

Country Name	Technical Cooperation for Strengthening Capacity for Water Quality Analysis and Monitoring System in Bangladesh
People's Republic of Bangladesh	

I. Project Outline

Background	<p>After arsenic was detected in tube wells water in Bangladesh in 1993, an importance of establishing the water quality analysis system in terms of providing safe water became recognized. The Government of Bangladesh approved the National Policy for Arsenic Mitigation in 2004, which clearly described the necessity of i) capacity development of the related organizations and personnel for water quality analysis of existing wells and alternative water sources, and ii) establishment of the network among laboratories well equipped for arsenic analysis. The Department of Public Health Engineering (DPHE) started the water examination activities since 1980's, with donors' support, including JICA's grant aid, for establishment of zonal laboratories. On the other hand, technical issues have remained, such as capacity development of the central and zonal laboratories in management, analytical works and quality control, development of communication system among the laboratories, and development of the database of water quality. In such circumstances, a technical cooperation project for the central and zonal laboratories was requested to the Japanese government.</p>														
Objectives of the Project	<p>This project aimed at improving DPHE's capacity for water quality analysis and monitoring and then establishing a surveillance system, in order to secure safe drinking water.</p>														
	<ol style="list-style-type: none"> Overall Goal: For securing safe drinking water, water quality monitoring is duly conducted and related surveillance system is launched. Project Purpose: DPHE's capacity for water quality analysis and monitoring is improved. 														
Activities of the Project	<ol style="list-style-type: none"> Project site: Central Laboratory (Dhaka) and 11 Zonal Laboratories (Mymensingh, Comilla, Rajshahi, Khulna, Rangpur, Bogra, Tongi, Sylhet, Jhenaidah, Barisal, Noakhali) Main activities: <ul style="list-style-type: none"> - Training for the laboratory staff on the water quality analysis from Japanese experts - Clarification of the work procedure and regulations for water quality analysis. - Development of the guidelines for the work procedure and laboratory management. - Implementation of the test water quality monitoring at the central and zonal laboratories. Inputs (to carry out above activities) <table border="0" style="width: 100%;"> <tr> <td style="width: 50%;">Japanese Side</td> <td style="width: 50%;">Bangladeshi Side</td> </tr> <tr> <td>1) Experts: 7 persons</td> <td>1) Staff allocated: 67 (laboratory staff)</td> </tr> <tr> <td>2) Training in Japan: 11 persons</td> <td>2) Land and facilities: Office space for Japanese experts, training facility, etc.</td> </tr> <tr> <td>3) Equipment: Water quality analysis equipment, office equipment, etc.</td> <td>3) Operational cost: 2 million Tk.</td> </tr> <tr> <td>4) Local operation cost: 62 million yen for equipment procurement, local consultant contract, etc.</td> <td></td> </tr> </table> 					Japanese Side	Bangladeshi Side	1) Experts: 7 persons	1) Staff allocated: 67 (laboratory staff)	2) Training in Japan: 11 persons	2) Land and facilities: Office space for Japanese experts, training facility, etc.	3) Equipment: Water quality analysis equipment, office equipment, etc.	3) Operational cost: 2 million Tk.	4) Local operation cost: 62 million yen for equipment procurement, local consultant contract, etc.	
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Ex-Ante Evaluation	2008	Project Period	March 2009 to March 2012	Project Cost	(Ex-ante) 300 million yen (Actual) 327 million yen										
Implementing Agency	Department of Public Health Engineering (DPHE)														
Cooperation Agency in Japan	Kokusai Kogyo Co., Ltd., Sowa Consultants Inc., Ministry of Health, Labour and Welfare														

II. Result of the Evaluation

1 Relevance
<p><Consistency with the Development Policy of Bangladesh at the time of ex-ante evaluation and project completion></p> <p>The project was relevant with Bangladeshi government policies, as mitigation of arsenic pollution and improved access to the safe water were prioritized in the Poverty Reduction Strategy Paper (2005-2010) and the 6th Five-year Plan (2011-2015) of the Perspective Plan of Bangladesh 2010-2021.</p> <p><Consistency with the Development Needs of Bangladesh at the time of ex-ante evaluation and project completion ></p> <p>Arsenic contamination in the well water was detected in the 1990s and 20-30 million people were estimated to be affected by arsenic contamination, and more than 20 million people still faced the threat at the project completion. There were great needs for capacity development of DPHE laboratories in conducting systematic water quality analysis for ensuring safe drinking water.</p> <p><Consistency with Japan's ODA Policy at the time of ex-ante evaluation></p> <p>In the Country Assistance program (2006), one of the priority areas was social development with human security, for which environment was one of the priority sectors.</p> <p><Appropriateness of the project design/approach></p> <p>The Project Purpose was mostly achieved, but this has not contributed to achievement of the Overall Goals. In other words, DPHE laboratories improved their capacity for water quality analysis and monitoring by using sufficient parameters and developed the comprehensive water quality analysis protocol which is included in WSF. However, since the project completion, DPHE has not started the periodic water quality monitoring or surveillance. The reason is the budget constraints, although water quality monitoring and surveillance for securing safe drinking water are prioritized in the government policy. The project should have considered possible measures for</p>

ensuring and getting approval for the budget at the planning and implementation stages.

<Evaluation Result>

In light of the above, the project was relevant with the Bangladesh government policies and development needs as well as the Japan's ODA policy, although certain measures should have been taken for ensuring the budget for achieving the Overall Goal with regard to the project design. Therefore, the relevance of the project is high.

2 Effectiveness/Impact

<Status of Achievement for the Project Purpose at the time of Project Completion>

The Project Purpose was mostly achieved. Water quality test was conducted with 53 and 22 parameters at the central and zonal laboratories, respectively, as targeted. Daily maintenance of the laboratory equipment was conducted as per the guideline, but repair was delayed due to the budget shortage. For the laboratory management, DPHE obtained ISO/IEC 17025¹.

<Continuation Status of Project Effects at the time of Ex-post Evaluation>

Effects of the Project Purpose have mostly continued. Water quality analysis and laboratory management have been conducted in the same way as they were during the project period. Chemicals and equipment have been operated following the quality manual developed by the project, but the chemicals have not been regularly supplied to meet the increasing demand for water quality analysis due to the budget constraints. No DPHE laboratories have been certified with ISO/IEC 17025 yet because they have not met all the required criteria. However, they are rated as the best water quality analyzers in the country by the Bangladesh Council of Scientific and Industrial Research.

<Status of Achievement for Overall Goal at the time of Ex-post Evaluation>

The Overall Goal has not been achieved as of the ex-post evaluation. Neither periodic water quality monitoring nor surveillance has started on a regular basis because DPHE has no such program on its own due to budget constraints. According to DPHE, water quality surveillance will be conducted in 2016 at a pilot basis in two municipalities by each zonal laboratory. As a road map for the full-scale water quality monitoring, the government has approved the Water Security Framework (WSF) in Bangladesh in 2011 following WHO's guideline for drinking water quality and prepared several guidelines regarding the water safety. However, these have not been implemented because of the lack of budgetary allocation. Instead, DPHE laboratories have conducted water quality analysis when new facilities are installed by DPHE, LGED (Local Government Engineering Department), PWD (Public Works Department), NGOs and others. Also, DPHE laboratories support NGOs and other development projects in testing the tube wells and other drinking water and mark them if they have contaminations.

<Other Positive and Negative Impacts>

DPHE has a hazardous water treatment facility at the central laboratory established by JICA². However, it has not functioned since 2013 due to the lack of chemicals and transport facility of the effluents from the zonal laboratories. Therefore, DPHE laboratories dispose the effluents with other wastes and they are mixed with surface water sources and soils, and it cannot be denied that this may be some negative impact on the environment and people's health. DPHE is giving directives for procuring chemicals and transport of the effluents, while it explains the quantity of the disposed effluents is too small to cause any catastrophic results.

<Evaluation Result>

The Project Purpose was mostly achieved and continued, but the Overall Goal has not been achieved. In other words, DPHE laboratories have improved their capacity for water quality analysis and monitoring with sufficient parameters. However, due to the budget constraints, DPHE has not started the periodic water quality monitoring or surveillance at the time of ex-post evaluation. There is an issue that there may be a negative impact caused by inappropriately disposed effluents from the laboratories. Therefore, effectiveness/impact of the project is low.

Achievement of the Project Purpose and Overall Goal

Aim	Indicators	Results
(Project Purpose) DPHE's capacity for water quality analysis and monitoring is improved.	1. Adequate chemicals & necessary equipment and instruments are available and in good conditions.	(Project Completion) <u>Partially achieved.</u> - Daily maintenance of the laboratory equipment was conducted based on the guideline. Major maintenance and OJT for the laboratory staff were planned but not conducted. Repair and maintenance of the equipment was delayed due to the budget shortage. (Ex-post Evaluation) <u>Partially continued.</u> - Instruments and equipment are readily available, but the regular supply of chemicals is limited.
	2. Laboratory management system is established following ISO system.	(Project Completion) <u>Achieved.</u> - Laboratory management system was established based on ISO/IEC 17025. (Ex-post Evaluation) <u>Continued.</u> - The central and zonal laboratory works, chemicals and equipment have been operated on the quality manual.
	3. 22 parameters are analyzed in regional lab and 53 parameters are analyzed in Central lab.	(Project Completion) <u>Achieved.</u> - 53 parameters can be analyzed in the central laboratory, and 22 parameters can be technically analyzed at the zonal laboratories. (Ex-post Evaluation) <u>Continued.</u> - 65 parameters at most are analyzed in the central laboratories, and 22 are analyzed at the zonal laboratories.
(Overall Goal) For securing safe drinking water, water quality monitoring is duly conducted and	1. Water quality monitoring is conducted periodically as per the comprehensive protocol.	(Ex-post Evaluation) <u>Not achieved.</u> - Periodical monitoring of the water quality has not started.
	2. Water quality	(Ex-post Evaluation) <u>Not achieved.</u>

¹ ISO/IEC 17025 is an international standard on General requirements for the competence of testing and calibration laboratories.

² The Project for Strengthening of Water Examination System (2004).

related surveillance system is launched.	surveillance is conducted as per the comprehensive protocol.	- Water quality surveillance has not been conducted by DPHE.
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Source: DPHE.

3 Efficiency

The project period was as planned (ratio against the plan: 100%). However, the project cost slightly surpasses the plan (ratio against the plan: 109%), probably because some expenditures had to be borne by the Japanese side before the budget from the Bangladeshi side was approved. Therefore, efficiency of the project is fair.

4 Sustainability

<Policy Aspect>

Water quality monitoring and surveillance for securing safe drinking water is prioritized in the government policy such as WSF. WSF includes the guidelines on water safety plans and water quality monitoring protocol. There is no specific plan for any future change in the current policies with regard to water quality analysis and monitoring.

<Institutional Aspect>

The organizational structure and functions of DPHE laboratories have not changed. Functions of the Water Quality Monitoring & Surveillance Circle (WQMSC) have been clearly defined. Zonal laboratories' work is monitored by the central laboratory. Every six months the central laboratory sends samples to the zonal laboratories, and their test results are compared with that of the central laboratory. When different results are found, the central laboratory sends a monitoring team to check the equipment to that laboratory. Monthly test reports are accumulated at the database of the central laboratory. Many personnel posts of the central and zonal laboratories are vacant because some have retired or left for better job opportunities and the recruitment or promotion process is too slow to fill in the posts. The Local Government Division has formed a committee to accelerate the recruitment process. The turnover of the laboratory chemists and bacteriologists is frequent, as they are suppressed by the managerial personnel and also any incentive is not paid for risky works. These vacancies and high turnover have caused increased waiting time for water quality testing and inappropriate sampling done by some contractors for new installation's testing. Most of the provided laboratory equipment is in good condition with a few exceptions (distilled water producer, ion meter, etc.) which need immediate repair or replacement. Due to the insufficient manpower and chemicals, many of the demanded tests have not been conducted at the zonal laboratories. Regular maintenance is conducted by each of the zonal laboratories, and special repair is asked to local suppliers through the central laboratory. Some repair parts need to be collected from the local agents, which often takes weeks.

<Technical Aspect>

The guidelines were developed and most laboratory staff has been trained on the use of these guidelines³. On-the-job trainings were also conducted based on the staff needs by the ToT (training of the trainers) trainers trained by the project, although regular training based on the needs assessment is not organized due to the budget constraints. The guidelines have not been updated or reprinted; however, they are accessible at all of the four visited laboratories. Unfortunately, the staff cannot use all of the guidelines fully since periodic pro-active water quality monitoring is not undertaken. The manuals are partially utilized and the staff's proficiency levels differ. More than half of UPS/IPS (uninterruptible power system/instant power supply) are not functioning and the computers are not updated, which affect accuracy of the test results.

<Financial Aspect>

There has not been much decrease or increase in the budget of DPHE for the last four years (Table 1). The budget for chemicals is slightly increasing every year. There is no specific budget for consumables and spare parts, and each laboratory has to adjust them from other budget. DPHE has not faced a major difficulty in conducting daily operations, but the budget is not sufficient to meet the increasing demands. For water quality analysis, only 50-60% of the budget demand of the zonal laboratories is met. As explained in the section of Effectiveness/Impact, neither periodic water quality monitoring nor surveillance has started due to the budget constraints, which are attributed to the low priority of DPHE works and its weak negotiation skills with the Ministry of Finance. However, according to DPHE, the budget for surveillance which is planned in the two pilot municipalities has been identified and will be met from the revenue. Zonal laboratories have income from water quality analysis works⁴, but it goes to the government treasury and does not come back to DPHE. DPHE is currently looking for measures to secure the income over water quality analysis.

<Evaluation Result>

Some problems have been observed in terms of the institutional, technical and financial aspects of the implementing agency. Therefore, sustainability of the project is low.

5 Summary of the Evaluation

The Project Purpose was mostly achieved and continued, but the Overall Goal has not been achieved. In other words, DPHE laboratories have improved their capacity for water quality analysis and monitoring using sufficient parameters, although they sometimes lack the chemicals. However, due to the budget constraints, DPHE has not started the periodic water quality monitoring or surveillance. Regarding the sustainability, there is personnel insufficiency at both the central and zonal laboratories due to frequent turnover and slow process for recruitment. Also, there are budget constraints for conducting regular training and purchase of chemicals and other consumables. Under such conditions, DPHE laboratories have not undertaken all of the requested testing. As for the project efficiency, the project cost slightly exceeded the plan to cover the expenditure which should have been borne by the Bangladeshi side.

In light of the above, this project is evaluated to be unsatisfactory.

Table 1. Budget of DPHE (million Tk.)

	2012	2013	2014	2015 (plan)
Total revenue	6,125	5,602	4,648	5,742
Development projects	2,730	2,104	965	746
Laboratory	3	15	31	7
Chemicals	3	5	6	7

Source: DPHE.

³ The developed guidelines are "management guidelines for laboratory wastewater and wastes," "guideline for equipment maintenance and management," "DPHE WQMSC internal proficiency test guideline" and "comprehensive water monitoring protocol."

⁴ According to the obtained data from 2010 to 2012, 11 zonal laboratories had 742 to 6,031 thousand Tk. The amount varies by year and laboratory, depending on the requests.

III. Recommendations & Lessons Learned

<Recommendations for DPHE>

1. It is recommended to increase personnel and budget for the laboratory works of periodic water quality monitoring and surveillance on a regular basis as government programs by negotiating with the Ministry of Finance.
2. It is recommended to establish an incentive or rewarding salary mechanism in which some portion of the revenue earning (10-20%) is given to the laboratory staff as performance-based bonus and risk allowance.
3. In order to operate the hazardous water treatment facility, it is crucial to secure necessary chemicals and transport facility of the effluents from the zonal laboratories, before the water currently disposed to the surface causes any negative impact on the environment and people's health.

<Lessons Learned for JICA>

1. The Project Purpose was mostly achieved, but this has not contributed to achievement of the Overall Goal. DPHE laboratories improved their capacity for water quality analysis and monitoring by using sufficient parameters and developed the comprehensive water quality analysis protocol which is included in WSF. However, since the project completion, DPHE has not started the periodic water quality monitoring or surveillance. The reason is the budget constraints, although water quality monitoring and surveillance for securing safe drinking water are prioritized in the government policy. The project should have considered possible measures for ensuring and getting approval for the budget at the planning and implementation stages. DPHE and the project should have clarified the procedure for budget approval and allocation in Bangladesh before the project started and intervened more not only in the technical aspect but also institutional and financial aspects during the project period, in order to realize the policy as budgeted activities. For example, the project should have developed programs for water quality monitoring and surveillance with budget plans and supported to get approval from the Ministry of Finance before the project completion.



(Chemicals for water quality analysis at the Central Laboratory)



(Procured equipment at Khulna Regional Laboratory)