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District Capitals Water Supply Project, Timor-Leste

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Summary

The Democratic Republic of Timor-Leste is a country in Maritime Southeast Asia which faces health concerns due to unsafe water and inadequate hygiene. The government with the assistance from the Asian Development Bank aims to provide safe and reliable water supply to the two district capitals of Manatuto and Pante Macassar and proper management of water resources in Ermera district. Towards the accomplishment of this objective, the District Capitals Water Supply Project was approved in 2011 and is expected to be complete by 2021. ADB financed USD 11.00 million (77%), whereas the government financed USD 3.32 million (23%) bringing the total cost of the project as USD 14.32 million (100%). The project was planned to comprise of five components viz., (i) rehabilitation and expansion of water supply systems in Manatuto and Pante Macassar by the National Directorate for Water Supply and Sanitation (NDWSS), (ii) increased knowledge of efficient use of water and safe hygiene practices in project areas, (iii) sustainable operation and maintenance (O&M) of urban water systems by the district department for water supply and sanitation (DDWSS), (iv) sustainable secured water resources in Lehumo Lake, and (v) efficient management of the project by the Ministry of Infrastructure (MOI) and NDWSS. However, the fourth component on rehabilitation of Lehumo Lake was cancelled at later stage of the project due to the budget constraints. This project is expected to ensure the availability of clean and potable water for about 5,200 household connections. Thereby, health benefits and poverty reduction will be achieved through this project in Timor-Leste.

Prepared by:
Mr. L. Mohanakrishnan,
Research Associate,
Asian Institute of Technology, 58 Moo 9, Km. 42,
Paholyothin Highway, Klongluang, Pathumthani 12120 Thailand
Email: mohanakrishnan.logan@gmail.com

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NewTap
Network on Water Technology in Asia and Pacific
http://www.jwrc-net.or.jp/aswin/en/newtap
newtap@jwrc-net.or.jp

Acronyms and Abbreviations

ADB	Asian Development Bank
DDWSS	District Department for Water Supply and Sanitation
EIRR	Economic Internal Rate of Return
EMP	Environmental Management Plan
FIRR	Financial Internal Rate of Return
GAP	Gender Action Plan
GOTL	Government of Timor-Leste
JICA	Japan International Cooperation Agency
Km	Kilometer
MDG	Millennium Development Goal
MOI	Ministry of Infrastructure
NDRBFC	National Directorate for Roads, Bridges, and Flood Control
NDWSS	National Directorate for Water Supply and Sanitation
NGO	Non-Government Organization
O&M	Operation and Maintenance
PIU	Project Implementation Unit
PPP	Public-Private Partnership
TA	Technical Assistance
USD	United States Dollars
WACC	Weighted Average Cost of Capital

1 Introduction

The Democratic Republic of Timor-Leste (hereafter, referred as Timor-Leste) is a country in Maritime Southeast Asia. It comprises the eastern half of the island of Timor, the nearby islands of Atauro and Jaco, and Oecusse, an exclave on the northwestern side of the island surrounded by Indonesian West Timor. Australia is the country's southern neighbor, separated by the Timor Sea. The country has a size of about 15,410 km^2 with a population of 1,167,242. Dili is the capital city. The economy is ranked as a low-income economy by the world Bank. It is placed 133th by Human Development Index, indicating a medium level of human development. About half of the population live on less than USD 1.25 a day and are illiterate. The country continues to recover the after-effects of a decades-long independence struggle which damaged infrastructure and displaced thousands of civilians. Bad harvest in 2007 led to deaths in several parts of the country.

Unsafe water and inadequate hygiene are two of the main causes of poor health in Timor-Leste. The infant and child mortality in Timor-Leste are directly related to inadequate water supply coupled with poor sanitation and hygiene. Notably, as on 2011, the under-five mortality rates in Manatuto and Oecusse districts are greater than the national average which is attributed to the low percentage of their populations with access to potable water. In Pante Macassar, the district capital of Oecusse, and in Manatuto, the sub-standard water supply assets and the lack of institutional capacity within District Department for Water Supply and Sanitation (DDWSS) have resulted in unsafe and unreliable water supply systems. In Pante Macassar, about half of the households access water for only a few hours per week. In Manatuto, three-fourth of households access water for only a few hours per week during the wet season; whereas in the dry period, close to 60 percent had no access to water from the DDWSS system. With 37 percent of the populace of Pante Macassar and 42 percent of Manatuto never having accessed water from the DDWSS system, the gap in service delivery was substantial. Moreover, the water provided by these systems was not safe for drinking purposes due to several reasons such as absence of uninterrupted supply, low system pressure, and poor maintenance of treatment and chlorination facilities. Residents of Manatuto and Pante Macassar boil and store water extracted from the system or shallow wells. However, the storage approaches led to contamination and resulted in adverse health impacts.

Poor sanitation was also found to aggravating the adverse health impacts caused by inadequate access to safe and reliable water supply. As on 2011, about 90 percent of households in Pante Macassar and almost all households in Manatuto treat water through boiling. Open defecation was practiced by 36 percent of the citizens in Oecusse and 11 percent of the residents in Manatuto. Due to these reasons, the rate of water-related disease is greater than the national average in both district capitals as mentioned earlier. Besides, lack of access to safe water increases the workload of women for managing the household water supply as well as caring for children affected by water-related diseases. Therefore, it is clear that by augmenting the access to water supply and ensuring safe hygiene practices, the health of residents in Manatuto and Pante Macassar, especially children, will be improved.

The Government of Timor-Leste had requested assistance from the Asian Development Bank (ADB) to rehabilitate Lehumo Lake to restore water resources in Ermera District. This was due to poor conditions of the eroded lake embankments which were unable to retain the water. This has reduced the capacity of the lake. This has also resulted in damage to the wetland ecosystem and small-scale fishing activity by the community. The rehabilitation of Lehumo Lake was envisaged to put the lake back to its full capacity by stopping erosion along the banks of the lake, which has also led to substantial damage to farm lands. Hence, these water resource management measures will improve a key livelihood source for farming and fishing-reliant communities. The layout of the Timor-Leste District Capitals Water Supply Project is presented in **Figure 1.**

Figure 1: Timor-Leste District Capitals Water Supply Project (ADB, 2011)

Timor-Leste's Strategic Development Plan 2011–2030 targets the elimination of child mortality as a consequence of inadequate water supply, malnutrition, and lack of health care; and eradication of extreme poverty through universal access to public services, ample job opportunities, and economic development in all regions. It can be seen that these goals are related to access to water supply and sanitation and improved water resources management, and are

closely linked with the achievement of the MDGs. ADB's 2011–2015 country partnership strategy for Timor-Leste focuses on the provision of infrastructure, including urban water supply and sanitation. ADB, together with the Japan International Cooperation Agency (JICA), has been supporting urban water supply since 2002. This project ensured continuation of ADB support to the urban water supply sector, and facilitating the development of public–private partnerships (PPPs) for service provision, in line with the Timor-Leste PPP policy and the draft law developed with ADB technical assistance (TA) support. The project also provides institutional support to NDWSS in investment and asset management planning, and phased PPP approach to rehabilitation and O&M. In addition, due to the status of Timor-Leste as fragile and conflict-affected nation, the project includes elements of the 2007 ADB approach to engaging with weakly performing countries, such as a strong focus on extensive community involvement through consultations, strong support to all levels of government agencies, and frequent monitoring.

The overview of the project is presented in **Table 1**. The project was planned to comprise of five components viz., (i) rehabilitation and expansion of water supply systems in Manatuto and Pante Macassar by the National Directorate for Water Supply and Sanitation (NDWSS), (ii) increased knowledge of efficient use of water and safe hygiene practices in project areas, (iii) sustainable operation and maintenance (O&M) of urban water systems by the district department for water supply and sanitation (DDWSS), (iv) sustainable secured water resources in Lehumo Lake, and (v) efficient management of the project by the Ministry of Infrastructure (MOI) and NDWSS. The water supply components of the project consist of rehabilitation, expansion, and provision of assistance in operation and maintenance (O&M) of two water supply systems located in Manatuto and Pante Macassar with a total combined capacity of 5,115 cubic meters (m^3) per day.

The rehabilitated water supply systems are projected to provide clean and potable water to about 30,437 people comprising about 5,177 household connections in 2031. This will in turn contribute to reducing the high rate of water-related diseases, particularly for children under 5. By the end of the project, NDWSS will provide safe and reliable water supply to the district capitals of Manatuto and Pante Macasar (outcome), and will lessen the workload of women. The project aims to deliver a clean 24-hour water supply to target urban areas, and increase the number of households with access with a piped water supply. It will also help women by including them in decision-making and sanitation awareness programmes. The Ministry of Public Works Transport and Telecommunications is the executing agency for the project, which is expected to be complete by 2021 (ADB, 2011).

Table 1: Overview of the water supply project (ADB, 2019)

Items		Description
Project Name	:	District Capitals Water Supply Project, Timor-Leste
Type	:	Water Supply and Urban Infrastructure

Donor Name	:	i. Asian Development Bank (ADB), ii. Timor-Leste Government
Project rationale and objectives	:	To provide safe and reliable water supply to the two district capitals of Manatuto and Pante Macassar and proper management of water resources in Ermera district
Project Components		i. Rehabilitating and Expanding Water Supply Systems in Manatuto and Pante Macassar ii. Increasing Knowledge of Efficient Use of Water and Safe Hygiene Practices iii. Sustaining Operation and Maintenance of Urban Water Systems iv. Securing Water Resources in Debo Lehumo Lake in the Ermera District v. Enhancing Project Management
Project Fund	:	Total: USD 14.32 million Asian Development Bank: USD 11 million Timor-Leste Government: USD 3.32 million
Project Duration	:	September 2011 – June 2021 (revised)

2 Technical and Technological Brief

Component 1 Rehabilitating and Expanding Water Supply Systems in Manatuto and Pante Macassar

Manatuto and Pante Macassar water supply systems are planned to be rehabilitated and expanded by NDWSS. This component includes rehabilitation and improvement of the existing intakes of both systems to maximize gravity-fed sources; development of a new groundwater source to be used during the dry season in Pante Macassar; and rehabilitation and improvement of existing storage and treatment facilities. Further, rehabilitation of existing distribution systems and construction of new water distribution systems; and installation of bulk and system water meters and replacement and installation of meters for all existing and new connections are also aimed through this component.

Component 2 Increasing Knowledge of Efficient Use of Water and Safe Hygiene Practices

The households in Manatuto and Pante Macasar need to have increased knowledge of efficient use of water resources and safe hygiene practices. The project aims to implement an intensive 6-month campaign for individuals and households, followed by a 6-month reinforcing campaign at

multiple levels. The training covers hand washing; proper handling and storage of drinking water; efficient use of water, including understanding of payment for water and metering; safe disposal of wastewater; and use of latrines by all household members, including children.

Component 3 Sustaining Operation and Maintenance of Urban Water Systems

Sustainable O&M of water systems are followed by DDWSS in district capitals. A PPP approach is to be piloted by packaging the rehabilitation of the systems with their O&M for 2 years, preparing bid documents and model contracts that focus on performance standards, preparing a manual for system O&M, and providing DDWSS personnel with on-the-job and external training to operate and maintain the system and to monitor contract implementation. During this period, the government, in line with its PPP policy and with support from the project team and ADB, will explore a long-term PPP arrangement for the O&M of urban water supply systems. In addition, local residents will be sponsored to receive vocational training on urban water supply and sanitation.

Component 4 Securing Water Resources in Debo Lehumo Lake in the Ermera District

Water resources in Lehumo Lake were envisaged to be secured in a sustainable manner. To restore water resources in the lake, the project preparatory TA piloted labor-intensive, community-led works to rehabilitate the lake, with more than 30 percent of the workers being women. Stopping the erosion through the use of gabions and the planting of tree, as well as securing the impermeability of the embankments through a borehole-grouting technique were proposed. Raising and securing the embankments with concrete and repairing the broken spillway in the western embankment were also planned. However, this component of the project was cancelled at the later stage due to cost escalation, limited budget and government's inability to finance cost overruns.

Component 5. Enhancing Project Management

MOI and the implementing agencies provide efficient project management and monitoring services. The project provides support to MOI; NDWSS; the National Directorate for Roads, Bridges, and Flood Control (NDRBFC); and the communities to supervise project implementation and PPP contract monitoring. The consulting services will be provided to assist NDWSS in preparation of a preliminary investment plan for the rehabilitation and expansion of urban water supply systems for the remaining district capitals (ADB, 2011).


Figure 2: Water storage facilities ensured supply of safe drinking water in Timor-Leste

3 Financial brief

The project is estimated to cost USD 14.32 million, including taxes and duties of USD 0.20 million. The total cost includes physical and price contingencies. The project investment plan is depicted in **Table 2**. The government has requested a grant of USD 11 million from ADB's Special Funds resources to finance 77% of the project cost. The grant covers civil works, materials, equipment, vehicles, project management, and capacity building. The government will finance taxes and duties and partly finance civil works and materials.

Table 2 Project Investment Plan (ADB, 2011)

Item	Project component	Amount (USD million)
A.	**Base Cost**	
	1. Rehabilitated water supply systems in Manatuto and Pante Macassar	10.02
	2. Efficient use of water resources and safe hygiene practices	0.41
	3. Sustainable operation and maintenance of water supply systems	0.41
	4. Water resources in Lehumo Lake	0.66
	5. Efficient project implementation	1.27
	Subtotal (A)	**12.77**
B.	**Contingencies**	**1.55**
C.	**Financing charges during implementation**	**Nil**
	Total (A+B+C)	**14.32**

In the base cost (investment cost) of USD 12.773 million, civil works are estimated to be USD 8.340 million and material cost of USD 1.270 million. The vehicles and equipment were estimated to cost USD 0.418 million. The consulting services and capacity development was estimated to cost USD 2.745 million. The physical contingencies were estimated at USD 1.290 million whereas

price contingencies were estimated at USD 0.259 million. The total cost for the Manatuto water rehabilitation sub-project was estimated at USD 4.32 million. Whereas, the total cost for the Pante Macassar water rehabilitation sub-project was estimated between USD 3.6 – 4.2 million. ADB financed USD 11.00 million (77%), whereas the government financed USD 3.32 million (23%) bringing the total cost of the project as USD 14.32 million (100%).

4 Project Features

4.1 Technical and technological features (ADB, 2011)

1	Rehabilitation, expansion, and O&M of Manatuto water supply system	1) Estimated capacity of 2,414 m^3/day 2) Construction of about 15.3 kilometer (km) of transmission pipelines and about 10,500 meters (m) of distribution pipelines 3) Rehabilitation of the DDWSS pump station and the Beklei storage reservoir 4) Rehabilitation of the We'e Teen spring intake 5) Provision of workshop tools and equipment, repair vehicle, and motorbikes 6) Support for O&M of the water system for 2 years 7) 865 household connections and construction of 10 public toilets
2	Rehabilitation, expansion, and O&M of Pante Macasar water supply system	1) Estimated capacity of 2,701 m^3/day 2) Construction of about 6.3 km of transmission pipelines and 145,865 m of distribution pipelines 3) Improvement and construction of water treatment plant facilities 4) Improvement of source and intake structures for Meokana, Oetulu, Tulubesi, Tulumopu and well 2 (Tono River) including pump 5) Construction of storage facility, warehouse, O&M office, and pump house 6) Support for O&M of the water system for 2 years 7) 1,787 household connections and construction of four public toilets 8) Provision of workshop tools and equipment, repair vehicle, and motorbikes
3	Lehumo Lake rehabilitation	1) Tree planting for slope stabilization 2) Improvement of the main and closure embankments

4.2 Economic and financial features

The project is efficient in financial and economic terms. The economic internal rate of return (EIRR) and financial internal rate of return (FIRR) are found to be satisfactory, taking into account factors such as time savings and the economic benefits of improved water delivery, improved health, and poverty reduction. The FIRR was calculated for revenue-generating components, namely the two water supply components. The FIRR is 1.9% for the Manatuto water supply component and 1.8% for the Pante Macasar component. These figures are above the weighted average cost of capital (WACC) of 0.59%. Since the two components are sensitive to revenue decreases and cost increases, it was emphasized that the efforts to avoid such cost increases must be made during project implementation and government must ensure the reintroduction of tariffs to all customers. Towards achievement of these targets by two district capitals, the project's civil works contractor is required to provide O&M for 2 years and develop appropriate maintenance plans to ensure their long-term sustainability.

Economic analysis reveals demand for the project, since the demand for water by Manatuto and Pante Macasar residents in 2031 cannot be met by the current water supply systems. The estimated mean willingness to pay for usage is USD 2.29 per month in Manatuto and USD 1.71 per month in Oecusse as on 2011. Usage tariffs are affordable where they do not exceed 5% of monthly household incomes with 13–14 m^3 per month consumed. The monthly water cost to households, including for low-income families, still remains below the affordability limit of 5% of household income at current tariffs. Benefits will arise from the project through economic and health benefits—cost of illness (24% of total annual benefits), savings in income loss (58% of total annual benefits), time savings (15% of total annual benefits), and treatment cost savings (3% of total annual benefits). Further, benefits that could not be readily quantified include land value appreciation in the area and environmental improvement. The project has an overall EIRR of 17%, which is higher than the assumed 12% discount rate. The EIRR remains above 12% against the following sensitivity tests: increase in capital cost by 10%, increase in operating cost by 10%, decrease in benefits by 10%, and a 2-year delay in implementation (ADB, 2011).

4.3 Social and environmental features

The project provides prospects for community-based organizations. A coordinating committee established in each district capital brings together chiefs, civil society representatives, water and sanitation officials, and project team to guide the project, and confirms residents' perspectives are considered during project implementation and involved in project monitoring. At least 30 percent of members of each coordinating committee will be women. Project investments will be available to all district capital households as the existing tariff scheme allows poor households to pay their connection fee over 1 year. The project is categorized as gender equity theme. The project will maximize benefits for women by involving them in decision making through the coordinating committees, encouraging contractors to hire them for construction jobs, and targeting them in project sanitation awareness drives and vocational training. The need for water collection, storage, and treatment by women is expected to reduce, once the households are

connected to safe and continuous water supply. The burden of caring for sick children are expected to reduce in the project areas. A gender action plan (GAP) was prepared for implementation during the project.

The project was categorized as indigenous peoples category C and involuntary resettlement category C, so a resettlement plan was not prepared. In Pante Macassar, no private land acquisition was necessary for the development works. The proposed new location for the Santa Rosa storage and treatment facilities was government-owned land and was provided to the project at no cost. Cultural tradition for the use of water sources was respected and included in the consultation and participation plan.

The project is categorized as environment category B, and an initial environmental examination with a detailed environmental management plan (EMP) was prepared in accordance with ADB's Safeguard Policy Statement (2009). The initial environmental examination concludes that no significant adverse environmental impacts are anticipated. The project's significant environmental benefits will include reduced erosion in Ermera, and better water supply and water treatment facilities; reduced water losses from the currently inefficient water distribution systems; and improved hygiene and sanitary conditions in Manatuto and Pante Macassar.

In Manatuto and Pante Macassar, minor short-term negative environmental disturbances associated with construction may be introduced through the project. However, the same can be mitigated by the operating procedures and monitoring plans detailed in the Environmental Management Plan (EMP). NDWSS will implement and monitor the EMP with the assistance of the PIU, which will be responsible for preconstruction and operation phase elements, and by the civil works contractors, which will be responsible for construction phase elements of the EMP. The project will have positive environmental impacts on the Lehumo Lake area and will enhance the lake's status among the wetlands of national significance for the conservation of endangered and near-endangered birds in Timor-Leste. Basic environmental procedures will also be incorporated in the contracts of individual contractors, so as to ensure obligation to manage minor environmental disturbances during construction. The supervising engineer will be responsible for day-to-day execution and compliance with ADB and government environmental and safeguards regulations and policy for the lake restoration.

In the context of appropriate mitigating strategies and the positive environmental benefits to flow from the project, environmental impacts can be managed within acceptable levels. There are no significant environmental impacts needing further detailed study or EIA. All potential and associated impacts can be addressed through implementation of the proposed mitigation measures and thereby fulfil entirely ADB's safeguard policy and the government's environmental regulations for the sub-project. Positive effects to the local economy will be ensured through improved water supply facilities, new revenue earning opportunities generated by demand for labor during construction, enhanced economic conditions through the creation of new business prospects in the neighboring regions (ADB, 2011).

Figure 3: Project delivers clean 24-hour water supply in the district capitals of Manatuto and Pante Macassar

5 Project Benefits

The rehabilitated water supply systems have the capacity to provide clean and potable water to about 30,500 people, including about 5,200 household connections. The project has already started to deliver clean 24-hour water supply in the parts of the district capitals of Manatuto and Pante Macassar as presented in **Figure 3.** It should be noted that increasing access to safe, reliable and affordable water reduces poverty in the two district capitals. The reduction in poverty is possible by improving public health and reducing malnutrition, resulting in reduced expenditure on health and reduced work days lost from morbidity; and increasing time savings from water collection, storage, and boiling, particularly for women. The project provided access to metered household water connections and 24-hour per day water service. Moreover, awareness of safe hygiene practices to households in two district capitals of Manatuto and Pante Macassar were also accomplished through this project. In Ermera, the project was envisaged to reduce erosion in Lehumo Lake, restoring the lake to its previous condition. When this is realised in the future, this will reinstate small-scale fishing relied upon by the surrounding communities and will open up the potential for ecotourism in Ermera. Health benefits are likely to come about from the avoidance of an increase in health problems that might result from a deterioration of the present water supply resulting from an increasing gap between the supply and demand for water for residential use. Without alternative sources, rapidly growing towns will experience increasing water shortages that will lead to rationing and, as a consequence, increased risk of contamination of water for human consumption. Diseases relating to water and sanitation prevented include diarrheal diseases; hepatitis; typhoid; paratyphoid; cholera; intestinal worms; and skin, eye, and ear infections. Health benefits from the project are prevention of increase in incidence of disease; prevention of associated increase in medical expenses; and prevention of associated increase in time lost from work leading to a loss of income or productivity.

Figure 4: Inauguration of Pante Macassar water supply by Prime Minister of Timor-Leste in January 2018 (GOTL, 2018)

6 Implementation status of the project

The component of rehabilitation and expansion of water supply systems in Manatuto and Pante Macassar through the National Directorate for Water Supply and Sanitation (NDWSS) has been completed. The rehabilitation and expansion of Manatuto water supply systems was completed in December 2016. The completion of rehabilitation and expansion of Pante Macassar water supply systems was accomplished in January 2018 as shown in **Figure 4**. The phase I of the second component on increased knowledge of efficient use of water and safe hygiene practices in the project areas was completed. The next phase of this component is expected to commence at the earliest.

The tender for the component on sustainable operation and maintenance (O&M) of urban water systems by the district department for water supply and sanitation (DDWSS) is in progress. The O&M and training services for water supply system in Manatuto district which aims to ensure the quality and continuity of water supply to the Manatuto service area from the upgraded water supply system will be contracted for a period of 24 months. This will be accomplished by implementing priority operations and maintenance actions and support know-how transfer to the 11 water operator graduates, to be recruited by the Employer, and Manatuto Municipality Water Supply, Sanitation and Environmental Services staff through on-the-job training and other targeted training activities, so as to be able to fully manage the operations of Manatuto water supply system at the end of the contract period. The tender was launched in August 2018 and the contract is expected to be awarded soon. The Invitation for Bids was received in September 2018 (ADB, 2018).

The fourth component on sustainable secured water resources in Lehumo Lake has been removed due to budget constraints. The final component on efficient management of the project by the Ministry of Infrastructure (MOI) and NDWSS is also realised through the ongoing support on efficient project management provided by the PMU. An estimated 2,590 households in

Manatuto and Pante Macassar have been connected to new water supply system through this project till date.

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