Ex-Post Project Evaluation 2013: Package II-4

(Honduras, Honduras/El Salvador, Guyana)

October 2014

JAPAN INTERNATIONAL COOPERATION AGENCY

GLOBAL GROUP 21 JAPAN, INC.

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Preface

Ex-post evaluation of ODA projects has been in place since 1975 and since then the coverage of evaluation has expanded. Japan's ODA charter revised in 2003 shows Japan's commitment to ODA evaluation, clearly stating under the section "Enhancement of Evaluation" that in order to measure, analyze and objectively evaluate the outcome of ODA, third-party evaluations conducted by experts will be enhanced.

This volume shows the results of the ex-post evaluation of ODA Loan projects that were mainly completed in fiscal year 2011, and Technical Cooperation projects and Grant Aid projects, most of which project cost exceeds 1 billion JPY, that were mainly completed in fiscal year 2010. The ex-post evaluation was entrusted to external evaluators to ensure objective analysis of the projects' effects and to draw lessons and recommendations to be utilized in similar projects.

The lessons and recommendations drawn from these evaluations will be shared with JICA's stakeholders in order to improve the quality of ODA projects.

Lastly, deep appreciation is given to those who have cooperated and supported the creation of this volume of evaluations.

October 2014

Toshitsugu Uesawa
Vice President
Japan International Cooperation Agency (JICA)

Disclaimer

This volume of evaluations, the English translation of the original Japanese version, shows the result of objective ex-post evaluations made by external evaluators. The views and recommendations herein do not necessarily reflect the official views and opinions of JICA. JICA is not responsible for the accuracy of English translation, and the Japanese version shall prevail in the event of any inconsistency with the English version.

Minor amendments may be made when the contents of this volume is posted on JICA's website.

JICA's comments may be added at the end of each report when the views held by the operations departments do not match those of the external evaluator.

Republic of Honduras

Ex-Post Evaluation of Japanese ODA Grant Aid Project

Urgent Water Supply Project in Tegucigalpa

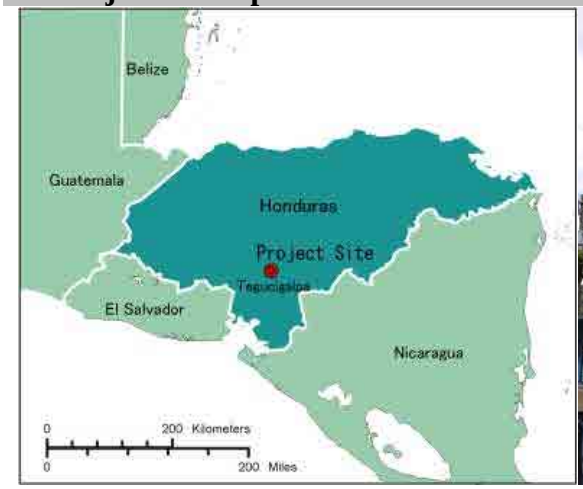
External Evaluator: Hajime Sonoda
Global Group 21 Japan, Inc.

0. Summary

Urgent Water Supply Project in Tegucigalpa (hereinafter referred to as "the Project") was implemented to improve the water supply situation in the eastern, south-eastern and peripheral areas of Tegucigalpa, the capital of Honduras, by means of rehabilitating and expanding a water treatment plant, renewing and newly constructing transmission and distribution pipelines, constructing distribution tanks and constructing water filling stations. The water supply sector has presented an important policy challenge since the time of the ex-ante evaluation and further improvement of the water supply service in the city is still a pressing need against the background of a continual population increase. As the Project is also relevant to Japan's ODA policy, the overall relevance of the Project is judged to be high. At the Picacho Water Treatment Plant (WTP) of which the water treatment capacity was enhanced by the Project, the actual water production volume has not increased much because of the lack of a sufficient raw water supply. The achievement of an appropriate water pressure through renewal of the transmission and distribution pipelines and construction of distribution tanks has led to an increase of the water supply hours and improvement of the water pressure in parts of the project area. While the construction of new water filling stations had made water filling to water trucks more efficient, the total water supply volume by water trucks has not increased because of the expansion of the distribution network in peripheral areas of the city and other reasons. In general, the impacts of the improved water supply service are localised and limited and the Project has not had any significant impact on improving daily life. As a result, the effectiveness and impact of the Project is judged to be fair. The final project cost slightly exceeded the planned cost and the project period was within the planned period. However, because of the slight scaling down of the Project to avoid over-spending in terms of the construction cost, the efficiency of the Project is judged to be fair. While it can be pointed out that the optimum water distribution in a systematic manner is difficult to achieve because of (i) the unclear prospect of the transfer of the water supply and sewerage service to the municipality and injection of private sector money and (ii) the lack of data on the actual state of water distribution, the operation and maintenance of the facilities constructed under the Project do not have any major institutional, technical or financial problems. Therefore, the

sustainability of the Project effects is judged to be high. In light of the above, this Project is evaluated to be satisfactory.

1. Project Description



Location Map

Distribution reservoir at the Olimpo 1 Water Distribution Center

1.1 Background

The Republic of Honduras (hereinafter referred to as "Honduras") is located in Central America and has a land area of 1,120,000 km^2 and a population of 7.4 million (2006). It is one of the region's least less-developed countries.

Around 2006, the Government of Honduras considered improvement of the living conditions and relief for the poor to be priority policies. In the water supply sector, the aim was to ensure a reliable supply of clean water and also to extend the water supply service to the poor. While the national coverage of the water supply service was 84% in 2004, only 46% of households had access to purified water. Under these circumstances, the national government gave the development of water supply facilities the highest priority with a long-term target of achieving nationwide water supply service coverage of 95% by 2015.

In Tegucigalpa, the capital of Honduras, the Metropolitan Division of the National Autonomous Service of Aqueducts and Sewage System (SANAA) was responsible for the provision of the water supply service, achieving local water supply service coverage of 92% (2005). However, because of the insufficient water sources, the water supply hours were restricted throughout the city. The water supply situation in peripheral areas of the city with a high concentration of poor people was extremely tight with an average annual water supply volume of some 40% of the water demand (2005).

SANAA had been proceeding with the development of water supply facilities in Tegucigalpa in accordance with the Water Supply Master Plan for Tegucigalpa which was prepared in 1988 with the cooperation of the JICA. Meanwhile, the Government of Honduras had prepared the Urgent Water Supply Project for Tegucigalpa centering on the construction of a dam designed to provide an additional water source based on recommendations made by the master plan development study and made a request to the Government of Japan for the provision of grant aid for the Project in 2003. In response, the JICA conducted a preliminary study (Preliminary Study on Water Supply Project in Tegucigalpa Urban Area) in FY 2005. This study confirmed that the water supply situation in Tegucigalpa was dire, requiring massive improvement. It also found that the requested construction of a dam involved many technological difficulties. As a result of consultations between the two countries on the feasibility of an urgent alternative project, a new request consisting of the expansion of a water treatment plant and the construction of new transmission and distribution facilities among others was made. Following the basic design study in 2007, the JICA implemented the Project from 2007 to 2010 in two phases.

1.2 Project Outline

The Project aimed at improving the water supply service in the eastern, southeastern and peripheral areas of Tegucigalpa, the capital of Honduras, by means of rehabilitating and expanding a water treatment plant, renewing and newly laying transmission and distribution pipelines and constructing new water filling stations.

Grant Limit / Actual Grant Amount	Grant Limit: (I) 486 million yen (II) 1,342 million yen Actual Grant Amount: (I) 486 million yen (II) 1,312 million yen
Exchange of Notes Date	(I) June, 2007 (II) February, 2008 (Detailed Design) May, 2008 (Main Contract)
Implementing Agency	The National Autonomous Service of Aqueducts and Sewage System (SANAA)
Project Completion Date	(I) January, 2009 (II) July, 2010
Main Contractor	Hazama Corporation
Main Consultant	Consortium of Kyowa Engineering Consultants Co., Ltd. and Tokyo Engineering Consultants Co., Ltd.
Basic Design Study	July, 2006 to March, 2007
Related Projects	Urgent Water Supply Project in Tegucigalpa: Preliminary Study on Water Supply Project in Tegucigalpa Urban Area (May, 2006)

2. Outline of the Evaluation Study

2.1 External Evaluator

Hajime Sonoda (Global Group 21 Japan, Inc.)

2.2 Duration of the Evaluation Study

The ex-post evaluation study for the Project was conducted over the following period.

Duration of the Study： September, 2013 to October, 2014
Duration of the Field Survey: 8th November to 14th December, 2013, and
20th to 29th March, 2014

3. Results of the Evaluation (Overall Rating: B[1])

3.1 Relevance (Rating: ③[2])

3.1.1 Relevance to the Development Policies of Honduras

As already mentioned in 1.1 Background, a stable supply of clean water and improvement of the water supply service for the poor were policy priorities of Honduras at the time of the ex-ante evaluation.

The present long-term plan of Honduras (Vision de Pais 2010 – 2038) adopts “health as the foundation for an improved life” as a strategic objective with such targets as halving of the size of the population without access to safe drinking water and increase of the water service coverage in rural areas to 93% by 2022. The national policies formulated by the National Council for Water and Sanitation (CONASA) in 2013 for the water supply and sewerage sector include the dissemination of the water supply service and improvement of the water supply and sewerage service level in areas around cities as important objectives.

Thus, the Project is highly relevant to the development policy of Honduras as improvement of the water supply service in areas around cities was strongly emphasised at the time of both the ex-ante evaluation and ex-post evaluation.

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1 A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
2 ①: Low; ② Fair; ③: High

3.1.2 Relevance to the Development Needs of Honduras

As already mentioned in 1.1 Background, the water supply coverage in Tegucigalpa at the time of the ex-ante evaluation was already high at 92%. However, the actual water supply situation was dire and massive improvement was required.

Although the network of distribution pipelines in new residential areas around Tegucigalpa has been expanding, the actual water supply coverage in the city declined to less than 90% in 2012 because of the rapidly expanding residential areas as well as a significant population increase. Meanwhile, the development of new water sources has stagnated since the time of the ex-ante evaluation.[3] SANAA annually prepares a water distribution schedule for the dry season and wet season in correspondence with the stored water volume at the two existing dams in an effort to establish the effective as well as efficient use of the limited water with the project-related facilities, etc. However, the increase of the service population means that no improvement of the water distribution schedule has been achieved in the last five years.[4] According to the findings of a beneficiaries' survey conducted as part of the ex-post evaluation[5] the proportion of dissatisfied residents in the project area is some 30% in regard to each issue of the water supply hours, water pressure and water quality.

As outlined above, there is much room for improvement of the water supply situation in Tegucigalpa at the time of the ex-post evaluation, indicating a continual need for the improvements already achieved by the Project. However, fundamental improvement of the water supply situation in Tegucigalpa requires the development of new water sources as pointed out by the master plan.

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[3] The raising of the spillway elevation at the two existing dams has increased the water storage capacity by 18% since 2008. Consequently, the total production volume of water treatment plants increased by some 10% between 2007 and 2012. However, this increase was modest compared to the increase of the service population in the same period. Although two sites were surveyed with a view to constructing two new storage dams, the huge relocation cost of households in areas which were expected to be submerged and the lack of prospective funding sources mean that no progress has been made up to the time of the ex-post evaluation.

[4] Here, the water distribution schedule means the daily schedule for water supply by manipulation of the operation of the valve at each distribution tank. As of 2012, water is distributed for 4 – 18 hours a day every 2 – 3 days in the project area. The average water supply duration is 5.3 hours/day in the wet season and 4 hours/day in the dry season. With the assistance of the World Bank and Government of Spain, work has started to improve the distribution facilities, to introduce distribution blocks, to introduce modern distribution management using the SCADA (Supervisory Control and Data Acquisition) System and to prepare a ledger for distribution facilities in some areas to reduce water leakage.

[5] For further details of the beneficiaries' survey, refer to Footnote 10.

3.1.3 Relevance to Japan's ODA Policies

Around 2006, following consultations with the Government of Honduras, the Government of Japan decided to primarily provide assistance for four sectors, i.e. basic education, health care, rural development and strengthening of competitiveness in view of the MDGs and development tasks for Honduras identified in its Poverty Reduction Strategic Paper, as Japan enjoyed a relative advantage compared to other donors in these sectors. In the water sector, the highest priority was given to cooperation to secure drinking water and the development of groundwater. Accordingly, it is safe to state that the Project was relevant to Japan's ODA policies.

Based on the above, this Project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy. Therefore its relevance is high.

3.2 Effectiveness[6] (Rating: ②)

3.2.1 Quantitative Effects

The Project aimed at improving the water supply service in eastern, southeastern and peripheral areas of Tegucigalpa by means of increasing the treatment capacity of a water treatment plant and renewing as well as newly constructing transmission and distribution pipelines. To ensure the efficient use of the limited water availability, the Project also intended to increase the effective water volume and to stabilise as well as equalise the water supply throughout the project area.

In this section, the overall picture of the water supply system in Tegucigalpa, areas and number of people benefiting from the Project are firstly established. This is followed by examination of the increased effective water volume from the viewpoint of (i) increased production volume of water through expansion of a water treatment plant and (ii) reduction of water leakage. The effects of the Project are then analysed from the viewpoint of (i) increased water supply hours to stabilise and equalise the water supply in the city, (ii) achievement of an appropriate water pressure and (iii) improved water supply with the use of tankers.

[6] For rating of the effectiveness, the impacts are taken into consideration.

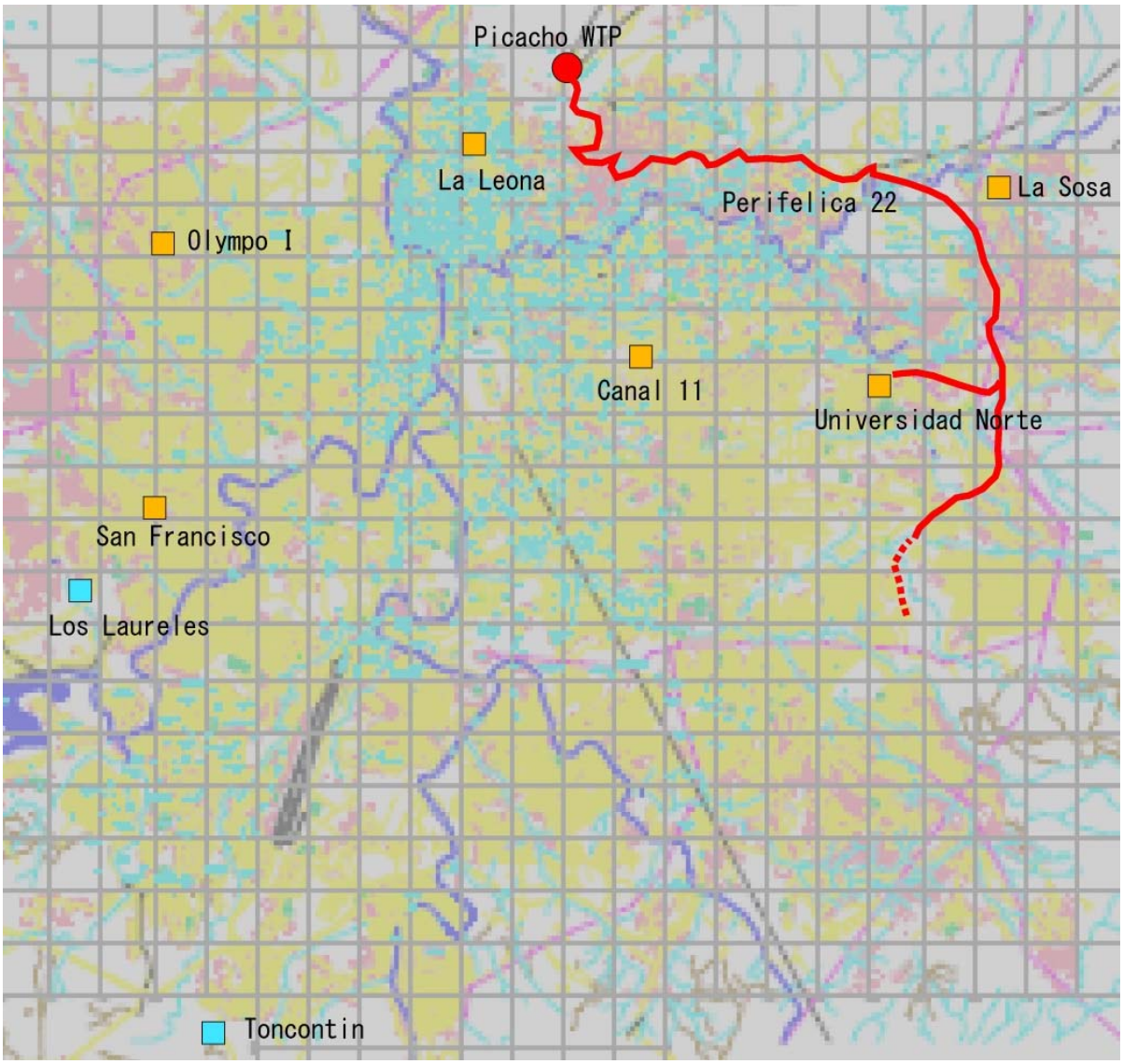


Fig. 1 Locations of Project-Related Facilities

3.2.1.1 Water Supply System in Tegucigalpa, Areas and Number of People Benefiting from the Project

The water supply system in Tegucigalpa consists of three systems using surface water. Under the Project, the treatment capacity of the Picacho WTP using several springs as water sources was enhanced. The other two water supply systems use a dam reservoir each as the water source.

The city of Tegucigalpa is divided into some 50 water distribution areas. Some of these areas can receive water supply from more than one water treatment plants. The use of a specific water treatment plant to receive water is adjusted based on the water production volume of

each plant. The partial renewal of the transmission pipelines to the northern part of the city from the Picacho WTP and the construction of a new pipeline to the peripheral area to the east of the city under the Project made it possible for eight distribution areas to receive water from the Picacho WTP. This transmission line to the north is called the Periferica 22 Pipeline.

In addition to the above, distribution reservoir and/or distribution pipelines were newly constructed in seven distribution areas along with the construction of a water filling station to serve tankers at two sites. The total number of beneficiaries of the Project is approximately 330,000 persons, accounting for almost one-quarter of the population of Tegucigalpa (1,220 thousands). The length of the Periferica 22 Pipeline was shortened by 1.5 km at the project implementation stage to reduce the overall project cost. As a result, the Villa Nueva distribution area (with a population of 21,000) was removed from the project area. Fig. 1 shows the locations of the facilities constructed under the Project while Table 1 shows the project installations and size of the benefiting population in each distribution area.

Table 1 Project Installations and Size of Benefiting Population by Distribution Area

Distribution Area (Population in 2010)	Connection to Periferica 22 Pipeline	Construction of Distribution Reservoir	Construction of Transmission and Distribution Pipelines
San Francisco (17,000)		O	O
El Sitio (6,000)			O
Olimpo I (67,000)		O	
La Sosa (44,000)		O	
Universidad Norte (7,000)	O	O	
La Leona (27,000)	O	O	
Canal II (9,000)	O	O	
Lindero (25,000)	O		
Juan A. Lainez (10,000)	O		
Hato II (24,000)	O		
Suyapita (7,000)	O		
Lomas II (7,000)	O		
Benefiting Population (Total Population of Listed Distribution Areas)	114,000	171,000	23,000
Service Population for Water Trucks	82,000		
Net Benefiting Population	330,000		

Source: Prepared by the evaluator using data provided by SANAA.

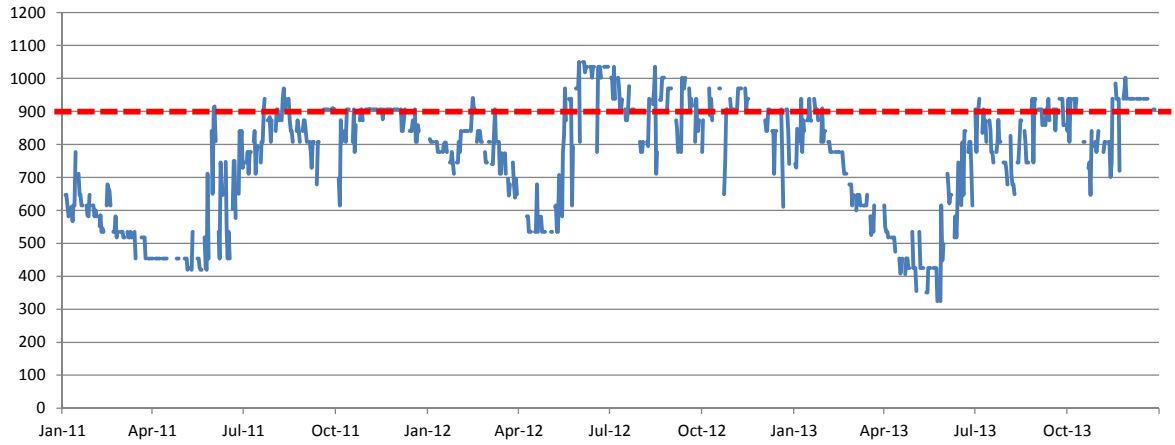
Notes: Benefiting population was calculated assuming that the entire population of each distribution area is benefitted. Total populations are not always same as the simple sum of the figures of each distribution area in the table which are rounded. Service population of water trucks is those population out of the distribution areas listed in the table.

3.2.1.2 Increase of Effective Volume of Water

(1) Increased Water Production by Expansion of Picacho WTP

As a result of the Project, the nominal production capacity of the Picacho WTP was expected to increase from 900 litres/sec to 1,100 litres/sec as its water production volume would increase particularly in the wet season when the supply volume of raw water to the plant would be high. After the completion of the Project, the maximum production volume of the plant in the wet season reached the planned 1,100 litres/sec for a short time. However, the highest daily average production rate so far is 1,050 litres/sec. (Fig. 2).

Fig. 2 Historical Changes of Daily Production Rate at Picacho WTP (litres/sec)



Source: Prepared by the evaluator using relevant SANAA data.

Note: The red dotted line indicates the pre-project production capacity (900 litres/sec)

As a result of the boosted production capacity by the Project, the produced volume of water in the three year period from 2011 to 2013 increased by 400,000 m^3/year compared to the pre-project period. Consequently, the water production volume of the Picacho WTP (1.56 million m^3/year) and total water production volume in Tegucigalpa (109.72 million m^3/year) increased by some 2.4% and 0.4% respectively compared to the pre-project figures.[7] As the achievement of the planned maximum water production volume at the Picacho WTP was short-lived, the contribution of the expansion work to increase the water production volume

[7] The volume of produced water above the pre-project production capacity of 900 litres/sec was estimated using daily average production data at the plant. The number of days when the production volume was above 900 litres/sec was 54 in 2011, 97 in 2012 and 65 in 2013. The treated water at the Picacho WTP has much improved since its level in 2004 in terms of turbidity, chromaticity, pH value, iron content and coliforms and all the values are below the threshold values set by SANAA.

and total water production volume in Tegucigalpa was rather modest. Prior to the Project, it was envisaged that the planned increase in water production volume at the Picacho WTP would enable the diversion of water from other treatment plants to areas in need, but such an effect appears to have been minimal.

The water production volume at the Picacho WTP which relies on spring water is influenced by the rainfall level. In addition, water from a water source is diverted at two sites before reaching the Picacho WTP. The diversion of part of the raw water supply (approximately 100 litres/sec in the wet season and 50 litres/sec in the dry season) to reach the Picacho WTP obviously affects the water production volume at the plant.[8] Without such diversion, expansion of the Picacho WTP under the Project could have produced a maximum water volume of some 2.3 million m^3/year or more than six times the previous performance. In the Basic Design Study, while a facility plan was prepared based on the evaluation results regarding the raw water production capacity of the available water sources, the diversion of water along the canals was not taken into consideration. It must be said that such diversion is made to supply water to meet the existing demand and does not mean the wasting of raw water.

Settling basin and filter basin added to the Picacho WTP

Transmission pipeline leaving from the Picacho WTP

(2) Effect on Reduction of Water Leakage

[8] There are four pipelines conveying raw water to the Picacho WTP. In regard to the Jutiapa Pipeline, untreated water used to be supplied to villages along the route for 20 hours a week from 2003. Since 2012, however, the supply hours have increased to 24 hours/day due to request and needs of local residents, etc., resulting in increased diversion from the canal (25 litres/sec in the dry season and 75 litres/sec in the wet season). At the Carrizal Pipeline, the diversion of water at a rate of 25 litres/sec began in 2011 to supply raw water to a small WTP which was newly constructed along the route. This WTP provides daily supply for 13 hours/day between 06:00 and 18:00. This WTP uses a small-scale water treatment system provided by Spain. In the wet season in 2013, the volume of diverted water was approximately 100 litres/sec. As the raw water production capacity at the water source was not exhausted, SANAA believes that the volume of raw water supply in this pipeline can be increased. No detailed survey or examination has yet taken place.

At the time of the ex-ante evaluation, the partial renewal of a deteriorated transmission pipeline (part of the Periferica 22 Pipeline) as well as the renewal of the transmission and distribution pipelines in the San Francisco distribution area were expected to reduce the water leakage by a combined volume of 34 litres/sec.[9] As no measurement of the volume of water leakage of these pipelines has been conducted, there is no quantitative data to substantiate the actual achievement of the Project.

In regard to the transmission pipeline of the Periferica 22 Pipeline, leakage repair work was required seven times between 2005 and 2009. Since the completion of the new pipeline in July, 2010, repair work has only been required once in 2012. Similarly, in the case of the distribution network in the San Francisco distribution area, pipe repair was required 62 times a year (2006) before the implementation of the Project. This figure fell to 33 in 2012. Because of the decline of the number of repairs of leaking transmission or distribution pipelines, it is inferred that water leakage in the project area has been reduced. According to the Operation Division of SANAA, the construction of distribution reservoirs has stabilised the water pressure in the San Francisco and Universidad Norte distribution areas to which water used to be directly pumped and also in the La Sosa distribution area receiving water directly from the Picacho WTP. Stabilisation of the water pressure from the high pressure in the past is believed to have achieved certain positive effects in terms of preventing damage to the distribution pipes and reducing water leakage caused by a high water pressure.

Based on the above, the achievement level of the planned project effect regarding an increase of the effective volume of water is fair.

3.2.1.3 Stabilization and Equalization of Water Supply

(1) Increased Water Supply Hours

The water distribution schedule set by SANAA shows a general trend of shorter supply hours for Tegucigalpa as a whole because of the much larger population increase than the increase of the water production volume. As SANAA does not possess chronological data on the actual water supply hours at the user level in each distribution area/block, it is difficult to accurately measure effects of the Project on the water supply hours.

[9] The calculation basis for this figure is unknown.

Based on the findings of the beneficiaries' survey,[10] Table 2 shows the average water supply frequency and supply hours in three distribution areas (La Sosa, Suyapita and Hato II) out of the eight distribution areas which began to receive direct or indirect water supply from the Periferica 22 Pipeline. In the wet season, no significant increase of the water supply hours has occurred for areas receiving water from the Periferica 22 Pipeline. In contrast, in three distribution areas (Olimpo I, San Francisco and La Sosa) out of six distribution areas where a distribution tank was constructed under the Project, the water supply hours in the wet season and dry season have increased by some 8% and 12% respectively since the implementation of the Project (Table 3).

In five distribution areas (La Sosa, Suyapita, Hato II, Olimpo I and San Francisco) where a storage tank was constructed or connection made to the Periferica 22 Pipeline under the Project, some 14% of interviewed households replied that the water supply hours and frequency had improved in both the wet season and dry season.

Table 2 Changes of the Water Supply Hours in Distribution Areas from the Periferica 22 Pipeline

	2008 (hours/week)	2013 (hours/week)	Rate of Increase
Wet Season	91.8	92.7	1%
Dry Season	60.4	65.8	9%

Source: Beneficiaries Survey

Table 3 Changes of Water Supply Hours in Distribution Areas Where a Storage Tank was Constructed or Added

	2008 (hours/week)	2013 (hours/week)	Rate of Increase
Wet Season	34.5	37.3	8%
Dry Season	24.2	27.1	12%

Source: Beneficiaries Survey

As the altitude considerably varies within each distribution area, those households at a higher elevation have to await the filling of the distribution pipelines in low elevation blocks. Therefore, it is not easy to equalise the distribution of water. The beneficiaries' survey found that the water supply hours and water pressure significantly vary depending on the elevation

[10] In the ex-post evaluation, an interview survey using a questionnaire was conducted with 180 households in distribution areas benefiting from the Project. This survey collected information on any change of the water supply service since the implementation of the Project, current level of satisfaction regarding the water supply service and changes of water use in daily life.

of particular households within the same distribution area and that the water supply situation worsened after the Project for some households.[11]

(2) Achievement of Appropriate Water Pressure

According to SANAA, the water pressure has stabilised at an appropriate level due to the construction of a distribution tank in two distribution areas which used to receive pumped water supply directly and in the La Sosa distribution area which used to receive highly pressurised water supply from the Picacho WTP. However, in the La Sosa distribution area where the long-established habit of water theft still persists, the water pressure has become insufficient compared to the pre-project period for those households at a high elevation.[12] The beneficiaries survey which was conducted in two of the three distribution areas mentioned above found that 44% and 22% of the residents believed that the water pressure had improved in the wet season and dry season respectively in the post-project period.

(3) Water Supply by Water Trucks

In newly urbanised areas where a distribution network has not yet been constructed, water is supplied by water trucks operated by private companies and SANAA. Prior to the implementation of the Project, there was only one water filling station, necessitating a lengthy wait for filling because of congestion. As a result, it was practically impossible to efficiently operate water trucks. The construction of two new water filling stations under the Project has resulted in a decline of the supplied water volume at the existing station to one-third of the level in 2003, eliminating the congestion at this station as the waiting time has been drastically shortened.

Meanwhile, the total water supply volume by water trucks has declined from the pre-project level as the demand for water trucks has fallen. According to SANAA, the likely reasons for such a decline of the demand for tankers are expansion of the distribution network in peripheral areas of the city and the opting of some large industrial users for surface water even though the actual demand for water trucks somewhat depends on the extent of drought. The water filling volume at the newly constructed Laureles Water Filling Station is comparatively small. The main reason for this is that local users try to use rainwater instead of

[11] 5 – 6% of the households interviewed said that their own water supply situation worsened after the Project.

[12] In the past, water theft did not affect the water pressure much because of the direct high pressure water supply from the WTP. In the La Sosa distribution area, a distribution pipeline was laid in El Citio. It was originally planned to use this new pipeline along with the existing pipeline to enhance the water supply capacity. Because the use of the existing pipeline was terminated, the work under the Project constituted the de facto renewal of an existing pipeline.

buying water. The fact that the filling time at this station is longer than that at others because of the low pressure of the water supplied from a nearby WTP may be another factor.

Judging from the current filling volume and number of water trucks in operation, the number of fillings per water truck is not much higher than twice a day and it is difficult to imagine that the frequency of filling has increased from the pre-project period. According to the findings of the beneficiaries' survey, one-third of households not connected to the distribution network have found that the frequency of water trucks distributing water has increased.

Based on the above, the level of achievement of the project effect regarding the stabilisation and equalisation of water supply is fair.

Table 4 Annual Water Supply Volume by Water Filling Station ('000 m^3)

Water Filling Station	2003	2011	2012
Filtros (existing)	528	215	174
Toncontin (new)	0	200	148
Laureles (new)	0	68	97
Total	528	483	418

Source: SANAA

Distribution tank in the La Sosa distribution area

Distribution tank in the San Francisco distribution area

Laureles Water Filling Station

Aluminium solidifier injection device at the Picacho WTP

3.2.2 Qualitative Effects

In some distribution areas which used to receive pumped water supply from a WTP other than the Picacho WTP, savings have been made with the electricity charge as the transmission and distribution of water without using a pump has become possible in the wet season due to fresh connection to the Periferica 22 Route.[13]

The construction or improvement of facilities under the Project has produced the following effects at the Picacho WTP.

- The water quality has improved as a fresh filtering agent (sand) is added to the existing filter basin following the construction of an additional filter basin. Because of the increased number of filter basins, the impact of the maintenance work requiring the suspension of operation at the subject filter basin on water production has been reduced.

- Because of the installation of a flow meter to each of the four conducting pipelines connecting the sources of spring water to the Picacho WTP, it has become possible to quickly determine which water source/conducting pipeline is responsible for a decline of the raw water inflow, allowing a swift response. (It was previously necessary to drive along all of the conducting pipelines to determine the cause of a decline.)

- The introduction of a small system to inject aluminium coagulant and neutraliser has made it possible to inject a small amount of these agents, reducing their injection amounts when the water production volume is small. (Only a large system was previously available and a

[13] No data to calculate the actual savings amount was obtained.

large amount of agents was wastefully injected even when the water production volume was small.) Because of the availability of two aluminium coagulant injection systems, injection operation can continue when one system is stopped for maintenance purposes.

3.3 Impacts

3.3.1 Intended Impacts

Only 12% of the surveyed households in the beneficiaries' survey replied that the improved water supply service in the post-project period has led to an increase of water consumption. In contrast, 64% of the households replied that the post-project improvement of the water supply service had led to an improvement of daily life. However, as described in 3.2 Effectiveness, only less than half of the households mentioned any improvement in terms of the water supply hours, frequency and water pressure and the ratio of those households which have actually experienced such positive impacts in improvement of daily life may well be lower than 50%.

Meanwhile, around half of the households expressed some complaints regarding the water supply service of SANAA, especially regarding such matters as the water supply hours, water quality, tariff and slow repair of leakages.

Some 10% of the households have a family member(s) which have suffered from a waterborne illness, including diarrhoea, but a clear picture has not been established by this ex-post evaluation concerning any change between the pre-project and post-project periods and any relationship with the project because of the lack of reliable data.

3.3.2 Other Impacts

An environmental permit was granted by the Ministry of Natural Resources and Environment for the construction work at the Picacho WTP and the construction of distribution tanks. The Project did not involve any resettlement or the acquisition of land. No special environmental or social impacts have been reported during and since the Project.

In summary, this Project has somewhat achieved its objectives. Therefore its effectiveness and impact is fair.

3.4 Efficiency (Rating: ②)

3.4.1 Project Outputs

The planned and actual outputs of the Project are shown in Table 5. All of the planned outputs were achieved except for the shortening of the Periferica 22 Pipeline at the implementation stage. According to SANAA, no special problems were encountered at the implementation stage and the quality of the work under the Project was sufficiently high.

Table 5 Planned and Actual Outputs of the Project

Planned	Actual
< Work by the Japanese Side > ① Rehabilitation and expansion of the Picacho WTP: construction of an additional settling basin and rapid filter basin; installation of flow meters and chemical injection system	< Work by the Japanese Side > ① As planned
② Construction of distribution tanks: RC concrete tanks (four ground tanks and two elevated tanks); steel tanks (three ground tanks)	② As planned
③ Construction of transmission and distribution pipelines • Periferica 22 Pipeline (transmission pipeline: 15. 3 km, ∅150 – 400 mm) • El Citio pipeline (distribution pipeline: approx.. 1.5 km, ∅150 mm • San Francisco Distribution Area (distribution pipeline: 2.9 km, ∅75 – 200 mm)	③ The length of the Periferica 22 Pipeline was shortened to 13.8 km. The other items were completed as planned.
④ Construction of two water filling stations	④ As planned
< Work by the Honduras Side > • Cleaning and levelling of the construction sites • Ensuring or improvement of access to each construction site • Extension of a power transmission line to the relevant sites and installation of a transformer as required • Auxiliary work involving fencing, gates and lighting at the relevant sites	< Work by the Honduras Side > As planned

Source: information provided by JICA

For the Phase II Project, it was discovered that the project cost would exceed the grant limit specified in the E/N for the construction of facilities by some 55 million yen. To avoid a situation of the construction period being substantially lengthened due to an unsuccessful tender, it was decided to remove a terminal section of the Periferica 22 Pipeline from the

scope of the cooperation in view of its relatively low priority. While this change was necessary to avoid a substantial lengthening of the construction period, it resulted in the non-connection of the Villa Nueva Distribution Area to the Periferica 22 Pipeline. This section of pipeline is scheduled to be completed by the end of 2014 at the earliest using the counterpart fund for Japan's non-project grant aid cooperation.

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual project cost of 1,847 million yen was slightly higher (101%) of the planned cost. When considering the shortening of the Periferica 22 Pipeline, the project cost cannot be described as efficient in view of the actual project outputs.[14] The main reason for this increased project cost was the global price hike of steel products. Review of the estimated price at the time of the basic design (October, 2006) as part of the detailed design work for the Phase II Project (April, 2008) revealed that the price of the steel transmission pipes (ductile straight pipes) which accounted for some 40% of the raw material cost increased by an average of 29% during this period while the construction cost of the steel distribution tanks also considerably increased.

Table 6 Planned and Actual Project Costs

Planned: ¥1,827 million	Actual: ¥1,847 million
Japanese portion: ¥1,817 million	Japanese portion: ¥1,797 million Phase I: ¥486 million Phase II: ¥1,312 million
Honduras portion: ¥10 million	Honduras portion: ¥50 million

Source: information provided by JICA and SANAA

3.4.2.2 Project Period

The Project was originally planned to take 38.5 months to complete from the signing of the E/N in June, 2007. In reality, it took 38 months to complete which was within the planned period.

In summary, although the Project period was within the plan, the project cost exceeded the plan. Therefore efficiency of the Project is fair.

[14] If the shortening of the Periferica 22 Pipeline had not been conducted, the total project cost would have increased by some 55 million yen or 105% of the originally planned cost.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspect of Operation and Maintenance

The operation and maintenance of the facilities constructed under the Project has been conducted by the Metropolitan Division of SANAA. The Maintenance Department of this Division has 210 employees while the Operation Department has 300 employees. The operation and maintenance of the Picacho WTP is conducted by 52 regular staff members and 15 members on contract. These figures, however, include staff members responsible for the management of distant water sources. Distribution tanks are operated around the clock on three shifts. In some distribution areas, the valves are manually operated to control the water flow in the distribution network to reduce the uneven distribution of water due to elevation differences. Six staff members are assigned to this operation in the metropolitan area. The Maintenance Department of the Metropolitan management Division has 20 repair teams with 3 – 4 members each to repair the transmission and distribution pipes following a report by a resident. As the present organizational structure and staff strength responsible for the operation and maintenance of the facilities constructed under the Project are clearly defined as well as in place, there appear to be no special problems in this aspect.

At the time of the ex-ante evaluation, it was planned to transfer the water supply service in the metropolitan area to the municipal authority in accordance with a decentralisation law so that the municipal government of Tegucigalpa would become responsible for project implementation and the operation and maintenance of the facilities. However, as of March, 2014, this transfer of authority from SANAA to the municipal government of Tegucigalpa has not materialised.[15] Should such transfer take place in the future, most of the current staff members of SANAA are likely to become municipal employees to continue their work.

In March, 2014 immediately before the change of the administration, the previous administration issued a presidential decree for the introduction of private sector funding to improve the operation of SANAA in line with a policy of promoting public-private partnership. The current new administration is likely to decide how to handle this decree while listening to the opinions of SANAA but there is no clear indication of the future course of events as of March, 2014.

[15] To materialise this transfer of authority, huge funding is required to settle various accounts, including massive retirement payment because the current staff members of SANAA will be dis-employed before their re-employment as municipal workers. Because of this, the political decision involving the central government, SANAA and municipal government has been postponed.

3.5.2 Technical Aspect of Operation and Maintenance

The Project principally involved the improvement and rehabilitation of existing facilities and no change was planned in regard to the existing operation and maintenance method. The field visit by the evaluator found that the operators of SANAA are operating the facilities in accordance with the relevant manuals. There does not appear to be any problematic technical issues in connection with the basic operation and maintenance of the water treatment, transmission and distribution facilities.

Although it has been confirmed that daily operation data is managed by SANAA, some operation data concerning the operation and water volume of the storage tanks are not ready for immediate use.[16] While the distribution office of SANAA determines the water distribution schedule for each distribution area, it does not have information on how much water actually reaches each block of each distribution area. With the assistance of the Government of Spain, the SCADA system has been introduced in some parts of the city (refer to Footnote 4) and the work to prepare a ledger for the distribution pipelines has started. Because of the insufficient data on water distribution, it is currently difficult to plan the most suitable distribution of water in a systematic manner.[17]

3.5.3 Financial Aspect of Operation and Maintenance

According to the financial statements for 2011, both the liquidity ratio and the capital ratio were sufficiently high at 217% and 95% respectively, suggesting a healthy state of the financial strength. Since 2006, however, the overall balance continued to be in deficit until 2011 except for 2010. Apart from a high ratio of non-revenue water, the continuing low tariff due to political interference and low collection rate of the water charge from public sector users were the main factors for such deficit.[18]

To improve the grim financial situation, SANAA prepared a financial reconstruction plan in 2012 and has since been earnestly engaged in wide-ranging measures, including the stricter collection of unpaid charges in both the public and private sectors and other measures

[16] Records of water distribution from a water tank are prepared and stored by the operators. As they are not kept in a tidy manner for analysis, however, it is difficult to use these records. In some distribution areas, valves attached to the distribution pipelines are operated to divert water to specific blocks for certain hours at a time of drought, etc. but there are no records of such operation.

[17] The SCADA system has enabled the gathering of flow data as well as the remote control of valves, making the first step in the establishment of distribution blocks. However, there is no concrete plan to start establishing the said blocks. In reality, it is often difficult to obtain accurate information because some of the pipelines were laid decades ago. As a result, the work to prepare a ledger of the distribution pipelines has made little headway.

[18] In 2012, the water charge collection rate in the private sector was 89% compared to 30% in the public sector.

designed to increase revenue, staff cuts and savings on fuel, vehicle repair, equipment, travelling and other costs.[19]

Amidst the drive to cut the costs, funding priority has been given to the necessary budget for the operation and maintenance of the water treatment, transmission and distribution facilities to maintain the water supply service and the budget level in this aspect appears to be adequate. Interviews with staff members responsible for the operation of the newly constructed facilities under the Project found that the operation and maintenance has never been hindered by insufficient budgetary allocation. The amount of the additional operation and maintenance cost incurred as a result of the construction of new facilities under the Project was too small to constitute a fresh financial burden for SANAA.[20]

Based on the above, although there are no pressing financial issues because of the secured budget for the operation and maintenance of the facilities constructed under the Project, there is a pressing need to improve the financial balance of SANAA to ensure the long-term sustainability of the water supply service.

3.5.4 Current Status of Operation and Maintenance

In general, the functions of the facilities newly constructed under the Project have been adequately maintained and the situation of their operation and maintenance is good. The field visit confirmed that most of the facilities are properly operated and maintained as no functional problems were found with these facilities except for the following.

- One of the four water meters to measure raw water at the Picacho WTP has broken down and has not been repaired.

- The water meter to measure treated water is not in use because the existence of many bubbles in the pipeline makes accurate measurement impossible.

[19] According to a senior staff member of SANAA, the original plan was to cut more than 450 staff members in 18 months. The execution of this plan appears to have been found to be difficult as the laying off of such a large number of staff would require a huge severance pay-out. Because of the replacement of the president of SANAA in March, 2014 under the new government, more detailed information on the state of the financial reconstruction plan was not obtained. A revised financial reconstruction plan for 2014 onwards is to be prepared under the leadership of the new president.

[20] The additional operation and maintenance cost resulting from the implementation of the Project is believed to be the cost of chemicals at the Picacho WTP and the personnel cost at the new water filling stations. The actual amount is likely to be approximately 860,000 HNL which is less than 0.2% of the operation and maintenance cost of the water supply system of SANAA (approximately 500 million HNL in 2011).

- Many of the water filling valves at the water filling stations have a broken handle and must be opened and closed using a spanner.

In summary, while it can be pointed out that there exists an unclear prospect of the transfer of the water supply and sewerage service to the municipality and the injection of private sector money and that optimum water distribution in a systematic manner is difficult to achieve because of the lack of data on the actual state of water distribution, no major problems have been observed in the institutional, technical and financial aspects of the operation and maintenance system. Therefore sustainability of the Project effect is high.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Project was implemented to improve the water supply situation in the eastern, south-eastern and peripheral areas of Tegucigalpa, the capital of Honduras, by means of rehabilitating and expanding a water treatment plant, renewing or newly constructing transmission and distribution pipelines, constructing distribution tanks and constructing water filling stations. The water supply sector has presented an important policy challenge since the time of the ex-ante evaluation and further improvement of the water supply service in the city is still a pressing need against the background of a continual population increase. As the Project is also relevant to Japan's ODA policy, the overall relevance of the Project is judged to be high. At the Picacho WTP of which the water treatment capacity was enhanced by the Project, the actual water production volume has not increased much because of the lack of a sufficient raw water supply. The achievement of an appropriate water pressure through renewal of the transmission and distribution pipelines and construction of distribution tanks has led to an increase of the water supply hours and improvement of the water pressure in parts of the project area. While the construction of new water filling stations had made water filling to water trucks more efficient, the total water supply volume by water trucks has not increased because of the expansion of the distribution network in peripheral areas of the city and other reasons. In general, the impacts of the improved water supply service are localised and limited and the Project has not had any significant impact on improving daily life. As a result, the effectiveness and impact of the Project is judged to be fair. The final project cost slightly exceeded the planned cost and the project period was within the planned period. However, because of the slight scaling down of the Project to avoid over-spending in terms of the construction cost, the efficiency of the Project is judged to be fair. While it can be pointed out that the optimum water distribution in a systematic manner is difficult to achieve because of (i) the unclear prospect of the transfer of the water supply and sewerage service to the

municipality and injection of private sector money and (ii) the lack of data on the actual state of water distribution, the operation and maintenance of the facilities constructed under the Project do not have any major institutional, technical or financial problems. Therefore, the sustainability of the Project effects is judged to be high.

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

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

SANAA is required to make the following efforts to fully utilise the facilities constructed under the Project.

- Reconfirmation of the need for water diversion from the conduction pipeline to the Picacho WTP is necessary so that the amount of water to be diverted can be adjusted. At the same time, the construction of new conducting pipelines should be considered based on the evaluation results of the production capacity of water sources with a view to increasing the supply amount of raw water to the Picacho WTP to fully utilise the additional production capacity created by the Project.
- Efforts should be made to develop operational data on distribution facilities in Tegucigalpa, to further introduce the SCADA system and to establish distribution blocks so that the distribution facilities can be operated in the most efficient manner.
- Efforts to develop new water sources should gain momentum.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

- Securing of a sufficient amount of raw water

  For investment in water treatment, transmission and distribution facilities to produce any benefit, a sufficient supply of raw water is essential. Because of this, when investment in such facilities is planned, it is important to verify the availability of a sufficient amount of raw water. In addition to checking the likely raw water production volume from the planned water source, due consideration should be given to the feasibility of other water treatment, transmission and distribution facilities using the same water source. When an

insufficient supply of raw water is experienced during or after the project implementation period, it is important to swiftly increase the raw water supply capacity or the appropriate and non-wasteful use of the raw water to effectively use the newly constructed water treatment, transmission and distribution facilities.

Republic of El Salvador and Republic of Honduras

Ex-Post Evaluation of Japanese Grant Aid Project

Project for Construction of the Japan-Central America Friendship Bridge

External Evaluator: Takeshi Yoshida
Global Group 21 Japan, Inc.

0. Summary

The Project was implemented with a view to making border crossing traffic between El Salvador and Honduras smoother by means of replacing the existing Goascorán Bridge with the new Japan-Central America Friendship Bridge. This border crossing point forms part of the Mesoamerican international road network connecting Central American countries with Mexico and is given strategic importance by the two countries. As the project meets the strong need for safe and smooth border crossing traffic as well as Japan's ODA policy, its relevance is high. The newly constructed Friendship Bridge (hereinafter referred to as "the New Bridge") is currently used for cargo traffic while the old Goascorán Bridge (hereinafter referred to as "the Old Bridge") is used for passenger traffic. While the overall bridge safety has been much improved, the danger associated with the Old Bridge which is still used by large buses has not been totally eliminated. Although the border crossing time appears to have been shortened, there is still room for improvement, particularly for cargo traffic as the congestion of cargo vehicles due to the border crossing procedure often reaches the bridge itself. The cross-border traffic volume has increased but has not reached the level planned under the Project. The number of people from Honduras visiting El Salvador has increased. However, significant impact of the New Bridge on physical distribution has not been confirmed. Based on the above, the Project has somewhat achieved its objectives and, therefore, its effectiveness and impact is fair. The New Bridge and its access roads were completed as planned and the actual project cost and project period were both within the plan. However, permanent border facilities have not yet been constructed by either El Salvador or Honduras at the time of the ex-post evaluation. Therefore, the efficiency of the Project is fair. Although no special problems are observed in regard to the operation and maintenance of the New Bridge, the Old Bridge lacks proper maintenance. The Road Fund of Honduras is facing significant limitations in terms of general bridge and road maintenance because of the tight financial situation. Accordingly, the sustainability of the Project is fair. In the light of the above, the Project is evaluated as partially satisfactory.

1．Project Description

Location Map

Japan-Central America Friendship Bridge

1.1 Background

Both the Republic of El Salvador (hereinafter referred to as “El Salvador”) and the Republic of Honduras (hereinafter referred to as “Honduras”) are located almost at the center of Central America and share a common border.

In the 2000’s, both countries called for strengthening of their international competitiveness, national as well as regional development and poverty reduction as objectives of their respective national development plans, and put a special emphasis on the development of transport infrastructure to achieve these objectives. The Puebla Panama Plan which came into force in 2001, was particularly given the status of a higher policy[1] and the International Network of Mesoamerican Highways as part of this plan established six fundamental road networks for the region, including (i) the east-west Pacific corridor linking roads in Mexico and Central America and (ii) the north-south interoceanic logistics corridor (dry canal route) linking La Union Port in El Salvador to Cortes Port in Honduras for the construction of which the use of the yen loan facility was planned.

Goascorán Bridge over Goascorán River in the El Amatillo border area between El Salvador and Honduras, since its construction by the US in 1943 during the period of the Second World War as part of the Pan-American Highway, has been playing an important role in the development of trade, travel of tourists and human as well as physical exchanges in Central America in general and between the two countries in particular. The

[1] The Puebla Panama Plan is a wide area development plan incorporating nine states in Mexico and seven Central American countries and was jointly announced by the governments of these countries in June, 2001. The main targets include the development of infrastructure, such as electricity, road and communication networks in this huge bridge area as well as the promotion of trade and commerce and the development of education, public health, the environment and disaster prevention.

bridge commands strategic importance for international road traffic as it is at the junction of the two above-mentioned corridors. However, it had become a bottleneck for international road traffic because of its narrow width and considerable damage to the concrete slabs and beams due to its 60 years of age. Its lack of sufficient load bearing capacity to support heavy trailer trucks made the bridge dangerous.

Under these circumstances, the Governments of El Salvador and Honduras made a request to the Government of Japan for grant aid to construct a new bridge to replace the existing Goascorán Bridge. In response, JICA conducted the Preliminary Study in 2005 and the Basic Design Study in November, 2006. Based on these studies, the project was implemented from June, 2007 to July, 2009.

1.2 Project Outline

The Project aimed at replacing Goascorán Bridge at the border between El Salvador and Honduras with the Japan-Central America Friendship Bridge with a sufficient width and withstand load with a view to smoothing the road traffic between the two countries.

Grant Limit / Actual Grant Amount	Grant Limit: 1,300 million yen Actual Grant Amount: 1,297 million yen
Exchange of Notes Date	El Salvador: June,2007, Honduras: May, 2007
Executing Agency	El Salvador: Ministry of Public Works, Transport, Housing and Urban Development (MOPTVDU) Honduras: Ministry of Infrastructure and Public Services (INSEP)[2]
Project Completion Date	July, 2009
Main Contractor	Hazama Corporation
Main Consultant	Consortium of Central Consultants Inc. and Nippon Koei Co., Ltd.
Basic Design Study	February to November, 2006
Related Projects (if any)	The Study for Port Reactivation in La Union Province of the Republic of El Salvador (Japanese ODA Loan)

2. Outline of the Evaluation Study

2.1 External Evaluator

Takeshi Yoshida (Global Group 21 Japan)

[2] At the time of project implementation, the executing agency in Honduras was the Ministry of Public Works, Transportation and Housing (SOPTRAVI). This ministry has been reorganized as the Ministry of Infrastructure and Public Services (INSEP) following a change of the administration in 2014.

2.2 Duration of the Evaluation Study

The ex-post evaluation study for the Project was conducted over the following periods.

Duration of the Study:	September, 2013 to October, 2014
Duration of the Field Survey:	11th November to 7th December, 2013, and 16th to 29th March, 2014

3. Results of the Evaluation（Overall Rating：C[3]）

3.1 Relevance（Rating：③[4]）

3.1.1 Relevance to the Development Plan of El Salvador and Honduras

As already mentioned in 1.1 Background, the construction of a Mesoamerican international road network connecting Central American countries with Mexico was a priority policy in both El Salvador and Honduras at the time of the ex-ante evaluation.

In Honduras, the Strategic Transportation Plan was formulated in 2004 in which the Pacific Corridor, including the Project, was considered to be one of the future trunk corridors in Central America along with the Atlantic Corridor and Interoceanic Corridor because of a foreseen large demand for these corridors. In El Salvador, the National Development Plan was formulated in 2002. The planned development of the eastern area prioritized (i) the development of La Union Port as a key industrial and logistics base and (ii) the development of trunk roads in the area. As these policies are still maintained at the time of the ex-post evaluation, the Project is relevant to the development policies of the two countries.

[3] A: Highly satisfactory, B: Satisfactory; C: Partially satisfactory; D: Unsatisfactory

[4] ③: High, ②: Fair; ①: Low

Fig. 1 Location of the project site in the Mesoamerican international road network (based on reference materials provided by JICA)

3.1.2 Relevance to the Development Needs of El Salvador and Honduras

As already mentioned in 1.1 Background, there was a strong need at the time of the ex-ante evaluation for replacement of the Old Bridge which was highly deteriorated despite its critical position on an international trunk route in order to achieve safe and smooth border crossing traffic. The importance of this bridge and the necessary for safe and smooth border crossing traffic are unchanged at the time of the ex-post evaluation, making the Project relevant to the development needs of the two countries.

Since the completion of the New Bridge, the Old Bridge has been exclusively used for vehicles other than cargo vehicles (buses, passenger vehicles and light vehicles) as well as pedestrians. With the use of both the New Bridge and the Old Bridge, the congestion at this border crossing point has been greatly reduced. Even though the risks associated with the Old Bridge have been reduced due to the diversion of heavy vehicles to the New Bridge, sufficient attention must be paid to the maintenance of the Old Bridge for its safe use.[5]

[5] For the current state of use of the New and Old Bridges, refer to 3.2 Effectiveness. For the state of their maintenance, refer to 3.5 Sustainability in this report.

The scope of the Project included the construction of such border crossing facilities as immigration, customs and quarantine facilities with funding by El Salvador and Honduras. The delay of this construction work has meant the delayed opening of the New Bridge and the current border crossing procedure using temporary facilities has room for improvement (refer to 3.2 Effectiveness).

3.1.3 Relevance to Japan's ODA Policy

The Consultation Meeting on Economic Policies with El Salvador held in July, 2007 confirmed such priority policy objectives as (i) vitalization of the economy and expansion of job opportunities, (ii) social development, (iii) environmental conservation for sustainable development and (iv) establishment and strengthening of democracy. The integration of Central America was called for as a priority theme.

In regard to Honduras, a consultation meeting arranged by Japan's ODA Task Force for Honduras established such priority objectives as (i) consolidation of basic education, (ii) improvement of health care and clean water supply, (iii) development of rural areas, (iv) strengthening of the international competitiveness, (v) safety of citizens and (vi) disaster prevention. The establishment of basic infrastructure for socioeconomic growth was included as a basic policy for Japan's ODA for Honduras and assistance for the Pueblo Panama Plan, including the improvement of roads for Central American integration, was clearly indicated.

This Project has been highly relevant to the development plan and development needs of both El Salvador and Honduras as well as Japan's ODA policy and, therefore, its relevance is high.

3.2 Effectiveness[6] (Rating : ②)

Although the New Bridge was completed in July, 2009 under the Project, a coup d'etat occurred in Honduras at almost the same time, closing the border.[7] Because of this border closure and the incompletion of the border crossing facilities, opening of the New Bridge was delayed until September, 2010.

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6 For rating of the effectiveness, the impacts are taken into consideration.

7 In June, 2009, there was a severe conflict between then President Zelaya who was trying to rewrite the Constitution to be re-elected and the Congress and Supreme Court which opposed him. On the orders of the Supreme Court, the Honduran Army ousted the president and sent him out of the country. In response to this, Micheletti was appointed as a president. However, most Central and South American countries subsequently did not approve it, isolating Honduras in the international community.

The objective of the Project was to achieve safe and smooth border crossing traffic at El Amatillo. In this section, effectiveness of the Project is analyzed from the viewpoint of the (i) border crossing time, (ii) cross border traffic volume and (iii) safety of the bridge. At the time of the ex-ante evaluation, the assumption was that only the New Bridge would be used after its completion. However, as the concurrent use of the Old Bridge assists the achievement of the positive effects of the Project, the project effects of the combined use of the two bridges are evaluated.

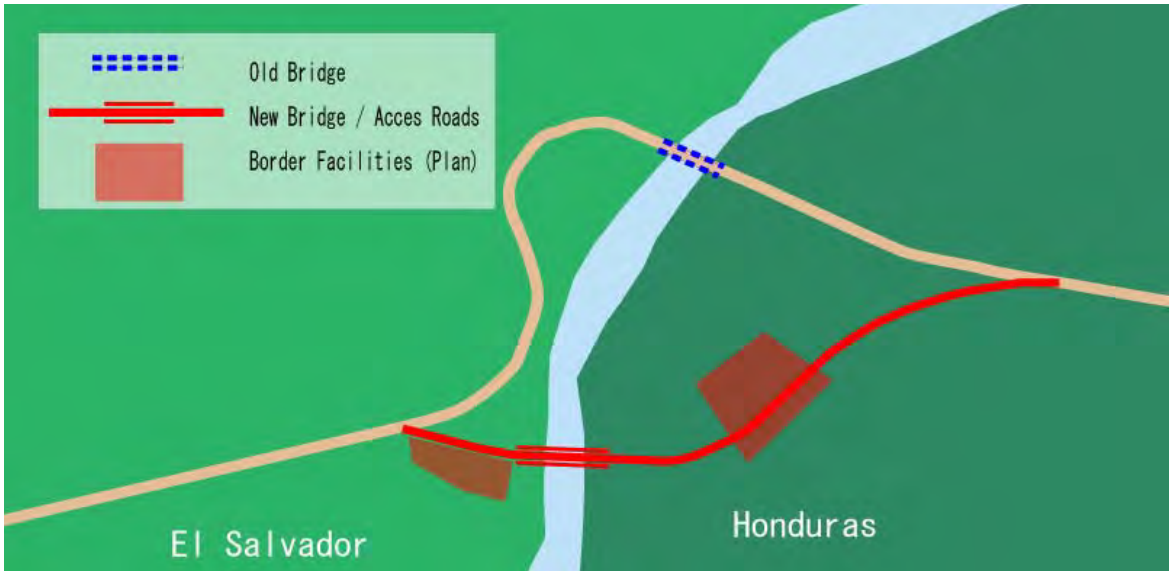


Fig. 2 Layout of the New Bridge, Old Bridge and border crossing facilities at El Amatillo

3.2.1 Quantitative Effects (Operation and Effect Indicators)

3.2.1.1 Border Crossing Time

Prior to the Project, the average actual vehicle velocity on the Old Bridge was estimated to be around 20 km/hour. Even though the planned average velocity on the New Bridge is 50 km/hour, drug control activities on the El Salvador side can made border crossing take a long time. As the traffic congestion can stretch beyond the bridges, the travelling speed towards El Salvador at this border crossing point can be very slow. However, most of the border crossing time is due to the border crossing procedure involving immigration, customs and quarantine rather than the actual travelling time on the bridge.

As part of the ex-post evaluation, the border crossing time was surveyed with some 5% (25 vehicles heading towards El Salvador and 27 vehicles heading towards Honduras) of cargo vehicles crossing this border.[8] The average time was found to be 2.9 hours for

[8] This survey checked the time required to pass between the check point near the customs on the El

vehicles heading towards El Salvador (west-bound) and 5.2 hours for vehicles heading towards Honduras (east-bound).Interviews with cargo vehicle drivers on changes of the border crossing time before and after the Project found that some 80% of drivers believe that the border crossing time has been shortened by the Project. Based on their replies, the actual border crossing time is inferred to have been reduced by half. Drivers reported that the construction of the New Bridge has resulted in such benefits as fuel saving, shortening of the travelling time and improved safety. Meanwhile, many drivers pointed out that the too-lengthy drug control procedure on entering El Salvador should be shortened. Some drivers also want the customs and quarantine clearance processes to be improved and shortened. Meanwhile, freight company owners in the two countries recognize the massive shortening of the border crossing time at El Amatillo as shown in Table 1.

Table 1 Changes of Border Crossing Time
(Average Time of Replies by Freight Companies)

(Unit: minutes)

	Immigration	Customs	Quarantine	Border Police (Including Drug Control)
Before Project	135	200	100	155
After Project	20	25	15	25

Source: Interview results with freight company owners (7 companies in El Salvador and 6 companies in Honduras)

A vehicle and driver survey was also conducted with passenger cars and buses using the Old Bridge. Many users replied that the cross border time on the Old Bridge had been significantly shortened compared to the past when they often had to wait a long time for cargo vehicles to pass through the customs and quarantine points. According to drivers the border crossing time for passenger vehicles was halved by the opening of the New Bridge.

This shortening of the border crossing time can be mainly attributed to the separation of traffic, i.e. passenger traffic using the Old Bridge and cargo traffic using the New Bridge, reducing both the physical as well as procedural congestion. At the time of the ex-post evaluation, border-cross is not particularly efficient as the border facilities serving the New Bridge is temporary and the small facilities on the Honduras side cannot fully

Salvador side and the customs and quarantine check point on the Honduras side. Because of the limited time, the survey was conducted for only one day and the passing time of vehicles which had not crossed the border by 21:00 was not measured. Because of this, the actual border crossing time on average is likely to be longer than that reported here. As drug control activities by El Salvador can take place without advance notice, the actual time can significantly fluctuate from one day to another.

accommodate the necessary border control officers, and part of the border crossing procedure still takes place at the existing facilities which primarily serve the Old Bridge. At present, both countries have been preparing for the construction of permanent border facilities as well as the standardization and improved efficiency of the border crossing procedure with the assistance of the Inter-American Development Bank.[9] Once these plans are realized, further shortening of the border crossing time is likely to become a reality.

Large truck awaiting drug inspection on the New Bridge

Check point at the access road to the New Bridge on the El Salvador side

Immigration and customs facilities for passenger cars and buses on the El Salvador side (attached to the Old Bridge)

Immigration and customs facilities for passenger cars and buses on the Honduras side (attached to the Old Bridge)

9 With the assistance of the Inter-American Development Bank, the construction of permanent border facilities in Honduras and the design work for permanent border facilities in El Salvador are due to start in 2014. This assistance includes technical assistance and the construction of facilities to standardize and improve the efficiency of the border crossing procedure and the information and communication system in both countries. On the El Salvador side, X-ray scanners are installed at the customs and border facilities serving the Old Bridge for the purpose of drug control.

3.2.1.2 Cross Border Traffic Volume

When the actual cross border traffic volume at El Amatillo is compared between 2006 (at the time of the basic design) and 2013, there is an overall increase of 17% mainly due to the increase of passenger cars and trailers (Table 2). The number of passenger cars increased by 72%. In contrast, the number of cargo vehicles was almost steady even though there was a trend of an increasing size of the vehicles.

Table 2 Changes in Cross-Bridge Traffic Volume (Cross border Traffic Volume)

(Unit: Vehicles/day)

	2006	2013	Rate of Increase (2006～2013)	Annual Average Rate of Increase
Passenger Vehicles				
Car	213	374	76%	8.4%
Bus	24	34	42%	5.1%
Sub-Total	237	408	72%	8.1%
Cargo Vehicles				
Small Truck	209	151	-28%	-4.6%
Large Truck	158	26	-84%	-23.0%
Trailer	541	757	40%	4.9%
Sub-Total	908	934	3%	0.4%
Total	1,145	1,342	17%	2.3%

Source: The Basic Design Study for 2006 figures (28th February, 2006).
The Ex-Post Evaluation Study (Traffic Volume Survey) for 2013 figures (27th November, 2013).

Note: All the vehicles used the old bridge in 2006. In 2013, the passenger vehicles used the old bridge and all cargo vehicles used the new bridge.

The basic design study forecasted an increase of the traffic volume at the El Amatillo border crossing point at an annual rate of 4% until 2009 when La Union Port would begin to be operated and an increase of 40% in 2003 from the level in 2006 because of an additional 178 vehicles/day travelling to and from Port La Union (an annual increase rate of 9% for the first six years and 4% thereafter). In reality, the annual increase rate was a modest 2.3% between 2006 and 2013, failing to live up to the planned figure. The traffic volume checked by the MOPTVDU in 2010 on the trunk road at El Amatillo village on the El Salvador side was below the forecast volume at the time of the basic design study (Table 3).[10]

As indicated by these figures, the cross border traffic volume has not increased as much as forecasted at the time of the ex-ante evaluation. The main reasons are probably (i) the

[10] As some vehicles return before reaching the border crossing point, the traffic volume on the trunk road is higher than the cross border traffic volume.

decline of cross border exchanges between El Salvador and Honduras due to the coup d'etat in Honduras in 2009 and (ii) the non-realization of the forecast level of cargo traffic at the time of the basic design study as La Union Port has not yet become fully functional.

Table 3 Comparison between Forecast and Real Traffic Volumes on the Trunk Road on the El Salvadorian Side

(Unit: Vehicles/day)

	2010 Forecast	2010 Actual
Passenger Vehicles		
Car	2,191	1,982
Bus	328	230
Sub-Total	2,519	2,212
Cargo Vehicles		
Small Truck	328	134
Large Truck	182	61
Trailer	621	594
Sub-Total	1,131	789
Total	3,651	3,001

Source: The forecast figures are those of MOPTVDU used for the Basic Design Study. The actual figures are those actually counted by MOTVDU.

3.2.2 Qualitative Effects

3.2.2.1 Safety of the Bridge

While the withstand load of the Old Bridge is 24.5 tons, a few hundred of large trucks weighing 25 tons and trailers weighing 37 tons have been using the bridge per day, resulting in a dangerous situation at the time of the ex-ante evaluation. In contrast, the withstand load of the design New Bridge is 40.8 tons, providing sufficient safety for cross border traffic involving many heavy vehicles.

At the customs on the El Salvador side of the New Bridge, a truck scale is installed in the cargo inspection area to weigh trucks when judged necessary. As no similar facility exists on the Honduras side, it is difficult to enforce effective weight control.[11]

Some 20 buses weighing approximately 17 tons each still use the Old Bridge every day. Even though this weight is within the original design withstand load of 24.5 tons, the

[11] At the time of the ex-post evaluation, El Salvador is in possession of several mobile scales to conduct spot weight inspection on trunk roads to enforce weight control and those found to violate the weight regulations are fined. There is no vehicle weight inspection station in Honduras on trunk roads although their introduction in the coming years is planned.

safety of the Old Bridge is a concern unless its maintenance is properly conducted (refer to 3.5 Sustainability).

3.3 Impacts

3.3.1 Intended Impacts

At the time of the ex-ante evaluation, the Project was expected to contribute to (i) the improved safety of pedestrians crossing the bridge and (ii) the facilitation of physical distribution, exchanges and friendship between the two countries as well as Central American countries.

(1) Impact on Traffic Accident Prevention and Pedestrian Safety

The workshops[12] held with local residents during the field survey found that many local residents now have an increased sense of safety as the tangled traffic involving pedestrians and large trucks on the Old Bridge no longer existed. On the other hand, some opinions expressed were that the check point area along the New Bridge on the El Salvador side where many large trucks were jammed together on the access road was dangerous as primary school pupils had to cross the road between these trucks to reach their school. In response, the MOPTVDU and FONDO VIAL expressed their intention to introduce traffic safety measures, including a pedestrian crossing, at the workshop. The number of people killed on the national road has decreased while the number of traffic accidents and people injured have actually increased. In short, there has not been much overall difference.

Table 4 Number of Traffic Accidents on El Amatillo Road

	2006 to 2008	2010 to 2012
Number of Accidents	5	7
Number of Fatalities	4	1
Number of Injuries	4	11

Source: MOPTVDU

(2) Impact on Physical Distribution

The trading volume across the El Amatillo border is shown in Table 5. Although the overall volume declined in 2010 after the coup d'etat, the figure for 2012 was an 8% increase on 2006.

[12] The workshops during the field survey took place at Goascorán (27 participants) and Nacaome (11 participants) and at Pasaquina (57 participants) and El Amatillo (36 participants) in El Salvador.

The impact of the Project on physical distribution appears to be modest as the cross border traffic volume has not reached the predicted level at the time of the ex-ante evaluation. As La Union Port is not yet fully functional, its impact on physical distribution at this border crossing point has not yet materialized.

Table 5 Trading Volume on El Amatillo Border Crossing Point

(Unit: '000 tons/year)

	2006	2008	2010	2012
Honduras → El Salvador	417	373	318	389
El Salvador → Honduras	388	445	332	480
Total	805	818	650	869

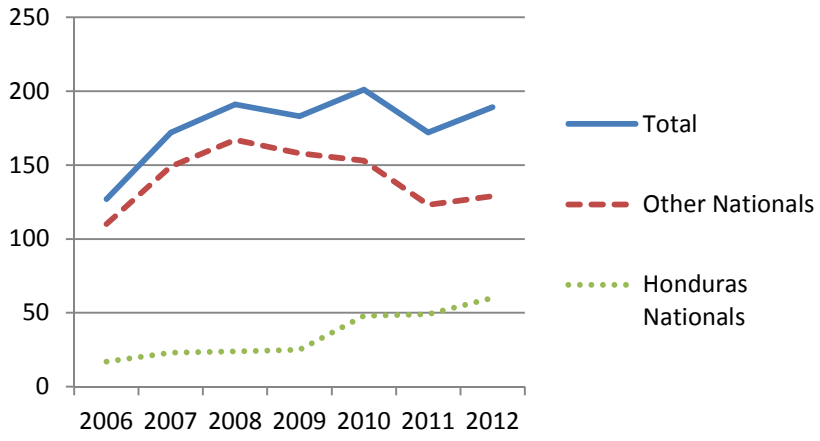
Source: SOPTRAVI

(3) Impact on Exchanges between El Salvador and Honduras

The number of people crossing the border since 2010 when the New Bridge was opened has slightly increased among Honduras nationals (Fig. 3).[13] The number of other nationalities crossing the border has actually decreased in the same period. As a result, the opening of the New Bridge has not had any significant impact on exchanges between the two countries. The workshops held in villages on both sides of the border found that cross border exchanges for shopping and the use of medical facilities increased due to the smoother cross border procedure. Particularly noticeable is the use of the better medical facilities in El Salvador by Honduras nationals.

Fig. 3 Changes of Number of People Crossing the El Amatillo Border

(Unit: '000 persons)



Source: Honduran Institute of Tourism

[13] Specific data for El Salvador nationals was not obtained.

La Union Port in El Salvador

Small shops near the border (El Salvador side)

3.3.2 Other Impacts

(1) Impacts on the Natural Environment

Impacts on the natural environment by construction of the bridge, access road and river protection were assessed through the preliminary study and the basic design study and measures to mitigate such impacts were examined. Such measures were taken at the time of construction and operation. No large negative impacts on natural environment were reported. Pre-identified possible impacts of the Project included; sediment collapse of access road, changes in direction and speed of winds, change of water route due to bridge pears, change of landscape. As a mitigation measures such changes in basic design were made as; reduction of embankment height, reduction of center span and bridge type. As a result, no significant negative impacts on natural environment have been confirmed.

While, at the workshop with residents of Pasaquina, the introduction of bridge footings under the Project slightly changed to a water route[14], occasionally causing flooding at the part of the road section descending to the river on the right bank side. However, such partial flooding occurs two or three times a year and there has not been any damage warranting repair work so far.

Workshop at Goascorán

(2) Land Acquisition and Resettlement

As a result of land acquisition and resettlement for the construction of the New Bridge and its access roads, nine landowners

[14] A water route means a river channel where river water flows during ordinary times.

in El Salvador and 16 landowners in Honduras were compensated in accordance with the relevant domestic laws in each country. No significant problems were encountered in this process and the construction work was not affected.

In the case of land acquisition by the Honduras authorities for the construction of border facilities after the operation of the New Bridge, a long time was required to complete the work as the lack of cooperation by the local mayor led to resistance by some landowners in order to achieve a better deal for their land.

(3) Unintended Positive/Negative Impact

There are many small shops and restaurants on both sides of the Old Bridge which serve tourists, drivers and others. At the workshops with local residents, it was reported that because of the smoother traffic since the opening of the New Bridge, drivers and passengers simply pass through the border area without stopping. Moreover, cargo vehicle drivers crossing the New Bridge do not often patronize those shops, etc. around the Old Bridge, resulting in the business decline of local shops, etc. At present, shops and restaurants are prohibited from operating within 250 m of the access road on both sides of the New Bridge. Local residents hope that this restriction will be lifted to allow shops, etc. near the New Bridge so that the shopping and dining of drivers and passengers crossing the New Bridge will economically benefit the local area. At the workshops, it was reported that land prices near the bridges almost trebled after the opening of the New Bridge. However, as most of the owners of small shops are not landowners, they have not benefitted from this.

The analysis results of the effectiveness and impacts of the Project indicate that even though the traffic safety for vehicles crossing the bridges has generally improved, the use of the Old Bridge by buses with the maximum total weight of 16.8 tons means that the danger associated with the Old Bridge has not been totally eliminated due to the lack of sufficient load bearing guarantee, in turn caused by insufficient maintenance, even though the weight of the passing buses is below the design withstand load of 24.5 tons for the Old Bridge. The parallel use of the New and Old Bridges appears to have reduced the border crossing time for both passenger vehicles and cargo vehicles. However, the congestion of cargo vehicles crossing the New Bridge due to the border crossing procedure sometimes reaches the bridge itself. There is, therefore, room for improvement as far as the border crossing time is concerned. While the cross border traffic volume has increased since the opening of the New Bridge, it has not reached the planned figure. While the number of Honduran people visiting El Salvador has increased, no major impact on physical distribution has been confirmed.

Based on the above, the Project has somewhat achieved its objectives. Therefore, its effectiveness and impact is fair.

3.4 Efficiency（Rating：②）

3.4.1 Project Outputs

The planned and actual outputs of the Project are shown in Table 6. The construction of the bridge, access roads and river protection by the Japanese side was completed almost as planned. While the construction of the border facilities by the two countries by the time of the completion of the Japanese work in July, 2009 was planned, only temporary facilities had been completed one year after the completion of the New Bridge. Even though the New Bridge has been in operation since the completion of these temporary facilities, no permanent facilities have been constructed so far.[15]

Table 6　Planned and Actual Outputs of the Project

Planned	Actual
< Work by the Japanese Side > ① Bridge: Total length: 170 m Total width: 13.3 m (Two lanes and sidewalks) ② Access road: Width: 14.1 m (Two lanes) - El Salvador side: 395 m long - Honduras side: 1,156 m long ③ River protection: Gabions - El Salvador side: 290 m - Honduras side: 1,214 m ＜Work by Two Recipient Countries＞ - Construction of new border facilities - Incidental works (temporary yard; electricity supply; telephone; water supply)	< Work by the Japanese Side > ① As planned ② As planned ③ Almost as planned Honduras side: 1,213 ㎡ ＜Work by Two Recipient Countries＞ - The new border facilities are temporary facilities. - The incidental works were completed as planned.

Source: JICA materials and results of interviews with the implementing agencies in the two recipient countries.

[15] At the time of the field visit, the border facilities on the Honduras side consist of nine containers housing offices, etc. On the El Salvador side, a new temporary check point has been established and the border crossing procedure takes place at the existing facilities.

At the consultation meeting between JICA and the two countries during the preliminary study in 2005, these two countries were required to prepare their own border facility construction plans by the time of the basic design study with the necessary domestic arrangements for these facilities and for the contents of the plans to be check during the basic design study.[16] In reality, however, the work to prepare the said plan by each country was not completed by the time of the basic design study. Consequently, the basic design study was conducted without reference to these plans.

Subsequently, a plan emerged in the process of examining a suitable border facility plan for the construction of integrated border facilities for the two countries in one place on the Honduras side. While this was agreed once by the both countries, they are currently proceeding with the construction of their own border facilities.[17]

3.4.2 Project Inputs

3.4.2.1 Project Cost

The planned Japanese portion of the project cost was 1,300 million yen and the actual cost of 1,297 million yen was almost identical to the planned cost. No comparison of the project cost for the two countries is conducted in this report because of uncertainty concerning the planned cost of the border facilities (at the time of the ex-ante evaluation) and the current lack of any permanent facilities.

3.4.2.2 Project Period

The Project was originally planned to take 26.5 months to complete from the tender in July, 2007. In reality, 25 months were required to complete the Project which was within the planned period as it was completed in July, 2009.

The original plan for the border facilities to be constructed by the two countries was for their construction to be completed by the time of the completion of the New Bridge and its access roads. In reality, temporary facilities were constructed approximately one year

16 As described in the reference materials provided by JICA.

17 Interviews with the executing agency (INSEP) and customs office in Honduras found that in 2008, it was found that the facility plan proposed by the customs office would be difficult to integrate into the already completed detailed design for the access road. In the process of seeking an alternative, the idea of constructed integrated border facilities on the Honduras side to allow the completion of the border crossing procedure of the two countries emerged. The executing agency in El Salvador (MOPTVDU) accepted this plan and the executing agencies in the two countries reached an agreement in June, 2009. The subsequent coup d'etat in Honduras led to the temporary closure of the border and the deterioration of diplomatic relations between the two countries meant that no further discussions were possible for a year. At the time of ex-post evaluation, each country plans to construct their own boarder facilities. There is now a prospect that in Honduras the construction of new border facilities will commence in 2014, and in El Salvador, it has been decided that new border facilities will be constructed with the assistance of the USAID and the design process will start by the end of 2014.

after the completion of the New Bridge and its access roads and the construction of permanent facilities has been delayed until 2014 or thereafter.

In short, while the Japanese work was completed as planned, the construction of the border facilities by El Salvador and Honduras has been delayed to the extent that only temporary facilities are in place today. Although both the project cost and project period were within the plan, the project period for the facilities to be constructed by the two recipient countries has exceeded the planned period and, therefore, the efficiency of the Project is fair.

3.5 Sustainability（Rating：②）

As the effects of the Project are materializing through the concurrent use of the New Bridge and Old Bridge and the parallel use of the New and Old Bridges is expected to continue in the future, evaluation of the project sustainability features both bridges.

3.5.1 Institutional Aspect of Operation and Maintenance

The Road Fund was established in El Salvador in 2001 and in Honduras in 2000 and the operation and maintenance of the trunk road network is entrusted to private companies in each country.[18]

In El Salvador, the national trunk road network is divided into 17 areas and the FOVIAL contracts out the routine maintenance of bridges and roads to private companies. The quality of this maintenance is checked by separately contracted private sector engineers who inspect road and bridge structures to determine any need for further maintenance work. For the purpose of conducting such maintenance work as repair of the road surface and/or shoulders and river protection separately from routine maintenance work, the country is divided into five zones and a private company is contracted to conduct the work in each zone.

In Honduras, a small company mostly employing local people is established for each 25 km of trunk road to conduct routine maintenance with a contract with the FONDVIAL. This work is supervised by separately contracted private sector engineers who also check the condition of bridges and roads and report any need for repair work. For the purpose of conducting repair work, the country is divided into 17 – 18 zones and a private company is contracted in each zone. Up to 2013, bridge repair work was contracted

[18] This road fund is called the FOVIAL in El Salvador and FONDVIAL in Honduras.

separately from road repair work. However, the commencement of a new contract regime which incorporates the repair of both bridges and roads is planned in 2014.

In the case of the New Bridge and Old Bridge at El Amatillo, the western half from the central point and the eastern part are under the jurisdiction of El Salvador and Honduras respectively. The routine maintenance of these two bridges is conducted in accordance with this jurisdictional division. When the Old Bridge requires repair work, suitably coordinated work covering the entire bridge is alternatively conducted by the two countries.[19] As the operation and maintenance system is clearly established for the two bridges, there are no special problems in this aspect.

3.5.2 Technical Aspect of Operation and Maintenance

In both countries, inspection surveys, planning, design and work supervision as part of bridge and road maintenance are entrusted to a consulting firm while the actual maintenance and repair work is entrusted to a construction company. Both the FONDVIAL and FOVIAL conduct a competitive tender for the selection of contractors and assess the technical capability of any tenderer from multiple viewpoints. According to them, more than 10 companies usually bid for a contract in any zone and a company with a high level of technical capability is selected. Accordingly, there appears to be no problems concerning the technical aspect of operation and maintenance.

3.5.3 Financial Aspect of Operation and Maintenance

Both the FONDO VIAL and FOVIAL are mainly funded by a tax on petrol. An interview with the FOVIAL found that its funding is stable. The FOVIAL receives part of the driving license renewal fees and traffic fines in addition to its petrol tax revenue and its operation is independent from government finance.

In Honduras, the FONDO VIAL is supposed to receive some 40% of the petrol tax revenue by law but the scale of its actual funding has been much lower due to the tight government financial situation, resulting in insufficient funding for the FONDO VIAL. An interview with the FONDO VIAL found that insufficient funding has led to insufficient routine maintenance, including the cleaning of gutters, developing a vicious cycle in which insufficient road maintenance leads to an increase of the required repair work, in turn pressing the available funds. As described later, the repair of the Old Bridge

[19] This coordination is conducted as required even though no documents or written agreement exists which specify the contents of coordination. No repair of the New Bridge has been necessary so far.

has been less than ideal because of a shortage of funds.

3.5.4 Current Status of Operation and Maintenance

The routine maintenance of the New Bridge, including cleaning of the gutters, etc. and weeding of the shoulders of the access roads, is conducted by the FONDO VIAL and FOVIAL in their respective countries. The field survey by the present evaluator did not find any damage of note to the New Bridge and its access roads except that listed below. As the New Bridge is only four years old, there are no structural problems, making any repair work currently unnecessary.

- Part of the guardrail on one of the access roads is damaged.
- Some of the metal gutter drain gratings on the bridge section have been stolen.
- Some hairline cracks can be seen on the bridge road surface.[20]

Although routine maintenance work is conducted for the Old Bridge, the bridge road surface has some damage. In addition, some parts of the concrete slabs and beams as well as the steel truss appear to require repair, suggesting insufficient maintenance.

Damaged road surface of the Old Bridge

Truss member (rusted) and concrete slab (exposed reinforcing bars) of the Old Bridge

According to the FONDO VIAL in Honduras, repainting of the Old Bridge in 2011 was planned. However, the available funds were exhausted by removing rust from the steel, leaving no funds to pay a contractor with the result that the planned painting was not conducted. In 2012, the FOVIAL in El Salvador conducted repair of the bridge road surface. However, the site survey by the evaluator found some damage to the same road

[20] At the time of the ex-post evaluation, both the FOVIAL and FONDVIAL have a policy of dealing with these cracks as part of any future repair work.

surface, making the extent of the repair work conducted in 2012 questionable. Because the road surface is now uneven, there is concern in regard to the adverse impact of vibration caused by large buses on the bridge structure. No repair work was conducted in 2013.

To summarize, there are no major problems regarding the operation and maintenance of the New Bridge. In contrast, the Old Bridge on which large buses travel even today lacks adequate maintenance, posting some danger. The FONDO VIAL is experiencing limitations for road and bridge maintenance because of insufficient funding. Some minor problems can be observed in terms of finance for the facilities related to the project and, therefore, the sustainability of the Project effects is fair.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Project was implemented with a view to making border crossing traffic between El Salvador and Honduras smoother by means of replacing the existing Goascorán Bridge with the new Japan-Central America Friendship Bridge. This border crossing point forms part of the Mesoamerican international road network connecting Central American countries with Mexico and is given strategic importance by the two countries. As the project meets the strong need for safe and smooth border crossing traffic as well as Japan's ODA policy, its relevance is high. The New Bridge is currently used for cargo traffic while the Old Bridge is used for passenger traffic. While the overall bridge safety has been much improved, the danger associated with the Old Bridge which is still used by large buses has not been totally eliminated. Although the border crossing time appears to have been shortened, there is still room for improvement, particularly for cargo traffic as the congestion of cargo vehicles due to the border crossing procedure often reaches the bridge itself. The cross-border traffic volume has increased but has not reached the level planned under the Project. The number of people from Honduras visiting El Salvador has increased. However, significant impact of the New Bridge on physical distribution has not been confirmed. Based on the above, the Project has somewhat achieved its objectives and, therefore, its effectiveness and impact is fair. The New Bridge and its access roads were completed as planned and the actual project cost and project period were both within the plan. However, permanent border facilities have not yet been constructed by either El Salvador or Honduras at the time of the ex-post evaluation. Therefore, the efficiency of the Project is fair. Although no special problems are observed in regard to the operation and maintenance of the New Bridge, the Old Bridge lacks proper maintenance. The Road Fund of Honduras is facing significant limitations in

terms of general bridge and road maintenance because of the tight financial situation. Accordingly, the sustainability of the Project is fair. In the light of the above, the Project is evaluated as partially satisfactory.

4.2 Recommndations

4.2.1 Recommendations to the Executing Agencies

- The customs office in each country must urgently realize the standardization and improved efficiency of the border crossing procedure and relevant information system so that the effect of a shorter border crossing time of the Project can be fully achieved.

- The executing agencies in the two countries must secure the safety of the Old Bridge by means of formulating and implementing an appropriate maintenance system through mutual consultation.

4.2.2 Recommendations to JICA

None

4.3 Lessons Learned

Improvement of border facilities and border crossing system by a border bridge construction project

The physical improvement of border crossing by the construction of a new bridge cannot fully achieve the intended effect of smoothing border crossing traffic unless border facilities and a border crossing system, including fully equipped customs, are improved at the same time. In the case of the present project, the delayed improvement of the border facilities is one cause of the delayed opening of the New Bridge, limiting the full achievement of the project effect. Moreover, as the access roads were designed and constructed without a finalized border facility construction plan, the scope of the arrangements between these roads and the border facilities was somewhat restricted, resulting in a further delay of the construction of border facilities.

This lesson illustrates the importance of conducting a concrete examination of the border facilities and border crossing system to be introduced when a border bridge construction project is planned. These facilities, etc. should be included in the scope of a project and

their feasibility should be verified. The planning of a bridge, its access roads and border facilities as integral facilities is highly desirable. If individual planning and detailed design is necessary, the individual plans should be fully coordinated.

Cooperative Republic of Guyana

Ex-Post Evaluation of Japanese Grant Aid Project

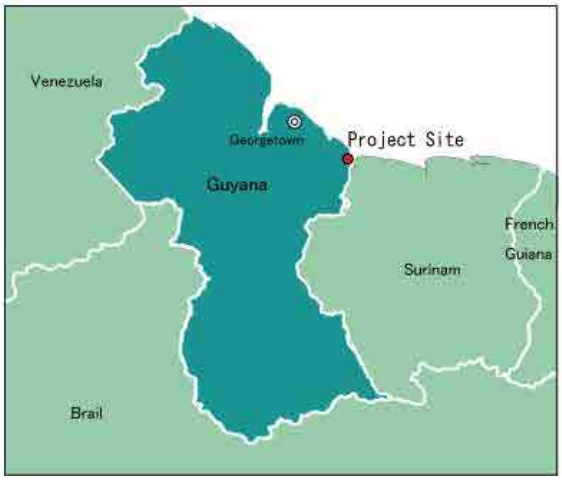
Project for Water Supply in Corriverton (Phase I and Phase II)

External Evaluator: Hajime Sonoda
Global Group 21 Japan, Inc.

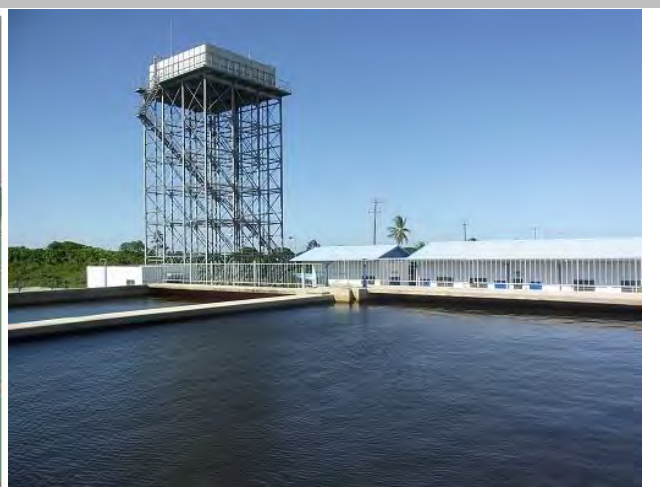
0. Summary

The Project was implemented to improve the water supply service in Corriverton in Guyana by means of rehabilitating the existing water source wells, constructing new Water Treatment Plants (WTPs), laying conducting and distribution main pipelines and procuring water meters. The supply of safe water has always been a priority issue in the national plan of Guyana. The expansion of areas receiving treated water is still a pressing task in coastal regions and the need for the Project is very strong. As the Project was in line with Japan's ODA policy, the overall relevance of the Project was high. At the WTPs constructed under the Project, iron in the raw water is now removed. However, coliforms are sometimes detected in the treated water, indicating that the safety of the water or capacity for water testing is in question. Partly because of the slower-than-planned progress of the reduction of the water demand to correspond to the treatment capacity of the WTPs, the size of the population receiving treated water at the time of this ex-post evaluation is some 60% of the planned size. Meanwhile, the installation of water meters and progress of leakage control have increased the water pressure throughout the project area, improving the convenience of water use along with an improved water quality due to the removal of iron from the raw water. The Project has somewhat achieved its objectives and its effectiveness and impact is fair. Because of problems with the tender due to the unexpectedly high price hike of construction materials and equipment, the completion of the Project was delayed by one and a half years from the originally planned completion date. As the project cost also exceeded the original plan, the efficiency of the Project is low. The institutional and financial aspects of the operation and maintenance of the facilities constructed under the Project are adequate. Although an outbreak of algae occurred at one of the WTPs with slow sand filter bed, technical capability to ensure the required quality of the treated water by means of employment an alternative means of algae control is available. As such, the sustainability of the Project effect is high. In light of the above, this Project is evaluated to be partially satisfactory.

1. Project Description



Project Location



Queenstown WTP

1.1 Background

The Cooperative Republic of Guyana (hereinafter simply referred to as "Guyana") is located in the north-western part of the South American continent facing the Atlantic with a population of 751,000 (2002 Census data). Its national economy is mainly dependent on agriculture, forestry and mining industries.

Guyana has set forth the National Development Strategy (2001-2010) and the Poverty Reduction Strategy Paper (PRSP) (prepared in 2001), both of which emphasise the improvement of social infrastructure, especially the supply of safe water. The priority targets for implementation by 2010 in the medium-term strategy of the government were i) supply of safe water to 95% of the population, ii) establishment of a nationally integrated water supply corporation, iii) intensification of water supply projects in coastal areas with emphasis on water purification and iv) implementation of a comprehensive rehabilitation and maintenance plan.

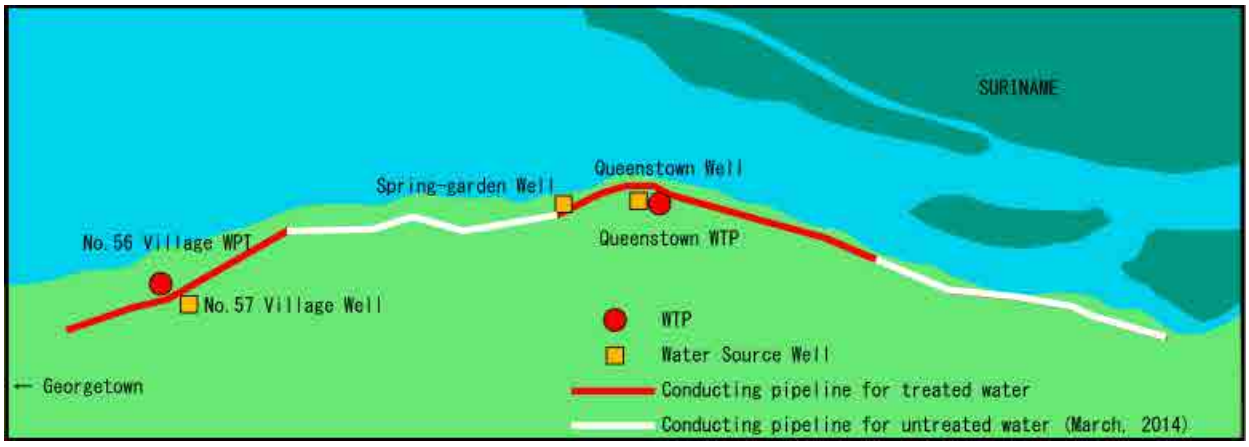
Guyana Water Inc. (hereinafter referred to as 'GWI'), which uniformly provides water supply and sewerage services nationwide, was established in 2002 and its water supply operations were placed under the jurisdiction of the Ministry of Housing and Water. In 2003, the national average coverage of the water supply service was higher than 80% but insufficient disinfection meant a high risk of bacterial infection. At the same time, the high level of iron in the water had been causing such unpleasant effects as a strange odour/taste and the reddish discoloration of clothing. Because of the country's mainly flat topography, the employment of a gravity system was difficult, and the direct supply system from water source well pumps had been suffering from a problem of insufficient pressure depending on the location and/or time. Another problem was restricted supply hours because of the need to save the cost of

electricity required to operate the pumps. Moreover, the low water meter installation rate meant that (i) users tended to waste water as many of them were not charged in accordance with the water consumption amount and (ii) it was practically impossible to estimate the quantity of non-revenue water, including leaked water, as no measurement on water consumption were available.

Under these circumstances, the Government of Guyana requested Japan for grant aid for the Project for Water Supply in Corriverton in August, 2003 for the purpose of improving the water supply situation in Corriverton (population of 31,000 in 2005) on the eastern coast of the country.[1]

1.2 Project Outline

The Project aimed at improving the water supply service in Corriverton in Guyana by means of rehabilitating water source wells, constructing new water treatment plants (hereinafter referred to as 'WTPs') (consisting of a slow sand filter bed, distribution pond, elevated tank and chlorination facility, etc.), laying new conducting and distribution main pipelines, procuring water meters and technical transfer on operation of slow filtration water treatment plants.



Location Map of Project-Related Facilities

[1] The Project for Water Supply in Corriverton was implemented in two stages. However, the construction work in Stage 2 did not take place because of an unsuccessful tender with only the detailed design, support for the tender and soft component executed in Stage 2 (see the section on Efficiency for further details). Subsequently, the Project for Water Supply in Corriverton (Phase II) was implemented after the feasibility study which was needed to re-examine the contents of the detailed design and quantity survey.

Grant Limit / Actual Grant Amount	Project for Water Supply in Corriverton (Phase I, Stage 1) 651 million yen / 647 million yen Project for Water Supply in Corriverton (Phase I, Stage 2) 725 million yen / 31 million yen Second Project for Water Supply in Corriverton (Phase II) 867 million yen / 809 million yen
Exchange of Notes Date	Project for Water Supply in Corriverton (Phase I, Stage 1) July, 2006 Project for Water Supply in Corriverton (Phase I, Stage 2) June, 2007; (Extension) March, 2008 Second Project for Water Supply in Corriverton (Phase II) January, 2009
Implementing Agency	Guyana Water Inc. (GWI)
Project Completion Date	Project for Water Supply in Corriverton (Phase I, Stage 1) March, 2008 Project for Water Supply in Corriverton (Phase I, Stage 2) April, 2008 Second Project for Water Supply in Corriverton (Phase II) October, 2010
Main Contractor(s)	Project for Water Supply in Corriverton (Phase I) Kitano Construction Corp. Second Project for Water Supply in Corriverton (Phase II) Tokura Corporation
Main Consultant(s)	Tokyo Engineering Consultants Co., Ltd.
Basic Design Study	November, 2005 to March, 2006
Related Projects (if any)	Implementation Review Study: July to November, 2008

2. Outline of the Evaluation Study

2.1 External Evaluator

Hajime Sonoda (Global Group 21 Japan)

2.2 Duration of the Evaluation Study

The ex-post evaluation study for the Project was conducted over the following period.

Duration of the Study : September, 2013 to October, 2014
Duration of the Field Survey: 18th to 30th November, 2013, 12th to 16th March, 2014

3. Results of the Evaluation（Overall Rating：C[2]）

3.1 Relevance (Rating: ③[3])

3.1.1 Relevance to the Development Policies of Guyana

As already mentioned in 1.1 Background of the Project, the supply of safe water was emphasised by the national strategy, etc. at the time of the ex-ante evaluation. As part of this emphasis, the expansion of water treatment for water supply was a priority in coastal areas.

The Poverty Reduction Strategy Papers revised in 2003 aimed at increasing the supply quantity of treated water in coastal areas along with the achievement of the supply of safe water to 95% of the population by 2015 while emphasising the rehabilitation and proper maintenance of the existing facilities. The Millennium Development Goal monitoring report for Guyana (2011) indicated that 94% of households had access to safe water and that 92% of the population had access to water supply. In inland areas, however, only 52% of the population had access to safe water, suggesting a large gap between coastal and inland areas. Because of this, at the time of the ex-post evaluation, priority is rather an increase of the water supply coverage in inland areas.

As described above, while the supply of safe water was still emphasised by the national strategy, etc. at the time of the ex-post evaluation, priority is given to an increase of the water treatment to produce safe water in inland areas in view of the much progress made in the supply of safe water in coastal areas.

3.1.2 Relevance to the Development Needs of Guyana

As already mentioned in 1.1 Background, the Project intending to spread the use of water meters and to improve the water treatment rate was relevant to the development needs of Guyana at the time of the ex-ante evaluation.

Interviews with GWI officials found that the primary challenges faced by the GWI at the time of the ex-post evaluation were the further spread of the use of water meters, improvement of the profitability through a reduction of the water leakage and improvement of the water

[2] A: Highly satisfactory, B: Satisfactory; C: Partially satisfactory; D: Unsatisfactory
[3] ③: High, ②: Fair; ①: Low

treatment rate.[4] In Corriverton, while the water supply coverage and metered household rate had reached 100% and more than 90% respectively at the time of the ex-poste evaluation, the water treatment rate was still as low as 58% (see 3.2 Effectiveness for further details).

One drawback was the failure to achieve a reduction of the water demand as assumed by the basic design study. Because of this, the supply of untreated water was necessary in some areas at the time of the ex-post evaluation (see 3.2 Effectiveness for further details). It can be pointed out that the reasons for this failure could have been (i) an under-estimated water demand by the GWI which was used as a criterion for the basic design and (ii) insufficient consideration of the risk relating to the delay of leakage control measures as well as water meter installation, which was a precondition for fostering the awareness of water users of the need for water saving. However, as the plan put forward by the basic design study team also included an assumed case of the water demand not being sufficiently reduced in a short period of time, it cannot be said that the plan for the Project was not sufficiently relevant to the development needs of Guyana.

Based on the above, it is safe to conclude that the Project was relevant to the development needs of Guyana at the time of both the ex-ante evaluation and ex-post evaluation.

3.1.3 Relevance to Japan's ODA Policies

At the time of the ex-ante evaluation, Japan set itself the task of providing grant aid and technical cooperation for improvement in areas of basic human needs and contribution to poverty reduction in Guyana from the viewpoint of "poverty reduction" which is one of the priority issues of Japan's ODA Charter. To be more precise, the intended cooperation would primarily focus on those areas concretely referred to in the PRSP prepared by the Government of Guyana so that the Japanese cooperation would provide sufficient aid to meet the demand in reference to basic human needs and to contribute to poverty reduction as such aid was considered to be highly necessary.[5] Accordingly, the Project was relevant to Japan's ODA policies.

This Project has been highly relevant with the country's development plan, development needs, as well as Japan's ODA policy, therefore its relevance is high.

[4] The Business Plan for the GWI (2012 -2016) aims at making the overall business profitable through an increase of the water meter installation rate and a reduction of non-revenue earning water. It also aims at improving the water treatment rate from 49% in 2012 to 80% in 2016.
[5] Japan's ODA Data Book for Guyana (FY 2006)

3.2 Effectiveness[6] (Rating: ②)

The objective of the Project was to achieve a continuous supply of safe water in a sufficient quantity for people (31,000 in 2005) in the project area. In this section, the quantitative effects of the Project are evaluated in terms of three aspects: i) operational status of facilities, benefitting area and benefitting population, ii) supply of safe water and iii) continuous supply of water in a sufficient quantity. In addition, the qualitative effects of meter installation and the introduction of a metered tariff, which are introduced to control the water demand, operation of a slow sand filter bed at WTPs and the soft component of the Project are also analysed as factors affecting the effectiveness of the Project.

3.2.1 Quantitative Effects (Operation and Effect Indicators)

3.2.1.1 Operational Status of Facilities, Benefitting Area and Benefitting Population

Upon completion, two new WTPs constructed under the Project began 24-hour operation. However, the volume of water treated at these WTPs fell short of the demand, resulting in a reduction of the service area and service hours. The reasons for this include the slow progress of the planned reduction of the water demand which was assumed by the water demand forecast at the time of project planning[7] and the shortage of raw water at No. 56 Village WTP that was caused by the diversion of raw water to a neighbouring area in order to cope with suspension of pumping operation at one of the water source wells located in a neighbouring area in the latter half of 2010. Treated water production volume at the two WTPs is shown in the Table 1 below.

Consequently, the service population of the two WTPs remains at 58% of the planned figure (5,211 households out of 8,992 households, approximately 23,000 people) as of March, 2014. In the areas not supported by these WTPs, the supply of untreated water from existing wells is continuing. The GWI currently plans to stop the diversion of raw water to neighbouring areas and to gradually expand the coverage of treated water supply in stages after the manifestation of the positive impacts in water saving by meter installation and reduction of the water leakage. As of March, 2014, work is in progress to freshly supply treated water to some 1,400 households by August, 2014. Depending on the actual outcome of this work, even though further expansion of the service area will be examined, it is unclear whether or not the entire project area can be covered by this further expansion.

[6] Sub-rating for Effectiveness is to be put with consideration of impact.
[7] See 3.2.4 Control of Water Demand Through the Installation of Water Meters and Other Means

Table 1 Treated Water Production Volume at WTPs in Corriverton

(Unit: m^3/year)

	2008	2009	2010	2011	2012
No. 56 Village WTP	1,314,000	1,095,000	740,000	866,400	862,879
Queenstown WTP	-	-	-	1,956,000	1,706,586
Total	1,314,000	1,095,000	740,000	2,822,400	2,569,465

Source: GWI

Based on the above, the achievement of the objectives relating to the benefitting area and population is judged to be fair. All of the water meters (8,400 units) procured under the Project has been installed throughout the project area at the time of ex-post evaluation, benefitting the entire project area in terms of water pressure, etc. as described later.

3.2.1.2 Supply of Safe Water

The original plan for the two WTPs constructed under the Project was to produce treated water by removing iron from raw water through oxidation by iron bacteria, slow sand filtration and chlorination.

According to the results of the daily iron level check which is conducted at each WTP, iron have almost completely removed. The test conducted at each WTP during the field survey found that the concentration of iron was below the detection limit. As the beneficiaries' survey reported that the supplied water no longer has a bitter taste or red colouring caused by the presence of iron, the intended removal of iron is believed to have been successfully achieved.

In contrast, coliforms which must not be detected in safe water is actually detected in one tenths of the sampled water from the two WTPs in question. Moreover, faecal coliforms which indicate the contamination of raw water as well as a risk of waterborne disease are found in several percent of the sampled water. As far as these test results are concerned, the treated water at these WTPs cannot be judged to be "safe water". According to the GWI, coliforms and faecal coliforms are detected in similar proportions at other WTPs in Guyana, indicating that the treated water at the two WTPs in question is not especially poor. The test on coliforms is conducted at a laboratory in Georgetown by transporting samples from each WTP. The GWI points out the possibility of the samples' contamination during the process of sampling at each WTP and/or during transportation to the laboratory. As such, the existence of coliforms in treated water has not been accurately established.[8]

[8] To strengthen its water quality testing capability, the GWI has begun the work to improve the laboratory in Georgetown, the capital of Guyana, to develop the water quality testing procedure, including the sampling and transportation of samples, and to train its staff.

As far as the test results of the sampled water at each WTP are concerned, the residual chlorine concentration is in the adequate range to suppress the propagation of bacteria in the treated water. However, it is suspected that the said concentration fluctuates to a certain extent as some residents during interview expressed the opinion that the residual chlorine concentration appears to be too high from time to time and should be lowered (17 out of 64 residents interviewed (27%) mentioned this).[9] 75% of the households receiving treated water purchase bottled water for drinking.

To sum up, the achievement level of the objective concerning the supply of safe water is judged to be fair.

Purified water
(No. 56 Village WTP)

Checking of the iron concentration using a reagent
(in an area receiving untreated water)

3.2.1.3 Continuous Supply of Water in Sufficient Quantity

① Improvement of the Water Pressure

According to the results of the beneficiaries' survey, 72% of the benefitting households say that the water pressure has improved.[10] This positive effect of the Project on the water pressure is observed by not only those households receiving treated water but also households throughout the project area. In some areas, the residents were forced to fetch water from another area before the Project. Since the project completion, however, supplied water reaches all households in the project area even though 28% of the benefitting households are still unsatisfied with the water pressure.

[9] For the present ex-post evaluation, 100 households in Corriverton were randomly selected for the beneficiaries survey using a questionnaire (see the Box at the end of 3.2.5).

[10] As the water pressure fluctuates throughout the day (it drops when the demand is high), data which can be compared to existing data of which the time of measurement is unknown has not been obtained.

According to the GWI, an improved water pressure is the combined effect of (i) a restrained water demand due to the installation of water meters procured under the Project, (ii) reduced water leakage from connection pipes as a result of the work to install water meters accompanied with renewal of connection pipes and (iii) reduced water leakage from water mains, etc. as a result of the work conducted independently from the Project. It is inferred that water leakage in the past mostly occurred at the connection between main water pipes and the service pipes for each house. In the beneficiaries' survey, many residents said that the water pressure significantly improved after the water meter installation work.

② Improvement of the Water Supply Hours

Prior to the implementation of the Project, water was supplied in Corriverton for 12 hours a day by means of direct pumping from water source wells. The plan for the Project intended the provision of 24-hour water supply from water tanks installed at the two new WTPs. However, as of March 2014, the two WTPs are supplying water for 16 – 17 hours/day, failing to achieve the planned 24-hour water supply.[11]

According to the GWI, while the WTPs have the capacity to supply water 24-hours a day, they do not operate at full capacity because of concern regarding wasteful water consumption at night. Most households in the project area have a large water tank and often leave the tap open at night to store water in the tank. Meanwhile, there is also a local custom of hardly using any water after 7 o'clock in the evening. Accordingly, 24-hour water supply could lead to the loss of water as water may overflow from the tank when the tap is left open. The existence of water tanks means that people do not find it particularly inconvenient when there is no water supply at night.[12] In fact, the beneficiaries' survey found that many people do not consider 24-hours water supply to be necessary. Instead, many people complained about the irregularity of the water supply hours during the day.[13]

Residents welcome the fact that each WTP has eliminated the suspension of water supply during power outages by installing a generator at each well.

Based on the above, the achievement of the objective relating to continuous water supply in a sufficient quantity is judged to be fair.

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[11] As of March, 2014, the No. 56 Village WTP supplies water from 05:00 to 21:00 while the Queenstown WTP supplies water from 04:00 to 21:00.

[12] As people in Guyana used to store rainwater for domestic use, each household traditionally has a large water tank. Even in Georgetown, the capital, around the clock water supply is only available in some areas.

[13] Even though there is a set water supply schedule, the actual water supply hours change almost daily depending on the volume of water available at each WTP.

Installed water meter

Water tanks installed at ordinary households

3.2.2 Qualitative Effects

3.2.2.1 Control of Water Demand through Installation of Water Meter and Other Means

Under the Project, 8,400 water meters were procured. The original plan was to install all of these by the completion of the Project in March, 2009 and the new regime of water charge collection based on the actual consumption volume was expected to substantially reduce the water demand. In reality, the number of meters installed was 2,170 by 2009 and 5,400 by 2010. In 2013, water meters were installed at more than 90% of the households in the Project area. The GWI explains that the main reasons for this delay of meter installation are that the contractors were too busy to install meters because of a nationwide construction boom and that there were non-residential house owners who were not present when an installer visits.

The general practice of the GWI is to start metered water charge collection upon the installation of the water meter in the new billing cycle. The beneficiaries survey found that 65% of the surveyed households had been trying to reduce their water use following meter installation. It is believed to have contributed to the reduction of the water demand along with the reduced leakage from connection pipes which are replaced as part of the meter installation work.

The delayed installation of water meters is a contributory factor for the non-accomplishment of the planned reduction of the water demand, restricting areas which receive treated water. Before the Project, the water supply volume per capita (daily water production volume divided by the number of people receiving water supply) was approximately 500 litres/day. Based on data from the WTPs and wells, the comparable water supply volume per capita in 2013 is estimated to be 381 litres/day. Even though the 2013 figure is much lower than the

pre-project figure, it is still more than double of the figure of 180 litres/day assumed in the basic design study.[14]

Another factor contributing to the reduction of leakage is the strengthening of the executing agency's capacity for leakage reduction (see 3.5 Sustainability).

3.2.2.2 Operation of Slow Filtration Water Treatment Plants

① Outbreak of Algae and Control

At the No. 56 Village WTP, the slow sand filter is in operation as planned and biological treatment using iron bacteria is effectively removing iron from the raw water. In comparison, there was a major outbreak of algae at the Queenstown WTP immediately after its opening, deteriorating the water quality (bad smell and taste). Clogged filters mean a slower filtration speed. The operation of this WTP was also hampered by the long time required to drain water from the filter bed for sand scrapping operation which must be frequently conducted to maintain the function of the filter bed. The GWI tried various measures to remove the algae, but has not been able to find effective solutions. The GWI started to experiment with the physiochemical treatment process of injecting chlorine prior to filtration (hereinafter referred to as "pre-filtration chlorine injection") in mid2013. This process is not necessarily the correct process for the operation of a slow sand filter as the required amount of chlorine for injection is almost that the amount of post-filtration injection, making the process very expensive. Meanwhile, the quality of the treated water from the Queenstown WPT is similar to that from the No.56 Village WTP at the time of ex-post evaluation.

The reason why only the Queenstown WTP suffered an outbreak of algae possibly lies with the different quality of the raw water but this has not been clearly established.[15] In general, it is very rare for a slow sand filter using groundwater as the raw water to suffer from an outbreak of algae[16] and was difficult to predict such an outbreak. The GWI is believed to have taken the most appropriate measure suggested by the available knowledge to deal with the situation.

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[14] At the time of the basic design study, it was believed that several years will be required till the supply of treated water covers the entire project area although the water meters were installed as planned, as some time would be required for the effect of meter installation on reducing the water demand to be felt.

[15] As the raw water for the Queenstown WPT has a high level of nitrogen content and conductivity, it may provide good conditions for the propagation of algae.

[16] A Japanese expert involved in the basic design told the present evaluator that he had not heard of an incident of an algae outbreak at a slow sand filter using groundwater as the raw water and that such an incident had not been assumed at the project planning stage.

At the time of the ex-post evaluation, the GWI is examining ways of reducing the quantity of pre-filtration chlorine injection or even eliminating this injection altogether by shading the facility by a structure, etc. to suppress the propagation of algae.

Slow sand filter bed at the No. 56 Village WPT (left) and Queenstown WTP (right)[17]

② Effects of the Soft Component

As part of the Project, the technical assistance relating to the operation and maintenance of a WTP was conducted as the soft component because the planned slow sand filter involved a technology which had not been previously used in Guyana. This technical assistance had the following objectives.

- Full understanding of the slow sand filtration method and the principle of iron removal using iron bacteria
- Development of the capability to operate new WTPs
- Development of the capability to collect necessary data for everyday maintenance
- Development of the capability to conduct adequate maintenance based on collected data
- Development of the capability to prepare an adequate maintenance plan, including sand scrapping work

These objectives appear to have been generally achieved based on the results of interviews with GWI engineers and those working at the WTPs, situation of storage and usage of manuals and operating status of the WTP facilities. It must be noted that the soft component of technology transfer did not involve a technology to control an outbreak of algae which

[17] A slow sand filter purifies water with a biological membrane formed on the surface of the filtering material (sand). At the No. 56 Village WTP, the iron bacteria method where iron bacteria is propagated on the sand surface is functioning well. At the Queenstown WTP, chlorine is injected to the raw water to suppress the propagation of algae. It is believed that this chlorine injection suppresses the formation of biological membranes at the same time. Differences in the raw water quality and filtering process are manifest in the colour of the water observed at these two WTPs.

subsequently became a problem at the Queenstown WTP because of the fact that such an outbreak at a slow sand filter bed is extremely rare, ant there was no way of predicting the necessity for such a technology. Moreover, as this technology transfer took place after the completion of the No. 56 Village WTP but before the construction of the Queenstown WTP, there was no opportunity to add the transfer of a suitable technology to deal with an outbreak of algae within the scope of the Project.[18]

< Beneficiaries Survey >

100 households were randomly selected from those located in Corriverton and face-to-face interviews using a questionnaire were conducted. The main findings are described below.

* Water tank installation rate: 94%
  Lifting pump installation rate: 22%
* Ratio of households using bottled water for drinking: 75%
* Problems of the GWI's water supply business as observed by its users (multiple replies permitted);
  Taste and smell: 47%; Colour: 40%; Water pressure: 24%
  Supply hours: 18%; Water charge: 16%; Maintenance: 6%
* Biggest problems among the above;
  Taste and smell: 29%; Colour: 18%; Water pressure: 10%
* Improved service after project implementation (ratio of households selecting the answer "Improved" from the multiple choices of "Improved", "No change" and "Worsened")
  Water pressure: 75%; Supply hours: 68%
  Maintenance (handling of water leakage, etc.): 56%
  Colour: 55%; Test and smell: 45%
* Meter installation rate: 94%
* Ratio of households that accept metered water charge system: 73%
* Ratio of households replying that they tried to reduce their water consumption after meter installation: 65%
* Ratio of households content with the current service: 90%
* Ratio of households replying that project implementation has resulted in an important positive change of their life: 48%
* Ratio of households replying that project implementation has resulted in a positive change of their life: 35%
* Ratio of households of which family members have experienced diarrhoea in the previous one year period (the basic design study produced a pre-project figure of 25%)
  - Among households using treated water: 13%
  - Among households using untreated water: 11%

[18] The No. 56 Village WTP was conducted under the Project for Water Supply in Corriverton (Phase I) while the Queenstown WTP was constructed under the Project for Water Supply in Corriverton (Phase II), completing the entire Project.

3.3 Impacts

3.3.1 Intended Impacts

The beneficiaries' survey found such positive impacts as a better taste of the water and less use of bleach due to the elimination of the reddish discolouration of clothing and dishes, both of which result from the removal of iron, in the areas receiving water supply from the No. 56 Village WTP. In contrast, such effects are not clearly established in the most of the service areas of the Queenstown WTP because of the low level of iron in the well water even before the Project.

Some 70% of the surveyed households in the project area reported an improved water pressure and supply hours (when the water actually reaches individual households). Because of this, availability of water has been enhanced, improving the convenience of life as water can be used whenever it is needed. Other positive impacts are a shorter water fetching time (in the past, people were sometimes forced to fetch water from a different area) and the non-requirement of a pump to compensate for the insufficient water pressure. All in all, almost half of the surveyed households replied that the recent improvement of the water supply service has had a positive impact on their life. Meanwhile, 90% of the surveyed households are content with the current service provided by the GWI.

The data gathered by the beneficiaries survey indicates that the number of incidents of diarrhoea has been slightly reduced compared to the pre-project figure. However, as a similar decline is recorded for areas receiving untreated water, there is no firm link between the declining number of incidents of diarrhoea and water treatment in the post-project period.

3.3.2 Other Impacts

The Project was implemented after the granting of an environmental permit which was issued by the Environmental Protection Agency in March, 2006. Prior to the actual work, the consultant prepared and implemented an environmental management plan, with which no specific problems have been reported. No special impacts on the natural environment are observed. The Project did not involve any resettlement of residents, and there were no special problems relating to land acquisition that were carried out based on relevant domestic regulations. There are no indirect impacts worthy of mentioning.

Based on the above, this Project has somewhat achieved its objectives, therefore its effectiveness is fair.

3.4 Efficiency (Rating: ①)

3.4.1 Project Outputs

The planned outputs of the Project are shown in Table 2. Although minor modifications were made at the implementation stage, these outputs were achieved almost as planned. The GWI has a high opinion of the quality of the construction work under the Project.

Table 2 Planned and Actual Outputs of the Project

Planned Outputs	Actual Outputs
(1) Water source wells: rehabilitation of three existing wells	
No. 57 Village well: output 45 kW	Output changed to 30 kW
Spring Garden well: output 37 kW	As planned
Queenstown well: output: 18.5 kW	As planned
(2) WTP: construction of two new WTPs (with a slow sand filter)	
• No. 56 Village WTP Treatment capacity: 3,800 m^3/day	As planned
• Queenstown WTP Treatment capacity: 5,500 m^3/day	As planned
(3) Laying of conducting pipelines: 5,230 m	Partial change of the planned route (5,330 m)
(4) Laying of distribution main pipelines: 15,471 m	Partial change of the planned route (14,990 m)
(5) Procurement of water meters: 8,400 meters	As planned
(6) Soft component: transfer of technology relating to the operation and maintenance of a slow sand filter bed	As planned

Sources: Basic Design Study Report and Project Completion Report

The modifications made at the implementation stage are explained below. All of them were necessary and appropriate.

- A pumping power of 45 kW at the No. 57 Village well as originally planned. At the detailed design stage, this pumping power in the basic design was found to be excessive in the light of the treatment capacity of the WTP and was accordingly reduced to 30 kW.

- The planned route for the conduction pipeline from the No. 57 Village well would run along a national road. Because of the completion of the rehabilitation work for this road,

the Ministry of Public Works declined to approve the plan. Accordingly, the route was changed to run along a road in a residential area. In addition to a lower cost, this change made it easier for the work to be conducted because of a lower traffic volume.

- In the Phase I Project, it took longer than expected to lay the conducting pipelines along trunk roads while minimising any adverse impacts on traffic and commercial activities along the routes. To prevent a repetition of this problem, the pipeline routes in the Phase II Project avoided trunk roads, causing an increase of the total length of conducting pipelines by 100 m. Meanwhile, the construction cost was lowered because of the parallel laying of conducting and distribution main pipelines on the same routes.

- In the course of the Phase II Project, it was found that a pipeline, which connects main distribution pipelines on both sides of a road, was missing in some places despite the contrary assumption at the time of planning. Consequently, a connecting pipeline was additionally introduced to ensure equal water distribution on both sides of a road.

- The lifting pipe at the No. 57 Village well in the Phase I Project was a zinc-plated steel pipe. Because the subsequent more-than-expected corrosion of this pipe that caused water leakage, in response to a request made by the GWI, stainless steel pipes were used for all of the lifting pipes installed in the Phase II Project.[19]

3.4.2 Project Inputs

3.4.2.1 Project Cost

The actual project cost of ¥1,516 million was slightly higher (113%) of the planned cost. The reasons for this are explained in 3.4.2.2 Project Period.

Table 3 Planned and Actual Project Costs

(Unit: ¥ million)

Planned	Actual
Total project cost: 1,346 - Japanese portion: 1,329 - Guyana portion: 17	Total project cost: 1,515.5 - Japanese portion: 1,487.2 Phase I Stage 1: 647.2 Phase I Stage 2: 31.0 Phase II: 809.0 - Guyana portion: 28.3

Sources: Basic Design Study Report, Project Completion Report and GWI

[19] The corroded pipe installed in the Phase I Project was replaced at the expense of the contractor. During this replacement work, pumping equipment accidentally fell to the bottom of the well. It took nearly a year to recover this equipment. The pump was repaired and the motor was replaced to restore pumping operation at this well.

3.4.2.2 Project Period

The Project was originally planned to be completed in March, 2009 by taking up 32 months to complete from the signing of the E/N in July. In reality, the completion was significantly delayed to September, 2010, taking 50.3 months (157% of the original plan).

Stage 1 of the Project for Water Supply in Corriverton (Phase 1) was completed in March, 2008, which was one month earlier than planned. However, for the stage 2 of the phase 1 project, the bidding ended in failure. The reason of the failure in the bidding is related to the increased prices of materials and equipment influenced by a price hike of crude oil. A company made a bid with the 27 % higher price than the bid ceiling and the negotiation of reducing the price was rejected. Since rebidding was impossible due to the rules of the grant aid scheme at the time and the remaining period mentioned in E/N was limited, only the detailed design work and soft component were conducted under the stage 2 and completed in April 2008.

For the remaining plant construction, an implementation review study, which was required to revise the existing design and quantity survey results, was subsequently conducted and the actual construction work started in the following year as the Project for Water Supply in Corriverton (Phase II). As a result, the overall project completion was delayed by 18 months and the project cost exceeded the planned cost by approximately 10%.

The project cost slightly exceeded the planned cost while the project period significantly exceeded the planned period. Therefore, the efficiency of the Project is low.

3.5 Sustainability (Rating: ③)

3.5.1 Institutional Aspect of Operation and Maintenance

The operation and maintenance of the facilities constructed under the Project has been conducted by Division 5 of the GWI as planned at the time of the ex-ante evaluation. This No. 5 District Office has 52 staff members and the facilities in the project area are handled by the No. 83 Area Section (seventeen staff members).

At each WTP, four operators work for 24 hours on three shifts which last for eight hours each. These operators are responsible for the operation, inspection and maintenance of the facilities as well as testing of the water quality. Sand scrapping at the slow sand filter bed which must be regularly conducted is entrusted to an external contractor. As of March, 2014, three water source wells to supply raw water to the WTPs and three wells to supply untreated water are in

operation. The GWI plans to reduce the number of wells supplying untreated water by one after the successful expansion of the area receiving treated water. The operation and maintenance of wells is conducted by a mobile team of the Section 083 of Division 5. As the current operation and maintenance system and the assignment of operators are almost as assumed at the time of the basic design, there are no specific problems worth mentioning

Division 5 has a contract with four private companies for meter installation and leakage repair. When water leakage is reported by a resident, etc. and is visually confirmed by a patrolling Division 5 staff member, one of these contractors and the maintenance section of Division 5 conduct the necessary repair. The repair of a water main pipeline is mostly completed within one day while minor repair work is done within three days. In recent years, the GWI has purchased acoustic leak detection devices. However, these are not yet used in the project area as priority is currently given to repairing reported and visually confirmed leakages. According to the beneficiaries' survey results, the leakage repair performance of the GWI has considerably improved recently and its response is now very swift. In short, the leakage monitoring and repair performance of the GWI is generally good, indicating that there was improvement in the performance from the time of the ex-ante evaluation.

3.5.2 Technical Aspect of Operation and Maintenance

As a result of technology transfer as the soft component of the project, the GWI has now mastered the basic operation and maintenance skills for the new slow sand filter system, including those for the planning and implementation of the regularly required sand scrapping. Although some of the operators who participated in the skill training under the soft component have already left the GWI, the relevant information and skills have been inherited within the GWI. There appear to be no special technical issues faced by the GWI in regard to the operation and maintenance of the wells and water distribution network.

The GWI has been making efforts to control the algae at the Queenstown WTP, including the gathering of information and research on the slow sand filter system. However, there are no experts on this issue in Guyana and the GWI cannot obtain proper advice. Against this background, the GWI has employed an alternative means (pre-filtration chlorine injection) to achieve a water quality similar to that at the No. 56 Village WTP and that it is independently examining a way of controlling algae without pre-filtration chlorine injection by means of blocking sunlight. These facts are positive proof of the technical capability of the GWI.

3.5.3 Financial Aspect of Operation and Maintenance

At the two new WTPs, there has been sufficient funding to meet the basic operation and maintenance expenses, including the personnel cost, electricity cost and cost of chemicals. No instance of insufficient budgetary funding impeding the operation and maintenance has been observed although there appears to be a shortage of reagents for water quality testing from time to time and this test is not necessarily conducted on certain items every day.

When the financial balances for the two new WTPs is estimated based on information provided by the GWI, the operational cost has increased by 1.7 times since the time of the ex-ante evaluation due to an increase of the personnel, electrical, chemical and repair costs, suggesting a slight deficit in the balance at present.[20]

The GWI has been suffering from a chronic deficit of the operating balance, necessitating a continual government subsidy.[21] According to the GWI, the principal reasons for such a deficit are the low level of the water tariff[22], low water charge collection rate and low water meter installation rate. Table 4 shows the operating balance of the GWI since 2010. While inaccurate water meter readings used to falsely boost the operating income[23], this situation has been gradually addressed since 2010. As a result, the operating income has been declining since 2010. In 2011, as the outstanding accounts payable were paid immediately, the operating balance for the year was significantly worse.

Table 4 Operating Balance of the GWI

(Unit: million GYD)

	2010	2011	2012
Revenue from water charge	3,971	3,374	3,182
Other revenue (subsidy, etc.)	2,148	4,236	3,208
Expenditure	6,475	9,737	7,033
Balance	-356	-2,127	-643

Source: GWI

[20] In 2012, the operation and maintenance cost, excluding the depreciation cost of the water supply system, including the WTPs, was approximately 108 million GYD which was 1.7 times higher than the estimated cost (65 million GYD) in the basic design. Meanwhile, the revenue from the water charge for the above system is estimated to be approximately 99 million GYD based on the production volume (4,881,000 m^3), the ratio of non-revenue earning water (52%), unit water charge (68 GYD/m^3) and water charge collection rate (national average of 62%). This revenue is slightly less than the operation and maintenance cost.

[21] This subsidy is provided by the Ministry of Finance in correspondence with the amount of debt of the GWI.

[22] The GWI's water tariff has remained unchanged since 2008.

[23] For many years, the GWI had a practice of overcharging customers based on an inflated water consumption level with a view to making a refund if a user made a complaint.

The GWI is aiming at putting its operating balance in the black in 2016 by means of installing water meters (target installation rate in 2015 of 95%) and reducing leakage. In 2013, the GWI established the Non-Revenue Water Reduction Unit as part of its commitment to reducing the quantity of non-revenue earning water. An increase of the water tariff by approximately 30% has been approved by the government and the new tariff is expected to come into force by the end of 2014.

In summary, although there are no specific financial problems impeding the operation and maintenance of the facilities constructed under the Project, the GWI is required to continue to make efforts to put its operating balance in the black from the long-term point of view.

3.5.4 Current Status of Operation and Maintenance

The field survey did not find any major functional or physical problems with the facilities. The operation of the new facilities is practically as planned except for the experimental pre-filtration chlorine injection at the Queenstown WTP to control outbreaks of algae and a lack of sand washing and re-use after sand scrapping work at the two new WTPs.[24] The spare parts procured under the Project are stored at the WTPs and are used when required. Both the WTP operators and well operators (mobile operator) manage their respective facilities in accordance with the operating rules set forth by the GWI and maintain operation records.

Based on the above, the operation and maintenance system of the facilities constructed under the Project and its financial aspect are both adequate. The GWI has the technical capability to ensure the quality of water by employing an alternative means of controlling outbreaks of algae at a slow sand filter bed. In short, none of the institutional, technical or financial aspects of the operation and maintenance pose any problems and the sustainability of the project effects is high. However, the GWI must make continual efforts to put its operating balance into the black from the long-term point of view.

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Project was implemented to improve the water supply service in Corriverton in Guyana by means of rehabilitating the existing water source wells, constructing new WTPs, laying

[24] It has been necessary to conduct sand turning more frequently than assumed in the basic design. Because of the large amount of labour required to wash the sand, it has been judged that the purchase of new sand is more economical that the re-use of washed sand.

conducting and distribution main pipelines and procuring water meters. The supply of safe water has always been a priority issue in the national plan of Guyana. The expansion of areas receiving treated water is still a pressing task in coastal regions and the need for the Project is very strong. As the Project was in line with Japan's ODA policy, the overall relevance of the Project was high. At the WTPs constructed under the Project, iron in the raw water is now removed. However, coliforms are sometimes detected in the treated water, indicating that the safety of the water or capacity for water testing is in question. Partly because of the slower-than-planned progress of the reduction of the water demand to correspond to the treatment capacity of the WTPs, the size of the population receiving treated water at the time of this ex-post evaluation is some 60% of the planned size. Meanwhile, the installation of water meters and progress of leakage control have increased the water pressure throughout the project area, improving the convenience of water use along with an improved water quality due to the removal of iron from the raw water. The Project has somewhat achieved its objectives and its effectiveness and impact is fair. Because of problems with the tender due to the unexpectedly high price hike of construction materials and equipment, the completion of the Project was delayed by one and a half years from the originally planned completion date. As the project cost also exceeded the original plan, the efficiency of the Project is low. The institutional and financial aspects of the operation and maintenance of the facilities constructed under the Project are adequate. Although an outbreak of algae occurred at one of the WTPs with slow sand filter bed, technical capability to ensure the required quality of the treated water by means of employment an alternative means of algae control is available. As such, the sustainability of the Project effect is high. In light of the above, this Project is evaluated to be partially satisfactory.

4.2 Recommendations

4.2.1 Recommendations for the Executing Agency

- It is necessary for the GWI to further reduce the water leakage and to advance the metered water charge collection in Corriverton to reduce the local water demand while making efforts to expand the areas receiving treated water in the project area.

- It is necessary for the GWI to conduct a technical examination with the assistance of an external expert(s) of the viability of controlling algae at the Queenstown WTP using a more appropriate method than the current pre-filtration chlorine injection.

- It is necessary for the GWI to strengthen its own water quality testing system and capability to check for any contamination of the raw water as well as the treated water (for the detection of coliforms) and its causes. Whenever contamination is discovered, the GWI must introduce appropriate control measures.

4.2.2 Recommendations for the JICA

Pre-filtration chlorine injection, the employment of which to the slow sand filtering process is unusual, is conducted at the Queenstown WTP to control outbreaks of algae, pushing up the operating cost. It is desirable for the JICA to urgently examine and implement possible technology transfer designed to control algae at slow sand filter by means of applying such means as the existing Training and Dialogue Programs and dispatch of short-term expert to the GWI.

As the prices of the construction materials for the Project had soared by the time of the detailed design and tender for Stage 2 of Phase I from the earlier assumed prices in the basic design, the tender was unsuccessful, making it necessary to revise the design and estimated project cost. In turn, this significantly delayed the actual implementation of the project-related work. To avoid the recurrence of such a situation, it is desirable for the JICA to modify the system for project cost estimation so that a revised system is capable of reflecting price escalation.

4.3 Lessons Learned

Under the Project, the transfer of technology relating to the slow sand filtration process was conducted after the completion of the first WTP. At the second WPT, there was an unexpected outbreak of algae which the GWI struggled to control, eventually adopting the expensive alternative of pre-filtration chlorine injection. If there had been an opportunity for technology transfer after the commissioning of the second WTP, a quick and adequate response could have been made within the scope of the Project, such as the introduction of new technology transfer to deal with this outbreak of algae. If sufficient attention had been paid to the different quality of the raw water for these two new WTPs, it could have been possible to set an appropriate timing for technology transfer by establishing a window for technology transfer for each WTP based on the assumption that the actual operation at each WPT may experience different operating conditions. It is, therefore, important to carefully plan the scope and timing of technology transfer when the slow sand filtration process is introduced in a country with no previous experience of this process while exploring all different possibilities that could affect the biological phase of a filter bed, including an outbreak of algae, because of the different quality of the raw water.

Republic of Honduras

Ex-Post Evaluation of Japanese Technical Cooperation Project
Project for Improvement of Teaching Method in Mathematics (PROMETAM)
Phase 1 & 2

External Evaluator: Tanaka Erika, Global Group 21 Japan, Inc.

0. Summary

The Project for Improvement of Teaching Method in Mathematics (PROMETAM) Phase 1 & 2 (hereinafter referred to as "PROMETAM" or "the Project") was implemented with the purpose of improving teaching methods in mathematics. Phase 1 consisted of the development of teachers' guidebooks and students' workbooks in five targeted departments in Honduras. Subsequently, Phase 2 was implemented to extend the benefits of Phase 1 all over Honduras and neighboring countries. The purpose of the Project was in line with the education policy to improve the quality of primary education[1] and the needs of mathematics education in the country, therefore the relevance is high. At the completion of Phase 2, the output indicators had almost been attained and the achievement of the project purpose – the improvement of mathematics teaching methods for in-service teachers and students in pre-service courses, was recognized. The overall goal should be considered achieved, as there is the prospect of improvement of students' academic achievement in mathematics. Therefore effectiveness/impact is high. The project period was as planned and the project cost was within the planned budget, which means that efficiency is high. Several issues can be pointed out in terms of the institutional and financial aspects of the counterpart (C/P)[2] organizations. For example, the in-service teacher training system is not functioning, and the budget required for teacher training and printing, as well as distribution of the teachers' guidebooks and the students' workbooks, has not yet been secured - therefore sustainability should be considered fair.

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

1. Project Description

(Project Location)

(Materials developed by the Project)

[1] In the education system in Honduras, basic education is nine years (extended from six years to nine during the period of Phase 1), of which the first six years is defined as primary education. Basic education is divided into three cycles, i.e., 1st cycle (Grades 1-3), 2nd cycle (Grades 4-6), and 3rd cycle (Grades 7-9). This Project is targeted at the 1st and 2nd cycles.

[2] C/P refers to administrators, technicians and/or organizations targeted in the technical transfer and/or policy advice in technical cooperation (International Development Journal, Inc. "Terminology of International Cooperation (original in Japanese)" (2004)).

1.1 Background

In the Republic of Honduras, the net enrollment rate of primary education was only 88% in 1999, while the average repetition rate in primary education was as high as 7.9%. The repetition rate for grade 1 was especially high, at 8.5%[3]. To achieve the global goal of "Education for All (EFA)[4]", the Honduran Government formulated the "EFA-Fast Track Initiative (FTI) Plan (EFA Plan: 2003 – 2015), in which low academic achievement in mathematics and the poor quality of teachers in service was found to be one of the significant factors in repetition and drop-out rates[5]. Japan provided cooperation assistance to the education sector in Honduras through construction of the National Institute of Investigation, Training and Education (hereinafter referred to as INICE, from its Spanish abbreviation) by grant aid and the dispatch of volunteers[6]. Based on the evaluation of the assistance, the Honduran government requested a technical cooperation project to improve mathematics education, and consequently, the Project for Improvement of Teaching Methods in Mathematics (PROMETAM) was implemented (April 2003 to March 2006). The purpose of the Project (Phase 1) was to improve the teaching capacity of teachers in service in the target area. The teachers' guidebooks and the students' workbooks were developed and the in-service teacher training program was improved. The terminal evaluation confirmed that these project activities produced a certain level of achievement. In addition, during the project period, based on the results of the Project, utilization of the teachers' guidebooks and the students' workbooks was requested by some other countries in the Central American and Caribbean regions, where the completion rate of primary education and academic achievement in mathematics were priority issues. With this as the backdrop, PROMETAM Phase 2 was launched on April 1 in 2006 with the period of five years to promote the utilization of the developed teachers' guidebooks and students' workbooks, to improve the capacity of students in pre-service teacher training courses as well as teachers in service, and to extend the benefits of PROMETAM to other countries in the Central American and Caribbean regions.

[3] Japan International Cooperation Agency (JICA) "Project Formulation Study Report on the Project for Strengthening of Primary Education in the Republic of Honduras" (2001), based on "La Eucación en Cifras" as the original source.
[4] The global movement to promote universal basic education all over the world was launched at the World Conference on Education for All at Jomtien in Thailand in 1990 with international collaboration at the initiative of UNESCO and the World Bank, among others.
[5] JICA "Implementing Study Report on the Project for the Improvement of Teaching Method in Mathematics" (2003).
[6] The terminology "volunteer" refers to volunteers dispatched by JICA, for example, Japan Overseas Cooperation Volunteers.

1.2 Project Outline

Overall Goal	Phase 1: To improve teaching methods in mathematics in the 1st and 2nd cycles of basic education, in departments* other than five targeted departments, namely El Paraiso, Ocotepeque, Colón, Valle and Comayagua through disseminating the project results. Phase 2 (National Component): Students' academic achievement in mathematics for Grade 1-6 is improved. Phase 2 (Regional Component): Teaching method in mathematics for teachers of targeted countries is improved.
Project Purpose	Phase 1: To improve the teaching method in mathematics in the 1st and 2nd cycles of basic education in five targeted departments, namely, El Paraiso, Ocotepeque, Colón, Valle and Comayagua applying the teachers' guidebooks and the students' workbooks. Phase 2 (National Component): Teaching method of teachers and students in pre-service training courses in mathematics for Grade 1-6 is improved. Phase 2 (Regional Component): Capacity of the core group members[7] to improve the teaching method in mathematics in targeted countries is developed.
Core Output(s)	Phase 1: 1. To elaborate the teachers' guidebooks in mathematics for the teachers in the 1st and 2nd cycles of basic education 2. To elaborate the students' workbooks in mathematics for the students in the 1st and 2nd cycles of basic education 3. The teachers who receive the in-service teacher training[8] in the five targeted departments can develop their classes according to the instruction of the teachers' guidebooks 4. To improve teaching capacities of the counterparts through those three processes from (1) to (3) above.
	Phase 2 (National Component): 1. Teachers' guidebook and students' workbook for Grade 1-6 in mathematics are revised. 2. (Pre-service Training) Teachers in 12 "Escuela Normal" and "Formación Inicial de Docentes (FID)[9] have capacity to work as trainers on the use of teachers' guidebook and students' workbook in mathematics for Grade 1-6. 3. (In-service Training) National trainers of the in-service training program have capacity to work as trainers on the use of teachers' guidebook and students' workbook in mathematics for Grade 1-6. 4. General interests, especially among primary school students, teachers and students in pre-service training courses, in mathematics education are increased.

[7] Core Group members are counterparts in the targeted countries who will receive direct technology transfer from the Project.
[8] Training to improve capacity of teachers already teaching (in service) at school.
[9] "Escuela Normal", or normal school, is an organization equivalent to higher secondary school to train primary teachers. The National Pedagogic University Francisco Morazán (referred to as the National Pedagogic University) provides teacher pre-service training courses equivalent to a bachelor level called FID (from its Spanish abbreviation). In addition to pre-service training, both "Escuela Normal" and the National Pedagogic University provide in-service training when necessary. In countries of the Regional Component, too, there are two types of pre-service training organizations, normal school (called "Escuela Normal" or teacher training school) and pedagogic university of bachelor level.

	Phase 2 (Regional Component): 1. The core group members obtain the necessary competence for development and adjustment of teachers' guidebook and students' workbook in each country, based on the materials developed by PROMETAM. 2. The core group members obtain the necessary competence to implement pre-service and/or in-service teacher training in each country. 3. The project experiences are shared among targeted countries and others.
Inputs	Japanese Side: Phase 1 1. Experts 9: 4 persons for Long-Term, 5 persons for Short-Term 2. 20 persons received (Training in Japan) 3. 0 persons for Third-Country Training Programs 4. Equipment: 14 million yen 5. Local Cost: 758,092.61 lempira (1US$=18.9 lempira: October 2005) Phase 2 (National and Regional Components) 1. Experts 14: 6 persons for Long-Term, 8 persons for Short-Term 2. 20 persons received (Training in Japan) 3. 204 persons (cumulative total) for regional training programs (22 from Honduras and 182 from 4 countries of Regional Component, including observers) 4. Equipment: Nil 5. Local Cost: 26,153,916.21 Lempira (1US$=19 Lempira: October 2010) Honduran Side: Phase 1 1. 28 Counterparts (Cumulative total) 2. Land and Facilities, 5 rooms as Project Office, 2 Store rooms, 1 room at the National Pedagogic University 3. Local Cost (2,457,503 lempira), Counterpart Salary Phase 2 (National and Regional Components) 1. 5 Counterparts (assigned solely for the Project) 2. Land and Facilities, Project Office (at INICE) 3. Local Cost, Counterpart Salary, Cost for seminars
Total cost	232 million yen (Phase 1) 450 million yen (Phase 2)
Period of Cooperation	April 2003 – March 2006 (Phase 1) April 2006 – March 2011 (Phase 2)
Implementing Agency	Secretariat of Education
Cooperation Agency in Japan	Tsukuba University, etc.

Related Projects	(Dispatch of experts) Development planning (May 2000 – May 2002) Basic education improvement (December 2001 – September 2009) (Dispatch of JICA volunteers) Dispatch of Japan Overseas Cooperation Volunteers by group (Model Project for comprehensive community improvement for basic education) (January 2003 – February 2006) (Bilateral Technical Cooperation Project) Project for the Improvement of the Quality of Teaching in Mathematics in the Dominican Republic (May 2005 – May 2010) Project for the Improvement on Mathematics Teaching in Primary Education in the Republic of El Salvador (April 2006 – March 2009) Project for Improvement of Mathematics Education in the Republic of Guatemala (Phase 1: April 2006 – March 2009・Phase 2: November 2009 – October 2012) Project for the Improvement on the Quality of Mathematics Teaching in Primary Education in the Republic of Nicaragua (Phase 1: April 2006 – March 2011/Phase 2: September 2012 –September 2015)

Overall Goal, Project Purpose, and Outputs are based on the final version of PDM.
*Department is an administrative area headed by a governor.

PROMETAM consisted of two phases. Phase 1 was implemented for five target departments in Honduras with the Secretariat of Education as the counterpart agency. PROMETAM Phase 2 was comprised of two components. The first was the National Component, where activities were implemented nationwide in Honduras, and the other was the Regional Component, to extend the benefits of the Project from Honduras to four other countries (Dominican Republic, El Salvador, Guatemala, and Nicaragua) in the Central American and Caribbean regions. The outline of the Project is as follows[10]. The concept chart of the Project is shown in Figure 1.

【Phase 1, Phase 2 National Component】

(1) Project activities

In both Phase 1 and Phase 2, the main objective of activities was the development of the teachers' guidebooks and the students' workbooks in mathematics as well as the improvement of teachers' capacity in the teaching of mathematics.

In regard to the teaching/learning materials, the project implementation team (C/P) was organized among the officials of the Secretariat of Education and technical staff of the National Pedagogic University and INICE. The project implementation team developed the teachers' guidebooks and the students' workbooks up to the 2nd edition with the support of the Japanese experts in Phase 1. In Phase 2, the materials were further revised. The completed materials were printed and distributed by the Secretariat of Education, utilizing the funds of other development agencies.

[10] This Ex-Post Evaluation was conducted for Phase1, the Phase 2 National Component, and the Phase 2 Regional Component. The results of the evaluations for each phase/component are sometimes described separately and sometimes described in one section, depending on the nature of the five evaluation criteria.

As for improvement of teachers' capacity, in Phase 1, training in the use of the teachers' guidebooks and students' workbooks was implemented for teachers at the primary schools of five departments. In Phase 2, training in the use of materials and teaching methods was provided through a "cascade system[11]". In a cascade system, C/Ps first trained the national trainers (1500 trainers were selected from among primary teachers); then, the national trainers provided training to primary teachers. In Phase 2, the Project supported pre-service training through training teachers at all the Escuelas Normales (12 Escuelas Normales in total nationwide) and the National Pedagogic University.

(2) Implementation system of the Project

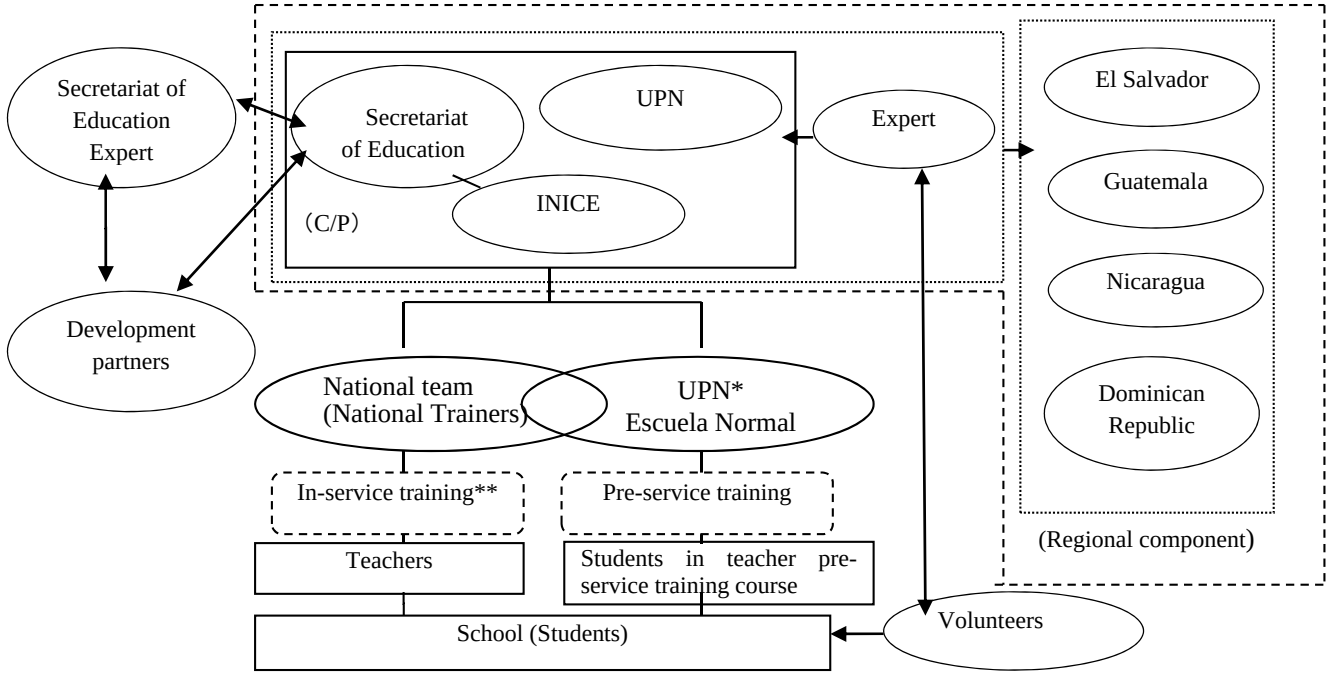
Project activities were implemented on the initiative of C/Ps at INICE under the Secretariat of Education and the National Pedagogic University. Phase 2 included pre-service training, and therefore, Escuelas Normales were involved in the Project more actively than Phase 1[12]. The Project was implemented as a part of the "Honduras Basic Education Program," which aims to produce comprehensive benefits through collaboration with volunteers in the education sector and utilize experts dispatched to the Secretariat of Education (aside from PROMETAM). In addition, the Project was implemented with the aim of contributing to the achievement of EFA goals in Honduras in collaboration with other donor agencies[13].

【Phase 2 Regional Component】

In the Regional Component, capacity development was implemented to build human resources in the "core group". The "core group" comprised technical staff of the Ministries of Education and teachers of the National Pedagogic University and Escuelas Normales for five target countries (Dominican Republic, El Salvador, Guatemala, Nicaragua, and Honduras). Apart from the Regional Component of PROMETAM, in each of the four countries (Honduras not included) of Regional Component, a bilateral project was planned[14] between each country and Japan and launched almost at the same time as the start of PROMETAM Phase 2. In the bilateral projects, materials development and teacher training were implemented on the initiative of the core group that was trained through the PROMETAM Regional Component. The bilateral projects in the four countries are not part of PROMETAM and the evaluation

[11] In a cascade training system, the training of trainers is conducted first, and then trained trainers conduct training for other personnel.
[12] Although pre-service training was not included in project components of Phase 1, training was given for some teachers at Escuelas Normales.
[13] In Honduras, education sector meetings called MERECE are organized regularly among the Secretariat of Education and development agencies for collaboration and coordination to achieve EFA goals.
[14] During the project period of PROMETAM Phase 1, in November 2003, a JICA expert dispatched to the Secretariat of Education gave a presentation about PROMETAM at the 8th Educational and Cultural Ministerial Meeting in Central America organized by the Central American Cultural and Educational Coordination (CECC), one department of the Central American Integration System (SICA), an inter-governmental agency. The Ministers of Education showed strong interest and requests for similar projects were presented by many member countries. At the request of these Central American and Caribbean countries, the Japanese government decided to provide technical cooperation in four countries in addition to Honduras (information provided by JICA).

of the bilateral projects of the four countries of the Regional Component is not included in the Ex-Post Evaluation of PROMETAM.



Source: Based on "Terminal Evaluation Report on the Project for Improvement of Teaching Method in Mathematics (PROMETAM) Phase II in Honduras (2010)"

* UPN (National Pedagogic University Francisco Morazán) is one of the C/P organizations and is responsible for pre-service training and a part of the in-service training during the Project.

**Phase 1 was focused only on in-service training. The national team for in-service training was established after reforming the training system through cascade methods.

Figure 1: Concept chart of the Project

1.3 Outline of the Terminal Evaluation[15]

1.3.1 Achievement of Project Purpose at the time of the Terminal Evaluation

【Phase 1】

In the comparative qualitative analysis of lessons[16], there was a significant difference between teachers who received in-service training and those who did not. With these results, it was judged that the prospect of the achievement of project purpose was high.

【Phase 2 National Component】

At the time of the Terminal Evaluation, the percentage of teachers who used the teachers' guidebooks and the students' workbooks had increased according to the evaluation survey. In addition, there was improvement in the average evaluation scores based on lesson observations in mathematics lessons of

[15] Terminal evaluation is usually conducted six months prior to project completion. The terminal evaluation was conducted from September 17 to October 7 2005 for Phase 1 and from September 30 to October 29 2010 for Phase 2.

[16] In PROMETAM, as indicators of the teachers' ability of mathematics, Japanese experts and C/Ps visited primary school and observed lessons to score and evaluate the quality of lessons conducted by teachers based on pre-defined criteria such as the quality of questions to students, use of the blackboard, and advice to students.

the 4th grade. There were also improvements in the results of tests conducted before and after the training on mathematics teaching methods as well as in the results of the evaluation of lessons during teaching practice. With these facts, it was evaluated that the project purpose, i.e., improvement of teaching ability of mathematics of primary teachers and students in pre-service training course, was being achieved.

【Phase 2 Regional Component】

The project purpose, the capacity development of core group members, was evaluated as achieved because activities were being planned and implemented at the initiative of the core group in each country and the planned activities were completed at the time of the Terminal Evaluation.

1.3.2 Achievement of Overall Goal at the time of the Terminal Evaluation

【Phase 1】

At the time of the Terminal Evaluation, trainers trained through PROMETAM provided training for teachers in areas other than the five targeted departments. Therefore, it was considered that the overall goal would be achieved if training was provided continuously and if teachers encouraged students' individual study, including doing homework and utilizing the students' workbooks.

【Phase 2 National Component】

The improvement in the academic achievement score was listed as an indicator. The follow-up report on the progress of EFA in Honduras compiled by the Secretariat of Education reported that there was a tendency towards improvement in the academic achievement of students in mathematics and that students utilized the students' workbooks with more writing in the workbooks. Therefore, it was evaluated that the possibility of the achievement of the overall goal, namely, improvement of academic achievement of students in mathematics, was high.

【Phase 2 Regional Component】

The Regional Component was focused on the improvement of the capacity of the core group, the main actor of bilateral project of each country in Regional Component. The core group members trained in the PROMETAM Regional Component were expected to implement activities in the bilateral projects in each country to improve the capacity of teachers. With this project design, it was impossible to forecast the achievement of the overall goal of PROMETAM Regional Component, improvement of teaching ability of mathematics at the time of the Terminal Evaluation, and evaluation of the achievement of the overall goal was not included in the Terminal Evaluation of PROMETAM Phase 2.

1.3.3 Recommendations at the time of the Terminal Evaluation

Recommendations on the measures before the completion of the Project are; 1) to organize an international symposium to share the experiences and knowledge obtained through PROMETAM, 2) to provide support to maintain a human network of implementing agencies of five countries of the Regional Component. In addition, the continuous role of INICE as a regional teacher training center in Central America was presented as a recommendation after the completion of the Project.

2. Outline of the Evaluation Study

2.1 External Evaluator

Tanaka Erika, Global Group 21 Japan, Inc[17].

2.2 Duration of Evaluation Study

Duration of the Study:	September, 2013 – October, 2014
Duration of the Field Study:	November 10, 2013 – December 16, 2013 (1st)
	March 22, 2014 – March 31, 2014 (2nd)

2.3 Constraints during the Evaluation Study

Interviews with teachers and lesson observations were not conducted sufficiently during the evaluation because lessons were not being conducted at primary schools during the first field study[18] and the duration of the second field study was limited. A beneficiary survey was planned to evaluate the project impact and was to be conducted by distributing a questionnaire to teachers teaching at primary schools selected by random sampling based on the school list of the Secretariat of Education, with considerations being made for access. However, selection was not conducted as planned because regular lessons had been completed. Instead, the Secretariat of Education selected several departments and the departmental education offices distributed the questionnaire to teachers[19].

[17] The evaluator belongs to Global Management Inc. and participated in the Evaluation Study conducted by Global Group 21 Japan Inc.

[18] The first field study was started before the completion of the academic year. During the academic year, there was not a single strike by teachers and the planned curriculum was covered without delay, and therefore, regular lessons were completed earlier than usual.

[19] In addition, a questionnaire was distributed to teachers who attended the training course conducted by the National Pedagogic University and teachers who attended the training conducted in six departments in Western Honduras by GIZ, the German assistance agency. Through these methods, questionnaire sheets were collected from a total of 264 teachers in 14 departments including all five targeted areas of Phase 1. This questionnaire survey is referred to as the beneficiary survey.

3. Results of the Evaluation (Overall Rating: A[20])

3.1 Relevance (Rating: ③[21])

3.1.1 Relevance to the Development Plan of Honduras and Countries of the Regional Component

【Phase 1, Phase 2 National Component】

At the beginning of both Phase 1 and Phase 2, the EFA plan was implemented, by which the universal completion of six years' primary school by 2015 was raised as a target, and the improvement of the quality of mathematics and Spanish education, along with raising the quality of teachers, were listed among the overall goals. The Education Sector Strategic Plan (Plan Estratégico Sectorial de Educación: 2005–2015), the country's basic education policy, lists the improvement of education efficiency and quality in its priority areas.

The EFA Plan and the education sector strategic plan were implemented as a basic policy in the education sector throughout the project period.

【Phase 2 Regional Component】

At planning, the improvement of the quality of primary education was mentioned in the strategic plan of CECC[22]. In the countries of the Regional Component, the EFA plan with the target year of 2015 was implemented throughout the project period.

3.1.2 Relevance to the Development Needs of Honduras and Countries of the Regional Component

【Phase 1, Phase 2 National Component】

At the planning of Phase 1, the need for improvements in mathematics education was high, as described before (1.1 Background).

In the academic achievement survey of Spanish (reading) and mathematics of primary students conducted by the Secretariat of Education in 2010 and 2012[23] (a little before and after the completion of the Project), the higher the school grade of the students, the lower the average mark of mathematics is (refer to Table 6 in 3.2.2 Impact). In Grades 7 to 9, the marks in percentage for mathematics were as low as the 30s while those of Spanish were around 60%. This shows that, in mathematics in early primary education, many students tend to "stumble", an issue that will become more problematic in secondary education. Through this survey, it was considered that the need for improvement of mathematics in primary education was high at the time of project completion.

[20] A: Highly satisfactory, B: Satisfactory, C: Partially satisfactory, D: Unsatisfactory
[21] ③: High, ②: Fair, ①: Low
[22] JICA "Implementing Study Report on the Project for Improvement of Teaching Method in Mathematics (PROMETAM) Phase II" (2006)
[23] The data from 2011, the year of the completion of Phase 2, was not available.

【Phase 2 Regional Component】

As described in "1.1 Background", during Phase 1 of PROMETAM, there were requests to use the materials developed in Honduras among countries in the Central American and Caribbean areas (Report on Implementing Study of Phase 2). In all four countries of the Regional Component, there were no official textbooks in mathematics before the start of Phase 2 and the need for cooperation was high at the planning stage of the Regional Component. According to the interviews with relevant organizations during the Ex-Post Evaluation, it was recognized that improvements in teacher quality were an important issue throughout the project period in each country of the Regional Component.

3.1.3 Relevance to Japan's ODA Policy

【Phase 1, Phase 2 National Component】

In the planning stage of Phase 1, human resource development and, especially, the improvement of primary education, was one of the priority areas in Japanese ODA policy toward Honduras (Ministry of Foreign Affairs, ODA Data Book 2002). At the time of the planning of Phase 2, basic education was named as one of four priority areas in Japanese ODA policy toward Honduras, with support for EFA-FTI as its top priority (ODA Data Book 2006).

【Phase 2 Regional Component】

In the planning stage, education was mentioned as one of the priority issues in Japanese ODA policy towards each country of the Regional Component[24] (ODA Data Book 2006 for each country).

This project has been highly relevant to the respective countries' development plans, development needs, as well as Japan's ODA policy. Therefore, its relevance is high.

3.2 Effectiveness and Impact[25] (Rating: ③)

3.2.1 Effectiveness

3.2.1.1 Project Output

【Phase 1】

Outputs 1 through 4 are considered as achieved as described in the following areas:

Output 1: To elaborate the teachers' guidebooks in mathematics for the teachers in the 1st and 2nd cycles of basic education

In regard to the indicator (i.e., publication of teachers' guidebooks in mathematics), the development of the teachers' guidebooks for nationwide distribution was completed and 4,600 copies of the sample

[24] In the ODA Data Book, promotion of development partners' coordination in the education sector is listed as a priority assistance area for Guatemala, strengthening of education and improvement of quality for El Salvador, education for the Dominican Republic, and improvement of enrollment rates and quality in primary education for Nicaragua, respectively.
[25] Sub-rating for effectiveness is grouped with consideration of impact.

version were distributed. Based on the feedback of the results of final monitoring, the revised versions of the teachers' guidebooks were elaborated[26].

Output 2: To elaborate the students' workbooks in mathematics for the students in the 1st and 2nd cycles of basic education

As to the indicator, publication of students' workbooks in mathematics, the nationwide version of students' workbooks was developed. The students' workbooks were recognized as the national textbook ("Terminal Evaluation Report I").

Output 3: The teachers who receive the in-service teacher training in the five targeted departments can develop their classes according to the instruction of the teachers' guidebooks

Two indicators were defined for this output. Indicator 1 was the number of primary teachers who completed in-service training and Indicator 2 was the number of primary teachers who obtained scores of more than 60% in the test of achievement and teaching methods. As shown in the table below, almost all the teachers completed in-service training with scores of more than 60%. In addition, volunteers conducted monitoring for teachers who received in-service training based on the monitoring sheet outlined by the Project. The monitoring results showed that teachers who received in-service training conducted classes utilizing the teaching methods acquired through the training.

Table 1: The number of teachers who participated in in-service training and completed the training with more than 60% scores

Training for Grades 1-3			Training for Grades 4			Training for Grades 5		
No. of participants	No. of those who completed	Completion rate (%)	No. of participants	No. of those who completed	Completion rate	No. of participants	No. of those who completed	Completion rate (%)
249	236	94.8	226	226	100%	226	226	100

Source: Terminal Evaluation Report I

Output 4 To improve teaching capacities of the counterparts through those three processes from (1) to (3) above.

Indicators for this output were not defined in the Project Design Matrix (PDM), however, it has been reported that C/P members who were directly trained by PROMETAM had improved their capacity in terms of understanding of teaching contents, and their attitude toward teaching after training (Terminal Evaluation Report I).

[26] JICA "Report on the Terminal Evaluation on the Project for Improvement of Teaching Method in Mathematics (PROMETAM) Phase I in Honduras" ("Terminal Evaluation Report I").

【Phase 2 National Component】

Outputs 1, 2 and 4 were considered to be achieved as follows. As for output 3, although the indicator, the capacity of primary teachers, was achieved, the training system was not fully established.

Output 1: Teachers' guidebooks and students' workbooks for Grades 1-6 in mathematics are revised.

The indicator of this output was authorization of the students' workbooks developed during the Project by the Secretariat of Education. At the time of the terminal evaluation, the second version of the teachers' guidebook and the students' workbooks whose revision was completed in 2007 had been authorized as the national textbook by the Secretariat of Education and the Secretariat of Education was printing and distributing the students' workbooks. Modifications were made to the students' workbooks for Grade 3 and above so that they can be reusable in a text style without writing by students in a note style. The sample versions of the reusable students' workbooks were presented to the Secretariat of Education at the completion of the Project[27].

Output 2: (Pre-service training) Teachers in 12 "Escuela Normal" and "Formación Inicial de Docentes (FID) have capacity to work as trainers on the use of teachers' guidebooks and students' workbooks in mathematics for Grades 1–6.

Table 2 shows the results of the evaluation tests for training, the indicator of this output. The tests (both pre- and post-test) were conducted before and after the training for teachers of Escuelas Normales and the FID course of the National Pedagogic University. The test scores improved after the training and an improvement in knowledge of mathematics teaching was recognized. In addition, in the comparison of the results of lesson observations for teachers at Escuelas Normales conducted in 2008 and 2010, improvements in actual lessons were recognized (Terminal Evaluation Report II).

Table 2: Results of tests before and after training for teachers of FID and "Escuela Normal"

Stage	Period	No. of participants	Pre-test (Score: %)	Post-test (Score: %)
1	May 2007	61	31.7	54.1
2	Aug. 2007	48	52.5	67.7
3	Dec. 2007	41	66.6	80.0
4	Feb. 2008	59	64.2	82.9
5	May 2008	56	47.4	76.2
6	Aug. 2008	48	48.5	84.5
7	Feb. 2009	44	53.9	79.2
8	Jan. 2010	42	50.8	75.6
9	May 2010	56	60.8	69.1

[27] JICA "Report on the Terminal Evaluation of on the Project for Improvement of Teaching Method in Mathematics (PROMETAM) Phase II in Honduras" ("Terminal Evaluation Report II").

10	Oct. 2010	53	63.4	85.6
11	Feb. 2011	59	-	-

Source: Based on materials presented by JICA

Output 3: (In-service training) National trainers of the in-service training program have the capacity to work as trainers on the use of teachers' guidebooks and students' workbooks in mathematics for Grades 1–6.

As the indicator of this output, evaluation tests were conducted several times before and after the training for national trainers or departmental trainers in 18 departments (after 2008). Improvements were recognized in the results of the tests after the training each time. It was found that the level of trainers in understanding of the teaching methods in mathematics had improved and training capacity was enhanced through training.

Table 3: Results of tests before and after training for national trainers and outline of training for departmental trainers and primary teachers

	Period	Major topics	No. of participants in national trainer training	Pre-test (Score: %)	Post-test (Score: %)	No. of participants in departmental trainer training (information for reference)	Coverage rate of departmental training participants (primary teachers) of all teachers (%)
1	May 2006	Natural numbers, Basic four operations, etc.	47	62.7	66.9	934	109*
2	Jun.2007	Decimal four basic operations, Figures, Teaching methods, etc.	120	44.9	56.5	1,227	109
3	Nov. 2007	Fraction four basic operations, etc.	109	68.4	78.0	1,430	95
4	May 2008	Complicated four basic operations, Figures, Teaching methods	1,450	56.8	74.7	-	72

5	Jun. Sept. and Nov. in 2009 Jan. 2010	Decimal and fraction division, Volume and measurement, etc.	1,004	28.4	68.8	-	43

Source: Based on the Terminal Evaluation Report II and materials presented by JICA.
*The number of all teachers was calculated based on the statistics of the Secretariat of Education. In PROMETAM training, there was also participation by teachers from PROHECO, a community-based alternative school program assisted by the World Bank. The teachers of PROHECO school are not included in the registration of teachers employed by the Secretariat of Education. Therefore, the coverage of participants to all teachers (registered at the Secretariat of Education) may exceed 100%.

Although indicators were achieved as described above, a system to continuously train teachers by national trainers has not been established. At first, the three-staged cascade system was implemented. There it was expected that five C/P members would train national trainers (122 selected primary teachers). Subsequently, the national trainers would train departmental trainers (1,540 selected primary teachers, following which the departmental trainers would train all teachers at the primary school level. However, in 2008, after a review of the training plan and training implementation system by the Secretariat of Education, it was modified into a two-stage cascade system, where C/Ps (4 technical staff at the Secretariat of Education) trained national trainers (1,500 selected teachers), who trained all teachers. As a result, the number of national teachers to be trained directly by C/Ps increased 10 times, which made C/Ps too overworked to fully conduct the monitoring of teachers at the primary school level. In addition, the national teacher training system (called SINAFOD from its Spanish abbreviation) was under a process of continuous reform and the teacher training system was frequently changed. This made it difficult to establish a cascade training system so that the system was well incorporated into the national training system. Moreover, EFA funding[28] by donor agencies was suspended due to some audit problems in 2009, which caused frequent cancelations and postponements of in-service training (materials presented by JICA). Due to the above-mentioned factors, an in-service training system was considered not fully established. However, establishment of the training system was not a part of the activities or indicators in the PDM. It is considered that the teachers' capacity was improved to some extent as shown by the indicators.

Output 4: General interest, especially among primary school students, teachers, and students in pre-service training courses, in mathematics education, is increased.

At the Terminal Evaluation, it was reported that psychological difficulties towards mathematics were reduced and interest in mathematics had been enhanced among teachers and students after the teachers' guidebooks and the students' workbooks were introduced in mathematics lessons (Terminal Evaluation Report II)[29]. During the project period, thirteen newsletters were issued as an activity to

[28] Some development agencies that support EFA provide financial assistance from a "Common Fund" (EFA fund) to be spent on specific activities at the Secretariat of Education.
[29] Interviews with teachers at Escuelas Normales during the Ex-Post Evaluation clarified that lesson preparation for teachers

enhance general interest in mathematics education. In the interviews conducted during the Ex-Post Evaluation, organizations including the National Pedagogic University, Escuelas Normales, departmental education offices, and development agencies showed a high level of recognition of materials developed by PROMETAM. Students at Escuelas Normales also commented that their interest in mathematics had been enhanced. Based on these facts, it is considered that the expected output had been achieved at project completion.

【Phase 2 Regional Component】

It is evaluated that the outputs 1 to 3 were achieved as follows.

Output 1: The core group members obtain the necessary competence for development and adjustment of teachers' guidebooks and students' workbooks in each country, based on the materials developed by PROMETAM.

In regard to the indicator (i.e., the results of analysis of training for the core group), pre-and post-tests of the regional training showed the improvement in performance after the regional training[30] in each training session (Terminal Evaluation II). In the Regional Component, the development of the teachers' guidebooks and students' workbooks was completed based on those developed in Honduras but adopted to the situations in each country at the initiative of the core group members at the terminal evaluation of the bilateral project in each country of the Regional Component. The developed teachers' guidebooks and students' workbooks were printed and distributed[31] as national textbooks except in the Dominican Republic. The quality of the developed materials was evaluated highly at the terminal evaluation of the bilateral project in each country. The majority of those interviewed in the Ex-Post Evaluation commented that the materials were easy to use and/or useful for the improvement of classes. The drafts of materials were elaborated mainly by the core group members with the assistance of Japanese experts, and therefore, a majority of those interviewed considered that their capacity for materials development had improved through the activity.

Output 2: The core group members obtain the necessary competence to implement pre-service and/or in-service teacher training in each country.

In regional training, comparison between the results of pre- and post-tests of training was conducted. The evaluation of training capacity was conducted based on the following evaluation criteria; the level of understanding of the contents of the teachers' guidebooks, the ability of conducting lecture-

became easier and both students in the pre-service teacher training and students at primary school understand the subject contents better through utilization of the teachers' guidebooks and the students' workbooks. Students in the pre-service teacher training course commented that the teachers' guidebooks and students' workbooks are easy to understand and they are described to attract interests of uses, reducing the image that mathematics is difficult.

[30] Five regional training courses were conducted to improve the capacity of core group members in five targeted countries in the Regional Component. In each training course, there were several observer participants in addition to core group members.

[31] The development of the teachers' guidebooks and students' workbooks was defined as activities in a bilateral project in each country of the Regional Component. Printing and distribution of the teachers' guidebooks and students' workbooks that were developed was not included in the activities of a bilateral project in each country.

style training and the ability of conducting practice-style training. The evaluation showed that their training capacity had improved. With the results of evaluation, it was considered that training capacity had improved after the training (based on information provided by JICA). In the interview during the Ex-Post Evaluation, core group members commented that they had enhanced their capacity in terms of structuring training and classes including time management, utilization of the blackboard and teaching/learning materials, encouraging participants and students to improve their interest, and so on.

Output 3: The project experiences are shared among targeted countries and others.

Two international symposiums on the Regional Component were held over a five-year period, which means the target of Indicator 1 of this output, at least two international symposiums, was achieved. In addition, core group members of each targeted country participated in national seminars in the other countries of the Regional Component, sharing experiences of their projects as well as acquiring seminar management skills. Ten issues of the newsletters on the Regional Component activities were published as planned, as required by Indicator 2 (information provided by JICA). As for Indicator 3, namely the number of participants in a communication network (mailing list), registration for the mailing list includes all of those involved in the Project, such as core group members, Japanese experts and national staff of bilateral projects in each country of the Regional Component, with information sharing and exchanges implemented (Terminal Evaluation Report II).

3.2.1.2 Achievement of Project Purpose

【Phase 1】

Project Purpose: To improve the teaching method in mathematics in the 1st and 2nd cycles of basic education in five targeted departments, namely, El Paraiso, Ocotepeque, Colón, Valle and Comayagua, applying the teachers' guidebooks and the students' workbooks.

Indicator (Improvement in the analysis results of mathematics classes conducted by teachers who receive the in-service teacher training)

The group comparison of teachers of 4th grade[32] shows significant differences in the quality of each lesson. Lessons by teachers who received training were better than lessons by those who did not receive training in terms of teaching through encouraging students to think for themselves, conducting lessons based on effective planning, and teaching methods (Terminal Evaluation I).

【Phase 2 National Component】

Project purpose: Teaching method of teachers and students in pre-service training courses in mathematics for Grades 1-6 is improved.

(For teachers in-service)

[32] A comparison was conducted between 40 teachers of 4th grade who used PROMETAM materials and received training and those who did not. This is because the analysis was conducted for teachers of 4th grade when training for 4th grade was completed.

1) Indicator 1 (Results of diagnosis on the use of the teachers' guidebooks and students' workbooks)
According to the questionnaire conducted during the Project, the percentage of teachers who responded that they used the teachers' guidebooks and students' workbooks was increasing (Table 4). The reasons for not using them were: the teachers' guidebooks and students workbooks had not been distributed, and they did not know how to use them (Terminal Evaluation Report II).

Table 4: Percentage of teachers who use teachers' guidebooks and students' workbooks

Year	2007	2008	2009	2010
Teachers' guidebook	74.9	90.0	98.7	96.7
Students' workbook	78.0	93.2	99.5	93.5

Source: Based on the Terminal Evaluation Report II

2) Indicator 2 (Results of analysis of mathematics classes)
The average percentage of the results of analysis of mathematics classes (for 4th Grade) increased from 68.8 in 2008 to 75.6 in 2010. In the beneficiaries' survey during the Ex-Post Evaluation, 44.3% of teachers surveyed responded that their teaching capacity had improved "very much" and 11.0% of teachers responded that their capacity improved "to some extent" through utilization of the teachers' guidebooks and students' workbooks. As to the specific abilities that had improved, better knowledge of mathematics was indicated by 44.7% of teachers, use of the blackboard by 44.7% of teachers, and use of teaching/learning materials by 44.3% teachers (multiple answers possible).

(For students in pre-service training)

3) Indicator 3 (test results of teaching method in mathematics for students in pre-service training)
Comparison of the test results (percentage of correct answers) before and after the training in mathematics teaching methods for students in the pre-service training course at FID and Escuelas Normales, showed improvement in both subject contents and teaching methods after 2008.

Table 5: Results of the tests before and after the training for students in the FID course and Escuelas Normales (% of correct answers)

	Contents	Before（%）	After（%）
2007	Subject contents	22.9	26.4
	Teaching methods	40.7	42.0
2008	Subject contents and teaching methods	40.6	66.4
2009	Subject contents	21.9	42.0

Source: Based on Terminal Evaluation Report II

4) Indicator 4 (Analysis of results of mathematics classes in teaching practice of students in pre-service training)

As for the students of the FID course at the National Pedagogic University, the average percentage of the results of the mathematics class in teaching practice was 66.5 in 2007 and 66.4 in 2009 – not a significant change. As for the students of the 3rd Grade of Escuela Normal, the average points in classroom observation of teaching practice improved from 63 in 2009 to 73 in 2010 (information provided by JICA).

【Phase 2 Regional Component】

Project Purpose: Capacity of the core group members to improve the teaching methods in mathematics in targeted countries is developed.

Indicator (Planning and implementation of activities on improvement of teaching method in mathematics by core group members in each country of the Regional Component)

In bilateral projects in each country of the Regional Component, activities such as the development of materials and teacher training were planned and implemented at the initiative of the core group and planned activities were completed at the completion of each bilateral project. This shows that the core group members have sufficient capacity through the PROMETAM Regional Component.

The project purpose has been achieved in Phase 1, the Phase 2 National Component, and the Phase 2 Regional Component.

3.2.2 Impact

3.2.2.1 Achievement of Overall Goal

【Phase 1】

Overall Goal: To improve the teaching methods in mathematics in the 1st and 2nd cycles of basic education, in departments other than five targeted departments, namely El Paraiso, Ocotepeque, Colón, Valle and Comayagua through disseminating the project results.

Indicator (Improvement in analysis results of mathematics class)

As described before, according to the Terminal Evaluation of Phase 1, the overall goal was likely to be achieved and nationwide expansion of project benefits was expected by the trainers who have received training.

During the Ex-Post Evaluation, a beneficiary survey was conducted for teachers in fourteen departments including the five targeted departments in Phase 1. According to the results, evaluation results were high in terms of frequency of utilization of the teachers' guidebooks and the students' workbooks, improvement in their own teaching capacity, and improvement of students' capacity. There were no significant differences between the respondents in the five targeted departments and those in other departments. Teacher training was conducted for teachers only in five departments in

Phase 1 but was expanded to all departments in Phase 2. Therefore it is considered that the project benefits have expanded equally in Honduras through distribution and utilization of the teachers' guidebooks and the students' workbooks.

【Phase 2 National Component】

Overall Goal: Students' academic achievement in mathematics for Grades 1-6 is improved.

Indicator (Results of academic achievement test scores of students)

According to the Terminal Evaluation, the overall goal was likely to be achieved in that there was a tendency toward improvement in students' academic achievement test scores.

The results of an academic achievement test in mathematics conducted by the Secretariat of Education in 2010, 2012 and 2013 are shown in Table 6 together with the results of Spanish as a reference.

Table 6: Test scores indicating academic achievement in mathematics and Spanish (%)

	Year/Grade	1	2	3	4	5	6
Mathematics	2010	73	53	52	41	39	37
	2012	79	61	55	55	48	53
	2013	84	61	54	58	48	57
Spanish	2010	54	52	51	65	62	60
	2012	64	57	66	62	63	69
	2013	66	60	69	69	70	70

Source: Based on "Informe Nacional Rendimiento Académico" 2010, 2012, 2013, Secretariat of Education, Honduras

The results show an increase in academic achievement in mathematics during the period from 2010 to 2013. It is difficult to precisely show a direct relationship with PROMETAM as the scores in Spanish improved as well, the test questions are different from year to year, and the academic achievements of the students may depend on various other factors, for example, the attitudes of parents, effective school days (or cancellation of lessons due to strikes by teachers), among others. However, according to interviews with relevant agencies during the Ex-Post Evaluation, it is considered that the Project had some impact on the academic achievement of students[33].

Among teachers at Escuelas Normales and teachers at primary schools interviewed during the Ex-Post Evaluation, some commented that there was an improvement in the academic achievement of students, while others said there had not been. According to the beneficiary survey, teachers who

[33] There were no national textbooks before the start of PROMETAM. The development and distribution of the teachers' guidebooks and students' workbooks, which became national textbooks, has had a significant influence on the academic achievement of students, according to some interviewees at the Secretariat of Education and development agencies.

responded that students' capacity improved "very much" accounted for 39.4%, while teachers who responded "to some extent" accounted for 14.8%. The specific capacity of students showing improvement is indicated in Table 7. There are few teachers who indicate academic achievement score but they recognize that student capacity is being improved in terms of participation in class, understanding of subject contents, and problem solving.

Table 7: Improvement of capacity of students (Multiple answers possible)

Item	Interest in mathematics	Level of participation in class	Understanding of subject contents	Problem-solving ability	Academic achievement score	Other
% of teachers who indicate each item (N=264)	42.0	48.9	43.6	42.8	33.7	1.9

Source: Beneficiary survey

【Phase 2 Regional Component】

Overall Goal: Teaching methods in mathematics for teachers of targeted countries is improved.

Indicator (Results of lesson observation)

At the Terminal Evaluation, it was considered impossible to evaluate the impact produced by the Regional Component as described before.

At the Ex-Post Evaluation, lesson observations, the indicator of the overall goal, were not conducted due to time limitations. However, it can be said that the capacity of teachers in each country of the Regional Component has been improved as follows.

The teachers' guidebooks and the students' workbooks developed have been designated as the national textbook in all five countries in the Regional Component and actually utilized. Based on interviews with core group members, as well as teachers at Escuelas Normales and primary schools, it can be reported that primary teachers' capacity has improved in terms of the ways of encouraging students to participate, presentation methods, use of the blackboard, and class management. Core group members commented that regional training in Honduras and technical exchanges[34] with a similar project in Bolivia conducted as part of the Regional Component contributed to the improvement of their capacity and were beneficial in conducting training in their countries. Through these facts, the capacity of teachers has improved through the Regional Component. It should be noted that it is difficult to evaluate the impact of the PROMETAM Regional Component, as it was implemented in each of the Regional Component country as a bilateral project. However, it is considered that there has been a certain impact on the achievement of the overall goal through

[34] In the technical exchanges, those involved in one technical cooperation project visited another technical cooperation project implemented in another country. In PROMETAM, technical exchanges were conducted between projects to improve the quality of education in Bolivia (called PROMECA, from its Spanish abbreviation), where they observed class management and teaching methods and exchanged opinions with those involved in PROMECA. Technical exchanges for the PROMETAM Regional Component were held three times, twice in Bolivia and once in Honduras.

PROMETAM, as seen by the fact that core group members trained by PROMETAM implemented activities related to teacher training in each country.

As described above, it can be said that the overall goal has been largely achieved in Phase 1, the Phase 2 National Component, and the Phase 2 Regional Component.

3.2.2.2 Other Impacts

Several unexpected positive impacts should also be recognized. Negative impacts have not been reported.

【Phase 1】

There were requests among some other countries in Central America to use the teachers' guidebooks and students' workbooks and the possibility of regional cooperation was discussed, which led to the formulation of the Regional Component of Phase 2. This can be acknowledged as an impact of Phase 1.

【Phase 2 National Component】

The teachers' guidebooks and the students' workbooks in mathematics for Grades 7-9, developed at the initiative of C/Ps at INICE, were printed and distributed to about 700 primary schools by the Secretariat of Education with the support of the International Development Bank (IDB) at the time of the Terminal Evaluation of Phase 2 (Terminal Evaluation Report II). At the time of the Ex-Post Evaluation, the drafts of the second version of the teachers' guidebooks and the students' workbooks for Grades 7–9 had been completed. With the assistance of short-term experts, completion is planned for approximately August 2014 and the textbooks will be introduced in the academic year of 2015 (interview at INICE).

The teachers' guidebooks and the students' workbooks developed by PROMETAM have been utilized in several projects supported by other development agencies. Teaching/learning materials for computer-assisted learning programs based on the teachers' guidebooks and the students' workbooks were developed in the project (called EDUCATRACHO) assisted by IDB and utilized at primary schools[35]. Moreover, GIZ is implementing training using materials and teaching methods introduced by PROMETAM in six departments in the western part of Honduras.

[35]Through assistance by EDUCATRACHO, computer terminals were distributed to 466 primary schools in 16 departments out of 18 nationwide (at the time of the Ex-Post Evaluation). On-line training for teachers is being conducted by utilization of the computer materials. Training participants can ask questions by e-mail and the staff at EDUCATRACHO respond to them. According to EDUCATRACHO staff, on-line materials are frequently used at primary schools and the computer terminals are well maintained.

【Phase 2 Regional Component】

According to the interviews with core group members during the Ex-Post Evaluation, lesson observations are being conducted in countries of the Regional Component based on the lesson observation sheet developed by PROMETAM. The core group members in El Salvador commented that the teaching methods introduced by PROMETAM can be applied to other subjects as primary teachers teach subjects other than mathematics. One of the core group members in the Dominican Republic said that he applies the same teaching methods in mathematic courses for adults.

This project has largely achieved the project purpose as well as the overall goals in Phase 1, the Phase 2 National Component, and the Phase 2 Regional Component. Therefore, the effectiveness/impact of this project is high.

3.3 Efficiency (Rating: ③)

3.3.1 Inputs

【Phase 1】

Inputs	Plan	Actual
(1) Experts	2 persons / year for Long-Term 2 persons / year for Short-Term	4 persons for Long-Term 5 persons for Short-Term (Cumulative total of experts dispatched)
(2)Trainees received	3 persons / year (Training in Japan)	20 persons (Training in Japan)
(3)Third-Country Training Programs	Not specified for the number of trainees	0
(4) Equipment	Vehicles, computers, projectors, PC software, etc.	(14 million yen)
Total Project Cost	Approximately 245 million yen	232 million yen
Total Local Cost	Not specified	Not specified

【Phase 2 (National and Regional Components】

Inputs	Plan	Actual
(1) Experts	5 persons for Long-Term Short-Term Experts in training planning, lesson improvement, education evaluation, public relations and sensitization	6 persons for Long-Term 8 persons for Short-Term
(2)Trainees received	15 persons per year	20 persons (Training in Japan)

(3)Third-Country Training Programs	Planned although specific No. of trainees is not described	Regional Training 22 persons from Honduras 182 persons from 4 Regional Component countries, including observers (Cumulative total)
(4) Equipment	Vehicle for monitoring, etc.	None
Total Project Cost	Approximately 660 million yen (360 for National Component, 300 for Regional Component)	450 million yen
Total Local Cost	Not specified	Not specified

3.3.1.1 Elements of Inputs

【Phase 1】

Japanese experts were dispatched almost as planned. Although the number of dispatched experts was not as large as that of experts usually assigned to similar activities in Japan, the planned outputs were produced (Terminal Evaluation Report I). Equipment including computers and vehicles was supplied as planned and was utilized for materials development and monitoring.

【Phase 2】

Among experts that JICA was planning to dispatch, one long-term expert and one short-term expert were not dispatched due to the effects of a political coup. However, those interviewed at INICE and the National Pedagogic University consider that activities of materials development and teacher training were appropriately supported by the Japanese experts dispatched, leading to sufficient output. Equipment supplied during Phase 1 was used continuously in Phase 2 as well. To improve the capacity of core group members, three technical exchange programs were held between the education project (PROMECA) in Bolivia, although the technical exchange programs were not included in the initial plan. In addition, officials at the departmental education office and teachers at Escuelas Normales commented that activities with volunteers were useful to produce outputs at the school level.

For bilateral projects in four countries in the Regional Component, only short-term experts were planned to be dispatched initially. Experts dispatched to Honduras had planned to visit the four other countries of the Regional Component for further assistance and there was no plan to dispatch long-term experts to assist with the bilateral projects in the other four countries. However, over the course of time, to provide sufficient technical transfers, long-term experts in areas such as primary education improvement and project coordination were dispatched to assist the bilateral projects in these four countries. This is because development of teachers' guidebooks and students' workbooks based on PROMETAM materials required greater technical assistance than expected, according to the

interviews with core group members in the four countries during the Ex-Post Evaluation. It should be noted, however, that the additional dispatch of long-term experts was implemented within the framework of each bilateral project in each of the four countries of the Regional Component and this does not mean that the inputs of PROMETAM needed to be increased.

In regard to the Honduran inputs, five assigned C/P were engaged solely in PROMETAM, which was efficient enough to produce the outputs. A budget shortage on the Honduran side since 2009 caused training courses to be suspended or postponed. However, planned outputs were produced through securing financial support from other donor agencies and implementing alternative activities (Terminal Evaluation Report II and interviews with INICE and donor agencies during the Ex-Post Evaluation).

3.3.1.2 Project Cost

In Phase I, a total of 245 million yen was budgeted at the Ex-Ante Evaluation and 232 million yen was actually disbursed. In Phase 2 (for both National and Regional Components), a total of 660 million yen was budgeted at the Ex-Ante Evaluation and 450 million yen was actually disbursed. The total cost was lower than the planned budget in both Phase 1 and 2.

3.3.1.3 Period of Cooperation

The project period was three years in Phase 1 and five in Phase 2, just as planned for both phases. During the period of Phase 2, some activities were suspended and changed due to the political coup in 2009 but the planned outputs were still achieved within the planned period through flexible implementation of the planned activities.

Both the project cost and project period were within the plan. Therefore, efficiency of the Project is high.

3.4 Sustainability (Rating: ②)

3.4.1 Related Policy towards the Project

【Phase 1, Phase 2 National Component】

Sustainability in terms of policy is high, as the policy to put a priority on mathematics education is continuing and the materials developed by PROMETAM have been continuously utilized.

Both the current education sector strategic plan and the EFA Plan cover the period until 2015. According to the Secretariat of Education, the education plan after 2015 (still to be formulated) will continue to list mathematics education as a priority area, as the level of academic achievement in mathematics is still not sufficient - although there has been a tendency toward improvement.

In Honduras, the Education Basic Law was revised in 2012 and the third cycle (Grades 7-9) was included in a compulsory subject. However, the policy of placing importance on primary education (1st and 2nd cycles: Grades 1–6) has not changed. In addition, the revised Basic Education Law stipulates that the qualifications of primary teachers (for Grades 1-6) be upgraded from graduation from Escuela Normal to that from university. With this backdrop, Escuela Normal, which has played an important role in pre-service teacher training and was supported by PROMETAM, accepted new students in the academic year 2014 but future plans after that are still under discussion. According to the interview at the Secretariat of Education and the National Pedagogic University, most Escuelas Normales are planning to continuously engage in pre-service training. The Secretariat of Education is still examining the framework of SINAFOD but is implementing training, including courses to upgrade qualifications and is planning to support teacher training in the future as well.

The teachers' guidebooks and the students' workbooks are still designated as national textbooks. It is required that the students' workbook for Grade 3 and higher be reused without notes by students in the workbook. The Secretariat of Education is planning to evaluate and revise the current curriculum in 2015 and, based on the curriculum, the teachers' guidebooks and students' workbooks will be revised by INICE, if necessary, according to the interview with the Secretariat.

【Phase 2 Regional Component】

The teachers' guidebooks and the students' workbooks are authorized and have been continuously utilized as the national textbooks in El Salvador, Guatemala, and Nicaragua, which means sustainability in terms of policy is high. In the Dominican Republic, one development agency also supported the development of a textbook and coordination between this development agency and JICA's project was not smoothly conducted at the Ministry of Education. During the project period, the materials developed by another development agency were adopted as the national textbooks[36]. However, the JICA office in the Dominican Republic promoted the adoption of materials developed by the Project, and the materials were officially recognized as the national textbook and presented on the website of the Ministry of Education at the time of the Ex-Post Evaluation.

3.4.2 Institutional Aspects of the Implementing Agency

【Phase 1, Phase 2 National Component】

The sustainability is generally high in terms of assignment of C/P personnel and activities of C/P organizations but the teacher in-service training system is not well established, which may be a concern in terms of the sustainability from an institutional perspective.

[36] After PROMETAM was launched, one development agency started to provide assistance in the development of a mathematics textbook with one university as its major counterpart. This university was not the one supported by JICA's project.

In the Ex-Post Evaluation, among five C/P members during the project period, four are still engaged in materials development and teacher training at the same organizations. The remaining one is working in a similar post in the project of another development agency and engaged in training and materials development based on PROMETAM's teachers' guidebooks and students' workbooks in collaboration with INICE.

In regard to activities introduced by PROMETAM, the in-service teacher training system by cascade was not well established and was not functioning sufficiently during the project period (see 3.2.1. Effectiveness). At the time of the Ex-Post Evaluation, the organizations concerned are trying to revamp the system. In some departments visited during the Ex-Post Evaluation, training courses on teaching methods and materials introduced by PROMETAM have been planned and organized on the initiative of the departmental education offices in collaboration with JICA volunteers, although there is a considerable difference in the extent of implementation of training courses among the departments[37]. As for lesson observations, training is provided at INICE based on the lesson observation sheet developed by PROMETAM as well as one-day visits to primary schools by INICE officials[38].

【Phase 2 Regional Component】

Institutional sustainability is high, as core group members trained by PROMETAM are continuously engaged in the expected activities. However, regional activities conducted during the project period are not being actively implemented.

During the Ex-Post Evaluation, almost all of the core group members were still working in materials development and teacher training at the same post or the post to which they were transferred in each country of the Regional Component. The core group members said that they were transferring their knowledge and techniques to other staff in their workplace, which means that the institutional systems have been established sufficiently enough to continuously implement activities introduced by PROMETAM.

Table 8: Assignment of core group members of the Regional Component

Country	During PROMETAM Phase 2	At Ex-Post Evaluation (As of Dec. 2013)
Dominican Republic	7 (7 at the Ministry of Education)	5 at the Ministry of Education 1 at university (as teacher)

[37] In El Paraiso Department, JICA volunteers provide two-day training courses once every three months to train departmental trainers. The departmental trainers conduct training with teachers at primary schools. In Lempira Department, in-service training at the local level was conducted during the project period on the initiative of the departmental education office. However, training has not been conducted since the completion of PROMETAM (interview at departmental education offices and Escuelas Normales during the Ex-Post Evaluation).

[38] According to the interview at INICE, lesson observations are the responsibility of the principal due to the decentralization policy. Therefore, actual implementation of lesson observations depends on the discretion of principals.

		1 retired
El Salvador	13 (13 at the Ministry of Education)	12 at the Ministry of Education 1 resigned
Guatemala	5* (4 at the Ministry of Education, 1 at pedagogic university)	4 at the Ministry of Education 1 at pedagogic university
Nicaragua	9 (cumulative total of Phase 1 & 2) * （6 at the Ministry of Education, 2 at “Escuela Normal”, 1 secondary school teacher）	4 at the Ministry of Education 2 at “Escuela Normal” 2 retired 1 passed away

Sources: Based on information by the local consultant hired for the Ex-Post Evaluation

* Phase 2 of the bilateral project was implemented in Guatemala and Nicaragua. The number of core group members in Guatemala at the end of the Phase 2 of the bilateral project is as indicated (as of 2012). In Nicaragua, Phase 2 of the bilateral project is still ongoing and there may be changes in core group assignments. The cumulative number of core group members of bilateral projects of Phase 1 & 2 in Nicaragua is as indicated.

Activities of the Regional Component are not being implemented very actively after the project completion. They exchange information on an individual basis but do not share information, utilizing the mailing list among ex-core group members. In 2011 a workshop was held to discuss the direction of regional activities with participation all five countries of the Regional Component. However, after the completion of PROMETAM, the Honduran implementing agency has not taking on the role of coordinator to organize regional activities continuously. Currently Nicaragua, where the bilateral project is being implemented, is designated as country holding the temporary presidency of the Regional Component but those involved in the Nicaraguan bilateral project are not making any special efforts to coordinate regional activities, according to the interview during the Ex-Post Evaluation. At the completion of PROMETAM, mutual learning for continuous capacity development was expected through activities such as sharing information and their expertise, but those kinds of activities have not been implemented and the coordinating system for the activities is not functioning well either. Nonetheless, the fact that regional activities are not being implemented has not caused many problems so far, because the objective of the Regional Component is to improve the capacity of the core group members. The core group members trained through PROMETAM are continuously engaged in the activities at implementing agencies in each country, thereby utilizing the benefits of PROMETAM.

As described above, institutional sustainability of the implementing agency is generally high in Phase 1 and Phase 2 of the National and Regional Components, although the establishment of in-service training to sustain the project benefits is still an outstanding issue from the Phase 2 National Component.

3.4.3 Technical Aspects of the Implementing Agency

【Phase 1, Phase 2 National Component】

It can be said that C/P members can carry out their activities almost on their own, although a certain level of external assistance is still necessary. During the field survey of the Ex-Post Evaluation, it was

confirmed that C/P members at INICE and the National Pedagogic University are implementing activities continuously under their own initiative. C/Ps interviewed at INICE and the National Pedagogic University commented that they had developed the capacity to continue their work through PROMETAM activities. At INICE, the teachers' guidebooks and students' workbooks for Grades 7 to 9 were developed and revised after Phase 2, with support by short-term experts. The interview with the C/P revealed, however, that expert assistance is still necessary[39] , although they are developing materials on their own initiative.

【Phase 2 Regional Component】
At the Ex-Post Evaluation, development and revision of materials and training are being implemented at the initiative of core group members in each country of the Regional Component. Based on the interviews, most core group members consider they have sufficient capacity to carry out their duties. Sustainability in technical aspects is therefore considered high.

3.4.4 Financial Aspects of the Implementing Agency

【Phase 1, Phase 2: National Component】
At the Terminal Evaluation of both Phase 1 and 2, the unstable financial situation was pointed out. There was still concern about financial sustainability at the time of Ex-Post Evaluation as well, as described below.

The budget for additional printing of the teachers' guidebooks and students' workbooks has not been secured. The Secretariat of Education is planning to strengthen in-service training utilizing the cascade system as well as lesson observations. However the budget to implement these activities continuously and regularly has not been secured either and activities are implemented on an ad hoc basis, depending on the available budget. The EFA Fund, which was suspended at the time of the Terminal Evaluation, was resumed in 2011, but various conditions have been applied and the available budget is smaller, according to the interview at the Secretariat of Education. The Secretariat of Education is trying to strengthen the financial basis, calling for assistance from bilateral donor agencies and non-governmental organizations. However, the prospect of securing the budget necessary to implement sufficient activities remained uncertain at the time of the Ex-Post Evaluation.

As countermeasures to the insufficient budget for the future printing of teachers' guidebooks and students' workbooks, the Secretariat of Education is planning to print the materials once every few years, not every year, by utilizing reusable teachers' guidebooks and students' workbooks to reduce printing costs. Interviews at the Escuelas Normales confirmed that the teachers' guidebooks and students' workbooks have been appropriately maintained and can be utilized for more than one year.

[39] According to the interview, it is considerably difficult to "homogenize" various materials that have been used so far at each school without authorization and develop consistent materials.

Although the budget for printing is not sufficient, as described above, materials are developed within the budget of INICE using some financial support from donor agencies, and in-service teacher training is being implemented, although not regularly. This means that the implementing agency has sufficient funds for current expenditures to some extent. Equipment supplied to INICE by PROMETAM is still utilized with maintenance costs such as fuel financed by their own budget.

【Phase 2 Regional Component】
Financial sustainability is not high in the Regional Component either.

The interviews during the Ex-Post Evaluation revealed that there is no budget to convene regional activities similar to those that occurred during PROMETAM in implementing agencies in Honduras or the other four countries of the Regional Component – for example, workshops or regional training – in any of the five countries. The printing costs for materials in each country are the responsibility of each country and were not included in the framework of PROMETAM. However, the officials interviewed at the Ministries of Education in each country commented that they are planning to apply for the printing budget but the prospects remain uncertain.

3.4.5 Sustainability of benefits

【Phase 1, Phase 2 National Component】
The teachers' guidebooks and the students' workbooks are utilized at primary schools and pre-service teacher training courses as a national textbook[40]. According to the interviews and questionnaires conducted during the Ex-Post Evaluation, the teachers' guidebooks and the students' workbooks are used in pre-service and in-service training courses, and those interviewed say that lesson preparation has become easier and the contents of the lessons are improving. Moreover, at Escuelas Normales, the National Pedagogic University, and primary schools, the teaching methods introduced by PROMETAM have been implemented in terms of lesson preparation, including lesson plan design, use of the blackboard, and ways of addressing students, during pre-service training and in primary schools [41]. In addition, in-service training courses are conducted continuously, though not regularly. It can be said that the benefits of PROMETAM have been sustained to some extent. In the interviews during the Ex-Post Evaluation, several primary teachers, teachers of in-service training courses, and students from the in-service training courses reported that some teachers are still conducting lessons using conventional methods. Based on these findings, it is necessary to further promote the appropriate

[40] According to the results of the beneficiary survey in Honduras, out of 264 respondents, 79.5% of them use the teachers' guidebooks and students' workbooks "every day", 16.3% use them "3 to 4 times a week". Those who responded that they use them "less than twice a week" or that they do not know them account for 1.9 % in total.
[41] During the Ex-Post Evaluation, lesson observations were conducted at two primary schools, although comparison with lessons taught during the project period cannot be done. In the lessons observed, teachers used teaching aids that they made themselves, let students make presentations, and allocated time for students to examine materials by themselves. It seems that the teachers were a little conscious of being observed but it is considered that they were implementing the teaching method as usual, evidenced by the fact that students showed natural responses such as raising their hands actively.

utilization of the teachers' guidebooks and the students' workbooks and implementation of teaching methods introduced by PROMETAM and to conduct additional training and monitoring. However, there is concern about acquiring the budget necessary to conduct these activities consistently.

To maintain the benefits of the Project, it is essential to continuously distribute the teachers' guidebooks and the students' workbooks. However, during the Ex-Post Evaluation, it was reported that the teachers' guidebooks and the students' workbooks had not been distributed to all the teachers and students. In addition to the inadequate printing budget, problems in the distribution procedures and monitoring were also pointed out.

【Phase 2 Regional Component】

As mentioned previously, the majority of C/Ps are engaged in materials development and teacher training as in the project period, with the teachers' guidebooks and the students' workbooks being used at primary schools and in pre-service teacher training courses as the national textbook. Teachers at Escuelas Normales and pedagogic universities interviewed in each country stated that the teaching methods introduced by PROMETAM are being implemented at Escuelas Normales, pedagogic universities, and primary schools.

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

4. Conclusion, Lessons Learned and Recommendations

4.1 Conclusion

The Project for Improvement of Teaching Method in Mathematics (PROMETAM) Phase 1 & 2 (hereinafter referred to as "PROMETAM" or "the Project") was implemented in Honduras with the purpose of improving teaching methods in mathematics. Phase 1 consisted of the development of teachers' guidebooks and students' workbooks in five targeted departments. Subsequently, Phase 2 was implemented to extend the benefits of Phase 1 all over Honduras and neighboring countries. The purpose of the Project was in line with the education policy to improve the quality of primary education and the needs of mathematics education in the country, therefore the relevance is high. At the completion of Phase 2, the output indicators had almost been attained and the achievement of the project purpose – the improvement of mathematics teaching methods for in-service teachers and students in pre-service courses, was recognized. The overall goal should be considered achieved, as there is the prospect of improvement of students' academic achievement in mathematics. Therefore effectiveness/impact is high. The project period was as planned and the project cost was within the planned budget, which means that efficiency is high. Several issues can be pointed to in terms of the institutional and financial aspects of the counterpart (C/P) organizations. For example, the in-service teacher training system is not functioning, and the budget required for teacher training and printing, as well as distribution of the

teachers' guidebooks and the students' workbooks, has not yet been secured - therefore sustainability should be considered fair.
In light of the above, this project is evaluated to be highly satisfactory

4.2 Recommendations

4.2.1 Recommendations to the Implementing Agency

Recommendations to the implementing agencies in Honduras

Reliable printing and distribution of materials

After the completion of the teachers' guidebooks and the students' workbooks, it took time to print and distribute them and some schools had not received the teachers' guidebooks or the students' workbooks at the time of the Ex-Post Evaluation. This is partly because printing and distribution of the teachers' guidebooks and the students' workbooks was not included in PROMETAM. It is necessary that the Secretariat of Education should take the initiative and allocate the required budget for printing and distribution every year by securing necessary funds, including seeking additional assistance from donor agencies. Also it will be necessary to conduct monitoring to confirm the distribution of materials to primary schools under the responsibility and supervision of the Secretariat of Education and departmental education offices. At the same time it may be effective to take measures to reduce the printing cost of the teachers' guidebooks and the students' workbooks. Re-use of students' workbooks by ensuring that students do not write in them may be an effective way to reduce printing costs, and is a measure that has already been put in practice. To implement this effectively, it is essential to retrieve students' workbooks after use without fail and store them. Necessary measures for this should be carefully examined and implemented as soon as possible. Another option to reduce printing costs is to further promote the use of websites and other online materials that are already utilized at some schools.

Future revision of materials based on the curriculum evaluation

The Secretariat of Education is planning to re-evaluate the current curriculum in all subjects in 2015. It is desirable that the Secretariat of Education revise teachers' guidebooks and students' workbooks based on the results of evaluation to deliver revised materials to schools as soon as possible. In revising the curriculum, it may be useful to adopt the concepts of the teachers' guidebooks and the students' workbooks and teaching methods introduced by PROMETAM in other subjects, where applicable.

Restructuring teacher in-service training system

The in-service teacher training system by cascade was implemented during the project period and is under examination and restructuring in several departments with support by JICA volunteers. In-service training is not actively conducted in a majority of departments because they do not actively formulate a specific training plan, and neither the Secretariat of Education nor departmental education

offices have sufficient funds[42]. Establishment of the training system was not one of the objectives of PROMETAM but is important in sustaining its benefits. Therefore, it is necessary that the Secretariat of Education formulate a specific plan and allocate the budget to strengthen teacher training activities at the school level. To reach primary teachers at a local level, it will be more effective when departmental education offices take the initiative as the main stakeholder of education administration at the local level to plan and implement activities such as training and lesson observations by the departmental training team. In regard to teacher training, various development agencies have already implemented programs. Therefore, it is important to establish a streamlined and consistent system nationwide, without duplication or contradictions in the contents and the system of ongoing trainings. Discussion and coordination at meetings among development agencies are necessary, on the initiative of the Secretariat of Education.

Recommendations to implementation agencies in Honduras and the four countries of the Regional Component

Activities of the Regional Component

After the completion of PROMETAM, Regional Component activities were held only once. It was reported that regional activities are effective in the sense that participants can share experiences with those from other countries and utilize the experiences in activities in their own country. It is desirable that regional activities be held on the initiative of the implementing agencies in Honduras and Nicaragua- for example, when the bilateral project in Nicaragua is completed (planned in 2015). A possible activity would be a workshop in which core group members and those involved in PROMETAM, after the completion of projects in countries of the Regional Component, can meet to share experiences and lessons learned.

4.2.2 Recommendations to JICA

Support for curriculum revision

It is desirable that JICA expert dispatched to the Secretariat of Education collect information on the progress of curriculum evaluation planning in 2015. If discussions on the revision of the curriculum and textbooks are started, it may be useful to advise the Secretariat of Education to revise the teachers' guidebooks and the students' workbooks so that the project benefits can be sustained.

Promotion of continuous utilization of developed materials

In the Dominican Republic, the teachers' guidebooks and the students' workbooks were not adopted as the national textbooks during the project period. They were officially recognized as national textbooks after the completion of PROMETAM through active promotion by the JICA Office in the Dominican Republic. In El Salvador, materials developed through the JICA project were adopted as

[42] During the project period, the trainings from the national team to primary teachers were administered mainly by departmental education offices (interviews with departmental education offices and Escuelas Normales).

the official textbooks and remain the major mathematics textbooks in the country. However, over the course of time, the Ministry of Education issued a policy stating that other materials could be used as well. Basically it is the responsibility of the government of the partner country to authorize and adopt developed materials. However, it is desirable that information be collected and any necessary advice be provided to the agencies concerned by experts from JICA at the Ministry of Education, or through the JICA Office in case no expert is dispatched.

4.3 Lessons Learned

Ensuring printing and distribution of materials

Developed materials will only have benefit once they are actually utilized. If materials development is included in the project activities, it is important that the printing and distribution of materials be discussed between JICA and implementing agencies, even if printing and distribution are not included in the PDM. If printing and distribution are not described in the PDM, necessary expenditures will not be borne by the project assisted by JICA. However, it would be appropriate to discuss the necessary measures among JICA, implementing agencies, and related development agencies, if necessary, to ensure that the required printing and distribution is undertaken and to confirm the process of distribution and monitoring by the implementing agency. One option may be to examine the possibility of including the initial printing and distribution as a project component or with the Japanese side bearing the costs.

With regard to materials, uploading materials to a web site for utilization may be one option to reduce printing costs and to disseminate materials across a larger area. To realize this, it would be necessary to distribute terminals for use and to conduct regular maintenance of them. This sometimes requires technical and financial support, and therefore, collaborative action may be necessary among JICA, the implementing agency, and other development agencies.

Importance of collaboration among development agencies and promotion toward the implementing agency

Honduras was designated as the EFA-FTI country and coordinated support was implemented with responsibilities shared among various development agencies during Phase 1 and 2 of PROMETAM. Materials developed by PROMETAM were recognized among development agencies and the printing costs were covered by financial support from other development agencies. On the other hand, in the Dominican Republic, where coordination among development agencies was not as significantly advanced as in Honduras, developed materials were not recognized as national textbook during the project period. If recognition of JICA's support can be obtained among development partners and support in the areas other than JICA's assistance is provided by other development agencies, project impact and sustainability will be enhanced. Therefore, it is important to ensure recognition of JICA's support among development agencies and seek agreement on the role of JICA's support among implementing agencies and development agencies.

It is important for the implementing agency to take the initiative in the coordination of development agencies. In regard to adoption of developed materials, for example, it is appropriate that the Japanese side take the necessary actions to encourage the implementing agency to coordinate project activities among various development agencies. Usually it is the role of the experts in project coordination to take this action. If no experts are dispatched as coordinators on a long-term basis, it is desirable that any dispatched experts, regardless of whether they are long-term or short-term, along with the JICA office, take a role in active promotion at every opportunity.

Effectiveness of regional projects

In regional projects, more effective and efficient implementation can be expected than usual because stakeholders can share the same issues and objectives with countries nearby. Compared with areas such as disaster prevention and disease prevention, where regional cooperation is essential, recognition of the importance of regional projects to develop materials may not be very high in the education sector, as education is provided based on the curriculum in each country. However, there are two advantages of regional projects in education that should be pointed out. First, materials can be efficiently developed by utilizing materials developed earlier in another country. Second, regional projects provide opportunities to share experiences with other countries and to learn from each other by promoting techniques and methods commonly acquired through regional activities. This enables effective capacity development of counterparts, leading to enhanced benefits. In regard to the first aspect of PROMETAM, the materials developed in Honduras were utilized in electronic data as a basis for the development of materials in the other four countries, considerably enhancing efficiency. As for the second aspect, in PROMETAM, capacity development in the four countries of the Regional Component was effectively realized by promoting utilization of materials and teaching methods introduced and already established to some extent in Honduras. In addition, activities with the participation of members of neighboring countries, such as regional training and technical exchanges, provide opportunities to share experience of countries of the regional project and to exchange information and opinions. Therefore, these regional activities can be more useful for capacity development than training courses organized for participants from only one country. In relation to the second aspect of capacity development of counterparts, it may be more effective to have regional workshops and similar activities after the completion of the project.

BOX: The program approach and regional approach of PROMETAM

Through PROMETAM, the following advantages and issues of the program approach and regional approach can be pointed out:

(1) Advantages and issues of efforts in coordinating the community of development agencies

In the program approach, importance is placed on coordination with the community of development agencies to address the development issues of the target country. In PROMETAM, development materials were printed and distributed with the financial assistance of other development agencies in Phase 1. On the other hand, in Phase 2, printing and distribution of developed materials was not implemented as planned due to the suspension of EFA funds. The suspension of EFA funds was inevitable because it was caused by an audit issue and a political coup. However, it is important to examine the possible advantages and risks as carefully as possible when support by other development agencies is expected in such projects.

(2) Clear objective setting of regional activities

In planning regional projects, it is necessary to clarify the objectives and scope of regional activities. As seen in PROMETAM, it may be an effective option to focus on capacity development of stakeholders through sharing experiences and knowledge among countries involved in the regional component and to develop materials in bilateral projects in each country at the same time. When implementing the regional component in parallel with bilateral projects, it is especially important to clarify the roles of regional and bilateral projects and to establish objectives and formulate plans of activity and inputs for regional and bilateral projects.

(3) Balance between efficiency and coordination costs in program and regional approaches

In the program approach, one agency implements several projects with multi-sided characteristics to contribute to development issues of the country in a comprehensive way. This approach will lead to synergistic effects. In regional projects, inputs can be implemented efficiently, as limited resources, including human resources, can be input into several countries in a simultaneous way. Synergistic effects can also be expected in regional projects through efforts to realize common objectives and the sharing of experiences among participants in each country. Thus the program and regional approaches have the potential to implement projects efficiently. At the same time, these approaches may require extra coordination in areas such as the implementation of several projects in parallel, coordination with development agencies, and coordination of various implementing agencies in one country, which may not be necessary for ordinary projects. In formulation of projects of program approach and regional approach, it is necessary to examine both sides of the program approach and regional approaches, namely, the synergistic effects/efficiency and coordinating costs.

(4) Careful project planning and flexible action

Projects of the program approach and regional approach involve more stakeholders than an ordinary single project – for example, third-country experts, several implementing agencies, and development agencies in some cases. Therefore, the influence of the external environment (important assumptions) may be more significant. For example, in regard to PROMETAM, printing of developed materials was delayed due to the suspension of common funds, and developed materials were not authorized as national textbooks by the Dominican Republic during the project period because of the change of environment of implementation and development agencies. In projects utilizing the program approach and regional approach, it is even more important than usual to confirm implementation status of agencies involved and to take flexible countermeasures in response to changing environments.

(5) Implementation system

The program approach requires the implementation and coordination of various projects in parallel, while regional projects provide support to various countries simultaneously. Therefore, in projects of the program approach and regional approach, it is effective to establish the implementation structure as a whole program or regional component. The most suitable implementation structure may depend on the nature of each project/program. It is important to establish an appropriate implementation system including a system for continuous activities after project completion.

(6) Evaluation method of the program approach and regional approach

Both the program approach and regional approach involve many factors in terms of input, activities, and coordination with other development agencies, and so on. Sometimes, bilateral projects are implemented in parallel with regional projects as seen in PROMETAM. In this case, it is difficult to clarify what benefit was produced by which input. In a program approach, evaluation based on the concept of contribution[43] is suggested. It is desirable to establish certain guidelines regarding the evaluation of benefits of project utilizing a regional approach.

[43]Recognition of the role that one agency played in undertaking comprehensive activities and producing benefits, in collaboration with each country's implementing and development agencies (JICA " Project Management Handbook (original in Japanese)"(2007)).