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Network on Water Technology in Asia and Pacific

Urban Water Supply Project
Cambodia

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Summary

Cambodia, a south eastern Asian country for the past decades has experienced significant economic growth and urbanization in many cities of the country. However, water supply in many of the country's urban cities has been described as poor, unreliable and inadequate and of bad quality. The unsatisfactory condition of the public water utilities has been attributed largely to the inadequate investment in the sector. Urban water supply in Cambodia is handled by the Phnom Penh Water Supply Authority (PPWSA) and the Siem Reap Water Supply Authority (SRWSA), 11 Public Water Works (PWW's), as well as 147 smaller utilities. Significant investments in the urban water supply sector has been focused on the SRWSA resulting in underinvestment in the the other public water utilities of the country. With about 90% funding from the Asian Development (ADB), the Urban Water Supply Project (UWSP) was formulated and implemented with the goal of expanding access to sustainable and safe water supply services for the urban population in Cambodia. The project will primarily support nine urban water supply utilities (eight provincial water supply authorities and one state owned public water supply authority) by administering the project fund as grants and loans to enable the utilities identified subprojects.

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Acronyms and abbreviations

ADB	Agricultural Development Bank
DPWS	Department of Potable Water Supply
EIRR	Economic Internal Rate of Returns
EMP	Environmental Monitoring Plan
FAO	Food and Agriculture Organization
FIRR	Economic Internal Rate of Returns
MDG's	Millennium Development Goals
MIH	Ministry of Industry and Handicraft
NRW	Non-Revenue Water
O&M	Operation and Maintenance
PIU	Project Implementation Units
PMU	Project Management Unit
PPWSA	Phnom Penh Water Supply Authority
PWW	Provincial Water Supply Authorities
SPS	Safeguard Policy Statements
SRWSA	Siem Reap Water Supply Authority
UWSP	Urban Water Supply Project
WACC	Weighted Average Cost of Capital
WTP	Water Treatment Plant

1 Introduction

Cambodia is a southeastern Asian country bordered to the east and the southeast by Laos and Vietnam respectively. To the northwestern and southwestern part of the country is the Gulf of Thailand and the Kingdom of Thailand. The country covers a land area of about 176, 515 km^2 with an estimated population of 16.2 million. Cambodia is a lower middle income country with a demography of a growing urban population estimated at 21% of the total population by 2017 (FAO, 2017). The country experienced notable accelerated economic growth over the past decade which was mainly boosted by tourism, garment, agriculture and textile export to the United States and the European Union (World Bank, 2018). Nevertheless, projections predicated on the current economic growth of the country noted that, by 2030, about 30% of the country's population would be living in urban areas (ADB, 2104). Thus, there is the need to match up the provision of needed urban utilities with population growth.

Figure 1. Geographic location map of Cambodia (CIA,2017)

Urban water supply has been one of the major focus areas of investment for Cambodia because it is central to government's rectangular strategy on growth, employment, equity, and efficiency. In 2015, survey reports indicated that, over 75.8% of urban dwellers have access to improved water supply (ADB, 2012). This achievement was facilitated by the proactive measures taken by the country in meeting the water and sanitation goals under the Millennium Development Goals (MDG's). Though considered a commendable achievement, access to potable piped water supply by urban households remained uneven and unsatisfactory. Urban water supply in Cambodia is handled by the Phnom Penh Water Supply Authority (PPWSA) and the Siem Reap Water Supply Authority (SRWSA), 11 Provincial Public Water Works (PWW's), as well as 147 smaller utilities. The Ministry of Industry and Handicraft (MIH), through its Department of Potable Water Supply (DPWS) has responsibility for urban water supply policy, strategic planning, regulation and a sector wide oversight, including the licensing of private water operators in the country.

Majority of investments made in the urban water supply sector, mainly through the PPWSA have been in Phnom Penh, the capital city. As a result, the other urban utilities, referred to as Public water Works (PWW's) in other urban towns of the country were left in deplorable state. The PWW's, lack infrastructural development and adequate financing to provide adequate and efficient services to serve the public. Access to water supply in some urban areas outside the Pnom Penh was reported to vary from about 12% in Siem Reap to ~ 64% in Pursat. Significant structural and institutional weaknesses of the urban water supply sector in Cambodia have been attributed to the high degree of control from the Central Government which was also characterized by poor accountability. This condition was noted to have contributed to the poor cooperate status of the PWW's. Also, insufficient investment in the sector resulted in the PWW's to having to face major challenges that serves to hamper service delivery. Some of these challenges include dealing with old and leaky distribution pipes, inadequate water supply coverage, lack of sufficient funds for operation and maintenance, water quality issues and high levels of non-revenue water (NRW).

Figure 2 Water storage in water scarce urban areas in Cambodia (SCF, 2016)

Rapid urbanization of most of the country's towns has increased the demand for adequate and potable water supply. However, the PWW's were unable to meet the growing water demand owing to high under investment in the sector. Further, poor tariff structures among the PWW's could not guarantee adequate cost recovery on water supply services offered by the PWW's. To ensure these problems are adequately addressed through the improvement of key services and infrastructure development of selected PWW's in urban centers across the country, the Urban Water Supply Project (UWSP) was formulated. This was needed to essentially promote sustainability and profitability in the water supply services delivery of these PWW's. The UWSP is funded by a sovereign project loan from the Asian Development Fund of the Asian Development Bank (ADB). The MIH is the agency responsible for executing the project. The UWSP was designed primarily to improve water quality and increase water production capacity of selected nine provincial PWW's. These improvements would be achieved by rehabilitating and improving existing water treatment plants (WTP), providing new water sources, and augmenting or replacing existing distribution pipelines to increase system pressure and improve service delivery. Also, new transmission and distribution pipelines would be provided under the project. Technical assistance would also be provided through capacity building and institutional strengthening. Table 1 provides a summary of the UWSP.

Table 1: Overview of the Urban Water Supply Project (ADB, 2014)

Items		Description
Project Name	:	Urban Water Supply Project
Type	:	Water and other urban infrastructure and services
Donor Name	:	i. Asian Development Bank (ADB) ii. Government of Cambodia
Project rationale and objectives	:	i. To provide new water supply systems and also improve deteriorated existing water supply systems improved in some parts of the country ii. To improve water quality and reduce the high levels of non-revenue water in the water supply networks. iii. Increase water supply coverage in some parts of the urban areas iv. Develop capacity and strengthen PWW for project implementation and operation and maintenance of expanded water supply coverage
Project Fund	:	Total: USD 37.4 million (Asian Development Bank: USD 34.0 million) (Counterpart funding by Government of Cambodia: USD 3.4 million)
Project Duration	:	June 2015 – June 2020

2 Technical and Technological Brief

2.1 Technical description of the Urban Water Supply Project

The UWSP would focus on contributing to achieving total coverage in safe piped water supply in selected urban areas of Cambodia. The major project components comprises strategies and interventions targeted at improving the performance of selected PWW's in nine provinces. With primary objectives of (i) rehabilitating and improving the performance of existing water treatment plants, (ii) providing new water sources and treatment plants, (iii) augmenting and/or replacing existing distribution pipelines so as to increase system pressure and improve service delivery, and (iv) providing new transmission and distribution pipelines. A complimentary stand-alone project was also formulated to provide technical assistance to the MIH by the ADB to deliver on these objectives and also provide capacity development to prepare the institution for a sector wide reform towards making the PWW's achieving high degree of autonomy and financial sustainability.

A total of nine urban water services suppliers would benefit from the project. These include eight provincial PWW's namely Kampong Cham, Kampong Thom, Kampot, Pursat, Sihanoukville, Stoung, Svay Rieng and Stung Treng. A state-owned water enterprise, Siem Reap Water Supply Authority (SRWSA) would also be supported by the project. Other special features of the project include (i) a planned support for the MIH's recent initiative to accelerate urban water supply sector reform and the improvement of the financial and operational performance of the PWW's with the aim to increase financial autonomy for all PWWs by 2018, (ii) the adopting and using the experience of PPWSA to enhance management and operational efficiency at other waterworks to improve service delivery and NRW management; (iii) optimizing the performance of existing

facilities through targeted small investments to pave way for further investment that would increase coverage and quality of services, and (iv) to implement a subsidized water connection policy similar to that used by PPWSA at all PWWs under the project to help poorer households to connect. A summary of the four main project outputs are shown in Table 2.

Table 2: Summary of features of the UWSP (ADB, 2014)

Output	Components
1	**Existing water supply systems improved in seven towns** (i) New deep wells at Kampong Cham (ii) Rehabilitate water treatment plants in seven towns (iii) Rehabilitate or new clear water storage tanks in three towns (iv) Rehabilitate pumping equipment in four towns (v) Augment and/or replace water mains in four towns (vi) Subsidize household connections along new pipeline routes, 20 including provision for 2,000 new connections for Kampong Cham and Svay Rieng (vii) New laboratory equipment will be provided in five towns to improve monitoring and water quality
2	**New water supply system provided for Stung Treng** (i) A surface water intake (ii) A water treatment plant that will have a capacity of about 7,950 m^3/d and be equipped with a laboratory (iii) About 354 km of water transmission and distribution pipelines (iv) Provision for 4,600 new household connections that will be subsidized for poor households
3	**Water supply coverage increased in Siem Reap** (i) About 6.5 km of new transmission mains (ii) About 35 km of new distribution pipelines (iii) Provision for 5,000 household connections to be subsidized for poor households
4	**Project implementation supported and operation and maintenance developed** The technical assistance (TA) would seek to build institutional capacity at the MIH, strengthen sector regulation, and improve tariff reform

3 Financial brief

The total cost of the UWSP was estimated at USD 37.4 million. About USD 34.0 million accounting for 90.0% of the total project cost would be financed by a sovereign project loan from the Asian Development Fund of the ADB. The remaining USD 3.4 million would be counterpart funded by the Government of Cambodia. The project cost allocation for the various project components are shown in Table 3. As mentioned earlier, eight PWW's and one state-owned enterprise, the SRWSA would be supported under the UWSP to carry out key subprojects necessary to improve their performance and service delivery. According to the project administration plan, a Project Management Unit (PMU) would be established within the MIH, through the Ministry's Department of Potable Water Supply and Project Implementation Units (PIUs) at the eight PWW's. However, SRWSA would make its own arrangements regarding project implementation

and agree with the MIH. About 54% of the project cost would be given as grants to the eight PWW's including Stung Treng. As part of the Loan agreement, portion of the project funds would be re-lent to SRWSA at terms and conditions satisfactory to the ADB.

Table 3: Overview of the Project Investment Plan (ADB, 2014)

Item	Project component	Cost allocated (USD million)
A	**Base Cost**	
	1. Output 1: Improved existing water supply systems in seven towns	4.61
	2. Output 2: New water supply system provided for Stung Treng	12.80
	3. Output 3:Water supply coverage increased in Siem Reap	5.68
	4. Output 4:Project implementation supported and O&M developed	4.69
	5. Vehicles and Equipment (including operation and maintenance)	0.73
	Subtotal (A)	**28.51**
B	**Contingencies**	**0.16**
C	**Financing charges during implementation**	**0.42**
	Total (A+B+C)	**37.40**

Investment in the PWW's would help them undertake subprojects that would wean them off the Ministry of Health and Industry. Unlike the PWW's, the SRWSA, is autonomous and with a good balance sheet indicative of strong financial standing with ample liquidity and no debt. As a result, project funds lent to SRWSA would be paid by SRWSA at interest rates similar to the lending interest rate of the ADB to the Government of Cambodia. In addition, costs that would arise due to fluctuations in foreign exchange during the debt servicing period would be borne by SRWSA through their service tariff. However, for the PWW's, the UWSP would give some of project funds as grants to undertake subprojects. Unlike the SRWSA, the foreign exchange risks on the grants re-lent to the PWW's would be covered by the national government. The PWW's would bear operation and maintenance cost and depreciation costs of facilities provided under the project. The PWW's would also be obligated to follow and implement strategic plans and commitments on new tariff structure that would enable the recovery of operation and maintenance and depreciation costs.

4 Project Features

4.1 Technical and technological features

As indicated earlier, the UWSP has four main outputs which sums up all project activities. The implementation of the UWSP would focus on expanding the existing water supply system of the eight provincial PWW and a state owned SRWSA. These would be achieved by rehabilitating the water treatment plants (WTP) supplying the seven towns with piped water. Rehabilitation works on the flocculation and sedimentation tanks and filtration units and storage tanks would be carried out under the project. In addition, new offices would be provided at Preah village in Sangkat, Strung Treng. New intake pumps would also be in installed under the project. Distribution networks would be revamped by installing new pipes so as to reduce non-revenue waters losses. High-density polyethylene (HDPE) pipes of 63-200 mm diameter would be installed in all districts. In addition, new water intake structures would be constructed along the Mekong River. New 7,950 m^3/d capacity water treatment plant with elevated storage tank and an underground tank would also be constructed. Subsidized household connections would be

provided with about 2,000 new connections for Kampong Cham and Svay Rieng. New laboratory equipment's would also be provided in five of the PWW's to improve water quality monitoring.

Other objectives under the UWSP would involve increasing the water supply coverage of already autonomous SRWSP. This involves the extension of treated water supply from new water treatment plant to new coverage zones. It would also comprise the installation of about (i) 6.5 km of new transmission mains; (ii) about 35 km of new distribution pipelines; and (iii) provision for 5,000 household connections to be subsidized for poor households. About 17,000 m^3/d of treated water would be supplied by a new water treatment plant being developed under a parallel financing project supported by the Agence Française de Développement. SRWSP would benefit from a JICA-financed project, which would source water from the Technical assistance (TA) aspects of the project would be developed as stand-alone capacity development technical assistance to MIH that would strengthen the sector regulatory and tariff reform functions for the Ministry. However, the scope of the TA would be based on the project.

4.2 Economic and financial features

The economic analysis of the project was carried out following the ADB guidelines prescribed for evaluating projects. These guidelines examines the economic viability of the project using the base case Economic Internal Rate of Returns (EIRR). The computation of the EIRR was predicated on the following: (i) the value of incremental water, (ii) resource cost savings made on non-incremental water, (iii) value of water saved from improvement in the non-technical losses, (iv) value of health benefits and (v) other economic benefits identified. The EIRR estimated for Stung Treng was 12.0%. Similarly using base case projections, 36.4% EIRR was estimated for Kampot and other PWW's. These values are equal or higher than the opportunity cost of capital which was estimated as 12% (ADB, 2014). Further, results of sensitivity analysis showed that, subprojects of the PWW's were most sensitive to increase cost and decrease in project benefits. Worst case scenarios for Siem Reap and Stung Treng indicated marginal EIRRS of about 10.5% and 9.5%, respectively. However, the project showed an overall EIRR of 13.9%.

The financial viability of the UWSP was also evaluated using the Financial Internal Rate of Return (FIRR). The FIRR calculated on the after-tax incremental cash flows of the subprojects to be implemented by the PWW's was 26.3%. The FIRR of the project was reported to be higher than the weighted average cost of capital (WACC) of 0.75% (ADB, 2014). A sensitivity analysis of the FIRR was also conducted per ADB guidelines provided. Sensitivity analysis showed that, the subprojects were most sensitive to a simultaneous increase in the cost of capital (20%) and O&M (10%), plus a decrease in revenue (10%). The results indicated that the subprojects are financially viable. Regarding the project loan facility, the repayment would be financed over a 32-year term, including a grace period of 8 years. An interest rate of 1.0% per annum would be charged on the loan during the grace period while a 1.5% per annum interest rate would be charged after the grace period elapses.

4.3 Social and environmental features

The implementation of the UWSP would generally improve public health and promote livelihood investment opportunities for inhabitants of the involved provinces of the PWW''s and Siem Reap. A total of over 551,000 inhabitants of the nine towns would benefit directly and indirectly from the implementation of the UWSP project. Access to potable and reliable water supply would improve when the UWSP project is implemented. The social inclusion commitments of the project

would ensure connections to the expanded piped water supply system at subsidized rates so as to enable the poor and marginalized to also have access to potable water. By these, potable water supply connections will be made available to 11,600 households through subsidies. Gender action elements of the project include employing about 10% of women in the civil works construction and in O&M, with the same pay and job conditions as those of men; (ii) participation by women in construction skills training and upgrading to enhance their employment opportunities; (iii) a minimum of 30% of the positions in the PMU staff training to be provided to women in planning, design, financial management, procurement, and O&M of project facilities.

Affirmative actions covenanted under the project loan agreements with the ADB involves adherence to gender-sensitivity and gender equity policies in executing the project. Project executing agency (PEA), project monitoring unit (PMU), and project implementation units (PIUs,) are enjoined to include gender awareness trainings in which at least 70% of the participants would be men. Workforce and labor engagements would be constituted of women accounting for at least 25% of the staff and 10% of the management positions in the executing agencies, PMU, and PIUs. Pro-gender policies targeted at progressive equalization of wages of women as men in the same positions would be adopted throughout the project implementation. Also, non-government organizations and civil society organizations would be involved as partners for information dissemination, education, and communication.

Figure 3: Gender dimensions of household water collection (ADB, 2017)

Involuntary settlement and impact on indigenous people by the UWSP has been classified as category C based on the ADB's safeguard policies (ADB, 2009). According to ADB safeguard policies, a proposed project is classified as category C if it is expected to have no impacts on indigenous people and without causing involuntary settlements. It implies therefore that, the project would involve minimal or no acquisition of new lands. It would also it induce little or no displacement of indigenous people. Infrastructural developments under the subprojects would be within existing waterworks compounds, thus new land acquisitions leading to resettlement of indigenous people would be minimal. Old pipelines trenches would be re-dug for installation of pipes. Where unintended impacts and temporary impacts would occur, they would be handled as per the stipulations of the countries laws and the ADB's safeguard policy statements (SPS). Potential environmental impacts resulting from the rehabilitation of the WTP's and building of office buildings and drilling of bore-holes would be mitigated through strategies outlined in the environmental safeguard documents. The project has been classified as category B for environmental impacts which implies minimal adverse impacts on the environment are expected

during the project implementation. This implies that, possible impacts by the project are site-specific, few and are irreversible, and in most cases mitigation measures can be designed more readily (SPS, 2009). ADB approved Environmental Monitoring Plans (EMP's) developed during project formulation would be continuously updated and applied to manage unintended environmental impacts.

5 Project Benefits

The Urban Water Supply Project would bring great benefits to the urban water supply sector of Cambodia. Water supply in the selected PWW's has been described by initial feasibility reports as unreliable and of poor quality. The PWW's were performing unsustainably with a high degree of control from the central government. The UWSP would provide much needed capital investment to the ailing PWW's to revamp the sector in order to improve their operations and service delivery. Theses intervention by the UWSP was necessary for the selected PWW's to improve critical services that would meet the demands of the rapidly growing urbanized towns in the country. Further, the project would contribute towards improving the financial performance of the PWW's by putting in place strategic management structures and policies aimed at promoting a better corporate status and autonomy. To ensure good cost recovery and business viability by the PWW's, the project grant agreements stipulates the implementation of new block tariff policies to be followed by the grantees (PWW's) in order to achieve good levels of cost recovery. Regarding SRWSA, which was considered operating viable water supply services, the project would enable them expand their services to new customers. Part of the project funds would also be applied to the acquisition of technical assistance and consequent preparation of MIH for new tariff structure implementation.

The project would contribute towards the alleviation of water related sicknesses reported in many parts of the project communities. Reduction in diseases such as intestinal tract infections, diarrhea in children and the elderly would be reduced. In most cases, due to unreliable and dysfunctional water supply system, consumers have had to resort to sourcing drinking water from rain water and rivers (ADB, 2017). However, the UWSP would contribute to increased access to reliable, potable and affordable piped water supply for drinking. These interventions would contribute towards improved public health of the direct beneficiaries of the project. In Siem Reap, many more urban dwellers would be connected to the water distribution network of the SRWSA. There would be significant reduction in the productive labor involved in fetching water from the rivers or dug wells mostly by women and children. Some households engage in collective investment and cost sharing in pipe installations to draw water from rivers and dug wells. With the implementation of the project, cost savings made on water conveyance from the rivers may be invested in other productive ventures. Skills development through job creation and training would be achieved through the enforcement of local content policies in the project agreement for project communities. The project would contribute to gender empowerment and the elimination of water poverty in poor communities of the beneficiary PWW's through subsidized connection programs.

6 Implementation status of the project

Funds for the UWSP has been approved since December 2014 and the project consequently became effective in July 2015. Since then, many activities relating to the project execution has been initiated. Activities carried out so far have focused on the conducting of due diligence in the

project site and project communities prior to major project activities. Involuntary resettlement performance reports indicated that recruitment of personnel for project monitoring and implementation units have been carried out. In addition, public consultations and project socialization process have been initiated. By 2016, activities relating to land areas demarcated for the construction of physical structures related to the project have been finalized. Resettlement arrangements and compensatory payments for affected assets have been completed (ADB, 2016). Ongoing and awarded contracts for goods and services include the supply, delivery and installation of office furniture. Also, consultancy for project implementation assistance has been awarded to Nippon Koei Company Limited and joint venture with Philkoei International (ADB, 2017). Tenders have been opened for the procurement of goods and works involving the rehabilitation of WTP's in all the provincial towns, pipe replacement in the Provincial Towns, Stung Treng Water System and SRWSA. Tenders has also been opened for competitive bidding for the provision of pipes, valves and fittings, laboratory equipment for provincial towns and equipment for SRWSA has been procured. Eleven project vehicles have also been procured under the project.

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