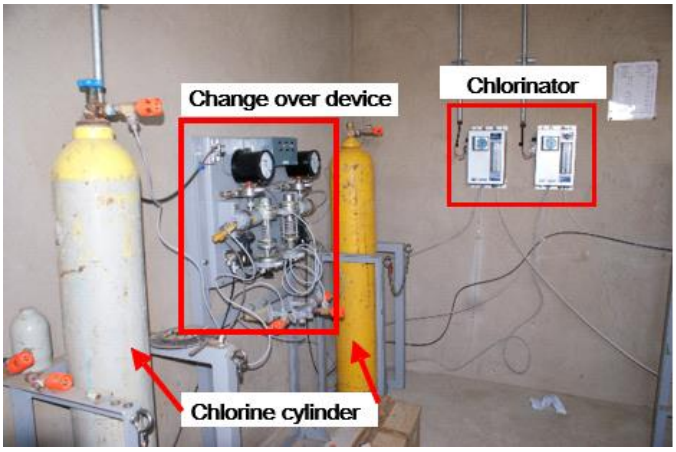


Figure 3-6. The chlorine injection unit in Kassala water treatment plant

Holding such regular meetings at the water treatment plants is very important for information sharing and concrete correspondence as well (Table3-1).The JICA Experts support to hold regular meetings surely by showing the concrete agenda. Various malfunctions occurring routinely are discussed in the regular meetings at the site. When the regular meeting continues, it is expected that the staff of the water treatment plants will be encouraged to work with critical mind and finally the capacity of operation and maintenance will be improved. Also, sharing information and communication are expected to be improved. On the other hand, a remote automatic monitoring system for the distribution volume at the water treatment plant in Kassala was established in phase 1. Due to installation of this system, the distribution volume in the water treatment plants can be measured (Figure 3-7).

Schedule	Topic
2016	
November	Routine inspection of pumps
December	Residual chlorine
2017	
January	Routine inspection of chlorination system
February	Safety practices
March	Stock inventory, stock yard cleaning
April	Safety patrol 1 (team composition, execution of treatment plant patrol)
May	Safety patrol 2 (execution of countermeasures, making modifications)
June	Operation and maintenance of standby generator
July	Operation and maintenance of electrical installations
August	Pump discharge pressure and distribution pipe network pressure
September	Cleaning of treatment plant interior
October	Operation and maintenance of treatment plant valves

Table 3-1. Scheduled Topics for Regular Meetings

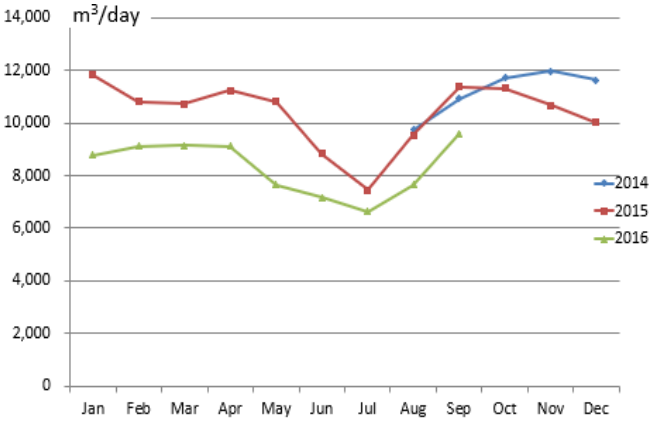


Figure 3-7. Recorded Water quantity by remote monitoring system in Kassala

(3) Corporate Management（Output３）

Output 3 aims to improve the management of the Kassala and White Nile SWCs. Both were selected as pilot SWCs by the project. Output 3 affects all activities of this project and financial improvement of the SWCs is a high priority. Figure 3-8 shows the relationship between the management committee and board of the SWCs. The budget application and business plan are to be prepared by the management committees of the SWCs and finally the boards of the respective SWCs approve this application.

In the Project, various performance indicators of the Kassala and White Nile SWCs were selected (Table 3-2). To achieve target benchmarks of these indicators, both pilot SWCs have prepared respective business plans (Figure 3-9). The SWC management committees and JICA Expert team have cooperated to prepare the business plans (draft).

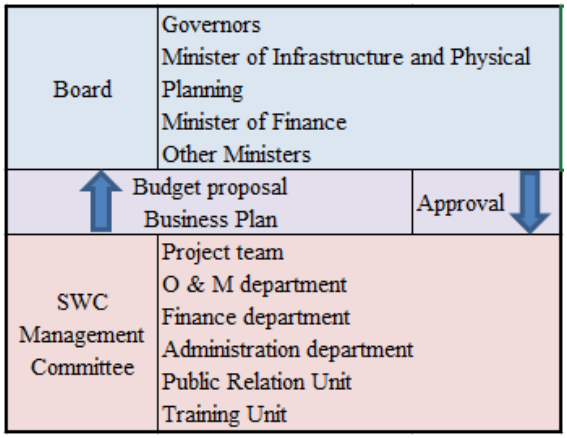


Figure 3-8. Relation of SWC management Committee and Board

Indicators	Current benchmarks in April 2017		Target Benchmarks in 2020	
	Kosti City	Kassala City	Kosti City	Kassala City
Total Population (estimation)	297,000	268,000	331,000	319,000
Population with Water Supply Service (estimation)	113,000	234,000	182,000	243,000
Water supply covering ratio *1	38%	87%	56%	76%
Total Water Production (estimation)	18,000 M3/day	37,000 M3/day	33,000 M3/day	45,000 M3/day
Total number of Water connections	19,000	42,000	27,000	44,000
Extension and replacement length of water pipeline	34	400	to be decided	500
Number of Metered Connections	0	0	300	130
Chlorine input	1,800 kg/year	4,188 kg/year	to be decided	to be decided
Number of parameters being tested	5	New boreholes: 12	to be decided	to be decided
		Treatment plant: 3		New boreholes: 12
				Treatment plant: 3
Number of staffs	305	343	to be decided	475
Amount of Bill Collection/year	10.6 M SDG	16.6 M SDG	14.0 M SDG	17.6 M SDG
Number of No water complaints/ month *2	48 -300	East Gash 8-87 West Gash 10-20	-	East Gash 5-15 West Gash 5-8
Number of training participation/year	173	2	506	218

*1 Reason of decline of water supply covering ratio is that expected increment of population is much faster than capacity of SWC's maintenance work. Countermeasure is required.
*2 Seasonal change causes variation width

Table 3-2. Performance indicators of pilot states.

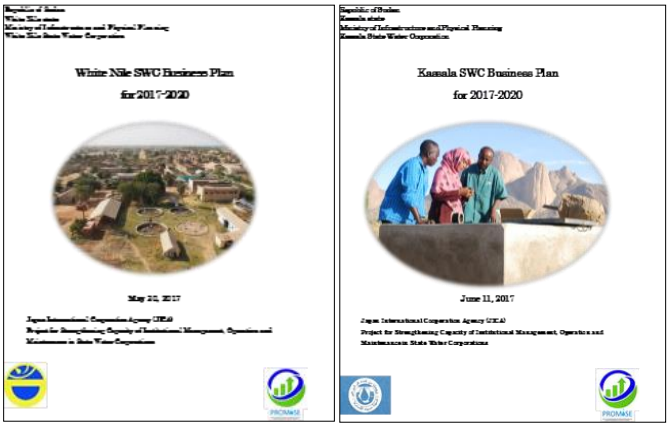


Figure 3-9. Drafts of annual business plan of 2 pilot states.

(4) Public Relations・Sensitization (Output 4)

While each SWC is the responsible organization of the drinking water supply in Sudan, information disclosure for the water users has not been insufficient until now. The water users did not understand the budget and the detail of activities of the SWCs. And because of lack of human resources and budgets, the SWCs couldn't cope with problems quickly until now even if the problems such as water leakage or water pressure drop though a water tariff is collected from the water users. Therefore, to strengthen the relationship of mutual trust between the water users and the SWCs is a big challenge. To tackle such problems and improve the communication between the water users and the SWCs, the project carried out the public relation activities in output 4. The main public relation activities are holding meetings with water users, implementing a customer satisfaction survey and setting up a bulletin board to inform the activities of the SWCs (Figure 3-10 and 3-11). Moreover, the project is publicizing the progress of the activities of the project and the SWCs through local TV, radio and newspaper.

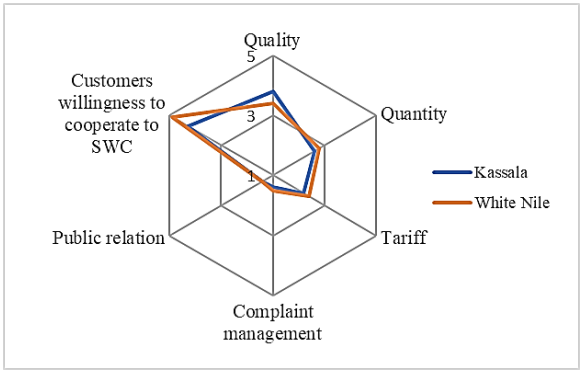


Figure 3-10. Summary of Customer satisfaction survey in pilot states

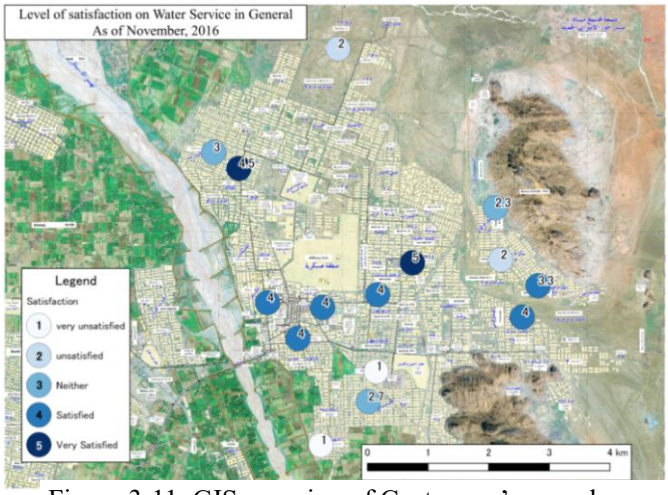


Figure 3-11. GIS mapping of Customers' general satisfaction level in Kassala (2016)

In addition, the Kassala SWC and the White Nile SWC opened Facebook pages in 2017 (Figure 3-12). Both SWCs continue uploading highly concerned topics such as regular meetings with water users, results of the customer satisfaction survey and the monitoring results of groundwater.


The third Public Committee Chiefs meeting in Kassala


Bulletin board in Kassala

Kassala SWC FB page　　White Nile SWC FB page

Figure 3-12. Pilot SWC Facebook page

(5) Sharing Output to all the SWCs (Output 5)

Output 5 is to share the various results of the project activities in pilot SWCs and model activity in other SWCs based on the monitoring survey. The DWSU and Drinking Water and Sanitation Unit Training Center (DWST) compile, analyze, and share good practices and model activities such as a water tariff system based on the water meters, efforts of profit improvement, and introduction of new technology with other SWCs. In terms of sharing information, Joint Seminars and Study Tours are significant opportunities in this project. In addition, the Project supports the establishment of the website to share information smoothly with each state in output 5. If the website is established by each SWC, it is a big contribution to effective basic information sharing and customer service.

No	1st	2nd	3rd	4th
Date	May 23,2016	November 24,2016	April 27,2017	May 10,2017
Venue	DWSU	Khartoum SWC	Kassala SWC	River Nile SWC
Participants	42	40	60	210
Main Topics	Approach of Gedaref, ,River Nile, Sennar, Khartoum SWC	Approach of Gezira, River Nile, Darfur Set up Website	Groundwater Monitoring	Model Activity of River Nile SWC
Photo				

Table 3-3. Summary of Joint seminars

No	1st	2nd	3rd	4th
Date	May 23,2016	November 24,2016	April 27,2017	May 11,2017
Venue	Khartoum SWC	Khartoum SWC	Kassala SWC	River Nile SWC
Participants	35	25	30	30
Main Topics	Bahali Water Treatment Plant	Alshajara Compact Water Treatment Plant	Groundwater Monitoring Facilities Irrigation Area	Model Activity of River Nile SWC Cement Factory
Photo				

Table 3-4. Summary of Study Tours

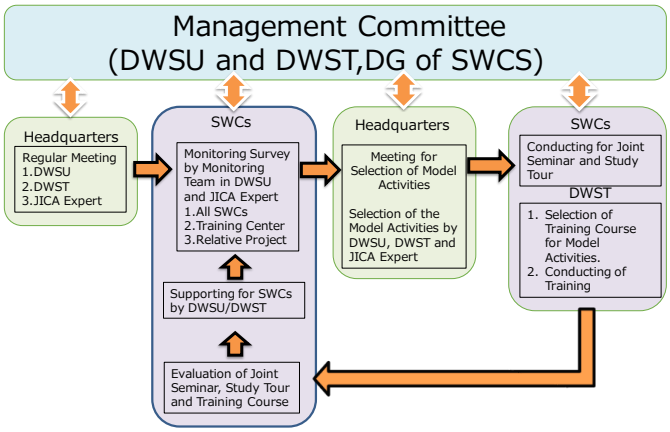


Figure 3-13. Management Committee chart for JCC and Study Tour

No	Contents	Prioroty
1	Greeting of Director General of SWC	A
2	Our Mission	A
3	Map of State	A
4	Organization	A
5	Budget	A
6	Water Tariff	A
7	Training Center and Human Resources Development	A
8	Water Treatment Plant Number	A
9	Office Building	B
10	Locality Office	B
11	Annual Work Plan	B
12	Major Activity of this Year	B
13	Official Development Assistance	B
14	Water Yard Number	B
15	Water Mater	B
16	Hand Pump Number	C
17	Hafir No	C

Table 3-5 List of Web site contents

4. Devise and lessons learnt of the Project

Expert visits states regularly to discuss with governor, related ministers, and DGs of SWC.

(1) Introduction of Award System

The award system is one of the effective approaches to maintain the motivation of the counterparts in Sudan. The JICA projects have introduced this system since 2008. The biggest advantage of introducing the award system is to raise the motivation of the counterparts and organizations which carry out model activities and various efforts. Because of government's decentralization policy in Sudan, the information sharing of each state was comparatively insufficient for many years; an effective approach for the solution has been difficult to share although many SWCs had similar problems. Therefore, the project commends effective approaches to be models for other states. In order for this system to function effectively, appropriate monitoring is necessary.

Award for a state which has already introduced
A water meter system

Figure 4-1. Incentive award for Gadaref State which is the only state that operates a water meter system in Sudan

(2) Introduction of the 5 S Activity

5S expresses initials of the Japanese: "Seiri" (Sorting), "Seiton" (Setting-in-Order), "Seisou" (Shining), "Seekers" (Standardizing), "Shitsuke" (Sustaining Discipline). Iit is expected that this activity works effectively in Sudan. The Project is introducing this 5S approach basically for environmental improvement of each workplace of the SWCs. In general, the staff needs to be aware of the necessity to improve maintenance of the work environment although the offices and warehouses are inferior. Each SWC has started trying to improve the maintenance of a comfortable work environment in this project. Specifically, tree planting in the workplace, thorough cleaning, quick correspondence for various malfunctions of the office are main activities. Some SWCs have already recognized the importance of 5S. The following photographs show the improvement of the work environments.

Comparison of the training center in Er Gezira SWC

(3) Training in Morocco

Twelve people including the JICA experts and a coordinator participated in the training in Morocco in November 2016. The government of Sudan decided on Morocco as a model country in the water sector and has

dispatched trainees to Morocco every year since 2012. As a result, 66 Sudanese participated in the trainings.

The participating trainees are executive candidates who are expected to manage each SWC in the future. After return to Sudan, the trainees submitted various action plans to feedback the training results in Morocco. However, most of the plans need a long period for implementation and will take more time to reach fruition from the action plans. Therefore, "the Atlas Club", the alumni association of the trainees was established and they decided to improve the work environment in each state. This is an approach to improve the work environment to a comfortable environment such as Morocco. Each SWC will carry it out with competitive consciousness.

Morocco Training

(4) Capacity Assessment of each SWC

There are 18 states in Sudan, the counterparts and JICA Experts implement regular capacity assessment of the 10 states:Northern, River Nile, Red Sea, Khartoum, El Gezira, Gedaref, Kassala, Sennar, White Nile and North Kordofan, except for conflict areas. The 6 assessment items are: Operation and Maintenance, Management, Public Relations, Human Resources Development, Budget and Monitoring of the Water Supply Facility. The results of the assessment are shown in Figure 4-2. The figure shows the different capacity of each SWC.

Especially, the activities of the River Nile SWC is the model for the other SWCs, the budget, human resources development and management are excellent in comparison with other SWCs. The Project will continue to carry out this assessment regularly during the project period and the JICA Experts will support t counterparts to enforce this approach even after the project.

This capacity assessment is an important approach to improve and motivate each SWC. Due to the large influence of the decentralization policy in Sudan, each SWC has carried out activities individually. But now, the communication and information sharing system is gradually improving. This capacity assessment has brought an effect to stimulate the potential for reform of the SWCs.

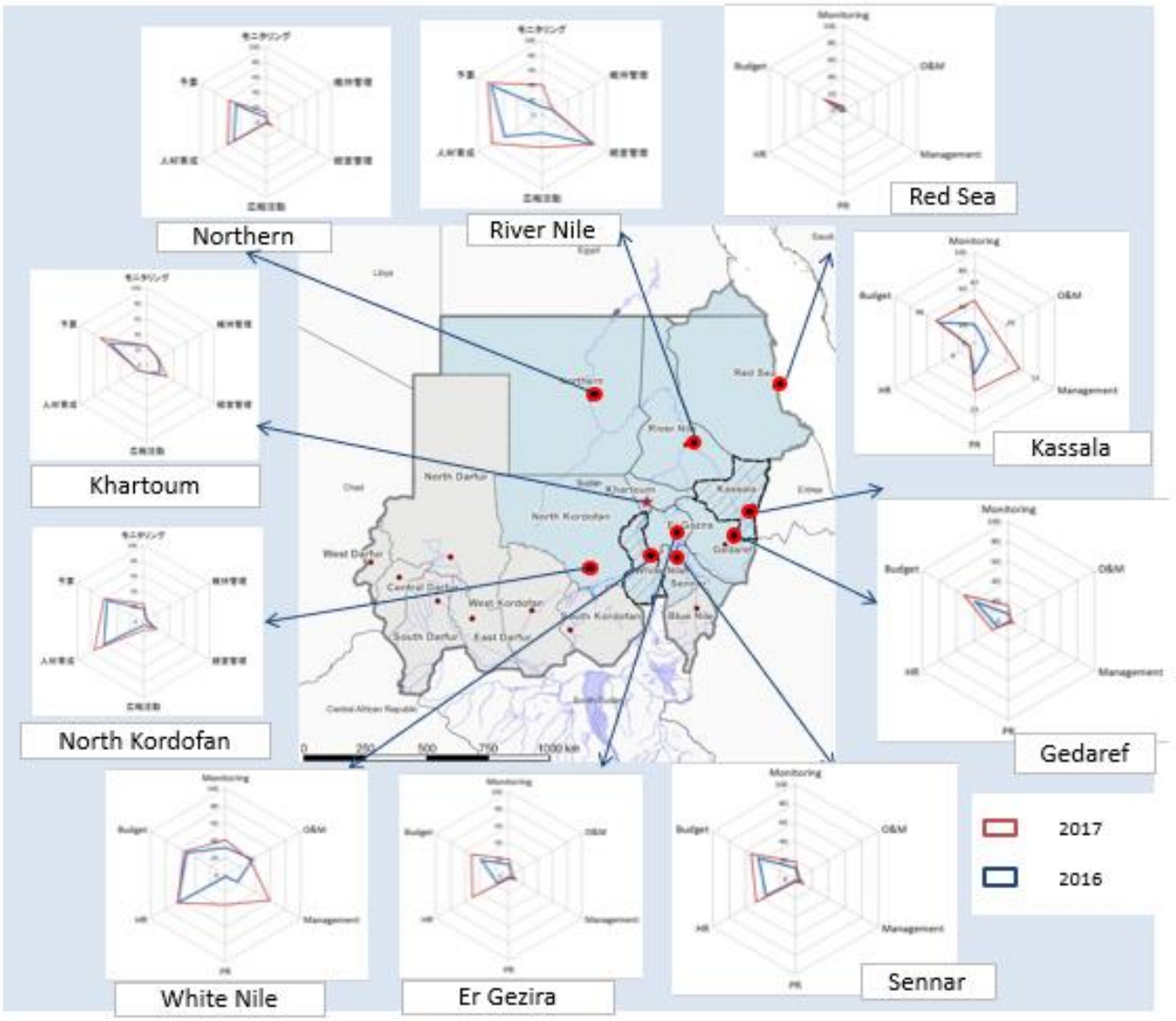


Figure 4-2. Evaluation result of 10 SWCs in Sudan

【Reference】

- Summary of the Project: https://www.jica.go.jp/project/sudan/007/index.html
- Project News: https://www.jica.go.jp/project/sudan/007/news/index.html
- Kassala SWC Facebook
  https://www.facebook.com/هيئة-مياه-الشرب-ولاية-كسلا-575786492620912/
- White Nile SWC Facebook
  https://www.facebook.com/هيئة-مياه-الشرب-ولاية-النيل-الأبيض-152655218741719/