Republic of Haiti

FY2016 Ex-Post Evaluation of Japanese Grant Aid Project

"Project for Improvement of Urban Roads and Drainage for Reconstruction of Léogâne City"

External Evaluator: Takeshi DAIMON, Waseda University

0. Summary

This project was implemented with the aim of improving traffic access in an urban district and reducing and preventing floods by improving urban roads after an earthquake and dredging existing drainage, thereby contributing to the reconstruction of Léogâne City and improvement of its sanitation. It was also implemented to support the livelihood of local residents, at least temporarily, by employing them for manual paving and dredging instead of using machinery. This project is highly relevant to both Haiti's development plan and Japan's ODA policy, and it was consistent with Haiti's reconstruction and development needs. While the project cost was within the plan, the project period exceeded it so efficiency of this project is fair. Furthermore, this project achieved its objectives of pavement distance in the urban district, improved traffic access, job creation almost as planned, and a certain amount of reduction of damage on roads by floods by improving drainage. The improved traffic access led to the favorable reconstruction and rebuilding of local residents' livelihoods by creating employment and improving sanitation, as demonstrated by the declining risks of waterborne disease. Therefore, the effectiveness and impacts of this project are high. On the other hand, despite having the necessary and sufficient technology and funds, Haiti faces the challenge of securing artifact-level personnel who can deal with future maintenance and repair needs. In addition, the drainage will lose its function unless sediment, including garbage, is removed, which may have a risk of affecting the sustainability of this project. Therefore, there are some problems to be solved in terms of the project's sustainability, which is considered as fair. Judging from the above assessments, this project is evaluated to be satisfactory.

1. Project Description

Project Location

A Road improved by this project

1.1 Background

A massive earthquake on January 12 (JST 13), 2010 caused serious damage, including the collapse of over 90% of all buildings, to Léogâne City, Haiti, about 40 kilometers west of the capital, Port-au-Prince. Although ready service was offered by the international community, the collapsed buildings were left in ruins and citizens were destitute even six months after the earthquake due to delayed reconstruction. Roads in Léogâne City were seriously damaged and covered with debris, which obstructed vehicles. In addition, the roads were submerged during rainfall because of poor drainage and this environment contributed to the spread of cholera.

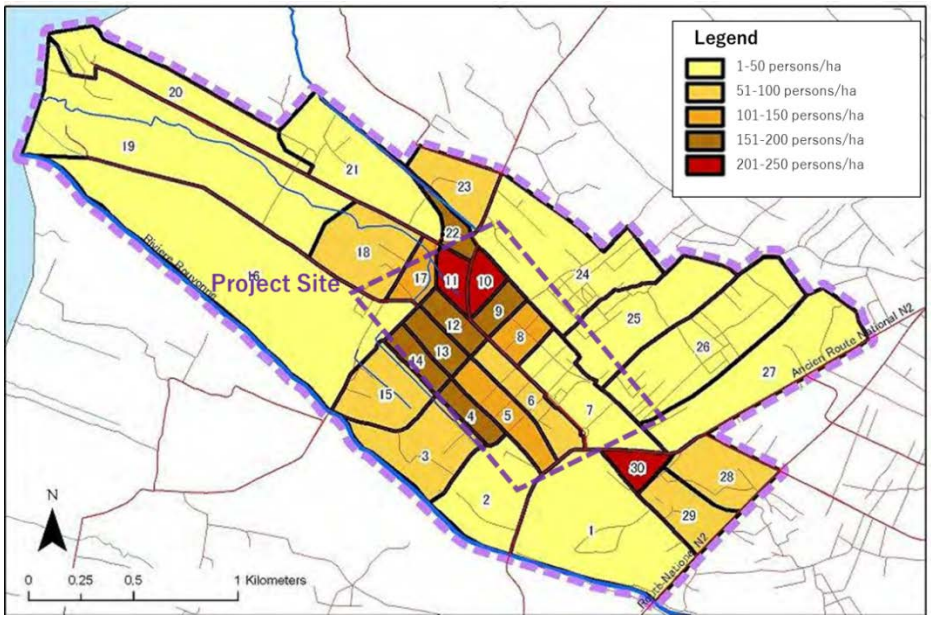
According to the 2003 census, Léogâne City has 22,779 inhabitants, of which 15% of the whole population of the city (communes)[1] lives in downtown. It has 5,265 households and 4.3 persons per household. As Figure 1 shows, the population converged on and around the grid district and at the southern part of the highway (former National Road #2). It was urgently needed to restore the infrastructure of this area, which had 100 to over 200 people a hectare, for disaster prevention and reconstruction.

In Léogâne City, Japan had been offering aid to the National Tuberculosis Sanatorium since before the earthquake, and the medical team from Japan Disaster Relief, the United Nations Peacekeeping Operation (Stabilization Mission in Haiti, MINUSTAH)[2], Japanese Red Cross Society (JRC), and others had engaged in various missions after the disaster. JICA started "The Urgent Rehabilitation and Reconstruction Support Project for Haiti" in response to the disaster in May 2010. It drew up a plan for basic land development and has been carrying out a plan for reconstruction and development and restoration of the water supply system in Léogâne City, which is treated as a model case[3]. This was how the Japanese government and JICA decided to offer intensive cooperation around the Léogâne area.

[1] Commune is a minimal administrative unit. There are 144 communes throughout Haiti. Port-au-Prince is the largest commune with about 1.2 million residents (as of 2005). Léogâne Commune is the 21st largest one with about 12,000 residents (as of the same year).

[2] The Japanese government has dispatched a total number of over 2,000 staff to the PKO.

[3] *The Final Report of the Urgent Rehabilitation and Reconstruction Support Project for Haiti* (November 2011)



Source: documents provided by JICA

Figure 1 The Distribution of Population of Center Léogâne City.
(As of when this project was planned)

1.2 Project Outline

The objective of this project is to improve transportation in the urban area, and reduce and prevent flood damage by improving roads, and dredging and repairing existing drainage in Léogâne City, thereby contributing to the reconstruction of this city and the improvement of its hygienic environment. In addition, this project intends to support stricken local residents, at least temporarily, by hiring them for pavement and dredging drainage, instead of using machinery for as long as possible.

G/A Grant Amount / Actual Grant Amount	1,048 million yen / 1,048 million yen
Exchange of Notes Date /Grant Agreement Date	November 2010 / November 2010
Executing Agency	Ministry of Public Works, Transport and Communications
Project Completion	June 2013
Main Contractors	EATT (Lot1) (Haitian), ENCOTRA (Lot2) (Haitian)
Main Consultant	Yachiyo Engineering Co., Ltd.
Procurement Agency	Japan International Cooperation System (JICS)

Outline Design	May, 2010 – June, 2010
Related Projects	Emergency Disaster Relief (January, 2010 – March, 2010) Post Disaster Needs Assessment (March, 2010) The Urgent Rehabilitation and Reconstruction Support Project for Haiti (June, 2010 to November, 2011) The Project for Recovery and Improvement of Water Supply System for Reconstruction of Léogâne City (2013)

2. Outline of the Evaluation Study

2.1 External Evaluator

Takeshi DAIMON, Waseda University

2.2 Duration of Evaluation Study

This ex-post evaluation study was conducted with the following schedule.

Duration of the Study: August 2016 – September 2017

Duration of the Field Study: December 4, 2016 – December 14, 2016; March 1, 2017 – March 7, 2017

3. Results of the Evaluation (Overall Rating: B[4])

3.1 Relevance (Rating: ③[5])

3.1.1 Consistency with the Development Plan of Haiti

Haiti has been pursuing decentralization and local development as its national development policy in order to reduce harmful effects of overconcentration and congestion toward the capital city since before the earthquake. It decided on an *Action Plan for National Recovery and Development of Haiti* (in March 2010), which consisted of four major fields, including "national land development" such as urban development and improvement of infrastructure. This project was supposed to contribute to this "national land development."

In 2012, the *Strategic Plan of Emergent Development of Haiti in 2030*[6] was decided as a successor to the *Action Plan for National Recovery and Development of Haiti*. It featured a land development policy which was intended to realize improvements to infrastructure, including roads, decentralization, and local autonomy, as well as reconstruction after the disaster.

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

[5] ③: High, ②: Fair, ①: Low

[6] *Plan Stratégique de Développement Haïti-Pays Émergent en 2030*

Therefore, this project was highly relevant to the country's development plan both when planned and as of this ex-post evaluation.

3.1.2 Consistency with the Development Needs of Haiti

The huge earthquake in January 2010 caused the collapse of over 90% of buildings and serious damage to many roads, and subsequent obstructed transportation, in Léogâne City, near the seismic center. Fast measures were urgently needed because the poor drainage of roads caused road floods and an unsanitary environment. In particular, the central district of the city, which had over 200 people per hectare, did not have sufficient capacity in roads surrounding houses and therefore formed very dangerous built-up areas for disaster prevention. The central district of Léogâne City was most apparently suffering from collapsed buildings, debris obstructing transportation, and serious damage to roads when the disaster happened. Thus, this city was selected as the object area for our support.

It has been found that post-disaster needs remain because unpaved roads still exist despite increased transportation, and further improvement to roads continues to be needed as of this ex-post evaluation due to frequent floods from hurricanes. The grant agreement was concluded in November 2010, ten months after the disaster in January. Appropriateness of the timing of Japan's outputs is difficult for the evaluator to judge because other donors started their own infrastructure projects, such as "18-month goal for recovery[7]," within six months after the earthquake. However, the timing of Japan's outputs was inevitable partly because public security had been worsening.

Therefore, this project was highly relevant to the development and reconstruction needs both when planned and as of this ex-post evaluation.

3.1.3 Consistency with Japan's ODA Policy

After the disaster, at the International Donors' Conference towards a New Future for Haiti in April 2010, the Japanese government declared that its policy was not only to restore Haiti to its pre-disaster situation, but also to renovate Haiti into a country with sufficient ability to meet national needs in terms of education, medical care, employment, and rule of law, and to continue to support Haiti especially in these fields[8]. This project was carried out within the context of "Grant Aid for Conflict Prevention and Peacebuilding[9]." Therefore, this project was highly relevant to Japan's ODA policy both when planned.

This project has been highly relevant to the country's development plan. In addition, it is generally relevant to reconstruction and development needs of Haiti and highly relevant to Japan's ODA policy at the time of planning. Therefore, its relevance is high.

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[7] U.S. Department of State (https://www.state.gov/documents/organization/267081.pdf 6-23-2017 retrieved)
[8] *Statement by Mr. Katsuya Okada, Minister for Foreign Affairs of Japan, at the International Donors' Conference towards a New Future for Hait*i (http://www.mofa.go.jp/mofaj/press/enzetsu/22/eokd_0331.html 5-7-2017 retrieved)
[9] This scheme was abolished in April 2015.

3.2 Efficiency (Rating: ②)

3.2.1 Project Outputs

This project has been implemented by way of procurement agency, leaving the possibility of changing the output at the time of detailed design. Hence, as for the efficiency, the plan after the detailed design was regarded as a standard value for the post-evaluative comparisons and evaluations. As of the time of the outline design (O/D), the total length of the roads was planned to be 11 km, while as of the detailed design after the exchange of notes (hereinafter referred to as "E/N") it had been revised to 9 km[10].

The planned output as of the time of the detailed design included the following components:

(1) Outline of engineering works

① Ordinary urban roads: interlocking pavement and improvement of drainage (about 8 kilometers)

② Congested roads: asphalt pavement and improvement of drainage (about 1 kilometer)

③ Dredging drainage: dredging existing drainage from the urban district to the coastline (about 2 kilometers)

④ Removal of obstacles (debris) from the roads (carried out by Haiti)

(2) Consulting service

- Supervising pavement of roads and improvements to drainage
- Labor-intensive supervision

As of this ex-post evaluation, all the outputs by Japan have been carried out as planned. Furthermore, the remaining project budget allowed for additional works to be carried out.

① Adjusting the size of U-shaped ditches (enlarging from U300/U400 to U500) (throughout Lots 1 and 2[11])[12]

② Reinforcing sidewalls of existing canals and replacing their slabs (part of Lot 2)

③ Increasing the amount of surplus soil removal (throughout Lots 1 and 2)[13]

④ Enlarging existing pavement area (throughout Lots 1 and 2)[14]

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[10] This project is an emergency disaster relief project, adopting the procurement services. In the procurement, the procurement agency, which represents the counterpart government, manages and supervises a series of procedures for funding, selecting, and procuring equipment and services, based on contracts with the counterpart government. In this procurement, estimated costs and components had been decided as of the E/N conclusion before the consultant started to carry out O/D. Therefore, this project had to adjust the unit cost in the O/D estimation to meet the approved project cost. In the case of this project, because fuel costs increased by about 36% and almost all the costs of construction materials soared to the same extent, it was a concern that the bidding would fail if its objective area was not modified. Therefore, this project treated market prices submitted by the executing agency as an official approved price considering the present market prices and reduced its objective area

[11] Lot 1 was a construction section carried out by EATT and Lot 2 by ENCOTRA, respectively. Lot 1 covers the east part of the city (including asphalt roads) and Lot 2 covers the west part (including dredging drainage from the urban district to the coastline).

[12] This was modified for easier maintenance in case ditches are blocked by gravel or garbage.

[13] This was modified because the reutilization of excavated soil, which had been supposed initially, became impossible.

[14] This was modified because the width of the existing pavement (15 cm) was thinner than that of the new pavement (45 cm) and, therefore, future subsidence was a concern.

⑤ Widening of roads with land acquisition from roadside households (part of Lots 1 and 2)
⑥ Adding subgrade treatment for wastewater by underground spring water (part of Lots 1 and 2)
⑦ Dredging added culverts (Lots 1 and 2)[15]

According to an interview with the Ministry of Public Works, Transport and Communications (Ministère des Travaux Publics, Transports et Communications in French, "MTPTC" for short thereafter) and an on-site inspection, there did not seem to be any problems with the quality of facilities and machinery, and therefore, the specifications can be considered appropriate for the objectives. The debris removal, to be funded by Haiti, was carried out as planned before the start of the project. Additional land for 25 households was acquired and existing water pipes and power poles were relocated or repaired due to the road construction, although they had not been planned at first. They were carried out at an expense paid by Haiti.

3.2.2 Project Inputs

3.2.2.1 Project Cost

When the plan was formulated (i.e., the E/N was concluded), the Japanese expense was to be ¥1,048 million, the Haitian expense ¥2 million, and the cost of the whole project ¥1,050 million. The Japanese expense eventually amounted to ¥1,048 million to carry out outputs after the detailed design, which was within the plan. On the other hand, the Haitian expense initially amounted to ¥2 million for the debris removal from roads, but MTPTC decided to exclude this expense from the project cost because the debris had been removed before this project began. Nevertheless, Haiti decided to pay the compensation of approximately ¥7.8 million (HTG approximately 3.9 million)[16] because an additional 25 households needed to be evacuated. In addition, Haiti expended about ¥14.0 million (HTG approximately 7.0 million) for the relocation of water pipes and ¥1.0 million (HTG approximately 0.50 million) for the relocation of power poles, which amounted to ¥22.8 million (HTG 11.4 million) as a whole[17].

Ultimately, Japan expended ¥1,048 million and Haiti expended ¥22.8 million on this project, amounting to a total of ¥1,070.8 million. Although the expense by Haiti is much higher than initially planned, this was necessary to accomplish outputs such as compensation for land acquisition from the 25 additional households and relocation of water pipes and power poles. Therefore, the project cost increased but was within the range necessary for the realization of the actual output.

3.2.2.2 Project Period

[15] This was modified because it was a concern that wastewater could not run unless deposits in existing drainage were dredged.
[16] The average exchange rate (1 HTG = about ¥2.0) in the project period (2011.3-2013.6) is adopted.
[17] Based on the material submitted by MTPTC.

The project was supposed to be implemented over a period of 19 months, including a contract of procurement services, a bid, a detailed plan, construction, and procurement[18]. The project took 28 months to complete, from March 2011 to June 2013, which was 147% longer than planned.

The reasons for this delay were that Lot 1 was rebid, the operation was hindered due to a change to the design, and there was additional construction (e.g., the relocation of water pipes) during the operation. In addition, Haitian contractors, who were less competent in operations and schedule management than their Japanese counterparts, were not able to prevent the delay.

Although the project cost was within the plan, the project period exceeded the plan. Therefore, efficiency of the project is fair.

3.3 Effectiveness[19] (Rating: ③)

3.3.1 Quantitative Effects (Operation and Effect Indicators)

Table 1 shows the targets and actual values of the operation and effect indicators. In addition, the evaluator carried out multi-dimensional information gathering and analysis through a beneficiary survey[20] for local residents living alongside the roads in Léogâne City in order to measure the effects and impacts of this project.

Table 1 Operation and Effect Indicators

	Baseline	Target	Actual	
	2010	2013	2013	2014
	Planned Year	1 Year After Completion	Completion Year	1 Year After Completion
Operation Indicators				
Length of paved road inside the urban district (m)	3,700	12,900(**)	13,000	13,000
Length of existing drainage network to be dredged (m)(*)	-	2,000	2,000	2,000
Effect Indicators				
Local residents hired for this project (people)	-	8,000(***)	7,000	-
Percentage of employees from Léogâne City (%)	-	20	50	-

[18] The ex-ante evaluation form says that the project period is 16 months from December in 2010 to March in 2012, including the detailed design and the bidding period, but it does not clarify the beginning of the project period. Therefore, this ex-post evaluation treats the project period (17.5 months after the contract with the procurement organization) described by the project implementation plan of the O/D report where its beginning is clarified as the project period as of planning. Hence, if the planned starting point of the project is taken to be the signing day of the delegation of procurement, the total implementation period is 19 months (months at both ends inclusive).

[19] Sub-rating for effectiveness is to be put with consideration of impact.

[20] In the beneficiary survey, the evaluator interviewed 110 households around the project area (approximately 1,000 households living within 2,000 m of the paved roads, or the target population, were divided into six mapping zones and 110 of them were randomly selected from cooperative households present during the interview period) with questionnaire. This sampling method can be considered inevitable because security seemed to get worse due to a presidential election and therefore the survey needed to be carried out quickly.

Source: documents provided by JICA and documents provided by MTPTC

Notes: * This indicator was added after the ex-ante evaluation in order to measure effectiveness.

**This number is described as "14,900m" on the ex-ante evaluation form, but it was modified because the length of road pavement by this project was shortened by 2,000m as of the detailed design.

***While this number is described as "2,000 people" on the ex-ante evaluation form, it is described as "maximum 8,000 (total number)" on the O/D report. Since MTPTC treats the total number as the number of employees as well, the evaluator unified this indicator by using the total number, which can be compared.

(1) Length of paved road inside the urban district

When this project started, there had already been 3,700 meters of paved roads in Léogâne City. The project added 9,000 more meters of paved roads, with none were added outside the project area. This ex-post evaluation confirms that a total of about 13,000 meters of road have been paved. Therefore, this project has achieved its objectives.

(2) Length of existing drainage network to be dredged (added indicator)

This project has achieved its initial objective of 2,000 meters of drainage improvement.

(3) Number and rate of local residents hired for this project

This ex-post evaluation confirms that this project created employment for a total of 7,000 people. Therefore, this project almost achieved its objective of 8,000 employees (88%).

Although the rate of employees from Léogâne City was supposed to be 20% (that is, 1,600 employees) when this project was decided, this ex-post evaluation confirms that the rate eventually amounted to 50%—over twice the initial target rate. This resulted in the creation of 3,500 jobs in contrast to the initial object of 1,600 people (a total number).

3.3.2 Qualitative Effects (Other Effects)

This project expected better access for Léogâne residents by improving urban roads and flood prevention by improving urban drainage. the evaluator carried out a beneficiary survey to measure their effects.

(1) Improvement of access for Léogâne residents

According to the survey, 107 of 110 households responded that this project had improved transportation. It contributed specifically to saving time for work (40 households), schooling (30 households), market (57 households), and other economic activities (18 households)[21] with an average of 11 minutes saved. Before this project, poor drainage of roads would force pedestrians and vehicles to be stuck in the mud during rainy seasons[22]. According to MTPTC, even light

[21] This survey allowed multiple responses.

[22] This was not asked in the beneficiary survey but some respondents pointed out this opinion. This was also confirmed in the interview with MTPTC.

rainfall would cause unpaved roads with poor drainage to become muddy (because the roads were clayey), thus preventing transportation. The pavements provided by this project changed the situation completely and enabled smoother transportation.

Before this project's completion	After this project's completion
	

Source: MTPTC

(2) Reduction and prevention of flood damage

Table 2 shows the result of the beneficiary survey. Most residents conceive that this project contributed to reduction of flood damage to some extent. However, MTPTC says that floods were not completely eliminated, and hurricanes or severe rainfalls still bring about floods in Léogâne City.

Table 2 Results of the Beneficiary Survey on Flood（N=110）

How much was flood prevented or reduced by this project?	Very much 46 Partly 21 Slightly 18 Not at all 6 I don't know 3
Was the flood caused by Hurricane Matthew[23] effectively reduced?	Effectively 44 Partly 25 Slightly 29 Not at all 7 I don't know 1

Source: the beneficiary survey

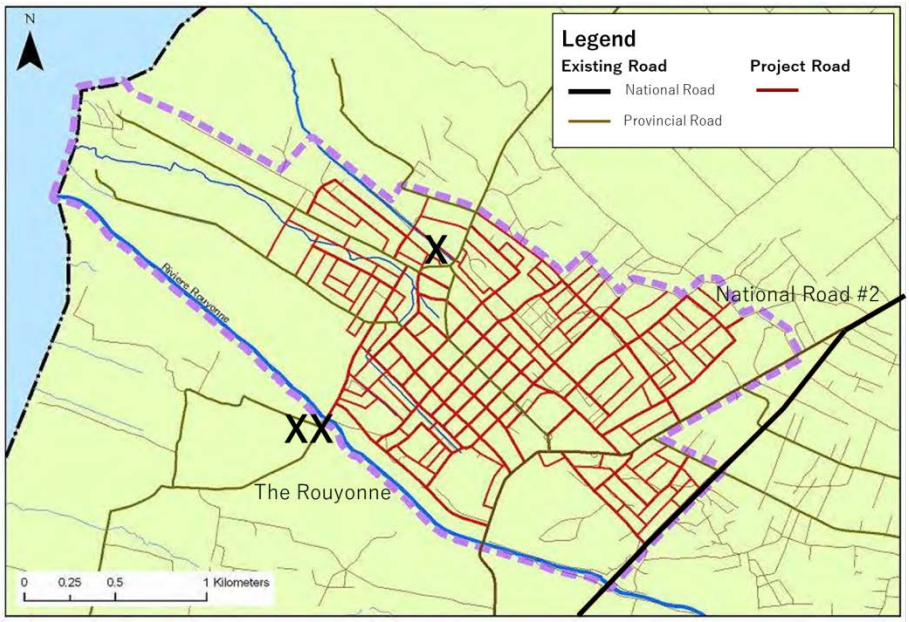
In the southwest part of Léogâne City, the Rouyonne River overflows and causes flooding once or twice a year. Overflows occur because accumulated gravel from the upper stream and the city road parallel with National Road #2 from the southwest to the northeast prevent the river from flowing smoothly (as shown by XX in Figure 2). Although a provisional bridge had been built before, the bridge did not function by accumulated gravel, and the improvement of full-scale dredging or river dike have not been carried out. However, the Rouyonne River is a so-called "quady" (river without any water) and lacks water in the dry season. Even in the wet season, rainfall is absorbed by soil and usually goes underground. If rainfall becomes severe enough to

[23] This large hurricane, which happened in October 2016, killed over 1,000 people including missing people and caused about 100,000 households to take refuge. It brought about the largest disaster after the earthquake in 2010.

flow over the surface (this happens once or twice a year), it causes banks to collapse and pour into the city. However, a depth gauge exists under the bridge where Route 2 intersects the Rouyonne River and a flood alarm is supposed to be issued if the depth of the river exceeds a certain threshold due to heavy rain. On the other hand, the canal where the drainage flows to the sea (point X in Figure 2) is blocked by accumulated gravel and dumped garbage. Therefore, water is blocked and flooding often happens around point X if it rains heavily.

Therefore, the number of floods apparently did not vary after this project due to external factors such as the overflow of the neighboring Rouyonne River and the blockade of the canal. Nevertheless, the damage of access by flooding is apparently much slighter than other spots without drainage. For example, whereas floods by heavy rain used to continue for about one month before this project, the flood by Hurricane Matthew settled down within a week in the project area[24].

Nevertheless, some residents said that this project should have prevented floods, although this was not asked in the beneficiary survey. Whether or not Japan's intention in the project design has been understood sufficiently by residents of Léogâne City via MTPTC, they expanded the expectation to prevent floods despite the initial request from Haiti because neighboring rivers' floods caused by frequent hurricanes invaded most parts of the city.



Source: documents provided by JICA

Figure 2 Places where Floods Happened

3.4 Impacts

3.4.1 Intended Impacts

(1) Reconstruction and modernization of residential environment

[24] Based on the interview with MTPTC.

This project intended to facilitate rebuilding of residences by disposing debris and reconstruction of residents' lives by employing them as of the time of planning. Haiti had finished disposing of debris before this project. The evaluator has evaluated the promotion of employment in the "Effectiveness" section. In addition, it can be said that residents' livelihoods were at least temporarily recovered, maintained and improved by employment revenue. Therefore, this evaluation inquires whether this project contributed to the reconstruction and modernization of the residential environment. Promoting the reconstruction of Léogâne City can be considered, in a broader sense, as a part of the reconstruction and modernization of the residential environment

Table 3 Results of the Beneficiary Survey on Residential Environment（N=110）

Did this project contribute to reconstruction and modernization of residential environment?	Significantly contributed 86 Contributed 26 Partia1ly contributed 10 Not contributed at all 0 I don't know 0

Source: the beneficiary survey

According to Table 3, it can be concluded that this project contributed to access to paved roads, improved drainage, and expansion of additional facilities, such as water supply and electricity, at the level of residents' perception. Many residents answered that this project completely changed the sight of this city, implicating that it contributed to not only the rebuilding of residences, but also the reconstruction and modernization of Léogâne City.

(2) Promotion of reconstruction in Léogâne City and revitalization of socio-economic activities by improving access

The ex-ante evaluation form divides qualitative effects into two impact items: promotion of reconstruction in Léogâne City and revitalization of socio-economic activities by improving access. However, it is difficult to distinguish these impacts and they are rather easy to measure when evaluated together. Therefore, the beneficiary survey was carried out as follows:

Table 4 Results of the Beneficiary Survey on Reconstruction and Revitalization of Socio-economic Activities（N=110）

Did this project contribute to improvement of access?	Significantly contributed 84 Contributed 13 Partia1ly contributed 9 Not contributed at all 0 I don't know 2
Did this project contribute to revitalization of socio-economic activities?	Significantly contributed 51 Contributed 25 Partia1ly contributed 23 Not contributed at all 6 I don't know 2

Source: the beneficiary survey

As Table 4 shows, many residents answered that this project "significantly contributed" or

"contributed." The results from interviews with the executing agency and Léogâne City officials also show similar opinions. Through on-the-spot investigation, the evaluator confirmed that there were more service facilities (e.g., restaurants and hotels), groceries, souvenir shops, and so on in the paved areas than in the unpaved areas; thus, socio-economic activities were significantly revitalized there.

(3) Improvement of sanitation by providing drainage

At the time of planning, it was expected that sanitation would be improved (e.g., decline in waterborne diseases) by equipping drainage. According to the Ministry of Health of Haiti, cholera, which was epidemic from 2010 to 2012, has decreased since 2013, and no cases have been reported since March 2014 (Table 5).

Table 5 Cases of cholera in Léogâne City (case/month)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
2010	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	4	210	1,296
2011	1,404	819	531	240	577	1,283	1,166	501	472	89	0	0
2012	0	0	0	3	325	210	75	15	0	0	813	470
2013	0	147	3	44	36	52*	132	151	175	10	126	78
2014	46	38	0	0	0	0	0	0	0	0	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	0	0	0
2017	0	0										

Source: the Ministry of Health of Haiti

Note: * means the completion month of this project.

In addition, five to ten cases of lymphatic filariasis[25], which is carried by mosquitos, had been reported every two years since fifteen cases were reported in January 2010. However, fewer than 10 cases have been reported since the ten reported cases in April 2012 (see Table 6).

The Ministry of Health, in our interview, attributed the significant decrease of cholera and the downward tendency of lymphatic filariasis to the improved sanitation after this project. This demonstrates that the improvement of drainage ameliorated the sanitation.

[25] Lymphatic filariasis occurs in insanitary wetlands or puddles in the tropics. Once a human is infected with the filariasis, the lymphatic system is seriously damaged and serious symptoms and physical malfunctions such as elephantiasis, a dermatologic disease characterized by inflated legs, start to show (http://atm.eisai.co.jp/ntd/filaria.html (in Japanese) 3-8-2017 retrieved).

Table 6　Cases of lymphatic filariasis in Léogâne City (case/month)

	Jan.	Feb.	March	April	May	June	July	August	Sept.	Oct.	Nov.	Dec.
2010	15	0	1	0	0	0	0	0	0	2	0	0
2011	0	0	0	0	0	1	0	0	0	0	0	0
2012	1	0	0	10	2	0	0	1	3	0	0	0
2013	0	1	0	0	0	0*	0	1	0	0	1	0
2014	2	0	0	1	9	0	0	0	0	1	0	0
2015	0	0	0	0	0	0	0	0	0	0	0	0
2016	0	0	0	0	0	0	0	0	0	1	0	5

Source: the Ministry of Health of Haiti

Note: * means the completion month of this project.

3.4.2 Other Positive and Negative Impacts

(1) Impacts on the Natural Environment

Domestic law does not require a report of Environmental Impact Assessment (EIA) for this project. Regarding air pollution and noise after the start of this project, severely harmful effects were not expected to happen because traffic density was limited and this project would work mainly on unpaved roads. Undesired effects on natural environment were expected to be minimal because this project did not contain vulnerable areas, such as national parks, and their vicinities.

According to the beneficiary survey, although the local residents had suffered from dust and noise going off from trucks before the road pavement, many of them answered that they no longer suffer from such nuisances because this project's road pavements facilitated traffic. On the other hand, the respondents who answered the question about temporary dust and noise during the construction were almost equally divided. The executing agency gained public understanding by persistently persuading residents who complained about the dust and noise. It should be noted that such complaints have not occurred since the start of service. Therefore, it can be said that local residents experienced dust and noise during the construction but the executing agency appropriately dealt with these problems, leading to the long-term improvement of environmental situation, such as noise and air pollution, in Léogâne City by this project.

Table 7 Results of the beneficiary survey on natural environment（N=110）

Did this project contribute to improving natural environment? (permanent dust or noise)	Significantly Contributed 74　Contributed 23　Partially Contributed 16　I don't know 2
Did this project have negative effects on natural environment during the construction period?	No effects 57　Many effects 22　Effects 25　A few effects 5　I don't know 0

Source: the beneficiary survey

(2) Land Acquisition

This project's scope was improvement of existing roads and dredging of drainage and was not supposed to include expropriation of land and relocation of residents. Nevertheless, at the time this project was planned, locals who lost their houses due to the disaster (about 1,000 people) were forced to live on the street and, therefore, there was land occupation (i.e. their temporary tents and barracks) at about 230 points before debris was removed from their residence areas. This project was supposed to eliminate the occupation on the streets by removing debris, excluding roads where removal was difficult. Real estate without any possession rights had been removed by the start of this project. On the other hand, land titles for the 25 households were acquired [26] and compensated, according to the interview survey with MTPTC. These households contributed some parts of their possessions as roads, but no disputes over compensation occurred.

(3) Promotion of poverty reduction

This project was intended to offer the disaster victims opportunities to earn money by reducing machinery and employing local residents in the pavement of roads and the dredging of drainage. It also provided opportunities to learn how to produce pavement blocks, construct roads, and maintain them in order to expand opportunities for locals to find employment post-construction.

This ex-post evaluation confirms that this project contributed to temporarily expanding employment and income of Léogâne residents because about half of the 7,000 total employees were from Léogâne City and were paid more than the minimum wage in Haiti [27]. In addition, this project used a traditional and labor-intensive method, called *adoquinage*, in which only manpower and no machinery was used. Therefore, this project contributed to reducing poverty by helping unskilled workers, many of whom were poor, gain professional skills.

(4) Gender and the socially vulnerable

This project was meant to benefit women by offering employment without distinction between men and women. In addition, it was supposed to facilitate access for the vulnerable and the disabled by improving urban roads.

This project left supervision of employment procedures entirely to staff members of the specified non-profit corporation "JEN," who were engaged in supportive consultation. According to MTPTC, a member of JEN always attended the employment process in order to ensure gender equality. The supervision process designed work tables focusing on the number of jobs, proportion of workers from Léogâne City, and gender of workers. Nevertheless, most

[26] Originally, no expropriation was planned; however, some land acquisitions turned out to be inevitable due to the expansion of existing roads, as described above. Nevertheless, no "involuntary resettlement" or "loss of livelihood" (JICA Guidelines for Environment and Social Considerations, April 2010) was involved.

[27] Based on the interview with JEN, the NGO that assisted the consultant.

workers employed in this project were male because many of their jobs involved physical labor[28]. However, as for the professional categories such as supervisors whose performance is not influenced by physical differences due to gender, the female employment rate was planned to be no less than the male rate. The number of employees was listed in the worksheet according to professional categories and gender, so that the female ratio would not be lower than the threshold, showing that it has been carefully designed to provide equal opportunities to both genders.

From the viewpoint of the vulnerable and the disabled, MTPTC pointed out that the improved access benefited people in wheelchairs and the evaluator confirmed that in the field investigation. Therefore, it can be said that this project had positive impacts in terms of consideration for gender and the socially vulnerable people.

This project (i) contributed to improved access by achieving the objective length of road pavement in the urban district, (ii) brought about employment by almost achieving the employment objective, and (iii) contributed to reducing and preventing floods to some extent by improving drainage as planned. Therefore, effectiveness of this project is high.

Furthermore, (i) access was so improved that the duration of commuting was reduced, (ii) residents' livelihoods were enhanced by job creation, and (iii) sanitation as a result of improved drainage was so improved that waterborne diseases decreased. While there were no negative impacts on the natural environment, there were positive impacts on reducing poverty and achieving goals considering gender equality to some extent.

This project has largely achieved its objectives; therefore, effectiveness and impact of the project are high.

3.5 Sustainability (Rating: ②)

3.5.1 Institutional Aspects of Operation and Maintenance

MTPTC was supposed to take charge of this project when it was planned. MTPTC consists of the Minister, Directorate of Public Works, Directorate of Transportation, Directorate of Communication, Directorate of Administration and Cooperation of Departmental Directions. The Cooperation has ten Departmental Directions and one of them, Departmental Direction of West, was supposed to take charge of this project. Consequently, the existing personnel were deemed necessary and sufficient to maintain the facilities (i.e., roads and drainage) established by this project.

This ex-post evaluation confirms that Departmental Direction of West oversees daily and regular maintenance of roads in Léogâne City. The Vice Minister is supposed to decide on a maintenance plan proposed by the Directors of Departmental Directions. When floods occur due to heavy rainfall such as hurricanes, the personnel of the Directions clean and fix roads. If the

[28] Based on replies from and documents submitted by MTPTC.

regular personnel of MTPTC cannot manage the maintenance and repair, it employs temporary staff or outsources the work to avoid excess or deficiency of staff.

3.5.2 Technical Aspects of Operation and Maintenance

When this project was planned, the existing technical level of operation and maintenance was thought to be sufficient for this project because it would mainly pave existing roads and its length was to be the same as before the disaster.

This ex-post evaluation confirmed that MTPTC had and referred to *the manual for maintenance of roads*[29], which contained methods of maintenance and repair of roads. Haiti considered it eligible to maintain roads with its existing technology by following the manual. Indeed, there have not been specific problems for maintenance of roads.

Regarding human resources, only those who have received a professional college education and a national engineer's license can get an engineer-level job at MTPTC. Craftsmen below the engineer-level had received a training program for newly-employed staff at the "training institute" in MTPTC before the disaster happened in 2010, but MTPTC no longer had its own formal training program for them because the institute's building collapsed in the earthquake and the Ministry cannot afford to rebuild it due to its limited budget.

Therefore, the opportunities for craftsmen to acquire techniques are more limited than when the institute existed; MTPTC also has such consensus. While Haiti has sufficient technology to maintain existing roads, more mature techniques will be needed if roads and drainage need to be repaired in the future. However, technical aspects remain insufficient because they will not be able to deal with retirement of skilled workers unless their technique continues to be acquired through the institute and so on.

3.5.3 Financial Aspects of Operation and Maintenance

Besides the budget of Departmental Directions, Haiti has a "Road Maintenance Fund (Fond de l'Entretien Routier, FER)" and can use it in the same way as the budget. As of planning, the total budget of pre-disaster MTPTC was estimated to be 22 million HTG for 2007-08 and 22 million HTG for 2008-09, in addition to budget support for FER by the Inter-American Development Bank (hereinafter abbreviated as "IDB"), leading to the judgment that their financial profile was sufficient to implement the project. Nevertheless, details could not be confirmed regarding how much of these financial resources would be appropriated for the operation and maintenance of this project.

This ex-post evaluation confirms that Haiti's budget for the maintenance and repair of roads consists of the general account of MTPTC and FER[30], and that Haiti has the framework to

[29] Its original title is *manuel sur l'entretien des routes* (document provided by MTPTC). This was established with the support of USAID in 1980s and has been used since then.

[30] FER was established in July 2003 by the initiative of the Haitian Government and its financial foundation has been largely supported by the government's own resources such as fuel tax among others, though financial aids have been received by external donors only under exceptional situation.

continue the maintenance even in the future. Table 8 shows the budgets of the road maintenance in the previous three years. Each of them focuses on the western part of Haiti, including Léogâne City. Even FER has amounted to more than HTG 60 million for the last three years. Therefore, it can be said that this project is funded well enough to maintain the 9,000 meters of roads.

After the completion of this project, daily and regular maintenance of roads has been carried out two to three times a year[31] and there have been no needs for major repairs. Therefore, according to MTPTC, FER has not been used for this project.

Besides this maintenance by MTPTC, Léogâne City has cleaned canals (especially removal of clogging) and the urban district on its own budget. Many residents have participated in this activity.

Table 8 The budgets for the maintenance of roads

MTPC Maintenance Budget for West Haiti (including Léogâne) (Unit: 1000 HTG)

	2014/15	2015/16	2016/17
Outsourced Cleaning	880	800	800
Parts of Maintenance Equipment	2,905	4,425	4,400
Fuel of Maintenance Equipment	1,839	3,338	3,338
Total	5,644	8,563	8,538

Road Maintenance Fund (FER) Budget for West Haiti (including Léogâne) (Unit: 1000 HTG)

	2014/15	2015/16	2016/17
Maintenance and Repair	63,953	n/a	72,092
Construction Management	4,400	n/a	2,400
Other Direct Costs	1,051	n/a	993
Total	69,404	58,886	75,485

Source: documents provided by MTPTC

3.5.4 Current Status of Operation and Maintenance

When this project was planned, daily maintenance of roads and drainage improved by this project was supposed to be needed (e.g., investigating damaged roads and blocked drainage). However, because those facilities by this project have never suffered from major problems, the evaluator judge that the maintenance is appropriately carried out.

In the on-the-spot investigation of this ex-post evaluation, I did not see any major damage of paved roads. The daily maintenance, such as cleaning, was carried out by local volunteers and the City office, which was sufficient to avoid road blockade. In addition, as an illustrative example that shows appropriate maintenance and repair, although some parts of paved roads had

[31] Even regular maintenance by MTPTC is done only two or three times a year. However, this does not include voluntary maintenance by local residents. In addition, the maintenance of drainage is not budgeted.

been broken due to the construction of water pipes, which was carried out by Japan's grant aid project, and soil had been exposed in December 2016, they were completely paved again and repaired in the on-the-spot observation (in March 2017).

Regarding drainage, some drainage with manhole covers had no major problems and the daily maintenance is carried out by local volunteers to complement some parts of maintenance that MTPTC and the City office do not sufficiently carry out. However, other drainage without manhole covers, especially the canal toward the sea (see Figure 2), is constantly blocked because residents throw garbage into it. MTPTC is aware of this fact but has not taken any measure (e.g., regular cleaning) yet. In addition, it does not keep a record of the frequency of cleaning. Although charitable people or international NGOs irregularly clean out the drainage, the residents have not fundamentally improved their awareness and, therefore, drainage very frequently suffers from blockages.

As above, Haiti does not keep records of situation of pavement repair and frequency of drainage cleaning, and therefore, the evaluator was not able to confirm them. Furthermore, they do not carry out monitoring. The maintenance of roads and drainage lacks monitoring and evaluation, which is caused by complex factors including institutional, technical, and financial aspects of maintenance, public consciousness, and lack of systematic garbage recovery.

The institutional aspect of this project has no major problems, and it has the necessary and sufficient technology and fiscal resources. However, due to the closed institute, there are still some challenges in securing craftsmen-level personnel to deal with maintenance and repair needs. In addition, there are no major problems with maintaining paved roads whereas drainage (especially of some downstream canals without manhole cover) constantly suffers from blockage because local residents throw garbage into them. As a result, floods happen if it rains severely, which would not happen if the drainage was not blocked. Therefore, drainage will lose its function and endanger the sustainability of this project in the near future unless sediment, including garbage, is removed. Some minor problems have been observed in terms of the current status. Therefore, sustainability of the project effects is fair.

4. Conclusion, Lessons Learned, and Recommendations

4.1 Conclusion

This project was implemented with the aim of improving traffic access in an urban district and reducing and preventing floods by improving urban roads after an earthquake and dredging existing drainage, thereby contributing to the reconstruction of Léogâne City and improvement of its sanitation. It was also implemented to support the livelihood of local residents, at least temporarily, by employing them for manual paving and dredging instead of using machinery. This project is highly relevant to both Haiti's development plan and Japan's ODA policy, and it was consistent with Haiti's reconstruction and development needs. While the project cost was within the plan, the project period exceeded it so efficiency of this project is fair. Furthermore,

this project achieved its objectives of pavement distance in the urban district, improved traffic access, job creation almost as planned, and a certain amount of reduction of damage on roads by floods by improving drainage. The improved traffic access led to the favorable reconstruction and rebuilding of local residents' livelihoods by creating employment and improving sanitation, as demonstrated by the declining risks of waterborne disease. Therefore, the effectiveness and impacts of this project are high. On the other hand, despite having the necessary and sufficient technology and funds, Haiti faces the challenge of securing artifact-level personnel who can deal with future maintenance and repair needs. In addition, the drainage will lose its function unless sediment, including garbage, is removed, which may have a risk of affecting the sustainability of this project. Therefore, there are some problems to be solved in terms of the project's sustainability, which is considered as fair. Judging from the above assessments, this project is evaluated to be satisfactory.

4.2 Recommendations

4.2.1 Recommendations to the Executing Agency

(1) The institute that trains new personnel taking charge of maintenance of roads and drainage has been closed since the earthquake in 2010. As a result, the under-engineer-level staff members of the executing agency, who were trained before the institute was closed, are playing a central role in the maintenance. The agency considers on-the-job training (OJT) sufficient for training new members. However, when major repairs are needed in the next five to ten years, these mid-career employees will retire and staff members without regular training in the institute may not be able to deal with the repair. Therefore, it is desirable that the institute be resumed as soon as possible, but this requires examining maintenance techniques needed by different job classes and training curricula. Meanwhile, the maintenance manual, which has not been reviewed for over 30 years, should be revised according to current technical level and used as a textbook for the institute. For example, MTPTC should take the initiative in deciding an action plan that defines persons in charge of the training program, priority, budget, and schedule.

(2) For higher sustainability of this project, it is necessary for local residents to change their way of thinking. Although some residents voluntarily collect garbage in their neighborhood, the collecting is inadequate and not organized. Therefore, the Departmental Direction of West of MTPTC should wage a joint campaign with the Léogâne City Office to prevent illegal dumping into drainages and impose stricter restrictions to eliminate illegal dumping, such as punishing disposal outside designated dumpsites. Meanwhile, it is desirable to offer residents incentives to participate in cleaning drainage and roads, thereby organizing and facilitating residents' participation. To achieve these objectives, the Léogâne City mayor and deputy mayor should hold counsel with the Departmental Direction of West, decide on a concrete action plan, and plan a budget for it.

4.2.2 Recommendations to JICA

There are no specific and realistic recommendations as of this ex-post evaluation. However, the plan at the conclusion of E/N was reviewed at the time of the detailed design. In this connection, traffic access and floods are still problematic in the areas not improved by this project, as described above. Since MTPTC also hopes to carry out and achieve the original plan so that Léogâne City will be used as a "model city" case recovering form disaster, JICA should consider additional support plans.

4.3 Lessons Learned

(1) Shift from prevention of flood damage to prevention of flood itself and reality of design

This project originally intended to improve roads in congested districts and residential environments through rebuilding the community as part of reconstruction from the earthquake disaster on January 2010 and building a disaster-proof city. As a result, this project included construction of drainage attached to roads. However, because support from all over the world was expected, Haiti expanded its expectation and eventually hoped for the construction of a city resistant to any disaster including severe rainfall and hurricanes, not only earthquakes[32]. As a result, this project intended to "reduce and prevent flood damage" as one of its initial objectives (outcome). It was assumed that drainage in the city cannot prevent floods itself but reduce and prevent flood damage to some extent, and this effect was achieved. However, the executing agency and local residents expanded their expectations to prevent floods despite Japan's intention because neighboring rivers' floods caused by frequent hurricanes invaded most parts of the city. As a result, this project was not able to meet these expectations because it was not supposed to prevent floods, per se. If this project had limited its objectives to the improvement of traffic access and the creation of jobs by building roads nor had emphasized the prevention of flood damage, such miscommunication would not have happened.

If a future relief project can carry out only palliative measures as an inclusive part of the road improvement project for local residents suffering from flood damage, it should provide them sufficient information so as not to give them excessive expectations. If it carries out fundamental treatment for flood damage, it needs to investigate more general feasibility by considering urban-environmental factors, such as neighboring rivers and groundwater.

(2) Project design and estimation of post-disaster emergency relief

This post-disaster emergency relief project adapts the procurement services, involving the procurement agency. Since fuel costs soared by 36% after the O/D and almost all costs for construction materials also rose to the same extent, this project employed the official quoted market price noted by the executing agency as adopted price and reduced the objective area considering the market situation. As a result, the outputs were reduced by about 20%.

[32] Based on the interview with MTPTC.

It is institutionally difficult for an emergency relief project in grant to make a rigorous cost estimate at the time of O/D. Hence, in the face of unintended exogenous factors, the project must make modifications such as adjusting the covered area. To minimize such a risk, cost estimates for the grant project, particularly an emergency relief project, must consider probabilities of price escalation due to these factors, and it is desirable for future projects to apply the so-called contingency[33].

(3) Need for follow-up

As referred to in the section "Recommendation to the Executing Agency," some parts of the agency share the opinion that rebuilding the MTPTC institute and its curricula and a public campaign, allowing participatory approach for residents of Léogâne City, for eliminating illegal dumping can lead to higher sustainability. However, any specific plans for such improvements have not been decided yet. Some parts of the agency think that it will start specific projects if Japan offers them aid for it.

As mentioned above, if the agency alone will not start specific action plans to improve sustainability, donor countries, including Japan, should share their experience so that the agency can make a budget. For example, JICA should consider carrying out follow-ups by technical cooperation, including delegating short-term technical experts and training local officials in Japan.

[33] The reserve expenses system was launched experimentally in 2009 for high-risk countries and expanded in 2015 to include all grant projects with facility installation portions and part of grant projects with equipment procurement portions.