

Country Name	<b>The Project for Urgent Improvement of Water Supply System in Bemos-Dili (Phase 1) (Phase 2)</b>
Democratic Republic of Timor-Leste	

**I. Project Outline**

Background	The Dili Water Supply System supplied 32,000 m <sup>3</sup> /day (May 2007) of treated water for approximately 160,000 city residents of Dili (estimated value of March 2006) from the Dili central water treatment plant (Urgent grant aid construction project by Japan in 2000) and Bemos water treatment plant (the Japanese grand aid project “Project for Improvement of Water Supply in Dili” in 2005) having the raw water taken from Bemos river conveyed through the Bemos raw water main system. However, the Bemos raw water main system had been severely damaged due to the floods caused by torrential rain occurred in the years 2004 and 2005. In order to restore the damaged Bemos raw water main system, the Japanese grant aid project “the Project for Urgent Improvement of Water Supply System in Bemos-Dili” was implemented upon the request of the government of Timor-Leste in 2009-2010. After signing the construction contract in January 2010, however, unusual rainfall and floods occurred in March, April and May 2010 in the area of upstream of Bemos River, which caused further damages to existing pipeline and facilities, furthermore extending the erosion and change of existing ground condition at the river bank. Therefore, it was necessary to modify the design of the damaged structures as well as to take countermeasure for landslide. In such circumstances, the phase 2 of the target project was planned.				
Objectives of the Project	To secure the stable raw water supply from the Bemos River and to improve the safety of the Bemos raw water main system by rehabilitation of raw water transmission facilities, thereby contributing to improvement of water supply service in Dili city.				
Outputs of the Project	<ol style="list-style-type: none"> <li>1. Project Site: Dili city</li> <li>2. Japanese side <ul style="list-style-type: none"> <li>• Renovation and construction works for 15 structures of raw water main systems such as Bemos Intake, Inlet and Grit Chamber Pipeline, Revetment at Right Bank River Terrace, Installation of Valves and Wash-outs, Lower Service Reservoir and Valve Chamber at Bemos Water Treatment Plant, etc.</li> </ul> </li> <li>3. Timor-Leste side: <ul style="list-style-type: none"> <li>• Land acquisition for grit chamber at the downstream of the Bemos Intake</li> <li>• Clear and level the project sites</li> <li>• Provision of project office and utilities</li> <li>• Provision of proper access road to the project office</li> </ul> </li> </ol>				
Ex-Ante Evaluation	(Phase I) 2009 (Phase II) 2010	E/N Date	(Phase I) May 26, 2009 (Phase II) January 31, 2011	Completion Date	(Phase I) November 23, 2011 (Phase II) February 24, 2012
Project Cost	E/N Grant Limit: (Phase I) 694 million yen / (Phase II) 272 million yen Actual Grant Amount: (Phase I) 666.9 million yen / (Phase II) 271.4 million yen				
Implementing Agency	National Directorate of Water Service (DNSA), Minister of Public Works, Transport and Communications				
Contracted Agencies	Sanyu Consultants Inc., Dai Nippon Construction				

**II. Result of the Evaluation**

1 Relevance
<p>&lt;Consistency with Development Policy of Timor-Leste Government at the time of ex-ante and ex-post evaluation&gt; This project was consistent with Timor-Leste’s development policy of “improvement of Dili water supply system” as set forth in the policy documents including the Annual Action Plan (2007, 2008) and the Strategic Development Plan (2011- 2030).</p> <p>&lt;Consistency with Development Needs of at the time of ex-ante and ex-post evaluation&gt; This project met the development needs of Timor-Leste to secure safe and stable water supply in Dili water supply system and to recover the flood damage by improvement of Bemos raw water main system. Since the source of water supply in Dili city heavily depends on the surface water taken from Bemos River, to secure Bemos raw water main system is still important.</p> <p>&lt;Consistency with Japan’s ODA Policy for Timor-Leste at the time of ex-ante evaluation&gt; Although the first Japan’s Country Assistance Policy for Timor-Leste (later issued in 2012) was not formulated at the time of ex-ante evaluation, the project was consistent with Japan’s Official Development Policy for Timor-Leste at the time of 2008 to prioritize development and maintenance infrastructure as one of the four priority areas.</p> <p>&lt;Evaluation Results&gt; In the light of above, the relevance of this project is high.</p>
2 Effectiveness/Impact
<p>&lt;Effectiveness&gt; The project has achieved its objectives, “to secure the stable raw water supply from the Bemos River and to improve the safety of the Bemos raw water main system by rehabilitation of raw water transmission facilities”. The daily raw water supply volume increased from 7,800 m<sup>3</sup>/day in 2010 to 8,900 m<sup>3</sup>/day in 2015 which met the target value of 8,800 m<sup>3</sup>/day. Also the number of days to stop raw water supply per year due to removal works of sand and sediment reduced from 7 days/ year before the project in 2010 to 0-1 day/year after the project completion. The safety of the Bemos raw water main system has been improved. Due to strengthening of the protection of Bemos raw water system by rehabilitation, the frequency of damage by the flood was reduced in comparison with pre project implementation. As mentioned above, failure of raw water supply rarely occurs after post project implementation. This failure happened only in rainy season due to inflow of sands and gravels into intake facilities caused by the flood. As a result of decrease in frequency of damage by the flood, the</p>

maintenance of raw water main system especially during the rainy season became easier in comparison with the pre project implementation.  
<Impacts>

The project contributed to improvement of water supply in Dili city. The supply of treated water in Dili city has increased significantly as the total water supply volume at Bemós water treatment plant and Dili Central water treatment plant increased from 3,312,000 m<sup>3</sup>/year in 2008 to 5,034,528 m<sup>3</sup>/year in 2014, which indicated a growth rate at 152% between 2008 and 2014. However, according to DNSA, not all the figures of the table are correct because water flow meters are often out of order, in addition, some of the figures are not consistent with annual raw water supply. But the tendency of increasing the amount of treatment water can be certainly recognized. On the other hand, there is a problem in accessibility of treated water at customers' level due to the poor condition of the distribution network in Dili city.

Water Supply Volume in Dili city

(unit: m<sup>3</sup>/year)

	2008 Baseline	2012 Actual	2013 Actual	2014 Actual
Water supply volume at Bemós WTP	936,000	1,123,000	1,460,600	1,898,208
Water supply volume at Dili Central WTP	2,376,000	2,340,000	2,448,000	3,136,320
Total	3,312,000	3,463,000	3,908,600	5,034,528

Source: DNSA

Note: WTP (Water Treatment Plant)

No negative impact on the natural environment was observed and no land acquisition and resettlement of people were associated with the project.

<Evaluation Result>

In the light of above, the effectiveness/impact of this project is high.

#### Quantitative Effects

Indicator	(Before the project) Year 2010 Actual	(Target year) Year 2015 Planned	Year 2011 Actual	Year 2012 Actual	Year 2013 Actual	Year 2014 Actual	(Ex-post evaluation) Year 2015 Actual
<b>Indicator 1</b> <sup>(Note 1)</sup> Daily raw water supply volume (1,000 m <sup>3</sup> /day)	7.8	8.8	8.7	8.9	8.8	8.9	8.9
<b>Indicator 1</b> <sup>(Note 1)</sup> Annual raw water supply volume (1,000 m <sup>3</sup> /year)	2,850	3,220	3,175.5	3,248.5	3,212	3,248.5	3,248.5
<b>Indicator 2</b> <sup>(Note 2)</sup> Number of days to stop raw water supply per year (day/year)	7	0	0	1	0	1	0

Sources: The ex-ante evaluation summary sheet and response to the questionnaire by Ministry of Public Works.

Note 1: Raw water supply volume means the volume of raw water supplied from Bemós river intake to the Dili and Bemós water treatment plants.

Note 2: Number of days to stop raw water supply per year means number of days to stop the raw water supply from Bemós river intake to the Dili and Bemós water treatment plants by removal works of sand and sediment.

#### 3 Efficiency

Both the project cost and project implementation period were within the plan (100% and 92% respectively), the efficiency of this project is high.

#### 4 Sustainability

<Institutional Aspect>

The operation and maintenance (O&M) agency of the project facility is the National Directorate of Water Service (DNSA), the Ministry of Public Works, Transport and Communications. DNSA is responsible for water supply services in Timor-Leste. The O&M of the Bemós raw water main system was directly handled by Dili Water Supply Department under DNSA. The total number of staff in Dili Water Supply Department is 121 including 38 in Production Unit, 5 intake keepers and 11 plant operators (3 operators for the Bemós WTP, 6 operators for the Central WTP, 1 operator for the Lahane WTP, and the 1 operator for the Benamauk WTP). Each WTP has to be operated 24 hours a day and 7 days a week by only the plant operator. DNSA conducts daily check and periodical maintenance and the major maintenance is outsourced to private maintenance agency each time. The allocated number of staff is not sufficient to conduct the daily check and periodic maintenance.

In addition, the procurement system of DNSA requires long time to procure necessary materials for O&M. Due to the stagnation of procurement, inadequate O&Ms are observed. For example, chemical materials for purification were not procured and some WTPs were operated without the chemical materials.

<Technical Aspect>

The JICA's Technical Cooperation "Capacity Development Project for Water Supply System in Dili and four Towns (2008- 2011)" and dispatch of the Advisor on Improvement of Water Supply of DNSA (2012-2015) contributed to improve the O&M technical capacity of DNSA and Dili Water Supply Department. The above JICA's cooperation provided technical transfer on O&M to the operators of WTPs, conducted training by the operators in MWA (Metropolitan Water Authority) in Bangkok for a week, and also some DNSA Staff have joined group training on water sector conducted in Japan. After the above JICA's cooperation, DNSA has been operating facilities by utilizing the manual and guideline for O&M of the facilities prepared through the JICA Project. However, DNSA's technical capacity is still not enough to fully undertake O&M. According to DNSA, the capacity of O&M on area of network, modeling, mapping system, leakage detection program and asset management need to be further developed and upgraded. Also there are very limited private maintenance agencies with enough technical skills and experience of the major maintenance works, specifically associated to waterworks project facilities.

In order to cope with the above situation, DNSA has been conducting the Public Private Partnership (PPP) feasibility study for Dili Water Supply System with the aim to assess the most viable PPP method that suit to the condition of Dili Water Supply System to ensure the sustainability of O&M and financial improvement in the near future.

#### <Financial Aspect>

The budget approved for DNSA usually got reduced against the requested/planned budget. DNSA received one million USD for O&M budget in 2014, however, it was not enough to fully conduct required O&M including procurement of necessary spare parts. On the other hand, DNSA received only 138,000 USD in 2014 for water charge revenue. This low water charge revenue issue may be caused by several reasons such as: lacking efforts on bill collection, a high water leakage rate and illegal connections in the distribution network. This limited O&M budget led to the shortage of O&M manpower and weak technical capacity of DNSA.

#### <Current Status of Operation and Maintenance>

As stated above, a full scale daily check and periodic maintenance for all project facilities has not been conducted due to a shortage of manpower, limited technical capacities and lack of necessary materials. However, operation and maintenance of the major facilities has been done within a certain range. For example, the operators in charge of Bemos raw water main system conduct the daily check for the Lower Service Reservoir in Bemos WTP. Physically the WTP is still in good condition. Thus, Lower Service Reservoir does not necessarily need a periodic maintenance. Also it is observed that some part of land nearby the grid chamber has been re-occupied by a community to grow vegetables, but so far it has not yet impeded the operation of project facilities. DNSA has collocated two operators to take care of the intake and the community occupied area in order to avoid the damage. Since the project facilities are still new, the project facilities have been functioning well so far and do not require major maintenance for a certain period of time.

#### <Evaluation Results>

Therefore, there are some problems in the institutional and technical aspects, and a major problem in financial aspect, the sustainability of this project effect is low.

#### 5 Summary of the Evaluation

The project has achieved its objectives, "to secure the stable raw water supply from the Bemos River and to improve the safety of the Bemos raw water main system by rehabilitation of raw water transmission facilities". The quantitative indicators such as the daily raw water supply volume and the number of days to stop raw water supply per year met the target respective values. Also the safety of the Bemos raw water main system has been improved as frequency of damage by the flood was reduced due to strengthening of the protection of Bemos raw water system. The project contributed to improvement of water supply in Dili city as the total supply of treated water in Dili city expanded by 152% between 2008 and 2014.

As for sustainability, there are problems in terms of institutional, technical and financial aspects due to shortage of O&M staff, technical capacity and O&M budget. Meanwhile, the project facilities have been functioning well so far and do not require major maintenance for a certain period of time.

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

### III. Recommendations & Lessons Learned

#### Recommendation for Implementing Agency;

- Budget allocation for O&M Bemos Water Treatment Plant should be sustained in order to hold up a periodical maintenance for the facilities.
- Technical capacity of staffs and operators should be improved continuously through in-country training program or overseas training program in order to upgrade knowledge and technical skills of O&M.
- In order to improve the profitability of DNSA as well as improve the accessibility of water supply service at the final beneficiaries (i.e. customers), DNSA should urgently create a task force team to detect illegal connections and leakages in the distribution networks.
- DNSA should now on discuss with the central government about the establishment of frameworks to make DNSA as an autonomy institution such as a public enterprise or to make DNSA install public enterprise accounting. DNSA is considering the importance to obtain adequate water revenue. However, the water revenue cannot be utilized by DNSA, themselves because the water revenue is once incorporated in the revenue of the Timor-Leste government and the operation cost of DNSA is allocated by the government regardless of its water revenue. If DNSA could have an independent accounting system from the government which allows DNSA to utilize its water revenue by themselves, improvement of financial issues could be expected in the long run and this would motivate DNSA to tackle with collecting water revenue harder.

#### Lessons learned to JICA

- Management of a water supply system including intake facilities and water treatment plants, requires appropriate operation and maintenance (O&M) capacity. In this project, the limited technical capacity and management system by O&M agency was witnessed. However, considering the fact that this project was implemented for the purpose to avoid the worst scenario, i.e. operation failure, in a vulnerable post conflict country such as Timor-Leste, it should have been suggested to the counterpart during the planning stage that a separate support by JICA or other donor agencies would be needed for the management including O&M after the emergency rehabilitation.

Furthermore, when providing grant aid for an emergency rehabilitation project of an existing facility, it would be advisable to agree on a separate "project life" which is different from that for a provision of new facility. In the future, it should be considered to set the durable life of equipment provided under the emergency rehabilitation project as the "project life". Then, construction of new facility or major rehabilitation work within the set expiry period should be suggested to the implementing agency during the planning stage.



Lower Service Reservoir



Bemos Water Treatment Plant Facilities