Sri Lanka

Ex-post Evaluation of Japanese Grant Aid Project
"Construction of a New Highway Bridge at Manampitiya
in the Democratic Socialist Republic of Sri Lanka"

External Evaluator: Keiko Asato,
Foundation for Advanced Studies on International Development

## 0. Summary

This project, the construction of a new highway bridge, was implemented in order to solve traffic bottlenecks, such as 1) the blockade of automobiles during the passing of trains due to the dual function of the railway-highway bridge, 2) alternating vehicular crossing due to the narrow width of the bridge, and 3) the poorness of travel conditions and traffic safety on temporary roads over the railway track due to the use of a modified road deck consisting of a simple floor slab.

The relevance of this project is high as it is consistent with the national development policy and sector strategy of the partner country, as well as with Japan's aid policy. The project period and the cost were under the estimated plan, and the implementing process was efficient. This project shows good results: the traffic congestion time at the bridge has been solved, the automobiles' passing speed has increased and the traffic volume has grown. The project has also contributed to economic and social development in the region by making people's daily lives more convenient and bringing economic benefits to the agricultural, fishery, construction and tourism industries.

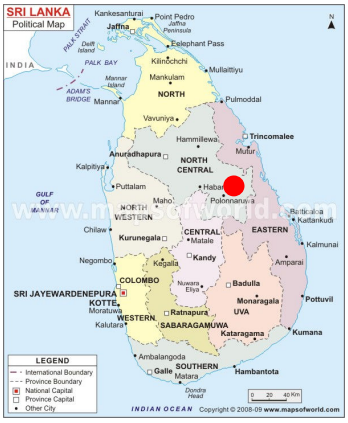
Other than the above mentioned, this project has large significance as economic infrastructure because it has greatly contributed to the reconstruction of areas damaged economically by the civil war (especially the Eastern Province). These effects are attributed to the construction of the target bridge (hereinafter referred to as "the bridge"), as well as the rehabilitation of National Highway 11 supported by World Bank at the same period (hereinafter referred to as the "A-11") and the cessation of the civil war in 2009.[1] We can see clear synergy effects between these factors. Given these factors, we can evaluate the effectiveness and the impact of the project as high. In terms of the sustainability of the project, even though the budget preparation is to be

[1] This project was formulated in response to the cease-fire agreement in 2002 and aimed to support the reconstruction of the partner country. However, violation of the agreement was repeated, and in 2008 the agreement collapsed. This project was put into practice during the civil war. In May 2009, the civil war was finally terminated. Therefore, the effect of this project is attributed to the recovery of security conditions after the cessation of the civil war in 2009.

improved as there are currently insufficient funds for daily maintenance and a long-term rehabilitation budget is yet to be secured, we did not identify major problems in other areas of sustainability.

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

## 1．Project Description




Project Location

Manampitiya Bridge

### 1.1 Background

The transportation network in Sri Lanka developed from inland transportation of agricultural products as plantations grew in the colonial era. At present, the principal industry in Sri Lanka is agriculture (such as production of tea, coconuts, rubber, rice and others). The smooth transport of these products is indispensable for the economic development of the country. At the time of ex-ante evaluation, the majority of the passenger and freight transport in Sri Lanka was carried out by inland transport. However, the low pavement ratio impeded smooth transport. In addition to this, most of the bridges on the trunk roads had problems relating to narrow width, unstable structure due to deterioration, and decreased load-carrying capacity due to corrosion of steel, which had been impeding the passage of large automobiles. Since 1999, the traffic volume has increased by 6% annually. Given this situation, it was an important issue to secure safety and reinforce the capacity of road transportation.

The Manampitya bridge is located on the A-11, which connects Polonnawra and Batticaloa, which were designated as key cities in areas of fast economic development by the Government of Sri Lanka. Thus, the rehabilitation of the bridge was expected to contribute to economic development in the neighbouring area. This is because the bridge previously restricted vehicle travel during the passing of trains due to the railway-highway dual function, and because the narrow width of the bridge imposed alternate passing of cars from opposite directions and

increased congestion times for automobiles. These conditions hindered smooth traffic between Polonnarwa and Batticaloa, as well as regional economic growth.

In Sri Lanka, the civil war that began in 1983 finally ended with a cease-fire agreement in February 2002. The Government of Japan supported the reconstruction of the country by organizing the Conference on Reconstruction and Development of Sri Lanka in Tokyo in June 2003, with the USA, Norway and EU. This project was part of a commitment agreed in the Conference to provide support to Sri Lanka of up to $1 billion over 3 years. The civil war created internally displaced persons (IDPs) in the Northern Province who sheltered in camps. Moreover, the regional disparity between the Northern Province and Eastern Province and other parts of the country was clear. For example, the average spending income in the Northern Province and Eastern Province was lower than that of the national average (Rs 14,251/month in the Northern Province and Rs 12,908/month in the Eastern Province compared to the national average of Rs 15,400/month in 2003/2004).[2] The availability of household equipment (such as refrigerators, telephones and televisions) in the Northern Province and Eastern Province is lower than the national average. Taking these situations into consideration, this project was expected to contribute to regional economic development and also to the reconstruction of the Northern Province and Eastern Province, which were economically impoverished during the civil war.

### 1.2 Summary of the Project

The construction of a new highway bridge was implemented in order to solve traffic bottlenecks such as 1) the blockade of automobiles during the passing of trains due to the dual function of the railway-highway bridge, 2) alternating vehicular crossing due to the narrow width of the bridge, and 3) the poorness of travel conditions and traffic safety of the bridge due to the use of a modified road deck.

| | | |
|---|---|---|
| Grant Limit/Actual Grant Amount | | 1,043 million yen／989 million yen |
| Exchange of Notes (hereinafter referred to as "E/N) Date | | (Detailed Design ) 3 February, 2005<br>(Construction) 27 May, 2005 |
| Implementing Agency | | Road Development Authority (hereinafter referred to as the "RDA"), Ministry of Highways |
| Project Completion Date | | September 2007 |
| Implementers | Main Contractor | Hazama Corporation |

[2] Central Bank of Sri Lanka, "Economic and Social Statistics of Sri Lanka 2011".

| | | |
|---|---|---|
| | Main Consultant | Oriental Consultants Co., Ltd. (Japan), Nippon Koei Co., Ltd. (Joint Venture) |
| Basic Design（hereinafter "BD"） | | July 2004～January 2005 |
| Related Projects (if any) | | Road Administration Advisor |

## 2. Outline of the Evaluation Study

### 2.1 External Evaluators

Keiko Asato, Foundation for Advanced Studies on International Development

### 2.2 Duration of Evaluation Study

Duration of the Study: November 2011 – September 2012

Duration of the Field Study: March 24, 2012 – April 5, 2012

May 27, 2012 – May 31, 2012

### 2.3 Constraints during the Evaluation Study

None

## 3. Result of the evaluation (Overall rating: A[3])

### 3.1 Relevance (Rating：③)[4]

#### 3.1.1 Relevance to the Development Plan of Sri Lanka

As stated below, this project is consistent with the development policy of the partner country at the time of both ex-ante and ex-post evaluation.

At the time of ex-ante evaluation, the National Physical Planning Policy (2002) designated five large urban areas. The bridge was located between two of these five urban areas: the Trincomalee-Anuradhapura large urban area and the Ampara-Batticaloa large urban area.[5] The estimated population in 2030 of both urban areas combined is projected at 2.75 million (compared to 1 million in 2001). It was expected that this project would promote a smooth road network and bring social and economic benefits to the people of the region. Moreover, the bridge was located on the A-11, which connects Plonnarwa and Batticaloa, both of which are designated as key cities in the early development promotion area. The construction of the bridge

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

[4] ③: High, ②: Fair, □: Low

[5] ① "The Greater Colombo urban area", ② "Trincomalee- Anuradhapura large urban area", ③ "The Greater Hambantota urban area", ④ "The Greater Jaffna urban area", and ⑤ "Ampara-Batticaloa large urban area".

was expected to facilitate the growth of a hub area for regional development. In addition, the Corporate Plan (2002-2007) listed four bridges including the bridge as a prioritized rehabilitation project. Among these, the bridge was the longest and needed techniques and funds for rehabilitation beyond the capacity of the partner country, therefore requesting support from outside of the country.

At the time of ex-post evaluation, the Sri Lanka New Development Strategy (2006)[6] formulated by the Ministry of Finance and Planning raised the issue of maintenance and rehabilitation of the road network as a prioritized investment area. This strategy highlighted the necessity for the development of the Northern Province and Eastern Province, whose development had been impeded by the civil war. The National Road Master Plan (2002-2017) (hereinafter referred to as "NRMP") designated the reinforcement of the road sector as an important project to solve the regional disparities throughout the country and to contribute to well-balanced national development. The Ministry of Construction, Engineering Services, Housing and Common Amenities formulated the National Physical Planning Policy and Plan (2011-2030) in 2011, after the cessation of the civil war in 2009. This policy provided regional development plans for the Eastern Province and Northern Province battered during the civil war. In order to execute these plans, the smooth transportation of goods through the A-11 and the bridge is important. From this perspective, we can say that the bridge contributes to the reconstruction of society following the civil war.

### 3.1.2 Relevance to the Development Needs of Sri Lanka

As stated below, this project is consistent with the development needs of the partner country at the time of both ex-ante and ex-post evaluation.

At the time of ex-ante evaluation, even though the bridge was an important part of the A-11 connecting Polonnarwa and Batticaloa, which were hub cities for the regional economy, it hindered the smooth flow of traffic in the area due to the dual function railway-highway bridge, and made the travel conditions and traffic safety low because temporary roads on the train track only used a simple, modified road deck. The bridge also had other physical problems: the width of the bridge was so narrow that automobiles congested the bridge; the curve radius of the access road was so short that the visual distance (distance to see an oncoming vehicle) was insufficient; and others. In addition to these problems, the bridge also confronted economic problems. For example, it impeded the efficient transportation of agricultural products produced

[6] No description was found regarding the year in which the documents were prepared, but it is estimated that the documents were prepared after 2009 considering the data and other information stated in them.

in the North Central, Eastern and Uva Province near the bridge, and hindered the quick transportation of fish unloaded in the Eastern Province to the Greater Colombo Metropolitan Area and others.

From the point of view of strengthening the road network, at the time of ex-ante evaluation the improvement of transport of commodities was important because 94% of the total passenger transport and 98% of the total freight transport in Sri Lanka was carried out by inland transport. The total length of national roads in Sri Lanka was 27,200 km and the road density was high, 1.5km/k ㎡. However the pavement rate was only 23%, and there were 3,900 decrepit bridges over the trunk road constructed 50-100 years ago during the British colonial era. Most of them were not wide enough, had unstable structures and decreased load-carrying capacities due to corrosion of the steel. These problems impeded the passing of large automobiles and made it difficult to respond to the 6% annual increase in traffic volume.

At the time of ex-post evaluation, according to the NRMP the maintenance of the road network in Sri Lanka was still not satisfactory. Appropriate and efficient maintenance of the road network is necessary for the social and economic development of the country. However, the budget for the road network has not been expanded in line with the increasing number of registered automobiles during the period of 1997-2006. In 2007, more than 50% of the road network needed rehabilitation.[7] It was said that the urban population rate, which was 30% in 2007, will increase to 50% in 2015. To keep the road network in good condition (including the rehabilitation and reconstruction of bridges), it is necessary to solve the economic disparity between the cities.

### 3.1.3 Relevance to Japan's ODA Policy

As stated below, this project is consistent with Japan's ODA policy and also with the aid strategy for Sri Lanka after the termination of the civil war.

The country aid plan (2004) for Sri Lanka was composed of two pillars: (1) support for the consolidation of peace and the reconstruction of the country, and (2) support for mid- and long-term development plans for the partner country. In order to implement the latter pillar, 1) the improvement of economic infrastructure, 2) the enhancement of foreign currency acquisition capacity, and 3) a strategy for poverty reduction were considered to be necessary. Improvement of the trunk transportation and communication network was one method to achieve 2) capacity enhancement of foreign currency. In the country project implementation plan (2004), (1) support

[7] NRMP (2007).

for the consolidation of peace and the reconstruction of the country and (2) support for mid- and long-term development plans for the partner country were also set as prioritized aid issues. In this plan, to achieve the latter pillar, a transportation program was planned as a part of the improvement of economic infrastructure.

Moreover, this project is part of support for Sri Lanka of up to $1 billion committed by the Japanese Government in response to the cease-fire of 2002.

In light of the above mentioned, this project had been highly relevant with the country's development plan, development needs, as well as to Japan's ODA policy, therefore its relevance is high.

### 3.2 Effectiveness[8] (Rating : ③)

#### 3.2.1 Quantitative Effect

As stated in Table 1, the quantitative indicators set in the BD have been achieved.

Table 1: The achievement of indicators set at ex-ante evaluation

| Indicators (unit) | 2004 (basis) | 2009 | 2011 | 2012 (actual) | 2013 年 (target) |
|---|---|---|---|---|---|
| Congestion time for automobiles during a train passing (minutes/day) | 80 minutes (20 minutes x 4 times) | 0 (solved) | 0 (solved) | 0 (solved) | 0 (solved) |
| Congestion time caused by alternating vehicular crossing (minutes/day) | 180 minutes (5 minutes x 3 times/hour x 12 hours) | 0 (solved) | 0 (solved) | 0 (solved) | 0 (solved) |
| Velocity of vehicle (km/hour) | 10-15km/hour | N.A. | 50-60 km/hour | 36-54 km/hour | 40-50 km/hour |
| Traffic volume (PCU/day)[9] | 4,600 | 7,608 | 9,046 | 10,304[10] | increase |

(Source) 2004 (basis)/2013 (target): BD (2005).
2009-2012: Answer provided to the RDA through a questionnaire and site survey.

##### 3.2.1.1 Vehicle congestion time

This project changed the originally narrow and dual function railway-highway bridge into a two-track bridge exclusively

Continuously passing automobiles

[8] Sub-rating for Effectiveness is to be put with consideration of Impact
[9] This figure was calculated by the formula of Passengers Car Unit (PC
[10] This figure is the average number of passing cars surveyed from 5 a
May 12 (Sat), 2012

for the passing of automobiles, which solved the congestion time caused by passing trains and alternating vehicular crossing. With these improvements, the smooth flow of automobiles has been attained.

#### 3.2.1.2 Velocity of automobiles

The velocity of automobiles on the bridge was 50-60km/hour (2011) according to a report by the RDA. It was 36-54 km/hour (2012) according to the actual site survey undertaken at the time of ex-post evaluation, which means that the current vehicle velocity is in line with the planned indicator of 40-50km/hour. No physical restrictions caused by the bridge structure nor traffic jams affecting the passing velocity have been identified.[11]

### 3.2.2 Traffic volume

The volume of traffic across the bridge has been increasing, as stated in Table 2. However, this effect is attributed not only to the construction of the bridge, but also other factors as described below.

#### 1) Expansion of the A-11

After the completion of the project, the expansion of the width and overlay of the A-11 was undertaken for the Maradankadawela － Habarana － Trikondiadimadu stretch (127km) in 2008-2010, supported by the World Bank. This rehabilitation project improved the traffic conditions on the A-11, which brought automobiles previously passing through other routes to the A-11. This causes the increased traffic volume on the A-11.[12] According to the RDA planning division, the expansion of the A-11 was not planned at the time this project was formulated. After securing the budget from overseas for the recovery from damage caused by the tsunami in December 2004, the rehabilitation project of the A-11 was designed.

#### 2) Increase of traffic volume of vehicles after termination of civil war

After the termination of civil war in 2009, lots of check points set during the war had been abolished, and the vehicles started to pass with no obstacles. Also the regional development plan for Eastern Province began to be put into practice, so the

[11] Automobiles or lorries with heavy loads pass slowly, so the cars following these automobiles were also obliged to pass slowly. Under such conditions, some frustration at the slow pace was expressed at the time of site survey. Without these heavily-loaded automobiles, most automobiles were passing at 50-54km/hours.

[12] The public bus service from Batticaloa and trucks carrying agricultural products from the Eastern/Central Provinces to Polonnarwa Agricultural office, which were previously passing through mountainous areas such as Kandy or Nuwara Eliya, are now utilizing the A-11 and the bridge due to better travel conditions following the rehabilitation project (according to the interviews with the officers in Polonnarwa office of Ministry of Agriculture and the passengers of buses at bus terminal in Batticaloa).

construction industry and other regional economy came to be activated[13]. This situation stimulated the number of vehicles passing the Bridge and A-11 which connect eastern and western areas[14]. This project was originally proposed and formulated responding to the cease-fire agreement in 2002. However, this agreement had not been observed repeatedly, and the cease-fire agreement had collapsed in 2008. In May 2009, the civil war has finally terminated, and after that, the social security has been recovered, which contributed to exert the remarkable project effect.

**3) Increase in the number of automobiles registered nationwide**

The number of registered automobiles nationwide in Sri Lanka has increased. In particular, the rate of increase in the Northern Central Province, where the bridge is located, and in the Eastern Province and Northern Province, which were controlled by anti-government powers during the civil war, is much higher than the national average rate. The increase in the number of registered automobiles in these provinces explains the increase of automobiles that pass over the bridge, as automobiles coming from the Northern Central and Eastern Province to the capital have to pass over the bridge.

Table 2: The transition in the number of registered automobiles

| | 2002 | 2008 | 2009 | Change from previous year (%) | 2010 | Change from previous year (%) | Change from 2002 (%) |
|---|---|---|---|---|---|---|---|
| Northern Central | 49,163 | 116,571 | 120,972 | 103.8 | 173,890 | 143.7 | 353.7 |
| Northern | 26,173 | 39,740 | 47,031 | 118.3 | 62,744 | 133.4 | 239.7 |
| Eastern | 39,464 | 99,895 | 110,760 | 110.9 | 192,260 | 173.6 | 487.2 |
| Total | 1,104,383 | 2,163,123 | 2,280,006 | 105.4 | 2,659,847 | 116.7 | 240.8 |

(Date source)
2008-2010 data: formulated by the evaluator taking data from "Economic and Social Statistics of Sri Lanka 2011" (Central Bank of Sri Lanka)
2002 data: BD (2005)

### 3.2.2 Qualitative Effect

As stated below, safety and travel conditions have improved compared to before the project.

[13] An interviews with headquarter, Polonnarwa and Batticaloa office of RDA.
[14] RDA headquarter (Engineering Service Division (Bridge Design)) estimates the traffic volume will continue to increase as a result of the development of Eastern Province and will reach its peak around 2015.

#### 3.2.2.1 Safety and travel conditions[15]

The expansion of width in order to accommodate two tracks for vehicle crossing has reduced the accidental contact with bridge railing. The diminishing of potholes on the surface of the bridge has lessened the number of accidents and disorder of automobiles. The exclusive use of the bridge for automobiles facilitates safer travel. Given this, it is considered that the safety of the bridge has been improved. Travel conditions have also been improved owing to the flat and smooth surface of the new bridge.[16]

Due to these improvements, the velocity of the automobiles has increased. Traffic accidents related to this improvement have not been reported according to the Polonnarwa Police Office.[17]

#### 3.2.2.3 Effect of floods

This project prevents the new bridge from being rendered unavailable due to rain and floods. Before the project, automobiles could not cross the bridge during heavy rain. However, the height of the new bridge was examined and decided based on the record of the highest water level since 1983. No cases have occurred in which the new bridge and new access road are unusable due to heavy rain.[18]

### 3.3 Impact

#### 3.3.1 Achievement of intended impact

At the time of ex-ante evaluation, as an impact of the project, the bridge was expected to contribute to the social and economic development of the system C area[19] which expands from Uva Province to Eastern Province, attributed to the improvement of transportation route from that area to the western area, and also to be contribute to the reconstruction of Northern Province and Eastern Province through the progress of peace agreement. At the time of ex-post evaluation, contributions to several sectors including the agricultural sector was identified: the improvement of transportation of fish caught in the Eastern Province, the active transportation of construction materials, the facilitation of smooth transportation of tourists, and others.

---

[15] An interview with 8 drivers of public buses, ambulances and tricycle cars was conducted on March 31 and April 2 on the national road before and behind Batticaloa and the bridge.

[16] Before the project, the bridge was used as a dual purpose railway-highway with a modified road deck on the train track. This made the surface of the bridge unstable.

[17] A Polonnarwa police office said that the increase in traffic volume on the A-11 has brought about an increase in the number of traffic accidents in their jurisdiction area. However, the traffic accidents occurring around the bridge have not increased. Only one accident was identified in which the vehicle turned off from the access road not realizing the extent of its curve due to the absence of street lights.

[18] According to an interview with the RDA and passengers of public buses.

[19] System C is famous area for its production of rice, which extends to Uva Province to Eastern Province.

The impact of this project is categorized into two types; the first is directly attributed to this project, and the second is the combined result with other factors. These other principal factors are, as stated in 3.2.1.3, the traffic volume, the rehabilitation of the A-11 by the World Bank, and the termination of the civil war. Even though the rehabilitation of the A-11 was not planned at the time of the project formulation,[20] combined with this rehabilitation, the impact of bridge construction by the project becomes greatly significant.

In this ex-post evaluation, both the direct impact caused by this bridge and contributions from this project to producing the social and economic synergy effects were evaluated. As a result, it was observed that in both aspects, this project showed contributions to regional social and economic development as well as reconstruction of the Eastern Province.

#### 3.3.1.1 Impact on the neighbouring residents

Direct positive impacts of this project were seen in the health sector and the movement of people in the region.

**1) Health sector**[21]

The district hospitals around Polonnarwa are not equipped with sufficient medical facilities so they have to send patients by ambulance to well-equipped hospitals in Polonnarwa when necessary.[22] For example, in the case of the Manampitya district hospital, it previously took 40-50 minutes to reach Polonnarwa before the project as a result of waiting for trains and oncoming automobiles at the bridge. However, at the time of ex-post evaluation, the ambulances consistently reached Polonnrwa Hospital in around 20 minutes due to the rehabilitation of the bridge. Previously, the patients sometimes reached critical condition while waiting for trains passing over the bridge.[23] At present, such situations no longer occur due to reduced time required to transport patients.

**2) The transport of residents around the bridge**[24]

The public bus services which cross the bridge are 1) short distance services which run in the surrounding areas of the bridge, and 2) long distance services which connect the core cities in

[20] Interview with the RDA planning division.
[21] Interview with hospitals in Manampitiya, Welikanda and Batticaloa.
[22] Most of the cases are related to acute asthma, acute cardiac disease, poisoning and childbirth.
[23] In cases related to childbirth, the ambulance stopped for some time at the bridge, and the medical condition of the women became fatal.
[24] Interview conducted at a bus station near the bridge and Batticaloa bus terminal with 12 passengers who use the bus service crossing the bridge.

the region.[25] The short distance services are utilized by local people for daily use, such as to go to hospitals and banks, to go shopping and for visiting relatives and friends. According to the passengers, the time to travel to Polonnarwa has been reduced, which increases the frequency of their visits to Polonnrwa. In regards to other benefits stemming from the bridge construction, comments have been noted from passengers such as: "we can pass the bridge even during heavy rain", "we can move as planned with a predictable arrival time", "the number of traffic accidents has decreased", "the patients can reach the hospital in the city faster", and others.

Regarding the long distance bus service that cross the bridge, at the time of ex-post evaluation daily regular services had been resumed: four times to Jaffna, seven times to Colombo, once to Mannar, and once to Vavuniya from Batticaloa per day. Such services were impossible during the civil war. One bus can carry 42 passengers with seats. During the busy season or on weekends, the passengers exceed the number of seats on these bus services. The time required to travel to Colombo has also decreased. With such improved bus services as well as shorter travel time via the new route, cases have been recorded of passengers who previously had passed through mountainous areas such as Kandy or Nuwara Eliya changing their route to the flat and comfortable route, now passing through the A-11 and the bridge.

As stated above, the bridge makes daily life more convenient and facilitates traffic between the east and west areas of the neighbourhood.[26] This change contributes to the promotion of the tourism industry as stated later.

Other than the effect stated above, the construction of the bridge, combined with the effects of the rehabilitation of the A-11 and the termination of civil war, contributes to the social and economic development of the neighbouring region and the reconstruction of the Eastern Province after the civil war.

#### 3.3.1.2 The impact on logistics and economic activities

**1) Agricultural sector**

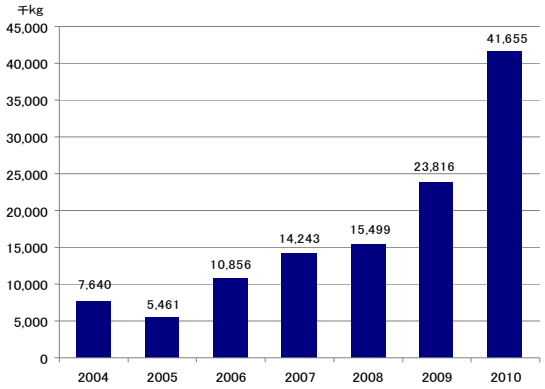
Sri Lanka has an agricultural distribution system based on harvests being purchased and distributed throughout the whole country through the Ministry of Agriculture. The harvests in the Northern and Central Province, Eastern Province and Uva Province are transported by land to the office of the Ministry of Agriculture in Polonnarwa. These three provinces are called the grain belt because the production volume of rice from these provinces amounts to 60% of that

[25] Polonnarwa, Colombo, Jaffna, Mannar, Vavuniya, Batticaloa and others.
[26] The RDA showed other positive impacts to students who live on the eastern side of the bridge can more conveniently go to schools in Polonnarwa and Krunegala.

of the whole country. Before the project, agricultural products were transported to the above-mentioned Polonnarwa office through the mountainous area (Kandy or Nuwara Eliya) due to the inconvenient traffic on the A-11 and the bridge, as well as unsafe conditions in the Eastern Province. However, the transportation of heavy loads such as agricultural products was dangerous when passing through the mountainous area, and the travel time was long. At the time of ex-post evaluation, the route through the A-11 and the bridge had been improved to make it flat and easier to pass with reduced travel time. This attracts the farmers in these regions and they now prefer to take the improved route, rather than the mountainous route, to transport their products to the Polonnarwa office.[27] In the Eastern Province, especially in Amparo district and Batticaloa district, the agricultural sector has been revived after the termination of civil war. This project contributes to the increased volume of agricultural products transported in these districts.

**2) Fishery sector**

During the civil war, the restriction of fishing areas and approval procedures discouraged fishery activities. After the termination of the civil war, these restrictions were abandoned, which brought about an increase in the volume of fishing in the Batticaloa district (refer to Graph 1). The principal destination of the fish caught are cities in the Western and Central Provinces, such as Colombo, Negambo, Kandy, Krunegala and Matale. Shipping from Batticaloa to these cities requires passing via the A-11 and the bridge.




(Source) Elaborated by the evaluator from the "Statistical Data, Batticaloa District Secretariat (2010-2011)"
Graph 1: The transition of volume of fish unloaded at Batticaloa district

The travel time from Batticaloa to Colombo was more than 10 hours before the project. At the time of ex-post evaluation, it had been shortened to 5-6 hours.[28] The reduction of travel time is mostly attributed to the rehabilitation of the A-11. However, the bridge is the longest bridge on the A-11. Without the construction of the new bridge under the project, the rehabilitated A-11 would not have been able to exert its maximum impact. From this perspective, the significance

[27] Interview at the Polonnarwa office of the Ministry of Agriculture.
[28] Interview with the fishery cooperation at the Walacheni port in Batticaloa Province and the intermediate person.

of the project is large.

Moreover, the reduction of travel time to the destination enables saving on fuel costs as well as the reduction of post-harvest losses. This effect maintains the freshness of the fish caught and thus prevents the falling of the price of fish due to deterioration of freshness during transportation. The tuna transported to Colombo port is now durable enough to even be exported to the EU. The export of fish caught brings foreign currency and leads to boosted income for the fishermen. Expecting the expansion of fish exports, the Ministry of Fisheries deploys training programs for the fishermen and intermediate business persons on quality control and maintenance of freshness of fish caught.[29]

According to interviews with fishermen at the time of ex-post evaluation, their disposable earnings had increased, and are spent on the fuel costs associated with going fishing, the repair of fishing equipment, the expansion and rehabilitation of houses, the purchase of electronic devices, cars and motorbikes, education for children and others, and increasing the sales volume of fish caught.

**3) Construction sector**

Since the termination of the civil war in 2009, the regional development plans in the Eastern Province and North Province have been put into practice, which have contributed to the expansion of the construction business in these areas. As the construction sector has been boosted, the transportation of construction materials over the bridge has been increasing. Moreover, the sand extracted from the riverside of the Mahaweli river is famous for its good quality,[30] and is transported throughout the whole country via the bridge. The sand mining supplier reported that the quantity of sand extracted from the Mahaweli river has increased from 100-150 trucks per day in 2008 to 350-400 trucks per day in 2012. According to the supplier, they cannot extract the sand beyond the upper limit set by the Department of Wild Conservation (hereinafter referred to as "DWC"). The quantity mentioned above for 2012 is within this limitation, and does not negatively affect the environment. Given this situation, we can consider that the bridge contributes to the smooth transportation of increasing volumes of construction materials.

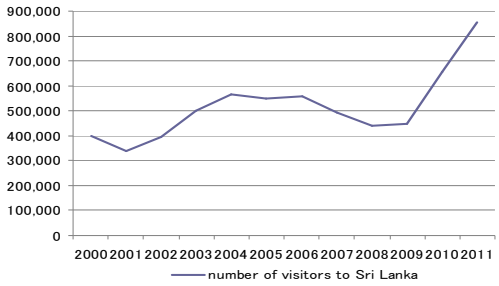
[29] At the time of ex-post evaluation, the Ministry of Fisheries was giving guidance to the owner of multi-day boats (MDB), fishermen and intermediate business persons on how to treat the fish caught in order to maintain freshness in collaboration with NIFNE (National Institute of Fisheries and Nautical Engineering).

[30] Sand mining suppliers say that the Mahaweli river provides high quality sand with minute uniform grains.

The RDA planning division estimates that the boom in projects stemming from regional development plans in the Northern Province and Eastern Province will continue until 2015. The rehabilitation of the A-11 and the bridge and the improvement of the road network are important for these businesses.

**4) Tourism sector**

The North Central Province, where the bridge is located, is famous as a tourism destination, with "ancient areas" in Polonnarwa, Sigiriya and Dambulla.[31] After the termination of the civil war, tourists from abroad have been increasing (refer to Graph 2). This area is one of the main destinations for tourists. Even without having obtained quantitative data, it is possible to say that the number of local residents who travel from the Eastern Province to the ancient area in the North Central Province or who go from the Western and Central Provinces to coastal areas of the Eastern Province is growing[32]. As stated in 3.3.1.1, the repair of the bridge encourages the movement of local people, and contributes to the active movement of domestic tourists to the tourist areas.




(Source) Elaborated by the evaluator from the "Annual Statistical Report 2009 (Sri Lanka Tourism Development Authority)"

Graph 2: The transition of tourists from abroad

As explained above, with the synergy effect of the rehabilitation of the A-11 and the termination of the civil war, the project contributes to the encouragement of logistical and economic activities across broad sectors, such as agriculture, fishery, construction and tourism.

### 3.3.2 Other impacts

#### 3.3.2.1 Impact on the natural environment

According to the headquarters and Polonnarwa office of the DWC, the construction of the bridge has not negatively affected animals and plants in the national park, nor has contaminated the Mahaweli river. The Initial Environmental Examination (hereinafter referred to as "IEE") set conditions relating to environmentally-friendly measures, such as measures against flooding, the minimization of soil erosion, the prohibition of the removal of trees, the replantation of indigenous plant species and horticulture spices, and the limitation of noise from construction areas. According to the DWC headquarters, the RDA and the DWC Polonnarwa office have

[31] According to the Sri Lanka Tourism Development Authority Annual Statistical Report 2009, in 2009, 19% of accommodation of the whole country is located in this ancient area.
[32] Interview with the RDA Polonnarwa office.

been monitoring compliance with these requests and have reported that these obligations have been observed as stipulated.

#### 3.3.2.2 Land acquisition and Resettlement

At the time of ex-ante evaluation, a pump facility, a high voltage feeder and some private houses were located on the left bank. On the right bank there were several houses belonging to the sand supplier, other private houses, a banyan tree, a low voltage feeder, a telephone line connected to the police campsite, and a generator.

Through the detailed design survey, the pump facility on the left bank and the banyan tree and generator on the right bank did not need to be relocated. The high and low voltage feeders were transferred by the electricity company, the cost of which was borne by the RDA.

The number of houses which needed to be relocated was 14 (8 on the right bank, and 6 on the left bank). However, as they were illegal residents in the national park, they were not eligible for relocation compensation provided under national law. They therefore moved their houses at their own expense, and have not expressed dissatisfaction with this procedure. The DWC is aware of these illegal residents in the national park. However, neither their number nor the environmental burden on the park are so big that the DWC has taken any measures to relocate these residents to outside of the national park. In their long-term administrative plan for the national park, the DWC is discussing the treatment of these illegal residents, but it is not considered an urgent issue.[33]


Newly issued 50 rupee bill issued in February 2011

At the time of ex-ante evaluation, 150-200 sand mining suppliers were operating their businesses around the project site. However, considering the environmental burden caused by sand extraction operating in the national park, the DWC requested them to move the extraction site to another location by the end of 2004. At the time of ex-post evaluation, it was confirmed that the sand extraction was being operated 1 km upstream from the project site, as instructed by the DWC.

Other than these impacts mentioned above, the bridge is used as an icon on the 50 rupee bill, which was newly issued in February 2011. Through this new bill, people in the country are

[33] Interview with the DWC headquarters.

familiar with the bridge. Other than these impacts, no negative impacts have been confirmed.

In light of the above mentioned, this project has largely achieved its objectives, therefore its effectiveness and impact are high.

### 3.4 Efficiency（rating：③）

#### 3.4.1 Project Outputs

This project was expected to produce outputs from the Japanese side, such as construction of the bridge and access road, as stated in Table 3.

**Table 3: Output on Japanese side**

| | | | | | |
|---|---|---|---|---|---|
| Bridge | Bridge length (m) | Super-structure | Substructure | Foundation | Bridge width (m) |
| | 302 | Prestressed concrete (PC) 6 spans continuous girder box | Reverse T-type abutments: 2 abutments Wall-type piers: 5 piers | Cast-in-place concrete piles (Φ1.0 m) | 10.4 Carriageway: 7.4 Sidewalk: 3.0 |
| Access Road | Right bank (m) | Left bank (m) | Road width (m) | | |
| | 182 | 264 | 13.4 (Carriageway: 7.4) (Sidewalk: 6.0) | | |

(Source) Report offered by JICA

The acquisition of land for project construction, temporary offices, accommodation, storage, workshops, a site for acquiring construction materials, and relocation of public facilities and private houses at the project site were responsibilities of the recipient country. The relocation of public facilities and private houses at the project site was conducted approximately as planned, as stated in 3.3.2.2. Land acquisition and Resettlement. The acquisition of land for storage, workshops, and a site for acquiring construction materials was also put into practice without problems.

#### 3.4.2 Input

##### 3.4.2.1 Project Cost

The cost borne by the Japanese side is as stated in Table 4.

**Table 4: The cost borne by the Japanese side**

(Unit: thousand yen)

| | Plan (2005) | Actual (2007) | | | |
|---|---|---|---|---|---|
| | | Total | Procurement | | |
| | | | In recipient country | In Japan | In third country |
| Construction | 920,793 | 920,700 | 265,729 | 364,253 | 290,718 |
| Design and administration | 69,000 | 69,000 | 3,100 | 65,900 | 0 |
| Total | 989,793 | 989,700 | 268,829 | 430,153 | 290,718 |

（Source） Planned amount：JICA's internal documents　　Actual amount：Completion report

The cost borne by the Sri Lankan side is as stated in Table 5.[34]

**Table 5: The cost borne by the Sri Lankan side**

(Unit: thousand yen)

| Items | Plan (2004) | Actual (2007) |
|---|---|---|
| Tax exemption | Covered by domestic budget | Covered by domestic budget |
| Acquisition of land for project implementation | None | None |
| Temporary offices, accommodation, storage, workshops | None | None |
| Site for acquiring construction materials | None | None |
| Relocation of public facilities | | |
| High voltage feeder | 1.40 | 2.309 |
| Low voltage feeder | 0.27 | |
| Houses of sand suppliers | 0.17 | 0 |
| | 1.84 | 2.309 |

（Source） Answers to the questionnaire undertaken by the RDA

The amount at the EN was 1,043 million yen. The project cost stated above is 95% of the EN amount, which is lower than planned. Even though the amount borne by the recipient country exceeded the original plan, the total cost borne by both countries is lower than planned.

### 3.4.2.2 Project Period

[34] At the time of ex-post evaluation in 2012, the actual amount was 2,264 million Rs. However, to compare with the plan, the figure stated in Table 5 has been recalculated in line with the exchange rate of September 2007.

This project started on 10 March 2005 (contract date of detailed design survey) and ended on September 27, 2007. This equals a total of 30.5 months, which is 94% of the original plan of 32.5 months. The actual project period is shorter than planned.

In light of the above mentioned, both project cost and project period were within the plan, therefore, efficiency of the project is high.

### 3.5 Sustainability（rating：②）

#### 3.5.1 Structural Aspects of Operation and Maintenance

Under the supervision of the operation, maintenance and construction division of the RDA, the Polonnaruwa office of the RDA is in charge of the operation and maintenance of the bridge. The number of the staff allocated to the Polonnarwa office is listed in Table 6.

**Table 6: The number of staff at the RDA Polonnarwa Office**

| | Ex-ante evaluation (2004) | Ex-post evaluation (2012) |
|---|---|---|
| Representative | 1 | 1 |
| Deputy representative | 2 | 1 |
| Engineers | 1 | 2 |
| Chief technicians | 4 | 2 |
| Principal workers | 7 | 7 |
| Workers | 14 (132)* | 60 |
| Administrative officers | 7 | 7 |
| Total | 36 (132) | 80** |

* The number of workers in parentheses in 2004 is the number of temporary workers working at the site.
** The 80 staff in 2012 also include the temporary workers.

(Source) 2004: BD
2012: Answers to the questionnaire undertaken by the RDA Polonnarwa office.

Among the staff listed in Table 6 (representing the whole Polonnarwa office), the staff members involved in the operation and maintenance of the bridge are one representative, one deputy representative, one engineer and five other members (workers who check and inspect the bridge on a daily basis).

A deputy representative secures the budgets and materials for operation and maintenance. Under the supervision of an engineer, the workers conduct the daily operation and maintenance,

including the cleaning of the bridge. They also carry out regular inspections on the road and bridge under the supervision of RDA headquarters. According to the deputy representative of the Polonnarwa office, the number of technical staff is sufficient, but there are insufficient workers to conduct exceptional inspections, such as the removal of sediments from the piers of the bridge after the rainy season. In Table 6, it is apparent that the number of workers had reduced at the time of ex-post evaluation compared to at ex-ante evaluation. This means that there is an insufficient allocation of staff.

### 3.5.2 Technical Aspects of Operation and Maintenance

The RDA Polonnarwa office says they recruit staff members who are well equipped with professional knowledge, following the recruitment criteria in terms of academic career, professional qualifications and work experience. The RDA headquarters offer various training opportunities to the technical staff in order to strengthen and maintain the technical skill levels of their staff. The RDA, professional training institutes and universities organize training programs as well as technical seminars and workshops in their own country. The RDA staff are also provided with the opportunity to participate in training programs abroad organized by the training institutions.[35] These opportunities are provided in order to maintain and strengthen the technical level of staff members. The workers at the project sites are also offered guidance on occupational safety. Considering the situations mentioned above, it is considered that the RDA staff are equipped with the required technical skills to conduct daily maintenance and operations.

On the other hand, the operation and maintenance manual for the bridge was prepared at the time of the completion of the project, but this manual is not made use of by the RDA staff members during regular inspections. The staff fill in the form designated by the RDA headquarters instead of following the instructions detailed in the manual. However, the engineers at the Polonnarwa office do not experience technical difficulties when inspecting the bridge on a regular basis without the manual.

The RDA headquarters' Japan-aided project management unit considers that making use of the availability of advanced equipment for the operation and maintenance of the bridge is still lacking, as is capacity enhancement. They consider that the maintenance of the bridge requires more advanced skills compared to the road, and RDA staff have not reached the sufficient technical level required to make full use of this advanced equipment.

[35] The engineer responsible for this project participated in technical training twice and budget management training once in 2011. The deputy representative also had the experience of participating in manager training.

### 3.5.3 Financial Aspects of Operation and Maintenance

According to the NRMP (2007-2017), 19% of the planned investment budget is allocated to the maintenance of the road, and 2.9% of the budget is assigned for the rehabilitation and maintenance of the bridge. A high priority is put on the road maintenance, and some of the budget for the bridge maintenance has been appropriated for the road. Because of this, the budget for the bridge maintenance is not sufficiently secured. Moreover, the budget for the bridge is mainly used for daily maintenance and is not allocated for long-term rehabilitation. Since December 2004 when the tsunami occurred, a large volume of overseas aid funds has flowed into the RDA. Given this situation, the ratio occupied by overseas funds in the RDA entire budget has increased from 20-30% at the time of ex-ante evaluation to 60-70% in 2010-2014 (refer to Table 7). Consequently, the RDA does not feel the necessity to secure the budget for large-scale rehabilitation by itself, and is prone to depending on the overseas budget to cover costs. This is because the national budget is not able to respond to the cost needs of long-term rehabilitation. However, the RDA planning division has warned of this situation, and made calls to cover the cost from the national budget for long-term rehabilitation.

**Table 7: The transition of annual revenue and domestic and overseas ratio of financial source**

(Unit: million rupees)

| Financial source | 2000 | 2001 | 2010 | 2011 | 2012 (Request) | 2013 (Estimation) |
|---|---|---|---|---|---|---|
| Total | 8,673 | 9,486 | 112,085 | 131,866 | 144,568 | 154,139 |
| Domestic | 6,702 | 7,925 | 40,365 | 42,910 | 42,409 | 49,329 |
| Overseas | 1,971 (23%) | 1,561 (16%) | 71,720 (64%) | 88,956 (67%) | 102,159 (70%) | 104,810 (68%) |

（Source）2000-2001：BD (2005)
2010-2013：Ministry of Ports and Highways “Budget Estimates” (2012)

In 2012, the Road Maintenance Trust Fund (hereinafter referred to as the “RMTF”) was established to secure the budget for the operation and maintenance of the road and bridge[36]. It is of great significance that the special account exclusively secured for operations and maintenance was established. However, in this trust fund, the account for the road and bridge is not clearly separated. Therefore, still more efforts are needed to secure the budget for bridge maintenance.[37]

[36] One rupee per liter of gasoline had been collected by the RDA for a long time. What is new in this trust fund is that the purpose of the fund is exclusively restricted to the operation and maintenance of roads and bridges.
[37] Interview with the RDA Planning division.

In the case of the RDA Polonnarwa office, the budget is mainly allocated to daily inspections and regular maintenance; 70% is designated to the road, and the rest is for the bridge. The budget was insufficient at the time of ex-post evaluation, so the RDA Polonnarwa office puts the priority on cases of bad damage or urgent need of repairs. In addition, the RDA Polonnrwa office checks potholes and damaged points on the road and bridge after the rainy season and floods, and takes necessary measures. The expenditure details in 2009 at the RDA Polonnrwa office were as below.

**Table 8 Expense amount and its ratio (2009)**

| Items | Amount (mil Rps) | Ratio (%) |
|---|---|---|
| Routine maintenance | 11,768 | 28.5 |
| Periodic maintenance | 14,250 | 34.5 |
| Drainage & structure improvements | 5,148 | 12.4 |
| Bridge maintenance | 2,481 | 6.0 |
| Maintenance of & road furniture | 619 | 1.5 |
| Special Maintenance | 817 | 2.0 |
| Others | 6,264 | 15.1 |
| Total | 41,347 | 100 |

(Source) Formulated by the evaluator from documents obtained from the RDA Polonnarwa office

### 3.5.4 Current Status of Operation and Maintenance

The regular inspection of the superstructure, such as cleaning of sand clogging the joints between the Prestressed concrete (PC) girders, checking and repairing potholes, cleaning drainage systems, pulling out weeds, repainting railings and other tasks, is done every three months as instructed by the RDA and reported to the RDA headquarters based on the designated format (inspection sheet). In cases in which problems are found, they are reported to headquarters with pictures. If significant problems that require serious measures are found, they are also reported on the occasion of the regular inspections.

Sand clogging joints due to lack of cleaning

In regards to the substructure, cracks along the piers, the condition of the bridge bearings, the tightening of nuts and bolts, and the condition of scoring should be inspected. However, the bridge is still new, so these inspections have yet to be undertaken since the completion of the construction of the bridge, and the inspection sheet was submitted

without a description. The Northern and Central Provincial office of the RDA has yet to report on this situation, nor has given guidance on this issue. For the other bridge, the Polonnarwa office of the RDA checks the condition of the scoring, bridge bearings and the cracks on the piers by taking photos or observing directly by using ladders in the dry season. At the time of ex-post evaluation, much sand was piled up on the surface of the bridge, and it was observed that cleaning was insufficient. The sand clogging the joints prevented the flexible movement of the PC spans, which made the connection between the super and substructure of the bridge rigid. This situation places an unnecessary burden on the entire physical structure of the bridge. Many automobiles carrying sand pass over the bridge, so cleaning every three months at the time of the regular inspections is insufficient to keep the bridge in good condition. The Polonnarwa office of the RDA is aware of this situation, but the number of workers who are responsible for cleaning the bridge is insufficient. This makes it difficult to conduct frequent cleaning.

The control of over-loading and speed violations, which affects the durability of the bridge, is carried out everywhere in collaboration with the police. However, a survey on over-loading conducted in June 2011 by the RDA revealed that 94% of large lorries (over 8.5 ton) violate the over-loading regulations (the maximum legal weight including the weight of vehicle is 15.275 ton).[38] The RDA is to continue to reinforce the crackdown on over-loading in collaboration with the police.

In light of the above mentioned, some problems have been observed in terms of finances and operation and maintenance. Therefore, sustainability of the project effect is fair.

## 4. Conclusion, Lessons Learned and Recommendations

### 4.1 Conclusion

This project was implemented in order to solve traffic bottlenecks, such as 1) the blockade of automobiles during the passing of trains due to the dual function of the railway-highway bridge, 2) alternating vehicular crossing due to the narrow width of the bridge, and 3) the poorness of travel conditions and traffic safety on temporary roads over the railway track due to the use of a modified road deck consisting of a simple floor slab.

The relevance of this project is high as it is consistent with the national development policy and sector strategy of the partner country, as well as with Japan's aid policy. The project period and the cost were under the estimated plan, and the implementing process was efficient. This project shows good results: the traffic congestion time at the bridge has been solved, the automobiles'

[38] The breakdown of over-loading is 93% sand, 8% machines, 1. 19% rice and 1.09% metals.

passing speed has increased and the traffic volume has grown. The project has also contributed to economic and social development in the region by making people's daily lives more convenient and bringing economic benefits to the agricultural, fishery, construction and tourism industries.

Other than the above mentioned, this project has large significance as economic infrastructure because it has greatly contributed to the reconstruction of areas damaged economically by the civil war (especially the Eastern Province). These effects are attributed to the construction of the target bridge (hereinafter referred to as "the bridge"), as well as the rehabilitation of National Highway 11 (hereinafter referred to as the "A-11") and the cessation of the civil war in 2009. We can see clear synergy effects between these factors. Given these factors, we can evaluate the effectiveness and the impact of the project as high. In terms of the sustainability of the project, even though the budget preparation is to be improved as there are currently insufficient funds for daily maintenance and a long-term rehabilitation budget is yet to be secured, we did not identify major problems in other areas of sustainability.

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

## 4.2 Recommendations

### 4.2.1 Recommendations to Implementing Agency

- Secure sufficient budget for the bridge

**＜RDA Headquarters＞**

A bridge is a physically complex structure, which requires more costly measures than roads as its condition deteriorates. In order to delay the process of deterioration and minimize the cost of future maintenance, continuous maintenance is important. However, the budget secured by the RDA for maintenance is allocated specifically to road maintenance. It is recommended that a sufficient budget is also secured for the bridge, with good balance.

- Secure a sufficient budget for long-term rehabilitation

**＜RDA Headquarters＞**

The RDA has not secured a long-term rehabilitation budget to cover incidences such as the repair of pavements, railings, curves, drainage and slopes on a 10-year basis from the national budget, and the budget for the rehabilitation of the deteriorated bridge is expected to be covered by overseas aid. Since the tsunami in 2004, the dependency of the budget on overseas aid funds is remarkable. To establish a long-term stable operation and maintenance system in the country, it is recommended to secure long-term rehabilitation funds through their own national budget.

- Reinforcement of inspection and monitoring

**＜Northern and Central Provincial office of the RDA＞**

At the time of ex-post evaluation, the inspection sheet had not been fully utilized, and inappropriate bridge inspection practices were overlooked. The provincial office of the RDA should give guidance to the regional office, which conducts inappropriate inspections and submits imperfect inspection sheets, or should work with the RDA headquarters to secure the budget to respond to requests for repairs that require funds. With these efforts, the RDA provincial office should try to reinforce the establishment of a monitoring system so that the regional office can implement appropriate inspections and the related office can take responsive actions as a result of the inspection.

**＜RDA Polonnarwa office＞**

The bridge is still new, so the RDA Polonnrwa office has not yet inspected the substructure. Considering the increasing traffic volume passing over the bridge, from now on it is recommended to conduct continuous maintenance of the substructure as well. The RDA headquarters have acknowledged the necessity of upgrading maintenance equipment (such as bridge inspection cars and others) and of the enhancement of the technical capacity of regional office staff who can make use of this advanced equipment. However, in order for this equipment to be utilized fully and appropriately, it is indispensable to enforce a system in which the daily inspections, reporting and responsive actions are undertaken appropriately.

### 4.2.2 Recommendations to JICA

None

## 4.3 Lessons Learned

In this project, we cannot dismiss the effect of the combination of the rehabilitation of the A-11 for the effective use and social and economic impact of the bridge. This project shows how larger impacts are brought by selecting a bridge located in a very important place within the entire road network, producing a synergy effect with the other road.

While formulating a bridge project, it is critical to select and formulate the project considering the location within the entire road network, and expected synergy effects with surrounding roads.