

Country Name	The Project for Mangrove Rehabilitation Plan for Enhancement of Disaster Prevention in Ayeyawady Delta
The Republic of the Union of Myanmar	

I. Project Outline

Background	Ayeyawady Delta in Myanmar had been managed as a conservation area, but the mangrove forest cover had been decreasing due to illegal activities (e.g. firewood, agricultural expansion and aquaculture). The Cyclone Nargis in May 2008 had a serious impact on the residents' daily lives and livelihoods, with a huge death toll and missing persons (no less than 140,000 people), and devastated the mangroves in Ayeyawady Delta. The cyclone, at the same time, served to confirm the disaster prevention effectiveness of the mangroves such as their role in alleviating seawater invasion by flood tide, prevention of erosion and drifting floating wreckage. However, it was difficult for the Government of Myanmar to implement early rehabilitation of the mangroves on its own due to limited budget.			
Objectives of the Project	The project aimed to rehabilitate the mangrove forest and recover its function of disaster prevention and mitigation in Kadonkani Reserve Forest (RF) in Ayeyawady Delta, which had been decreased by the damage caused by the cyclone, deforestation, etc., by (i) establishing a mangrove plantation, constructing a cyclone shelter with a forest watch tower, and procuring equipment for management and (ii) implementing the relevant technical assistance, thereby contributing to establishment of a disaster prevention structure in the cyclone affected area ¹ .			
Contents of the Project	<ol style="list-style-type: none"> 1. Project Site: The central part of Kadonkani RF (1,154ha) in Ayeyawady Division. 2. Japanese side: (1) Provision of grant necessary for establishment of the mangrove plantation (area: 1,154ha), construction of a cyclone shelter with a forest watch tower (capacity: 150 people) and procurement of 2 vehicles and 1 boat for management; and (2) Technical assistance (soft component of Grant Aid) to Forest Department (FD) regarding preparation of the participatory management plan of the mangrove plantation established by the project, and implementation of participatory disaster prevention drills and aquatic life survey. 3. Myanmar side: Opening of the office required for construction supervision, acquisition of the land required for facility construction, observation of tree planting and inspection of facilities and equipment at each stage, etc. 			
Project Period	E/N Date	April 21, 2012	Completion Date	February 15, 2017 ²
	G/A Date	August 3, 2012 (Original) December 28, 2012 (Revision)		
Project Cost	E/N Grant Limit / G/A Grant Limit : 583 million yen, Actual Grant Amount: 568 million yen			
Executing Agency	Forest Department (FD), Ministry of Natural Resources and Environmental Conservation* *Ministry of Environmental Conservation and Forestry at the time of ex-ante evaluation. The name was changed due to the government restructuring in March 2016.			
Contracted Agencies	Main Contractor(s): Hazama Ando Cooperation Main Consultant(s): Kokusai Kogyo Co., Ltd.			

II. Result of the Evaluation

< Special Perspectives Considered in the Ex-Post Evaluation >

- Due to COVID-19 pandemic, the Ex-post evaluation was done by data collection from existing reports and questionnaire for Executing Agency, without on-site field survey.
- Although the management plan, namely, Mangrove Forest Management Plan (MFMP), was prepared as planned, it is noted that not only "preparation" but also "implementation" of the management plan is mentioned in the relevant output of the soft component in the Ex-ante Evaluation Sheet. However, it is considered the actual contents planned were up to "preparation" based on the Soft Component Plans included in the PS2, according to which the soft component activities were carried out, as their planned outputs and activities do not include "implementation" of the management plan.

1 Relevance

<Consistency with the Development Policy of Myanmar at the Time of Ex-ante Evaluation>

The project was highly consistent with development policy of Myanmar at the time of Ex-ante Evaluation. "Myanmar Action Plan on Disaster Risk Reduction (MAPDRR) 2009-2015" was drawn up in July 2009. The action plan shows seven main policies including plantation and construction of cyclone shelter. The goal of the action plan is "To make Myanmar Safer and more Resilient against Natural Hazards, thus Protecting Lives, Livelihood and Developmental Gains", and the implementation of this project was to contribute to achievement of this goal.

<Consistency with the Development Needs of Myanmar at the Time of Ex-Ante Evaluation>

The project was highly consistent with the needs of Myanmar for rehabilitating the damaged mangrove as described in "Background" in 1. Project Outline.

<Consistency with Japan's ODA Policy at the Time of Ex-Ante Evaluation>

¹ Since the Assumed Impact is not mentioned in the Ex-ante Evaluation Sheet, the Overall Goal (establishment of a disaster prevention structure in the cyclone affected area) mentioned in the Preparatory Survey Report (PS) 2 is used as the Assumed Impact in this Ex-post evaluation.

² The completion date of the soft component has been confirmed to be within February 2017, however, its exact date could not be confirmed. Here, the completion date of the construction work is used as the completion date of the whole project.

At the time of Ex-ante evaluation, the project was consistent with the economic cooperation policy for Myanmar (April 2012), which include assistance for disaster prevention for improvement of people's livelihood³.

<Evaluation Result>

In light of the above, the relevance of the project is high.

2 Effectiveness/Impact

<Effectiveness>

The project objectives have been achieved. As for quantitative effects, the rehabilitated area of mangrove forest in 2017 (the year of project completion) was 1,154 ha as planned, and has been properly maintained since the project completion. In addition, based on "Myanmar Reforestation and Rehabilitation Programme (MRRP) 2018-2027", FD has been implementing mangrove plantation of 566.8 ha in Kadonkani RF annually from 2018 to 2020, resulting in the total rehabilitated area of 2854.4 ha in 2020 (ratio against assumed quantity: 248%). Also, conditions of facilities and equipment procured in the project are good and in use, namely cyclone shelter with forest watch tower, two 4WD cars, and a boat. The cars and boat have been utilized for observation of mangrove forest or meetings during implementation period, and for transportation of staffs and equipment in the maintenance activities after project completion. Based on the assumption made at the Ex-ante evaluation, it is estimated that 1,000 ha of mangrove plantation could reduce CO2 emissions by 35,450 tons/year.⁴

The project also made full use of the capabilities of relevant personnel which were strengthened through JICA's preceding Technical Cooperation Project (TCP) "Integrated Mangrove Rehabilitation and Management Through Community Participation in the Ayeyawady Delta" (2007-2012), where JICA had cooperated towards sustainable management of mangrove forest for FD and the local residents.

As for qualitative effects⁵, The capacity of staffs of FD were improved through participation in the project, and FD has been continuously operating mangrove forest maintenance and rehabilitation as planned in MRRP 2018-2027".

In the soft component, MFMP was prepared by FD and disseminated to local residents through workshops, and at the time of Ex-post Evaluation, they are willing to work for mangrove restoration and rehabilitation through community forestry and plantation labours. According to FD, the soft component also contributed to raising awareness of local residents on importance of sustainable forest management (symbiosis between mangrove forest and people), issues they have been facing in associated with mangrove depletion and degradation in the last few decades, and possible measures to be taken for their livelihood security at present and in future. In addition, the disaster drills and biodiversity survey by local residents resulted in their better understandings of mangrove forest's function for disaster prevention and biodiversity conservation.

<Impact>

FD acknowledged positive impacts as follows: in adjacent 20 villages, 2,498 houses and 8,057 local residents (target: 4,400 local residents) have been benefitted in mitigation of the damage caused by strong wind from rehabilitated mangrove forest, namely reduced speed of turbulences have been observed in the early monsoon season. Likewise, in adjacent 22 villages, 49,957 houses and 217,389 local residents (target: 210,000 local residents) have been benefitted, as rehabilitated mangrove forest has prevented tides and damage caused by it has been reduced. Furthermore, as a result of the disaster prevention drills implemented in the soft component, when cyclones and storms are in place, residents of the nearby villages and fishermen evacuate to the shelter. The project also contributed to raising awareness of the local residents for conservation of biodiversity by involving them into biodiversity survey in the soft component.

Since it was expected that slight amount of wastes (e.g. cement bags and scrap wood) would be discharged under construction, the project was categorized as "Category B" in accordance with "JICA Guidelines for Environmental and Social Considerations (April, 2004)" at the planning stage. However, monitoring of waste management had been done by the consultant as a part of TOR on construction supervision, and no negative impacts on the natural environment caused by wastes were observed in the Ex-post Evaluation.

<Evaluation Result>

Therefore, the effectiveness/impact of the project is high.

Quantitative Effects

Indicators	Baseline 2012 Baseline Year	Target figure 2020 3 Year(s) after Completion	Actual figure (2017 Completion Year)	Actual figure (2018 1 Year after Completion)	Actual figure (2019 2 years after Completion)	Actual figure (2020 3 Years after Completion)
Indicator 1: Rehabilitated area of the mangrove forest damaged by the cyclone.	0 ha	1,150ha	1,154ha	1,720.8ha	2,287.6ha	2,854.4ha

Source : Ex-ante Evaluation Sheet and other JICA documents, Questionnaire for Grant Aid Project (answered by FD)

3 Efficiency

Both the project cost and the project period were within the original plan (ratio against the plan: 97% and 98%, respectively). Therefore, the efficiency of the project is high.

4 Sustainability

< Institutional/Organizational Aspect >

³ Based on the description in the ODA Country Databook in 2012.

⁴ Area of plantation (1,000 ha)*carbon absorption per unit area (9.66 tons/ha/year)*CO2 reduced-value(3.67)=35,450 tons/year

⁵ Among the qualitative effects mentioned in the Ex-ante Evaluation Sheet, (1) "CO2 reduction" is included in the quantitative effects as numerical data were not available. (2) "Tide and wind protection" is included in the "Impacts" section below based on logic.

Relevant policies are MRRP 2018-2027, which includes a 10-year mangrove plantation plan by FD, and “Myanmar Action Plan on Disaster Risk Reduction 2017” (MAPDRR 2017) which includes hazard and vulnerability atlas. Regarding Operation and Maintenance of the facilities/equipment provided in the project, staffs are sufficiently assigned in accordance with MFMP provided in the soft component ; namely, i) for mangrove forest, three Range Officers, three Deputy Range Officers, five Forester, and two Forest Guard, ii) for the cyclone shelter, one Range Officer, one Deputy Range Officer, two Foresters, and one Forest Guard, and iii) for procured equipment, two Directors, one Assistant Director, and one Staff Officer. Granted the rehabilitated area as the community forestry, local residents are actively involved in mangrove management, disaster prevention, and fish/shrimp/crab habitat conservation.

<Technical Aspect>

As mentioned above, technical levels of FD staffs have been sufficiently improved through the project for management of mangrove forest. Furthermore, trainings on mangrove rehabilitation and restoration are delivered once to three times a year for approximately 20 staffs at Community Forestry Development Training Center at Hmawbi in Yangon and Myanmar Forest School in Phyin Oo Lwrin, and the system for maintaining the technical levels of FD is sufficient.

<Financial Aspect>

Union Budget and Regional Budget cover the following items; i) cost for mangrove conservation and management in Bogalay Township, where Kadonkani RF is located, ii) construction and maintenance cost of the cyclone shelter, and iii) operation and maintenance cost of procured equipment (two vehicles and one boat). Although data on budget amounts were not available, it can be said that the necessary budget has been allocated, given the policy support and good operation and maintenance situation, as mentioned elsewhere.

<Current Status of Operation and Maintenance>

After handing over the project, FD shall execute the following maintenance works: i) for mangrove forest, fire protection, weeding supplemental plant or patching (if necessary), and forest guard, ii) for the cyclone shelter, daily cleaning, recoating of waterproof paint every ten years, and renovation work (if necessary). FD has been implementing the above-mentioned operations in the rehabilitated mangrove forest, and the necessary budgets are secured yearly by Union and Regional Budget. It shall be noted that planning and dissemination of MFMP along with the mangrove plantation have contributed to proper maintenance of established mangrove forest.

<Evaluation Result>

No major problems have been observed in the institutional/organizational, technical, financial aspects and current status of the operation and maintenance system. Therefore, sustainability of the project effects is high.

5 Summary of the Evaluation

The project achieved its objective of rehabilitating the mangrove forest damaged by the cyclone Nargis. Both quantitative and qualitative effects have been observed to a greater degree than initially expected, as well as further plantation of mangrove forest by FD on its own after the project completion. Regarding the sustainability, staffs for operation and maintenance have been assigned, and trainings for relevant staffs have been done on regular basis. Also, necessary budgets for operation and maintenance are secured. Overall, from institutional/organizational, technical, and financial aspects, operation and maintenance is expected to be sustainably implemented by the executing agency and the local residents.

Considering all of the above points, this project is evaluated to be highly satisfactory.

III. Recommendations & Lessons Learned

Lessons Learned for JICA:

- The main reasons for successful mangrove rehabilitation during the project period and maintenance, and further mangrove plantation by FD after the project completion are summarized up in the following four points: 1) through collaboration with JICA’s TCP “Integrated Mangrove Rehabilitation and Management Through Community Participation in the Ayeyawady Delta”, the project could have active commitment by the FD staffs whose capacity had been developed through the TCP Project, 2) planning and dissemination of MFMP were done in parallel to the mangrove plantation, and resulted in proper maintenance of established mangrove forest, 3) necessary budgets for mangrove forest maintenance were secured by FD based on MRRP, and 4) the involvement of local residents into the project led to active cooperation by them, especially on implementation of the soft component activities.
- In Ex-post Evaluation, it was difficult to observe the growing conditions of mangrove forest and improvement in the biodiversity situation. Since continuous monitoring of these conditions is vital for proper implementation and timely modification of management plan, it was preferable to include those monitoring activities into the MRRP.



Implementation of project activities



Cyclone shelter with a forest watch tower developed in the project

