

Executive Summary

Grand Phnom Penh Water Supply Project

Country : **Cambodia**

Sector : **Water supply**

Evaluator : **SCE and Keran Asia Services**

Date of evaluation : **2022**

Key data on AFD support

Project number : CKH1121 01F

Amount : EUR 51.8 million (loan: EUR 30 million)

Disbursement rate : 99.9%

Signature of the financing agreement: March 2013

Date of completion : November 2016

Duration : 44 months



Context

Phnom Penh, capital city of the Kingdom of Cambodia, has undergone a spectacular demographic growth over the past 15 years, bringing the total number of its inhabitants from about 1.5 million in 2005 to about 2.1 million in 2020. In order to cope with the growing water demand, the Phnom Penh Water Supply Authority (PPWSA) planned the development of water production facilities and relating distribution networks: as a result, the construction of the first and second phases of the Niroth Water Treatment Plant (WTP) was foreseen in the 2005-2020 Master Plan. The first phase ("Niroth 1") was put into operation in 2013: the present evaluation focuses on its second phase, referred to as "Niroth 2".

Stakeholders and modus operandi

The main project stakeholders were:

- PPWSA, project owner and direct beneficiary of the loan provided by AFD (non-sovereign loan)
- Agence Française de Développement (AFD)
- Safege (now known as Suez Consulting): consulting firm in charge of the project preparation and construction supervision
- Vinci: contractor for the second phase of Niroth WTP under a design-build contract
- Suppliers (e.g., pipes & accessories, GIS): Saint-Gobain PAM, Powercode, G2C, Yokogawa
- Beneficiaries: users of water services in Phnom Penh.

PPWSA counterpart funding covered 90% of the civil works costs for the WTP extension, the construction costs of the transmission and distribution networks and taxes.

Objectives

The general objective was to enhance the living conditions of Phnom Penh inhabitants by providing safe, continuous, and quality water supply to all. This was to be achieved thanks to an increase in the service coverage, including in the 20 communes from Kandal Province merged with Phnom Penh in 2010. This entailed the development of new production facilities and distribution networks, obtained via the extension of Niroth WTP and the development of a transmission & distribution network to serve zones located north-west of the city center.

Expected outputs

- Extension of the production capacity of Niroth WTP by 130,000 m³ per day
- Installation of 26.5 km of transmission mains
- Installation of 561 km of distribution mains
- Distribution & Management Improvement (DMI) component through the installation of a new GIS the upgrade of the supervisory system

Performance assessment

Relevance

The project aimed at answering the growing water demand of connected users, both in terms of quality and pressure, and at allowing additional users to connect. The service remains affordable thanks to (i) the rising block tariff structure (for domestic and corporate users) which allows everyone to benefit from a lifeline amount of water at a very reasonable price and (ii) PPWSA "Water for All" social policy that consists in subsidizing the connection to the network for low-income households.

Coherence

The construction of the two phases of Niroth WTP was identified in the second Master Plan, that is as early as 2005. Besides, the project contributes to the achievement of the objectives set in the National Strategic Development Plan 2014-2018 which (i) aims at achieving 85% piped water supply coverage by 2018, and 100% coverage by 2025, and (ii) promotes the improvement of operational performance. It also aligns with AFD's geographical & sectoral strategic policies, which address the provision of basic urban services including water supply and sanitation and the strengthening of human capital.

Effectiveness

The project resulted in functioning infrastructure producing quality water. Infrastructure is properly maintained following operating procedures. As for the GIS, it was the first time the proposed software was ever deployed in a real working environment: as a result, a very important number of bugs had to be corrected. The GIS eventually functioned well but like for the upgrade of the supervisory system, it is not possible to conclude on their actual impact on non-revenue water (NRW): NRW increased between 2015 & 2019, but its level remains reasonable (10%) and shall be analyzed in consideration of the soaring number of connections and pipe length as well as of the ageing of pipelines.

Efficiency

The project was timely implemented and on budget. It is highlighted that some contracts were amended to address components they were not related to or even other projects: for instance, 49% and 22% of the total value of the change orders made to the WTP design-build contract were used for the transmission mains program and Niroth Phase 1, respectively.

In addition, the transmission component underwent numerous changes for various reasons (changes in urban development patterns or water supply strategy, etc.). The coordination with Phnom Penh Municipality and the insertion of the mains into the urban fabric was also challenging at the time (lengthy authorizations, conflicts with other urban utilities, etc.).

Impact

It is assessed that the project allowed to increase the coverage in PPWSA's service area from about 82% to 86%. The water users in Phnom Penh are globally satisfied with the service provided by PPWSA.

Sustainability

The discharge point of the sludge from the treatment is close to the location of a water intake, and a counter current phenomena could have the discharged sludge mixed with raw water. The use of high-quality equipment contributes to the investment sustainability.

Added value of AFD's contribution

The flexibility of the financing modalities of AFD definitely smoothed out the project implementation. The long-term partnership and trustworthy relationship established with PPWSA also contributed to facilitate the discussions.

Recommendations

- 1) It would be interesting to develop a shared platform on Phnom Penh urban development: there is no shared knowledge on the various utilities (drainage, water supply, electricity, etc.). Having a platform led by Phnom Penh Municipality gathering all utilities would have a real added-value so as to properly plan & design urban infrastructure projects. Such platform could also maintain a shared GIS, gathering in one place all available information on existing and planned utilities.
- 2) To cope with a fast-changing context, alternative financing modalities could be thought of: the changing priorities in urban development highly impacted the development of the transmission networks. As a result of this changing context, the resources from the loan were not entirely used for Niroth 2. This leads to wonder whether a project-based modality is the best approach: more flexible and/or longer-term support modalities (such as multi-tranche facilities) could be investigated as they may bring more efficiency (decreased time and resources for administration), and more flexibility to accommodate changes.
- 3) Affordability of the water tariffs shall not hinder PPWSA's financial capacity in the long run: PPWSA's water tariffs are designed to be affordable to the population, but attention shall be paid to the fact that PPWSA needs financial means to further invest in the development of its systems so as to catch up with the ever-growing water demand in Phnom Penh.

Executive Summary

Extension of Chamcar Morn Water Production Facilities and Distribution Network

Country : **Cambodia**

Sector : **Water supply**

Evaluator : **SCE and Keran Asia Services**

Date of the evaluation : **2022**

Key data on AFD support

Project number : CKH1174 01P

Amount : US\$ 49.43 million (loan: EUR 30 million)

Disbursement rate : 100%

Signature of the financing agreement: December 2016

Date of completion : October 2019

Duration : 52 months



Context

In Phnom Penh, capital city of Cambodia, the second phase of Niroth Water Treatment Plant (WTP), commissioned in November 2016, was producing over its design capacity as soon as end of 2017. As early as 2015, it was thought that Niroth WTP would be saturated earlier than the commissioning of the new planned production facility North-East of Phnom Penh. Therefore, Phnom Penh Water Supply Authority (PPWSA) proposed then to study the feasibility of rehabilitating the Chamcar Morn (CCM) WTP, in order to help filling in the planned production gap.

Stakeholders and modus operandi

The main project stakeholders were:

- PPWSA, Project Executing Agency
- The Ministry of Economy and Finance (MEF) of the Royal Government of Cambodia, recipient of the loan provided by AFD, subsequently on-lent to PPWSA
- Agence Française de Développement (AFD), only international donor involved in the project
- Safège (now known as Suez Consulting): consulting firm in charge of the project preparation and construction supervision
- Vinci: contractor for the rehabilitation of CCM WTP under a design-build contract
- Beneficiaries: users of water services in Phnom Penh.

PPWSA counterpart funding covered mostly 50% of the civil works costs for the rehabilitation of the WTP and the construction costs of the transmission and distribution networks (pipes & accessories funded via the loan).

Objectives

The general objective was to enhance the living conditions of Phnom Penh inhabitants by providing safe, continuous, and quality water supply to all. This was to be achieved thanks to an increase in the production and distribution capacity of PPWSA, obtained via the rehabilitation and upgrade of CCM WTP and the completion of the transmission & distribution programs initiated during the extension of Niroth WTP.

Expected outputs

- A 52,000 m³/day WTP
- Installation of 30 km of transmission mains
- Installation of 540 km of distribution mains
- Installation of 60,325 new connections (95% domestic) reaching around 375,000 people

Performance assessment

Relevance

The project aimed at answering the growing water demand of connected users, both in terms of quality and pressure, and at allowing additional users to connect. The service remains affordable thanks to (i) the rising block tariff structure which allows everyone to benefit from a lifeline amount of water at a very reasonable price and (ii) PPWSA "Water for All" social policy that consists in subsidizing the connection to the network for low-income households. PPWSA's communication actions have furthermore contributed to raise awareness on the value of piped water, compared to other water sources.

Coherence

The project contributes to the achievement of the objectives set in the National Strategic Development Plan 2014-2018 which aimed at achieving 85% piped water supply coverage by 2018, and 100% coverage by 2025. It also aligns with AFD's geographical & sectoral strategic policies, which address the provision of basic urban services including water supply and sanitation. The rehabilitation of CCM WTP was not identified in PPWSA's master plan at the time: however, it aimed at relieving existing production facilities and at bridging the foreseen production gap in a context of a fast-growing demand thus it remains consistent with PPWSA's strategy.

Effectiveness

Both projects resulted in functioning infrastructure producing quality water. Infrastructure is properly maintained following operating procedures. Capacity building activities did not bring the expected results because of the cancellation of a number of training sessions due to the COVID-19 pandemics. In addition, when training sessions actually happened, the poor selection of the participants (both in terms of number and relevance to their daily jobs) limited their impact.

Efficiency

The project was timely implemented and on budget. The procurement methods were adapted (e.g., introduction of order contracts for goods, to avoid multiple bidding processes) to fast-track its implementation. The use of funds have been maximized to provide PPWSA with additional goods (e.g., distribution pipes). On the other hand, the location of the plant – in a central district of Phnom Penh – and the nature of the project – a rehabilitation of an old facility which had to be mostly dismantled – triggered operational difficulties and high costs, in comparison with a new plant settled in an easily-accessible plot.

Impact

It is assessed that about 375,000 people benefit from a connection to piped water thanks to the project. The water users in Phnom Penh are globally satisfied with the service provided by PPWSA.

Sustainability

The quality of the raw water abstracted from Bassac River is expected to further deteriorate in the future because of urban development. In addition, both discharge points of the sludge from the treatment processes of Niroth and CCM WTPs are downstream yet very close to the location of CCM WTP's water intake. The counter current phenomena could bring the discharged sludge that could mix with the raw water. Treating low quality water entails higher costs of production and remains feasible only within certain limits.

Added value of AFD's contribution

The flexibility of the financing modalities of and advice provided with regard to procurement by AFD allowed to fast-track the project implementation. The long-term partnership established with PPWSA also contributed to facilitate the discussions.

Recommendations

- 1) The actual impact of capacity building could be enhanced, thanks to a study to map the skills and competencies necessary to each position in all units, followed by a gap analysis with the actual skills & experience of PPWSA's staff members. This would allow the design of a relevant training plan, and to better target the beneficiaries of such training.
- 2) Affordability shall not hinder PPWSA's financial capacity in the long run: PPWSA's water tariffs are designed to be affordable to the population, but attention shall be paid to the fact that PPWSA needs financial means to further invest in the development of its systems so as to catch up with the ever-growing water demand in Phnom Penh.
- 3) The protection of Phnom Penh's water sources shall be given more emphasis in future programs: maintaining an acceptable quality of raw water sources is key to the sustainability of PPWSA's operations, but it is jeopardized because of the environmental pressures linked with urban development (e.g., discharge of untreated wastewater & unsafely managed solid waste).
- 4) To cope with a fast-changing context, alternative financing modalities could be thought of: for over 15 years, the water demand in Phnom Penh has exceeded the production capacities much faster than anticipated, which led to urgent requests such as the rehabilitation of CCM WTP. This leads to wonder whether a project-based modality is the best approach: more flexible and/or longer-term support modalities (such as multi-tranche facilities) could be investigated as they may bring more efficiency (decreased time and resources for administration), and more flexibility to accommodate changes.

Executive Summary

Siem Reap Emergency Bridging Project for Potable Water Supply

Country : **Cambodia**

Sector : **Water supply**

Evaluator : **SCE and Keran Asia Services**

Date of evaluation : **2022**

Key data on AFD support

Project number : CKH 1161 01K

Montant : USD 12.97 million

Disbursement rate : 100%

Signature of the funding agreement: October 2015

Date of completion : May 2019

Duration : 43 months



Context

In 2014, the water supply of Siem Reap relied mostly on groundwater sources, and the water demand was steadily growing because of the increasing number of tourists coming to visit the nearby Angkor temples. There was therefore a fear that groundwater abstraction might cause land subsidence, which could endanger the stability of the temples, and the only water supply development project relying on surface water at the time was not deemed to be operational before 2019 at the earliest.

Stakeholders and modus operandi

The main stakeholders of this project, according to their functions were:

- SRWSA, Project Executing Agency
- The Ministry of Economy and Finance (MEF) of the Royal Government of Cambodia, recipient of the loan provided by AFD, subsequently on-lent to SRWSA
- APSARA, the authority in charge of the management of the Angkor archeological park
- Agence Française de Développement (AFD), sole international donor of the project
- The Asian Development Bank (ADB) and the Japan International Cooperation Agency (JICA), which funded parallel projects
- Safege (now known as Suez Consulting): consulting firm in charge of the project preparation and construction supervision
- Vinci: contractor for construction of all facilities under a design-build contract
- Beneficiaries: users of water services in Siem Reap.

Objectives

The general objective were to (i) enhance the living conditions of Siem Reap inhabitants by providing safe, continuous, and quality water supply; and (ii) protecting the historical heritage by limiting groundwater abstraction. This entailed the development of water production facilities from a surface water source – the West Baray which is a reservoir located within the Angkor temples complex – and of a transmission main. The distribution system was developed in the framework of two other Official Development Assistance (ODA) projects, respectively funded by ADB and JICA.

Expected outputs

- A raw water intake in the canal of the West Baray
- A new 15,000 m³/day Water Treatment Plant (WTP)
- A pumping station, a water reservoir, and a 6 km-long 700 mm-diameter transmission main

Performance assessment

Relevance

The Project answered an urgent concern to limit the abstraction of underground water so as to protect historical heritage. It also answered a need from the population and businesses, which willingness-to-connect was checked before the implementation of the Project, and at a price considered fair by the users themselves.

Coherence

The project participates in achieving objectives set in the National Strategic Development Plan 2014-2018 which aimed at achieving 85% piped water supply coverage by 2018, and 100% coverage by 2025. It also aimed at contributing to the objective of APSARA relating to the preservation of historical heritage. It aligns with AFD's geographical & sectoral strategic policies, which address the provision of basic urban services including water supply and sanitation and environmental protection. An effort has been made in ensuring consistency and complementarity with other ODA interventions. Nevertheless, the evaluation highlights conflicting technical approaches between the various ODA projects teams and a lack of coordination with APSARA, which have either slowed down the design or might be a threat to the project sustainability.

Effectiveness

The project resulted in functioning infrastructure producing quality water. The infrastructure is properly maintained. SRWSA's staff improved their capacity, on the one hand because the treatment of surface water is a new subject to the utility, and on the other hand because they experienced a new form of contract (design-built).

Efficiency

The Project suffered delays at the start, which allowed the application of price adjustment by the Contractor early in the construction phase and required to extend the contract of the Implementation Consultant, which altogether resulted in additional costs.

Impact

Between 2017 and 2020, about 5,120 new connections were established serving approx. 34,000 persons. The Project allowed (i) newly connected users to save time, effort & energy; and (ii) users already connected to the network to benefit from an improved pressure. However, not all new users stopped using their private wells. The COVID-19 pandemics disrupted the business activities and the operations of SRWSA, so it is not possible to fully qualify the impacts of the Project.

Sustainability

One of the primary objectives of the Project was to limit water abstraction from groundwater sources in order to prevent land subsidence and protect historical heritage. It is unknown to which extent this objective has been fulfilled, because of (i) the lack of data on the groundwater table and of (ii) the impact of the COVID-19 pandemics on the demand & SRWSA's financial means. In addition, there are concerns about the quality of the water in the West Baray, which is the raw water source.

AFD Added Value

The mobilization of a grant by AFD and agreement to single-source the Consultant in charge of the feasibility study allowed to fast-track the project preparation. AFD provided valuable support during the project implementation, for instance by directly coordinating with other donors, by advising on the coordination with APSARA, and by providing a grant to four staff members of SRWSA to follow the "Water for All" master program in France.

Recommendations

- 1) For future AFD interventions, co-financing - that is, the gathering of financial resources with other donors – shall be favored the financing of parallel interventions, as technical disagreements can lead to major inconsistencies between two infrastructures. Besides, the success of the SR EBP was totally dependent on the actual implementation of the ADB-funded project (distribution network).
- 2) The SR EBP was qualified as "urgent": AFD overrode some its standard procurement procedures so as to speed up the Project implementation whereas the Cambodian national procedures were strictly followed. It would be worthwhile developing simplified national procedures for such emergency projects.
- 3) There is a lack of comprehensive vision of the available water resources, their conditions and uses in the region. Considering the issues at stake (protection of the historical heritage on which the economy of the whole region heavily relies) and to ensure future water security, the preparation and implementation of an Integrated Water Resources Management Plan is highly recommended.
- 4) In order to limit uncontrolled groundwater abstraction from private wells, key messages need to be tailored to each user category: indeed, large businesses are more sensitive to environmental protection than domestic users, who on the other hand pay more attention to tariffs.