

## Philippines

### “Maritime Safety Improvement Project”

#### Project Summary

Borrower	Government of Republic of the Philippines
Executing Agency	Maritime Industry Authority
Exchange of Notes	March 1991
Date of Loan Agreement	July 1991
Final Disbursement Date	October 1996
Loan Amount	¥3,516 million
Loan Disbursed Amount	¥3,487 million
Procurement Conditions	General Untied
Loan Conditions	Interest Rate: 2.7% Repayment Period: 30 years (10 years for grace period)

**<Reference>**

(1) Currency: Philippine Peso (P)

(2) Exchange Rate: (IFS annual average market rate)

Year		1990	1991	1992	1993	1994	1995	1996	1997	1998
Rate	Peso/US\$	24.311	27.479	25.512	27.120	26.417	25.714	26.216	29.417	40.893
	YenUS\$	144.79	134.71	126.65	111.20	102.21	94.06	108.76	120.99	130.91
	YenPeso	6.0	4.9	5.0	4.1	3.9	3.7	4.1	4.1	3.2
CPI (1990 = 100)		100.0	118.7	129.3	139.1	151.7	164.0	177.8	186.8	203.5

Source: IFS (Yen/Peso was calculated by author based on the figures above. CPI was also calculated by author based on IFS)

(3) Rate at the time of appraisal: 1 peso = ¥6.3

(4) Fiscal Year: January ~ December

(5) Abbreviations:

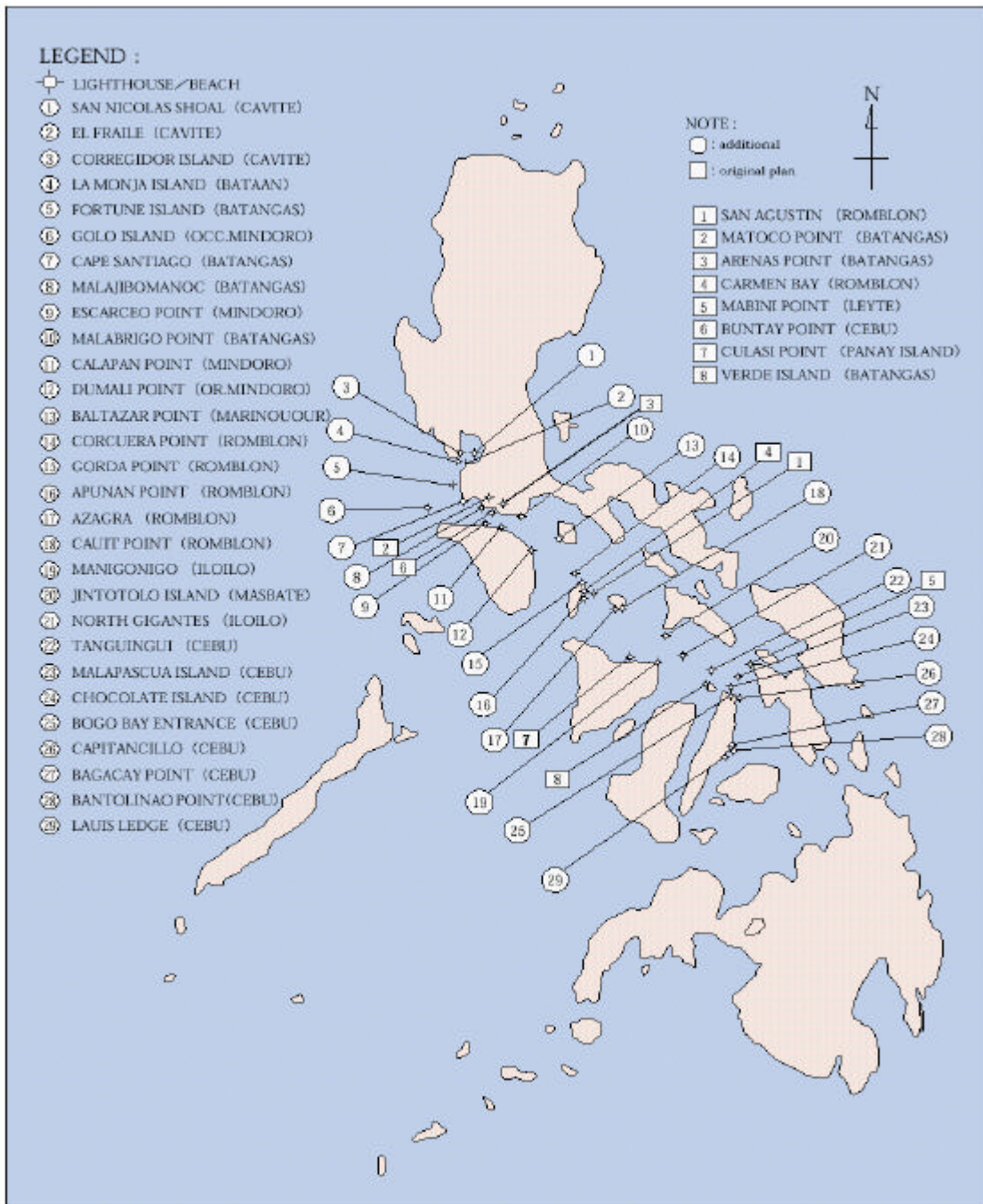
- DOTC: Department of Transport and Communications
- MARINA: Maritime Industry Authority
- PCG: Philippine Coast Guard
- HANC: Headquarters on Aids to Navigation Control
- O/M: Operation and Maintenance
- IP: Implementation Program

(6) Terminology

Lighthouse/light beacon: According to the International Association of Lighthouse Authorities (IALA), a lighthouse is a facility that has large-scale lighting equipment and building, and to which regular lighthouse staff is assigned, and all other small- to medium-scale facilities are light beacons.

# 1. Project Summary and Comparison of Original Plan and Actual

## 1.1 Project Location



## **1.2 Project Summary and ODA Loan Portion**

The Maritime Safety Improvement Project (hereinafter referred to as “this project”) that was the object of this post-evaluation, is a project designed to perform comprehensive surveys related to emergency rehabilitation projects and general maritime safety, with the purpose of improving maritime transport safety in the Philippines.

This project consisted in performing emergency rehabilitation for navigational aid facilities (37 lighthouses and light beacons) on the Manila-Cebu Island sea road and providing training required for the operation and maintenance of these facilities. Moreover, studies for the creation of a tender for the emergency rehabilitation project for lighthouses and light beacons, construction management, and implementation of future maritime safety improvement projects, were performed using consultant services.

The ODA loan covered the entire foreign currency portion of the project costs.

## **1.3 Background**

### **1.3.1 Development Plan and Maritime Sector at the Time**

The transportation sector was positioned relatively high in relation to other sectors in the Medium-Term Development Plan of the Republic of the Philippines (1987 to 1992), and accounted for 24.6% of the total investment budget for the government investment plan for the same period. As a result, the transportation sector ranked second after the energy sector (27.6%), with a budget of approximately 63 billion peso. These budgets were primarily marked for the road sector, which accounted for approximately 70% of the planned investment amount for the transportation sector. The reason that a large portion of investment goes to the road sector is that roads are a major means of transport in the Philippines (accounting for 53% of freight transport and 89% of passenger transport in 1987), and in addition to investment for new road construction, investment for improvement and rehabilitation were also actively performed.

On the other hand, the planned investment amount for the maritime sector during the same period was planned to be 15% of the total for the transportation sector. This budget was earmarked mainly for the enhancement of port facilities and the enhancement of navigational aid facilities such as lighthouses. As the background, the development of the maritime transport industry should be done by the private sector, but the Philippine government, which wants to support this, has the policy of seeking to raise navigation safety by making budget allocations in particular for navigational aid facilities.

### **1.3.2 Positioning of this Project in Maritime Sector**

The Republic of the Philippines consists of more than 7,000 islands, so that coastal shipping is essential for national life and industrial and economic activities. In 1990, the year when the appraisal was performed, the percentage of maritime transport as a share of total freight transport had been increasing year after year, rising from 35% in 1980 to 47% in 1987 or almost half of total freight transport, nearly equaling land transport. Furthermore, road transport accounted for approximately 90% of passenger transport, while maritime transport came next in importance, accounting for approximately 10%. Thus the maritime sector held an extremely important position in the transportation system of the Philippines.

On the other hand, maritime transport was facing various problems in the area of safety. First, typhoons inflicted important damages every year, and navigation was a trade affected by numerous hazards. Furthermore, the number of ships did not grow in line with the increase in cargo volume, and consequently overloaded ships were a frequent occurrence, and safety considerations were taken relatively lightly. Moreover, a large number of ships were over 20 years old and insufficiently maintained, but despite these numerous problems, the Philippines had only 2 search and rescue ships and one third of all lighthouses were inoperative, making the backwardness of the maritime safety infrastructure of the Philippines particularly conspicuous<sup>1</sup>. It was under these circumstances that the collision of the cargo and passenger ship Donyapas, which left over 4,000 dead and was the worst maritime accident in the world, occurred in 1987, and that the Donyamaririn sank in October 1988, leaving over 500 persons dead.

The occurrence of these large-scale maritime accidents demonstrated the low level of maritime safety in the Philippines. The presidential government, which took serious note of this situation, created a special survey committee in 1988, and issued a recommendation on maritime safety in May of the following year. Based on a request by the Maritime Industry Authority under the Department of Transport and Communications (DOTC) of the Philippines, which received this recommendation, Special Assistance for Project Formation (SAPROF) was implemented by the JBIC in January 1990, and an outline of the project was drafted. Projects for the rehabilitation of lighthouses and other navigational aid facilities were positioned as high-urgency projects based on the fact that the state of disrepair of these facilities was a major factor for maritime accidents.

### **1.3.3 Status of Maritime Sector at the Time**

A selection of sea roads used for a large cargo volume and number of passenger based on the statistics of the National Statistics Office of the Philippines in 1986 shows that the Manila-Cebu Island sea road is a major sea road. (See Table 1.) This sea road is characterized by the fact that part of the subordinate sea roads that make it up, such as the Davao-Manila sea road, Manila-Iligan sea

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<sup>1</sup> Even if ships are aged 20 or more years, their safety can be secured and not represent a problem through the performance of adequate maintenance. However, the environment in the Philippines is not one where adequate maintenance can be performed, so that ship obsolescence gets progressively worse and ship safety is declining.

road, and Cebu-Ormoc sea road are overlapping sea roads, which positions the Manila-Cebu Island sea road as the most important sea road of the Philippines.

Moreover, coastal navigation was performed by a total of 8,798 ships including fishing boats in 1987, and the great majority of these ships were second-hand ships imported from Japan. The average age of these ships is 20 years or more, and their maintenance state is poor, so that there are concerns about their declining safety.

**Table 1**

Cargo flow (Unit: 1,000MT)			Passengerflow (Unit: 1,000 people)				
Bataan	Manila	(1,206)	Iloilo	Bacolod	(977)		
Manila - Cebu		(1,114)	Manila - Cebu		(726)		
[	Iligan	Manila	[	Cebu	Cagayan de Oro	]	(444)
	Manila	Cebu		Manila	Cebu		(374)
	Davao	Manila		Cebu	Ormoc		(352)
Bohol	Cagayan de Oro	(517)	Zamboanga	Basilan	(702)		
			Batangas	Calapan	(523)		
			Cebu	Pumaguete	(324)		

### 1.3.4 Status of Navigational Aid Facilities at the Time

The number of navigational aid facilities that assist the navigation of these obsolete ships in the entire Philippines as of March 1990 was as shown in Table 2. There were 155 lighthouses, 154 land facilities, and 1 maritime facility. Of these facilities, 26 of the land facilities were no longer in operation. There were a total of 167 light beacons, 151 of these on land and 16 on the sea. Out of these light beacons, 58 of the terrestrial beacons and 2 of the maritime beacons were out of operation. Most of the existing lighthouses and light beacons had been built under the Spanish rule, and they were in an advanced state of obsolescence. The main reasons for such facilities being inoperative were insufficient repair parts and insufficient rehabilitation technology, but due to obsolescence, the damage of the building part of lighthouses and light posts was very severe, and not a few lighthouses were beyond repair.

On the other hand, during the project formation stage of this project, in order to secure cross bearing<sup>2</sup> in the Philippine sea area, it was said that it was necessary to set up one lighthouse or light beacon every 12.4 nautical miles<sup>3</sup> (or 8 such facilities for every 100 nautical miles). Applying this rule to the 18,679 nautical miles of coastline for the entire Philippine territory, this means that 1,506

<sup>2</sup> Cross bearing refers to accurately ascertaining the position of one's ship through visual recognition of 2 or more lighthouses from the sea, while single bearing refers to roughly ascertaining the position of one's ship through visual recognition of 1 lighthouse.

<sup>3</sup> One nautical mile equals 1,852 meters.

such facilities were necessary. Even to secure single bearing as a minimum, approximately 750 such navigational aid facilities were required. The number of lighthouses and light beacons in the Philippines at the time of the appraisal was only about 2.5 facilities per 100 nautical miles, compared to 4 in Indonesia and 7 in Malaysia, clearly indicating the insufficiency of the Philippines in this regard (in Japan, the average number of navigational aid facilities per 100 nautical miles is 30.) Therefore, in addition to promoting the construction of new lighthouses and light beacons, the expansion of the visible range by repairing existing facilities and strengthening lighthouse facilities in a short time was positioned as a high-priority project.

**Table 2**

	Under operation	Under suspension	Total
<u>Lighthouse</u>			
Maritime	1	-	1
Land	128	26	154
Total	129	26	155
<u>Light beacon</u>			
Maritime	14	2	16
Land	93	58	151
Total	107	60	167

### 1.3.5 History

1990	January	Request of implementing Special Assistance for Project Formation (SAPROF) by National Economic Development Agency (NEDA)
1990	Feb. ~ Mar.	Implementation of SAPROF
1990	May	SAPROF Final Report sent to the Philippine government Request of the 17th ODA Loan by the Philippine government
1990	June	Dispatch of governmental mission
1990	August	Dispatch of OECF Appraisal Mission
1991	February	Prior Notification for the 17th ODA Loan
1991	March	Exchange of Notes for the 17th ODA Loan
1991	July	Loan Agreement signing for 17th ODA Loan (¥3,516 million)
1995	November	Completion of the project

## 1.4 Comparison of Original Plan and Actual Result

### Project Scope

Project Scope	Plan	Actual	Difference
Emergency rehabilitation of navigational aid facilities between Manila and Cebu (including training)	28 1)San Nicolas Shoal 2)El Fraile 3)Corregidor Island 4)La Monja Island 5)Fortune Island 6)Golo Island 7)Cape Santiago 8)Malajibomanoc 9)Escarceo Point 10)Malabrigo Point 11)Calapan Point 12)Dumali Point 13)Baltazar Island 14)Corcurera Island 15)Gorda Point 16)Apunan Point 17)Manigonigo 18)Jintotolo Island 19)North Gigante 20)Tanguigui 21)Azagra 22)Malapasscua Island 23)Chocolate Island 24)Bogo Bay Entrance 25)Capitancillo Island 26)Bagacay Point 27)Bontolinao Point 28)Lauis Ledge	37 Same as left Tres Reyes Same as left 29)Cauit 30)Verde Island 31)San Agustin 32)San Matoco 33)Arenas 34)Carmen Bay 35)Mabini 36)Buntay 37)Culasi	Baltazar Island was renamed to Tres Reyes The following 9 places were added. Cauit Verde Island San Agustin San Matoco Arenas Carmen Bay Mabini Buntay Culasi



Consulting service Preparation of bidding documents, bidding assistance, construction supervision	FOREIGN 49 M/M LOCAL 47 M/M	F: 59 M/M L: 99 M/M	F:10 M/M increase L:52 M/M increase
Study *	FOREIGN 170 M/M LOCAL 108 M/M	F: 71 M/M L: 91 M/M	F:99 M/M decrease L:17 M/M decrease
Total	<u>Total 374 M/M</u>	<u>Total 320 M/M</u>	<u>54 M/M decrease</u>

(Source: PCR)

\*: The above study was implemented with the aim of offering suggestions on measures for improving problems and engineering services providing a link with the next project, in addition to surveying the state of the maritime sector based on the JICA master plan created during the same period. Based on the results of this study, a series of cooperative activities related to the Domestic Shipping Modernization Program and Maritime Safety Improvement Project (II) were launched.

### Implementation Schedule

	Plan	Actual	Difference
Selection of Consultant	Jul. 1991 - May 1992 (11 months)	Nov. 1991 - Apr. 1992 (6 months)	- 1 month ( - 5 months)
Consulting Service (Study)	May 1992 - Nov. 1993 (19 months)	Jun. 1992 - Apr. 1993 (11 months)	- 7 months ( - 8 months)
Consenting Service (Project management)	May 1992 - Nov. 1994 (31 months)	May 1992 - Jan. 1996 (45 months)	+ 14 months (+ 14 months)
Bidding, Contract	May 1992 - Oct. 1993 (18 months)	May 1992 - Sep. 1993 (17 months)	-1 month (-1 month)
Main project	Oct. 1993 - Nov. 1994 (14 months)	Sep. 1993 - Nov. 1995 (27 months)	+ 12 months (+ 13 months)

(Source: PCR)

	1991				1992				1993				1994				1995				1996			
	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV	I	II	III	IV
Selection of consultant																								
Plan			■	■	■	■	■	■																
Actual				■	■	■	■	■																
Consulting service																								
Plan																								
Actual																								
Bidding, Contract																								
Plan																								
Actual																								
Improvement of navigational aid facilities																								
Plan																								
Actual																								

(Source: PCR)

Project Cost

(Foreign currency: ¥ million, Local currency: million peso)

	Plan (at the time of appraisal)		Actual	
	Foreign currency	Local currency	Foreign currency	Local currency
(1) Emergency rehabilitation				
Materials and equipment	1,446	0	2,006	
Spare parts	262	0	316	
Maintenance equipment	250	0	157	
Insurance, transport costs	120	0	0	
Installation, construction costs	374	7.0	549	
Miscellaneous	273	0	0	
Training	20	0.5	33	
(2) Consulting Service				
Procurement assistance, construction supervision	113	5.1	212	
Engineering Study	382	14.4	210	
(3) Contingency	275	1.0	0	
(4) Price Escalation	0	2.2	0	
(5) Tax etc.	0	110.6	0	(Breakdown unknown)
<b>Total</b>	<b>3,516</b>	<b>140.8</b>	<b>3,483</b>	<b>6.5</b>

[Exchange Rate] At the time of appraisal (month/year): 1 peso = ¥6.8 (July 1990)  
 At the time of completion (annual IFS): 1 peso = ¥3.7 (1996)

## **2. Analysis and Evaluation**

### **2.1 Evaluation on Project Implementation**

#### **2.1.1 Project Scope**

##### **(1) Emergency rehabilitation and training**

This scope of this project was (1) the emergency rehabilitation of 28 lighthouses and light beacons out of the 39 such facilities existing on the Manila-Cebu Island sea road, and (2) the implementation of technological training for operation and maintenance following implementation of emergency rehabilitation. However, ultimately, 9 navigational aid facilities were added to the list of those already selected for emergency rehabilitation, and thus emergency rehabilitation of 37 facilities was performed. In order to expand the single bearing and cross bearing range on the Manila-Cebu Island sea road, emergency rehabilitation consisted principally of strengthening the lighting facilities of lighthouses and light beacons, building new power supply facilities, and constructing new light posts in order to secure sufficient height. In the case of one facility among those that were later added (locality name: Cautit), it was judged necessary to notify the danger of shoals during the detailed design stage, and thus this facility was added to the project scope. Regarding the remaining 8 facilities that were added, although the need for rehabilitation was recognized beforehand, they were designated for rehabilitation in a follow-up project from the viewpoint of relative priority. The rehabilitation of these 8 facilities was made possible through the use of the funds left over from the tender for the initial 29 facilities and part of the prepared emergency, so that the request from the Philippines was accepted and implementation of the rehabilitation of these 8 facilities was launched in order to ensure even greater maritime safety.

Moreover, with regard to training, 3 types of training were performed, one aimed to management class executives and designed to teach them basic knowledge about light control facilities, one aimed at middle level managers, and one aimed at lighthouse keepers. The first 2 types of training were performed in Tokyo, while the other types of training, mainly training for lighthouse keepers, were performed locally.

The procurement of tools required for lighthouse maintenance and 5 years' worth of spare parts was also included with the scope of this project. Furthermore, the vehicles required for shipping spare parts and transportation requirements were procured through the reduction of part of the training to be performed domestically as well as use of a portion of the contingency.

There were no major problems in particular with regard to the implementation of emergency rehabilitation and training.

##### **(2) Consulting services**

The scope of consulting services was largely divided into (1) bidding assistance and construction

management, and (2) engineering studies (hereunder, studies). These studies were configured of 3 parts, (1) assessment of marine traffic, (2) preparation of future improvement plan, and (3) implementation program (IP) creation. These studies completed the JICA master plan prepared during the same period, and were designed with the aim of mapping out IPs required for the projects that would follow after this project. Regarding the contents, since an assessment of marine traffic had been implemented also as part of the JICA master plan<sup>4</sup> and the results of this survey became known by the start of the study, the parts of the survey that overlapped those of the survey that had already been done were cancelled. Therefore, the contract with the consultants was reduced from the initially planned 278M/M for the study to 171M/M.

Five IPs were ultimately drafted through the study, of which 3 were accepted via 3 ODA-funded projects, and studies for moving the remaining two IPs into the implementation stage through the support of other donors were also made, so that the studies were efficiently utilized for the improvement of the maritime sector<sup>5</sup>.

### 2.1.2 Implementation Schedule

Regarding the overall implementation schedule, there was a delay of approximately 1 year compared to the initial plan, but had there not been additional work necessitated by the addition of 9 lighthouses and light beacons to those initially selected for emergency rehabilitation, it is judged that the project would have been completed as planned.

With regard to the consultants, since compared to the selection stage during the appraisal period, the implementation schedule for emergency rehabilitation was shortened and, as previously mentioned, the time for the studies was forecast to be reduced, a contract for a shorter required M/M (261 M/M) than that estimated at the time of the appraisal was signed. However, due to expansion in the project scope (occurrence of additional construction) with regard to the bidding assistance and construction management portions, the M/M figure exceeded that which had been planned. On the other hand, the studies were implemented effectively, and were completed earlier than the contract. As a result, the final M/M figure (320 M/M) was close to that calculated during the appraisal. These changes in the implementation schedule were done appropriately and in a timely manner, and there were no particular problems in this regard.

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<sup>4</sup> “Maritime Safety Management Plan Survey”: Implemented in 1990 with the aim of mapping out a basic maritime safety improvement plan.

<sup>5</sup> The prepared IPs were (1) the modernization of ships used for coastal navigation, (2) strengthening of navigational aid facilities and construction of buoy bases, (3) the procurement of dedicated O/M ships, (4) the modernization of the maritime database, and (5) GMDSS (Global Maritime Disaster Safety System). Among these IPs, (1) was implemented as the Domestic Shipping Modernization Program (PH-P151), while (2) and (3) were implemented as the Maritime Safety Improvement Project (II) (PH-P159). Of the 2 remaining IPs, (5) was implemented with aid from France, and (4) is currently being studied by the government of the Philippines.

### **2.1.3 Project Cost**

The total project cost was 4,474 million yen, with the foreign currency portion of the ODA loan being 3,516 million yen. The actual loan disbursed amount for ODA loan portion was 3,483 million yen. A portion of the prepared contingency was applied to additional procurements for the 9 lighthouses and light beacons whose rehabilitation was deemed to be particularly urgent, as well as the additional procurement of spare parts for these 9 facilities. Only a total amount of 6,453,000 peso has been reported by the MARINA to have been disbursed as the local currency portion by the Philippines side. The fact that the local currency portion is remarkably lower than the amount that was initially planned is thought to be due to the fact that taxes and a number of other items have not been recorded. Nevertheless, considering the fact that the additional construction and additional procurement were performed within the ODA loan amount indicated above, resulting in the expanded effect of the entire project, the use of project costs including the emergency is considered to have been appropriate.

### **2.1.4 Implementation Scheme**

#### **(1) Executing Agency**

The Maritime Industry Authority (MARINA) was the executing agency for this project. The MARINA was established in 1974, and placed under the jurisdiction of the Department of Transport and Communication (DOTC) from 1979. The maritime administration of the Philippines at the time was assured by several government offices, one of which was the MARINA. Therefore, the Steering Committee consisting of the MARINA, its primary government office, the DOTC, and the Philippines Coast Guard (PCG), which is responsible for the operation and management of navigational aid facilities under the jurisdiction of the Philippines navy, was established for the implementation of this project, and this committee set up a decision-making system for matters related to the implementation of the project. Moreover, Project Management Team consisting of 3 organizations was also established under the Project Management Committee, and this team performed practical business and technical management related to the implementation of this project. This implementation system remained unchanged until the completion of this project. (See Figure 1.)

**Figure 1 Project Implementation Scheme**



Currently, the maritime sector of the Philippines is in a phase where its control will be centralized under the jurisdiction of the Department of Transport and Communications (DOTC). Based on a presidential directive issued in 1997, the PGC was placed under the jurisdiction of the DOTC, so that the management of navigation aid facilities is currently the responsibility of the DOTC<sup>6</sup>. As a result, for the Maritime Safety Improvement Project (II), which corresponds to Phase 2 of this project, the executing agency is the DOTC, while the PCG, which is located under the DOTC, is responsible for project implementation.

(2) Consultant

The Japanese consulting firm was retained as the result of selection by short list. This consulting

<sup>6</sup> By presidential directive, the PCG has been placed under the jurisdiction of the DOTC, but a bill for ratification by the Senate is currently being drafted.

firm implemented the SAPROF for this project, and also rendered consulting services for the Maritime Safety Improvement Project (II), which corresponds to the continuation of this project, as well as the Domestic Shipping Modernization Program, a related project, and the consultants were favorably evaluated by the Philippine government on account of their experience in the maritime sector and their project monitoring ability.

### (3) Contractor

With regard to the major part of this project, as the result of prequalification (P/Q) and an international competitive tender, a Japanese contractor won the contract. The contents of the contract were divided into a construction portion and a training portion. Regarding the civil works portion, there were lighthouses for which construction delays occurred, but the project was successfully completed without any problems having a major influence on the progress of the entire project.

Moreover, the training portion was also implemented without major problems. The executing agency reported that, by dividing the recipients of the training into three categories, i.e. top management, middle level managers, and working level employees, the management class was able to gain a comprehensive understanding of navigational aid facilities and their system, and to grasp their importance. Moreover, it was reported that the gains achieved through the training for the middle level managers were successfully reflected to the training performed within the PCG. Regarding the training for lighthouse keepers, the maintenance methods that were taught were also reported to be implemented at the local level.

## **2.2 Evaluation on Operation and Maintenance**

### **2.2.1 Operation Scheme and Status**

Prior to the implementation of this project, the PGC had ownership of facilities consisting mainly of lighting equipment and power supplies for navigational aid facilities, while the DOTC was responsible for managing the building portion of these facilities. Moreover, with regard to budget measures, funds were allocated by the DOTC so as to avoid overlapping with the portion provided by the navy itself. Currently, the PCG operates all, including the building portion, under the jurisdiction of the transport sector section of the DOTC.

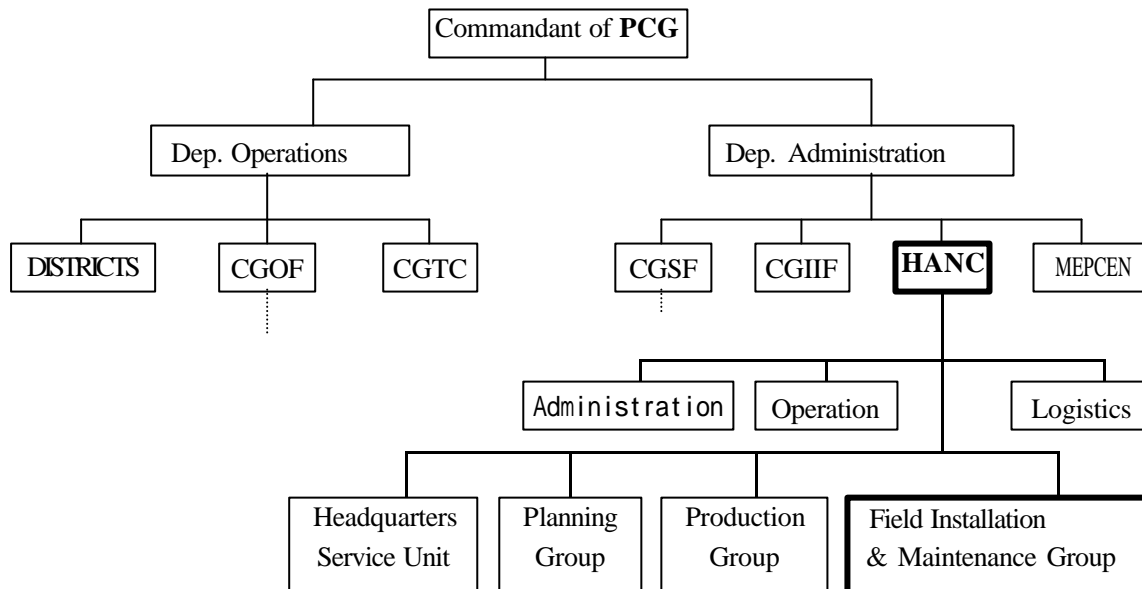
### **2.2.2 Maintenance Scheme and Status**

Maintenance of navigational aid facilities is performed by the Headquarters on Aids to Navigational Control (HANC), which is part of PCG. (See Figure 2.) HANC is physically located in the city of Cadi, on the outskirts of Manila, on Luzon Island, and it has overall control and implementation responsibility for lighthouse repairs. Spare parts are generally managed by HANC, and each



regional office stocks the parts required for the lighthouses managed in that region. Every lighthouse stocks parts required for daily repairs and spares such as light bulbs.

**Figure 2 Maintenance Scheme**



**[Abbreviations]**

- CGOF : Coast Guard Operating Force
- CGTC : Coast Guard Training Center
- CGSF : Coast Guard Support Facility
- CGIIF: Coast Guard Intelligence and Investigation Force
- HANC : Headquarters on Aids to Navigation Control
- MEPCEN: Marine Environmental Protection Center

With regard to the project maintenance scheme, first the lighthouse keeper performs daily maintenance such as cleaning and gauging of instruments. When a problem occurs, the lighthouse keeper reports the contents to the regional PCG office. The problem is then handled by the regional PCG office if this is within its capabilities, and the office then submits a post-report to HANC.

In the case of a problem that cannot be handled by the regional PCG office, it reports the problem to HANC, and HANC then dispatches a technician to handle the problem. At the time of the appraisal, the target was for HANC to perform periodic inspections, and in case repairs are required, for the regional PCG office to perform minor repairs within between 1 and 5 days, and for HANC to perform items not within the capabilities of the regional PCG office within one month.

However, HANC does not perform periodic inspections. Instead, HANC uses repair missions to given lighthouses as an opportunity to perform ad hoc inspections of nearby lighthouses. Regarding this, the PCG gives the fact that it currently has only one dedicated maintenance ship as the main reason. With regard to dedicated maintenance ships, one such ship was procured as part of the

Maritime Safety Improvement Project (II) and is assigned to Luzon, while two more dedicated maintenance ships are planned to be procured as part of the Maritime Safety Improvement Project (III) and are to be assigned to Visayas and Mindanao. Three dedicated maintenance ships will be available for maintenance work in the near future. As a result, it will be possible to establish a periodic inspection system.

Regarding the O/M budget allocation, 6.2 million peso were estimated to be needed just for the lighthouses selected for repair under this project at the time of appraisal, but actually the budget allocation has finally reached 9.8 million peso this fiscal year as the O/M budget for 421 lighthouses<sup>7</sup> over the entire nation, and the initial estimate was in no way sufficient. While there is a problem with this situation, under the current situation, as the PCG has an insufficient number of dedicated maintenance ships, there is a high possibility that it will not be possible to perform the required maintenance even with the O/M budget, and it is thought necessary to seek to maximize efficient use of the dedicated maintenance ships that the PCG currently owns. However, based on the facts that the procurement of dedicated O/M ships is in the process of becoming more concrete, that the PCG has come under the jurisdiction of the DOTC, and that the DOTC has as its policy to make it easier to increase budget allocations for the maritime sector, it is desirable that the maintenance scheme, including periodic inspections, be enhanced.

During the field survey conducted in July 1999, of the 37 lighthouses for which emergency rehabilitation was performed under this project, 35 were being satisfactorily operated. However, the 2 remaining lighthouses still required improvements. First, the power generator at the Corregidor Island lighthouse located on the outskirts of Manila was broken, and the lighthouse operated on its auxiliary lighting equipment powered by solar cells. (The executing agency independently installed these solar cells prior to the failure of the power generator, and the lighting range is one half that of the conventionally powered one.) Although the executing agency reports that since ships can take their navigational bearings from other lighthouses<sup>8</sup> in the area, this situation does not represent a major impedance to navigation, it was considering the implementation of repairs. As a result, in September 1999, work to fully equip the lighthouse with solar cells was performed, and operation with full lighting capacity was started. The other lighthouse that required improvements, the Bacacay lighthouse on the outskirts of Cebu Island, operates on batteries that provide a reduced lighting distance until late at night, when civilian demand drops, due to insufficient power supply capacity from the local power company. In this case too, the executing agency explained that since ships can take their bearings from other lighthouses in the area, this situation does not represent a major impedance to navigation, it was decided to convert the lighthouse to the same solar cell specifications as the Corregidor Island, and a concrete study to this effect is being conducted within the PCG.

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<sup>7</sup> Number as of October 1997

<sup>8</sup> In addition to the Corregidor Island lighthouse, 3 other lighthouses, La Monja, El Fraile, and San Nicholas, operate in the vicinity of Manila Port.

### 2.2.3 Impact on Environment

This project, which consists in repairs of existing lighthouses and light beacons and construction work at these facilities, does not have a particular impact on the environment. On the other hand, since the project contributes to improving navigational safety, the number of tanker stranding accidents has decreased, which is considered to represent an indirect positive impact on the environment.

## 2.3 Project Effects and Impacts

### 2.3.1 Quantitative Effects

It is generally difficult to calculate revenues for projects of this type, and no calculation of quantitative effects has been performed for this evaluation.

### 2.3.2 Qualitative Effects

As the result of the rehabilitation of lighthouses and light beacons through the support of other donors on a nation-wide scale, 400 out of 421 such facilities were operating as of October 1997. Of these, all 37 lighthouses and light beacons that were rehabilitated through this project are operating, although some of them only on a partial basis, and compared to the situation prior to implementation of this project, navigational safety can be said to have improved. Interviews of the Domestic Ship-Owner Association of the Philippines (DSA) and sailors actually navigating the Manila-Cebu Island route revealed that navigational safety remarkably improved after implementation of the project.

Maritime disasters do not depend only on the maintenance status of navigational aid facilities, but the number of maritime disasters, including the number of stranding accidents, has been steadily declining 2 years in a row since 1995, when the project was completed. (See Table 3.)

**Table 3 Number of Maritime Disasters in the Philippines**

(Unit: Number of accidents)

	1993	1994	1995	1996	1997
Number of maritime disasters	1 7 3	1 6 3	1 8 1	1 1 9	5 9
Number of stranding accidents included in number of maritime accidents above	2 6	2 3	5 8	2 1	5

Source: MARINA

Furthermore, the IPs drafted as part of the studies performed by the consultants were made into subsequent projects, but since they were considered with the aim to actually make them into projects, they can also be said to be an indirect aspect of this project's contribution to creating a

safer maritime sector.