

No.

Ministry of Fisheries and Aquatic Resources
Tsunami Housing Reconstructon Unit
Ministry of Provincial Council and Local Government
Ministry of Finance and Planning

Japan International
Cooperation Agency
(JICA)

**Recovery, Rehabilitation and Development Project for
Tsunami Affected Area of Southern Region in
the Democratic Socialist Republic of Sri Lanka**

Final Report

March 2006

PADECO Co., Ltd.
in association with
NIPPON KOEI Co., Ltd.
and
OVERSEAS AGRO-FISHERIES CONSULTANTS Co., Ltd.

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*For the currency conversion, in case necessary,
Exchange rate shown below is applied*

1 USD= 107.00 JPY,

1 Rs= 1.0 JPY

PREFACE

In response to the request from the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to conduct Recovery, Rehabilitation and Development Project for Tsunami Affected Areas of Southern Region in the Democratic Socialist Republic of Sri Lanka and entrusted the Project to the Japan International Cooperation Agency (JICA).

JICA selected and dispatched the Project Team which consists of PADECO Co., Ltd., NIPPON KOEI Co., Ltd., and Overseas Agro-Fisheries Consultants Co., Ltd. to the Democratic Socialist Republic of Sri Lanka between March 2005 and March 2006. The Project Team is headed by Mr. Yuichiro Motomura of PADECO.

The Project Team held discussions with the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka and conducted field surveys at the project area. Upon returning to Japan, the Project Team conducted further studies and prepared this final report.

It is my hope that this report will contribute to development in the Democratic Socialist Republic of Sri Lanka, and to the enhancement of friendly relationship between our two countries.

Finally, I wish to express my sincere appreciation to all the officials concerned of the Government of the Democratic Socialist Republic of Sri Lanka for their generous cooperation to the Project Team.

March 2006

Kazuhisa Matsuoka
Vice-President
Japan International Cooperation Agency

March 2006

Mr. Kazuhisa MATSUOKA
Vice-President
Japan International Cooperation Agency
Tokyo, Japan

Letter of Transmittal

Dear Sir,

We are pleased to submit herewith the final report of “ The Recovery, Rehabilitation and Development Project for Tsunami Affected Area of Southern Region in the Democratic Socialist Republic of Sri Lanka”.

This report presents the results of the project, which was undertaken in the Democratic Socialist Republic of Sri Lanka from March 2005 to March 2006 by the Project Team, organized jointly by PADECO Co., Ltd. NIPPON KOEI Co., Ltd. and Overseas Agro-Fisheries Consultants, Co., Ltd under the contract with JICA.

The Project Team, and in cooperation with a diverse sectors of the people in Sri Lanka, has formulated a comprehensive plan of tsunami rehabilitation and has implemented selected priority programs. The Project Team also technically supported some of the infrastructure rehabilitation funded by the Japanese Non-project Grant Aid. Because of the nature of planning and implementation processes involving intensive participation of various stakeholders, we believe that a fair amount of tangible and intangible achievements has been realized in the form of rehabilitation work of related sectors and communities in the Project Area.

We owe a great deal to many people for the completion of this report. We would like to express our deep appreciation and sincere gratitude to all those who extended their kind assistance and cooperation to the Project Team, in particular, the concerned officials of the four counterpart agencies of the Sri Lankan Government as well as concerned organizations in Southern Province.

We are very much thankful to the officials of your agency and the Ministry of Foreign Affairs.

We hope that the report will contribute to facilitating further socio-economic development in the Democratic Socialist Republic of Sri Lanka.

Very truly yours,



Yuichiro MOTOMURA
Team Leader

The Project for Recovery, Rehabilitation and Development Project
for Tsunami Affected Area of Southern Region
in the Democratic Socialist Republic of Sri Lanka

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List of Abbreviations

AASHTO	American Association of State Highway and Transportation Officials
ADB	Asian Development Bank
ASTM	American Society for Testing and Materials
BOQ	Bill of Quantities
CAD	Computer Aided Design
CBO	Community Based Organization
CCF	Child Care Foundation
CEY-NOR	CEY-NOR Foundation L.T.D.
CFC	Ceylon Fisheries Corporation
CFHC	Ceylon Fishery Harbor Corporation
CHA	Centre for Humanitarian Assistance
CNGS	Governments' Centre for Non-Governmental Sector
CNO	Centre for National Operations
DAC	Development Assistance Committee
DCC	Department of Coast Conservation
DDMC	District Disaster Management Coordinator
DFAR	Department of Fisheries & Aquatic Resources
DMC	Disaster Management Center
DS	Divisional Secretary
EDSC	Enterprise Development Service Center
EEZ	Exclusive Economic Zone
FAO	Food and Agriculture Organization of United Nation
FCS	Fisheries Cooperative Society
FRP	Fiber reinforced Plastic
F/S	Feasibility Study
GA	Government Agent
GOJ	Government of Japan
GOSL	Government of the Democratic Socialist Republic of Sri Lanka
GRP	Glass-reinforced Plastic
IBM	In-board Motor
IDB	Industrial Development Board
ILO	International Labor Organization
INGO	International Non Governmental Organization
IOTC	Indian Ocean Tuna Commission
IOM	International Organization of Migration

JBIC	Japan Bank for International Cooperation
JICA	Japan International Cooperation Agency
JICS	Japan International Cooperative System
JIS	Japan Industrial Standard
JPY	Japanese Yen
JRA	Japan Road Association
KOICA	Korea International Cooperation Agency
McRAP	Matara City Renewal Action Plan
M/M	Minutes of Meeting
MOFAR	Ministry of Fisheries & Aquatic Resources
MOPCLG	Ministry of Provincial Council and Local Government
MOU	Memorandum of Understanding
MOUDWS	Ministry of Urban Development and Water Supply
NADAS	National Aquaculture Development authority of Sri Lanka
NARA	National Aquatic Resources research & development Agency
NDTF	National Development Trust Fund
NHDA	National Housing Development Authority
NGO	Non Governmental Organization
NIFNE	National Institute of Fisheries and Nautical Engineering
NWSDB	National Water Supply & Drainage Board
OAFIC	Overseas Agro-Fisheries Consultants
OBM	Out-board Motor
ODA	Official Development Assistance
PDM	Project Design Matrix
PTA	Parents and Teachers Association
R/C	Reinforced Concrete
RRC	Regional Reconstruction Committee
Rs	Sri Lankan Rupees
SDC	Swiss Agency for Development and Cooperation
SME	Small and Medium Enterprise
TAP	Transition Accommodation Project
TAFREN	Task Force for Rebuilding the Nation
TOR	Term of Reference
UDA	Urban Development Authority
UNICEF	United Nations International Children's Emergency Fund
UNDP	United Nations Development Programs
USD	US Dollar

VAT Value Added Tax
WSP Water Steel Pipe Standard Specifications, Japan

Executive Summary

1. Introduction

Coastal areas in Sri Lanka were devastated by the tsunami that hit on the 26th of December 2004. Based on a request by the Government of the Democratic Socialist Republic of Sri Lanka, the Government of Japan decided to implement a project, "Recovery, Rehabilitation and Development Project for Tsunami-affected Area of Southern Region" in the Democratic Socialist Republic of Sri Lanka as part of JICA's technical cooperation program.

The objectives of the Project are:

1. To formulate a plan for a recovery, rehabilitation, and development program for the tsunami-affected area in the southern region of Sri Lanka;
2. To assist and monitor technically the implementation of recovery and rehabilitation projects to be funded under Japanese Non-project Grant Aid and ODA Loan; and
3. To share Japanese experiences in disaster management through implementation of the Project.

Areas subject to this Project include Galle District, Matara District, and Hambantota District, and the Project mainly focuses on the Galle Fishery Harbor, Tangalle Fishery Harbor, and Matara District.

The framework of the project is illustrated in Figure 1. The project can be classified into four parts: (i) Part I is the analysis of methods developed in Japan, through their experience in post-disaster rehabilitation and on how such methods could be applied in Sri Lanka; (ii) Part II is the planning and implementation of priority projects designed to examine the effectiveness of post-tsunami rehabilitation methods in Sri Lanka (to be reflected in the medium-term rehabilitation plan as well as the emergency physical rehabilitation projects); (iii) Part III is the evaluation of post-disaster management methodologies as identified in Part II above; and (iv) Part IV is the formulation of strategies and policies for the planning of a medium-term regional rehabilitation plan, as well as general conclusions from all the work done.

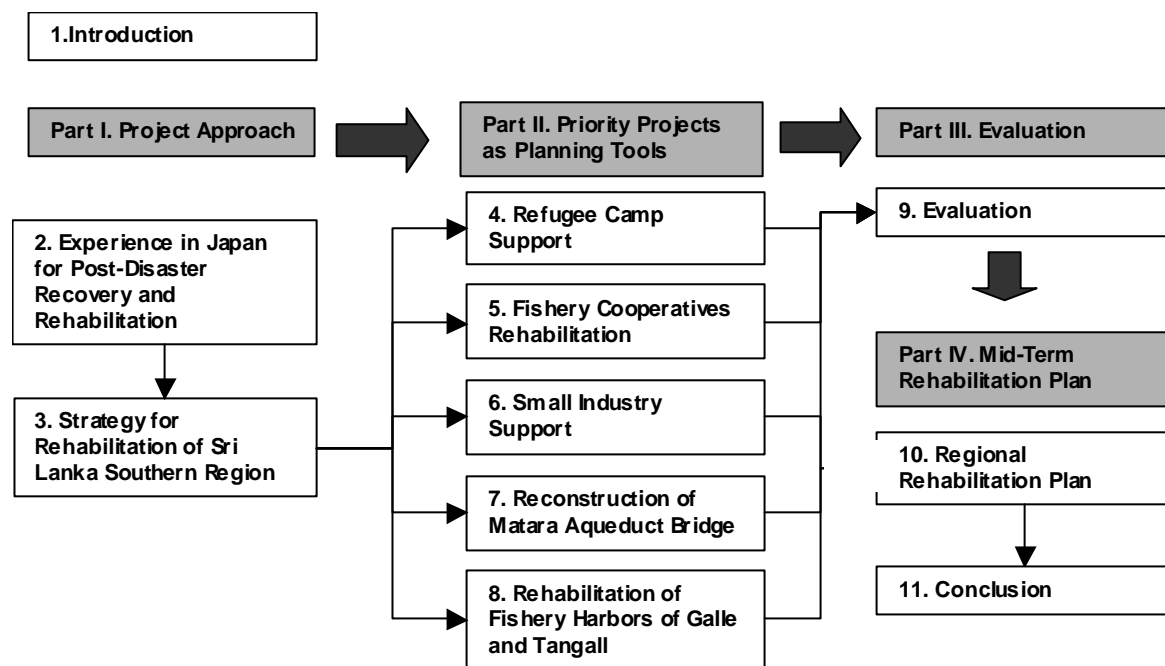


Figure 1 Framework of the Project

Part I Project Approach

2. Japanese Experiences in Post-Disaster Recovery and Rehabilitation

It is important to utilize proven methods for efficient and substantial rehabilitation of other countries. Japanese methodologies in post-disaster recovery process were studied. As such, two representative Japanese documents¹ in disaster rehabilitation methodologies were adopted for possible application to post-tsunami rehabilitation in Sri Lanka.

(1) Phases for Rehabilitation

There are four phases of rehabilitation after disaster:

- I) Phase I - Emergency phase (lasting up to one week after the disaster);
- II) Phase II - Evacuation phase (lasting between one and two months after the disaster);
- III) Phase III - Rehabilitation initiation phase (lasting between three and six months after the disaster); and
- IV) Phase IV - Full-scale rehabilitation phase.

The Project deals with activities for Phases III and IV. It was also found to be useful to

¹ Lessons from Kobe Earthquake by the Office of the Cabinet of the Government of Japan, 2005 (<http://www.hanshin-awaji.or.jp/kyoukun/>) and Manual for Natural Disaster Rehabilitation Activity by Tokyo Metropolitan Government, 2003

classify rehabilitation work into two levels, administrative and on-site activities, for planning purposes.

(2) Approach for Administrative Activities - Finding Bottlenecks

Based on lessons from the Kobe Earthquake experience, the Office of the Cabinet of the Government of Japan summarized lessons and checkpoints for rehabilitation, which are classified into three phases: rescue, evacuation, and initial recovery. Since this methodology can promote the proper identification of bottlenecks and the quick preparation of rehabilitation plans, the JICA Project Team deemed that this methodology was very useful for tsunami rehabilitation in Sri Lanka. Based on the Japanese list for the initial recovery phases, the JICA Project Team extracted 75 lessons, classified into five major fields with 22 sub-fields. The five major fields are: (i) refugee camp closing and temporary housing provision; (ii) reconstruction of life and houses; (iii) township rehabilitation planning and implementation; (iv) demolition and clearance of damaged buildings and debris control; and (v) industry rehabilitation. Each sub-field has checkpoints that are used to assess bottlenecks in Sri Lanka.

(3) Approach for On-Site Activities - Co-Assistance

The Manual for Natural Disaster Rehabilitation Activities suggests a “Three-Level Model Structure.” The ordinary public security system is composed of two levels: public services and self-assistance. In the reconstruction phase after a disaster, when public service levels are reduced, co-assistance (mutual assistance among victims) supported by a CBO mediates between the two levels.

The function of the co-assistance is strengthened during the rehabilitation phase and substitutes for public service functions. The table below shows the difference in functions at the three levels and the extension of functions of co-assistance in different phases of the required services.

The organization for co-assistance may consist of a rehabilitation committee for the area, as well as residents in an area. Such co-assistance can be channeled by a regional rehabilitation committee (RRC) consisting of a representative of the residents.

Table 1 Roles and Functions of the Three-Level Organizations in Time Series

Phases	Role of public service (ko-jo)	Role of co-assistance (kyo-jo)	Role of self assistance (ji-jo)
Emergency evacuation phase	Procure goods for life and security operations in the administrative area	Organize the CBO in a democratic way as a representative of the community	Secure safety at the personal/household level
Rehabilitation initialization phase	Propose a master plan for reconstruction	Coordinate demand for reconstruction plans at the community level Report the summarized demand to administrative levels	Participate in the CBO.
Full-scale rehabilitation phase	Develop and implement the project for reconstruction	Undertake urban reconstruction as well as industrial rehabilitation and other related projects as an implementation body	Participate in project implementation

Source: Project Team

It was observed that there was a serious lack of public service and co-assistance in communities during tsunami rehabilitation in Sri Lanka. Even though this model is basically used for earthquake disasters in Japan, the methodology can apply to other types of disaster rehabilitation in similar situations. As such, the JICA Project Team assumed that co-assistance could accelerate tsunami rehabilitation at the community level in Sri Lanka. In the project, it seems worthwhile to test its effectiveness in Sri Lanka on an experimental basis. Needless to say, the model should be adjusted to fit realities in Sri Lanka by means of proceeding through the assessment process as described above.

(4) Hypotheses for Effective Rehabilitation Methods

The noted two approaches developed in Japan after the Great Hanshin-Awaji Earthquake, which recognized the importance of administrative and social factors in post-disaster management, were applied to post-disaster management of the Chuetsu Earthquake of 2003. This experience proved that the two approaches were quite useful. The JICA Project Team therefore took up the following two hypotheses for effective rehabilitation methods (assuming each would be equally applicable and useful to Sri Lanka):

- 1) The list of lessons and checkpoints can enable authorities to quickly identify bottlenecks and necessary administrative activities for disaster rehabilitation; and
- 2) The enhancement of co-assistance can promote community rehabilitation under the conditions of reduced public assistance.

Adopting these two approaches, the JICA Project Team carried out the Project so that the validity and effectiveness of the approaches could be examined through an evaluation of Project results.

3. Strategy for Rehabilitation of the Southern Region

(1) Needs Assessment

According to the list prepared in Japan, the JICA Project Team assessed the situation against all checkpoints of administrative activities, which are identified above, and summarized the bottlenecks, necessary activities, and implementation program as shown in Table 2.

(2) Selection of Priority Projects

With the bottleneck analysis summarized in Table 2 and tsunami damage survey (Chapter 3.1), as well as the detailed discussions with concerned authorities of the Sri Lankan Government, the Project Team selected two infrastructure rehabilitation activities as part of the priority project.

- 1) Rehabilitation of Matara Aqueduct
- 2) Rehabilitation of fishery harbors in Galle, Tangalle and a limited part of the fishery harbor in Kirinda

Concerning community level rehabilitation, the Project Team nominated camp management and industrial or livelihood reconstruction from bottleneck analysis (Table 2). After a series of discussions with concerned authorities, the following three ideas were formulated as priority projects in Matara District.

- 3) Support of refugee camp associations
- 4) Support of fishery cooperative societies
- 5) Support of associations of small enterprises (food industry and ornamental fish industry)

In addition to these, the JICA Project Team has been working on the Matara township rehabilitation plan. Relevant plans for infrastructure and urban development have been examined in order to make a proposal to Matara city that is strong against disasters.

Table 2 Summary of Bottlenecks, Necessary Activities, Implementation and Priority

Fields	Bottlenecks	Necessary Activities	Proposed Implementation Methods by JICA Project Team	Priority
1. Refugee camp closing and temporary housing provision	<ul style="list-style-type: none"> Location of semi-permanent housing: need to keep the location of semi-permanent housing near the center of their living activities in the planning phase or provide adequate facilities to secure their livelihood Absence of land in areas preferred by people Mixing of people from different villages, cast them in the same housing scheme <p>Lack of Utilities</p>	<ul style="list-style-type: none"> Transportation services, facilities for filling the gap between present and previous lives Provision of utilities such as drinking water wells 	<ul style="list-style-type: none"> Select some camps and identify such issues, provide adequate facilities and services, and consider the impact of the provision in the with/without Project cases With community participation, construct wells and other utilities Provide useful information through newsletters 	High
2. Revival of industry	<ul style="list-style-type: none"> Large number of people lost their livelihoods and the diversity of such livelihoods Loss of productive assets like machinery, equipment, and boats due to the tsunami Slow provision of such assistance Lack of trade associations to enable affected to work together Lack of technical assistance Lack of access to capital in the form of credit or grants to replace lost assets Loss of infrastructure 	<ul style="list-style-type: none"> Identify key sectors such as fishing, coir, food processing, and ornamental fishing and conduct needs assessments Form Community-Based Organizations or trade associations Provide assistance to develop business plans to resume businesses Provide grants, credit, and lease arrangements to procure productive assets lost during the tsunami Provide training and access to markets Revive collapsed markets and infrastructure Need for better coordination between agencies to avoid duplication and missing those in need 	<ul style="list-style-type: none"> From the survey results and secondary data from the GA office, followed by a questionnaire/ Interview for needs assessments Organize those who need assistance into CBA or trade associations by raising awareness in the benefits of such organizations Provide business consultants (Business Development Centre, Matara etc.) to develop business plans and provide training, consultancy, and marketing assistance Assist to develop savings and credit program Lobby Government to build infrastructure and link other agencies working on market development Provide assistance within their budget and for needs such as credit, boats, nets, and equipment, and link the associations to agencies Participate actively in the District Secretary Office led coordination meetings at Matara and CHA led coordination meetings in Colombo. Provide all information regarding assistance to avoid duplication 	High

Fields	Bottlenecks	Necessary Activities	Proposed Implementation Methods by JICA Project Team	Priority
3. Reconstruction of Houses	<ul style="list-style-type: none"> • Large amount of land required for construction of new houses • Legal transfer of these lands from existing ownership (even government agencies) to new owners • The poor location and quality of some of the lands identified • The buffer zone rule and people's reluctance to leave this area • Lack of capacity of NGOs to construct houses • Lack of skilled labor required for construction • The price of construction materials impacts the construction of housing 	<ul style="list-style-type: none"> • 90% of land has been identified and agencies have allocated land, but construction has begun only on about 30% of the land. In Matara, an MOU has already been signed with donors for 3,187 houses and land has been allocated. • The need is to expedite construction work. Training needs to be given to enlarge the pool of skilled labor. Legal formalities need to be finalized. • Efficient approaches for procurement (joint procurement) should be considered. 	<ul style="list-style-type: none"> • Give monthly targets and schedules to agencies doing construction and close monitoring done • Assist to introduce joint procurement techniques 	
4. Township rehabilitation planning and institutional building	<ul style="list-style-type: none"> • The township program preparation activities started one month after the disaster. This was due to the fact that the public sector's capacity to make decisions during the disaster situation was insufficient. Lack of expertise in township planning during the disaster situation 	<ul style="list-style-type: none"> • Advice on township program development and implementation • Disaster preparation training for officials of Matara Municipality 	<ul style="list-style-type: none"> • Provide adequate consulting services for planning agencies • Consult with JICA HQ for implementation budget for rehabilitation work • Conduct disaster management training and consultancy for municipality offices and other government agencies • Promote greater coordination and leadership for township development 	High
	<ul style="list-style-type: none"> • Infrastructure: delay of infrastructure rehabilitation can be seen, particularly in the public sector, such as high cost aqueduct rehabilitation. 	<ul style="list-style-type: none"> • Identify bottlenecks in infrastructure rehabilitation and rehabilitation funds (Matara Aqueduct, Galle and Tangalle Harbors) 	<ul style="list-style-type: none"> • Provide the engineering consulting services for tender, design and monitoring for the project funded by Japanese Non-project Grant Aid 	High
5. Demolition of damaged buildings and debris disposal	<ul style="list-style-type: none"> • Lack of expertise • Lack of resources and machinery • Lack of knowledge in recycling of materials 	<ul style="list-style-type: none"> • Consulting/planning services for wreckage disposal management • Provision of machinery to assist wreckage removal • Transfer of technology for wreckage recycling as construction materials • Need to develop garbage management capacity throughout the country and in both the public/private sectors 	<ul style="list-style-type: none"> • Provide training and consultancy • Provide assistance to buy machinery or provide money for renting machinery • Provide state-of-the-art consultancy and technology on wreckage and garbage recycling <p>Medium</p>	

(3) Co-assistance Approach for Pilot Projects

Out of the five Priority Projects, three pilot projects for grassroots rehabilitation were designed to test the on-site co-assistance approach as explained above. The following show the co-assistance approach for each Pilot Project.

1. Refugee Camp Support

Based on lessons learned in Japan, the JICA Project Team assisted refugees to establish camp associations that could promote co-assistance among disaster-affected people for effective recovery from devastation. The role of the associations was to make decisions on management issues of the camps, including procurement of necessary equipment and facilities, as well as coordination of seminars and trainings.

2. Fishery Cooperative Societies (FCS) Support

Most of the property of fisherman were lost or damaged during the tsunami. As such, equipment was required for resuming fishing activities. The JICA Project Team decided to support FCS, which consisted of fishermen, and support cooperative members mainly through a micro-credit scheme.

3. Associations of Small Industries Support

For promoting co-assistance activities, trade associations of targeted industries were formed. The associations were expected to support, reopen, and improve the businesses of members, to lobby for matters affecting trade such as licenses, taxes, and inspection procedures, to enhance the social/economic status of the industry, and to appeal for necessary assistance from the Government, NGOs and donors.

Part II Implementation of Priority Projects

4. Refugee Camp Support

(1) Outline of the Project

- Project Title: Refugee Camp Management Support Pilot Project
- Location: The Gurubewila and Pathegama Camps were selected as model camps out of the 22 refugee camps in the Matara District
- Project Duration: July 2005 to February 2006

- Background: As of April 2005, 3,325 people lived in 22 refugee camps in the Matara District. Minimum living necessities were assured in the camps, however, refugees were not organized and were unable to improve many problems in their lives through their own initiatives.
- Project Goals: Develop capacity of affected people (camp refugees) to contribute to improving their quality of life
- Project Components:
 - Development of a strong society of affected persons capable of lobbying for their rights and assistance and capable of contributing to the improvement of their own lives;
 - Improvement of basic household needs, water, sanitation, as well as environmental aspects at temporary housing sites, working in partnership with affected people; and
 - Creation of a structure for refugee camp associations to learn from each other's good practices. A newsletter has been launched for this purpose.

(2) Activities and Results

Activities	Contents	Results
Camp Household Survey	Conduct questionnaire surveys to understand socioeconomic conditions and needs of households at model camps	Issues on transportation, education, water, electricity, and so on were clarified.
Camp Management Survey	Interview managers of all 22 refugee camps to identify management issues	Problems in management and coordination of basic necessities were clarified.
Institutional Building of Camp Associations	Form camp associations at model camps	In April, associations were formed.
Steering Committee Meeting	Form steering committees of stakeholders to handle the Pilot Project	The committee meetings were held once a month.
Lending of Equipment	Select and lend necessary equipment for people at refugee camps	Gas cookers were lent to the two camps in August, while cupboards, generators, and stationery were lent in October.
Coordination among the stakeholders	Coordinate with the District Secretary in Matara and divisional secretaries in Weligama and Lordstar	People in the camps have been actively discussing among themselves and negotiating with outside entities.
First-Aid Training	Conduct first aid training for refugees	The first-aid training was held at the Pathegama and Gurubewila Camps in September.

Activities	Contents	Results
Preparation of Well Digging	Provide wells, pumps, and tanks for bathing water	Construction work was canceled because refugees would move to permanent houses.
Newsletter	Provide newsletters to learn about good practices on improving refugee lives	Five newsletters in local language were issued on a monthly basis.
Study Tour	Conduct study tours to other camps for sharing experiences and information	The first tour with refugees from the Pathagama Camp was conducted in July.
Positive Thinking Workshop	Conduct workshop for relieving psychological distress and encouraging positive thinking	Workshops were held at both camps in October.
Evaluation Workshop	Conduct workshop for assessing the Pilot Project	Workshops were held at both camps in December.

(3) Achievement and Evaluation

The following results were identified in the evaluation process.

- People in the model camps gained the initiative to improve their livelihoods.
- Capability for rehabilitation was enhanced through seminars and workshops.
- People understood the importance of the co-assistance approach and actively assisted committees and community activities.
- Livelihood rehabilitation was promoted by the Pilot Project.
- Concerning the sustainability of the pilot project, the camp residents will maintain cooperation even after shifting to permanent houses. Newly-developed micro-credit schemes facilitate solidarity.

5. Fishery Cooperatives Rehabilitation

(1) Plan of the Pilot Project

- Project Title: Fishery Cooperatives Society (FCS) Support Pilot Project
- Location: Epitamulla, Noonawella, and Dodampahala FCS in Matara Province
- Counterpart Organization: Fisheries District Office and Cooperatives District Office
- Project duration: July 2005 to February 2006
- Background: The three fisheries cooperative societies had been in existence for some time primarily for executing micro-finance schemes for society members. Their office buildings were destroyed and they could not resume their activities.

- Project Goal: The lives of fishermen are re-established at the community level with the support of the FCS
- Project Components:
 - Increase knowledge and facilitate capacity building in FCS-related activities;
 - Conduct open seminars; and
 - Construct fishing gear lockers, small auction halls, and FCS office buildings.

(2) Activities and Results

Activities	Contents	Results
Interview survey of directors of FCSs	Conduct questionnaire surveys of directors in the nine FCSs in Matara District	Their situations and problems were clarified.
Steering committee	Hold a steering committee of the FCSs and coordinate the Pilot Project	Five committee meetings were held in July to December.
Needs Assessment Workshop	Hold workshops and clarify their needs	Workshops were held for the Noonawella and Eptamulla FCS in August.
Coordination with Stakeholders	Collaborate with the Department of Fishery and Aquatic Resources (DFAR) and Co-operative District Office	Memorandum of understanding on the Pilot Project was signed by the DFAR and Co-operative Office in the Southern Province.
Construction Work	Construct the following facilities <ul style="list-style-type: none"> • Bank office, OBM locker, community hall for Dodanpahara • Bank office for Eptamulla • Auction hall for Noonawella 	Bank office in Eptamulla was completed in November, and the office building and the OBM locker in Dodanpahara were completed in December. Other buildings were also completed.
Seminar	Hold seminar on positive thinking and business plan preparation	These seminars were held in October.
Study Tour	Visit other FCSs or co-operatives for exchanging their experience and information	Study tours to Noonawella FCS Kotopola and a multi-purpose cooperative center were carried out.
Evaluation Workshop	Conduct workshop for assessing the Pilot Project	Workshops were held at every fishery cooperatives in December.

(3) Achievements and Evaluation

The following results were identified during the evaluation process.

- People in the fishery societies became more motivated to rehabilitate their livelihood through the Pilot Project.
- Their capability for rehabilitation was enhanced through seminars and workshops.
- People understood the importance of the co-assistance approach and actively assisted committees and community activities.

- Since fishery cooperative banking was just resumed, it will contribute to livelihood rehabilitation.
- Sustainability of the FCSs has been enhanced with renovated micro-credit schemes, construction of society buildings, and mutual learning among counterpart cooperative societies.

6. Small Industry Rehabilitation

(1) Plan of the Pilot Project

- Project Title: Small-scale Industry Support Pilot Project
- Location: Matara City and Nearby Vicinity
- Counterpart Organization: Industrial Development Board (IDB)
- Project Duration: July 2005 to February 2006
- Background: Recovery of local industries is essential for regional rehabilitation. The food processing and ornamental fish industries were selected as target groups for the Pilot Project by the JICA Project Team after working together with IDB.
- Project Goal:
 - Each small business establishment recovers from tsunami damage both in terms of income and employment.
- Project Components:
 1. Forming small business/establishment owner associations for targeted sectors to promote co-assistance;
 2. Lending necessary equipment and tools for business operations; and
 3. Providing technical and management advices.

(2) Activities and Results

Activities	Contents	Results
Business Associations	Form business associations for both industries among tsunami-affected businesspersons	Both business associations were established in May. Membership and committee members were decided as well.
Survey on Equipment	Conduct interview surveys on required equipment for association members	Clarify required types of equipment.
Steering Committee	Establish steering committees including both associations, the	Three committee meetings were held.

Activities	Contents	Results
	Industrial Development Board, NGO, and JICA Team	
Lending of Equipment	Lend equipment and tools for reopening businesses	Pieces of equipment were handed over to the food base industry in August. Equipment for divers in ornamental fish industry was handed over in November.
Coordination among Stakeholders	Collaborate with Industrial Development Board of Ceylon (IDB) and UNDP for the Pilot Project	IDB and JICA Project Team agreed on collaborating for the Pilot Project. JICA Project Team and UNDP agreed to commence a micro-credit scheme for the target industries.
Workshop	Hold workshops for identifying the needs of members of both associations	Two workshops on the food industry and one on ornamental fish industry were conducted in September, resulting in the clarification of the needs of each association.
Exhibition of Food Products	Hold a exhibition of food products to promote business	The exhibition was held in October and a lecture for business management and a evaluation session were also convened.
Evaluation Workshop	Conduct workshop for assessing the Pilot Project	Workshops were held at both associations in December.

(3) Achievements and Evaluation

The following results were identified through the evaluation process.

- Although small industry cooperatives are not common in Sri Lanka, the Pilot Project succeeded in forming functioning cooperatives.
- With equipment lent through associations to members, all businesses have been successfully restarted.
- While members of the food association understood the importance of the co-assistance approach through the Pilot Project activities, the ornamental fish association had some difficulty in establishing an understanding.
- Concerning the sustainability of association activities, members of the food association appreciate the food exhibition and micro-credit scheme and remain in the association.
- However, the Ornamental Fish association is less sustainable in this current form. Divers and suppliers are engaged in very different businesses and often have conflicting interests. Reorganization of this association may need further co-assistance.

7. Reconstruction of Matara Aqueduct Bridge

(1) Outline

- Background: The Matara Aqueduct was completely destroyed and washed away by the tsunami. The Aqueduct, which supplied water to about 78,000 people in the Dondra Area before the tsunami, was temporarily repaired with a polyethylene pipe. There was an urgent need to provide a new permanent aqueduct before the next monsoon season.
- Project Components:
 - Construction of the Aqueduct Bridge over the Dondara Lagoon Channel, along with National Road No.2.

The JICA Program Team has been in charge of technical assistance of design, tender, and construction monitoring. Construction work is being implemented by the Non-Project Grant Aid scheme.

(2) Summary of Activities and Progress

Activities	Progress
Topographic and Geological Investigations	Topographic survey, drilling works and laboratory test were carried out and necessary data for design work was provided.
Preparation of Design Work	Design drawing, cost estimation, and implementation plan were prepared.
Preparation of Draft Tender Documents	Draft Tender document was already prepared and submitted to the Sri Lanka Government.
Tendering Procedure	Tender process was finished and a contractor was selected.
Monitoring of the work	The JICA Project Team is monitoring and advising on the construction work and procurement. The JICA Project Team approved shop drawings.

8. Rehabilitation of Fisheries Harbors of Galle and Tangalle

(1) Outline

- Background: Most damage at the Galle and Tangalle Fishery Harbors was concentrated at on-land facilities. One of the urgent problems in the Galle Fishery Harbor was ice supply, as several facilities and related equipment were damaged at the Tangalle Fishery Harbor.

- Project Components:

1. Galle Fisher Harbor

- Construction of a refrigeration ice plant, Ceylon Fishery Harbor Corporation's (CFHC) office building, an auction hall, a canteen, a welfare shop, a quay wall, a slipway, and a winch hut.
- Demolition of five existing buildings, an old CFHC office, and some unused facilities.

2. Tangalle Fishery Harbor

- Repair and provision of port facilities

The JICA Project Team has been in charge of assisting design, tender, and monitoring for the above construction works. Construction work is being implemented by the Non-Project Grant Aid scheme.

3. Kirinda Fishery Harbor

- Among the various buildings and facilities damaged by the tsunami, the auction hall was most frequently used by local people. CFHC and JICA Project Team agreed to rehabilitate the roof of the auction hall.
- Bathymetric surveys were carried out to review of the sand drafting at the Harbor.

(2) Summary of Activities and Progress

Activities	Progress
Preparation of Rehabilitation Plan	Rehabilitation plan, basic design, and drawings were prepared and construction costs were estimated.
Preparation of Draft Tender Document	Draft Tender document was prepared and submitted to the Sri Lanka Government.
Tender Procedure	Tender process was finished and a contractor was selected.
Monitoring or Work	The JICA Project Team monitored and advised on construction works, procurement, and project management.
Rehabilitation of Kirinda Fishery Harbor's auction hall	Rehabilitation of the roof was completed in August. This construction work was implemented as a Pilot Project of the JICA Project Team.
Bathymetric surveys at Kirinda Fishery Harbor	Bathymetric surveys were carried out to review of the sand drafting at the Harbor in November/December 2005 and in February 2006. The data will be used for the future planning of the Harbor.

Part III Evaluation

9. Evaluation

The JICA Project Team evaluated the methodological approaches including the bottleneck identification and the co-assistance approaches, as described above, against observations noted in the actual implementation of the Projects.

(1) Evaluation of Bottleneck Identification Approach

The checkpoints, bottlenecks, and implementation methods as shown in Table 2, were evaluated from the following perspectives:

- Whether the checkpoints identified in Japan were applicable in post-tsunami southern Sri Lanka or not?
- Whether or not the identified bottlenecks were appropriate for recovery? Were there other bottlenecks?
- Was the implementation method adopted for the bottleneck appropriate?

The degree of applicability was assessed and a score was given to each item on a scale of 0 – 10. Table 3 summarizes the score for each evaluation categories.

Table 3 Average Score of Each Evaluation Categories

Field	Field	Checkpoints	Bottlenecks	Implementation	Missing Checkpoints
Refugee Area Closing and Temporary Housing Provision	7.0	3.9	7.8	8.0	0
Reconstruction of Houses	9.0	5.6	7.3	6.0	-2.0
Township Rehabilitation Planning and Institutional Development	7.0	5.3	7.0	6.7	-2.0
Demolition of Damaged Buildings and Debris Disposal	0	1.0	1.0	1.0	0
Industry Rehabilitation	8.0	7.0	7.1	6.4	-2.0

Source: JICA Team

Bottlenecks identified by the listed checkpoints are generally found to be quite relevant. Implementation methods that have been derived from these bottlenecks are also found to

be appropriate, although slightly less than bottlenecks. However, some of the checkpoints applied directly from those compiled in Japan were found to be irrelevant. Also, there seems to be some missing checkpoints necessary for Sri Lanka. The difference can be attributed to the fact that the list developed in Japan was compiled after the great earthquake experience, whereas the disaster in Sri Lanka was caused by a giant tsunami, a completely different phenomenon. Also, underlying economic and social circumstances were quite different, which made some difference in the weighting of issues in each respective society.

However, the list itself was proven to be quite useful in identifying work to be done in a very systematic manner and in quickly reaching practical solutions. It is therefore most desirable for Sri Lanka to prepare such a list in a fashion similar to the Japanese one, via a thorough compilation of its own experience in post-disaster management.

(2) Evaluation of Co-Assistance Approach

The Pilot Projects were evaluated in terms of how co-assistance contributed to the improvement in the lives of victims. To clarify the difference between activities without co-assistance (such as the simple provision of equipment), the concept of “social capital” was introduced to the evaluation (it is one of the five capitals necessary for a Sustainable Livelihood Approach, originally proposed by DFID²). Social capital can be defined as “various factors affecting cooperative behavior of human group aiming at some development goals in human group”. The other four capitals are human capital, natural capital, physical capital, and financial capital.

It is assumed that the Pilot Project, based on the co-assistance, enhanced the social capital and the synergy with social capital and other capitals, and promoted rehabilitation of the quality of life in each community. Based on this consideration, the JICA Project Team implemented the following three methods of evaluation for the co-assistance:

1) Evaluation of Social Capital from the Perspectives of Beneficiaries

This aims to clarify how beneficiaries recognize the social capital and its contribution to improvement of the quality of life through community activities of the Pilot Projects. This was done through a series of workshops. Major findings are summarized below:

- Correct understanding of the requirements/needs in the community was encouraged in the fishery societies and the camp associations;

² http://www.livelihoods.org/info/info_guidancesheets.html According to DFID, social capital is defined as “the social resources upon which people draw in pursuit of their livelihood objectives”.

- While the fishery societies and the camp associations recognized that the fairness of committee management was improved, the small industry associations did not recognize that fairness improved;
- Besides the ornamental fish industry association, all societies/associations replied that trust among members and internal, spontaneous mutual help were enhanced or improved;
- Most societies negotiated with or contacted external agencies more actively, such as donors, government agencies, and other societies; and
- All fishery cooperatives and camps possessed very cooperative attitudes vis-à-vis community activities. While the attitude of the food association became more cooperative, the ornamental fish association did not.

2) Evaluation of Capitals for Improvement of the Quality of Life as Enhanced by the Project

Through the assessment of the five capitals, this evaluation clarified how each capital was enhanced by activities of the Pilot Projects and identified the differences between the approach of the Pilot Projects' and the assistance of other donors. This was implemented through the evaluation workshops.

- **Refugee Camp Societies and Fishery Cooperatives**

Financial, human, social and physical capitals were severely damaged by the tsunami. There was no significant damage in natural capital. While other agencies mainly assisted human, financial, and physical capitals through the provision of equipment/money, workshops, and seminars, the JICA Pilot Project enhanced social capital and supported the financial, human, and physical capitals, which are complementary to the social capital.

- **Small Industry Associations**

For small industry associations, the financial and physical capitals were seriously damaged, while human capital was significantly damaged by the tsunami. There was no significant damage in natural capital. Since there was no association before the tsunami, the social capital was not affected by the tsunami either. While no other agencies focused upon these small industries, the JICA Pilot Project enhanced their social capital and other capitals in a balance manner.

3) Evaluation of Social Capital from the Perspectives of Improvement of Life Quality

The evaluation clarified: (i) how the enhancement of the social capital contributed to improve the quality of life of affected people; (ii) how financial, physical, natural, and human capital were enhanced or complemented by the social capital; and (iii) how social

backgrounds and characteristics affected the social capital development. Major findings are summarized below:

- Camp societies and fishery cooperatives acquired the capability to understand the appropriate requirements/needs for the improvement of the quality of life from a medium-term perspective. For example, camp societies identified micro-finance, a generator, and a sound system (instead of a well and electricity, which were not expected for the long term as they were going to leave their transitional shelters sooner or later);
- Communities that existed before the tsunami realized easy and fair opportunities for assistance to other members, while other communities had some difficulties. This is because the trust among members is essential for fair opportunity and it takes some time to build up a trustful relationship;
- The members in the food association started to assist improvement of food technology one another, which will strongly promote the rehabilitation of the quality of life;
- All target communities could acquire loans fund from external agencies and negotiate with other agencies through the initiative of these committees. The establishment of committees made communities socially recognized and visible to external agencies, which enabled them to receive assistance from external agencies more easily; and
- The co-assistance approach fits well with the traditional desire of Sri Lankan rural societies to work in group situations. The people could easily accept the co-assistance approach and this fact resulted in the smooth implementation of the Pilot Projects.

Part IV Support of Mid-Term Rehabilitation Plan

10. Suggestion for Regional Rehabilitation Plan

The city of Matara does not have urban development plans with comprehensive countermeasures against disasters. The JICA Project Team reviewed the existing plans and is providing a basic framework for a sustainable post-disaster rehabilitation plan by integrating various activities and lessons learned from the implementation of this Project.

(1) Review of Existing Urban Plans in Matara Urban Area

There are some plans related to rehabilitation in the Matara Urban area as follows.

1) 100 m buffer zone

After the tsunami, the Sri Lanka Government designated a 100 m buffer zone along the coast, which regulates buildings in the area within 100 m of the shoreline. The regulations in the buffer zone are summarized as follows:

- Rebuilding of damaged residential houses is prohibited;
- People whose houses were damaged are to be given new land and houses by the Government; and
- Buildings for tourism, fishery, and religion, infrastructure, and historical structure are exempted from the above regulations.

2) McRAP (Matara City Renewal Action Program)

The McRAP is the only township program being prepared for post-disaster Matara. Objectives of this program include avoiding ad hoc land use in the face of the relocation of tsunami-affected families, improving infrastructure and public facilities in the process, and building a disaster-free new urban center, assembling currently-scattered public services and economic institutions in a designated area.

(2) Suggestion for Rehabilitation Plan

Some issues remain regarding the existing rehabilitation plans as follows:

- There is no rehabilitation plan at the community level;
- There is no study or research at present that relates to lessons learned from rehabilitation experiences; and
- Although Matara is prone to not only tsunamis, but also floods, a cross-sectoral disaster management plan does not exist.

The JICA Project Team summarized the suggestions on rehabilitation in the subsequent section.

1) Identification of Bottlenecks

The list of possible bottlenecks (adapted from the one prepared in Japan) proved to be quite useful. However, it is strongly recommended that the list be modified to reflect the actual circumstances in Sri Lanka by planners of the regional rehabilitation plan especially in the following points.

- The dual structure of local administration in Sri Lanka
- Involvement of a large number of donors and NGOs
- The co-assistance approach

- Availability of land for evacuees
- Roles of the Urban Development Authority, Provincial Government, and Municipality
- Consideration of the needs and opinions of victims themselves
- Revival of small-scale industries
- Expansion to include public health and education, as anticipated in the earlier stages

2) Co-Assistance

The co-assistance approach proved to be quite effective in post-disaster management. A number of points have emerged in the course of implementing the Pilot Projects, which, if properly done, would make the approach even more effective as follows:

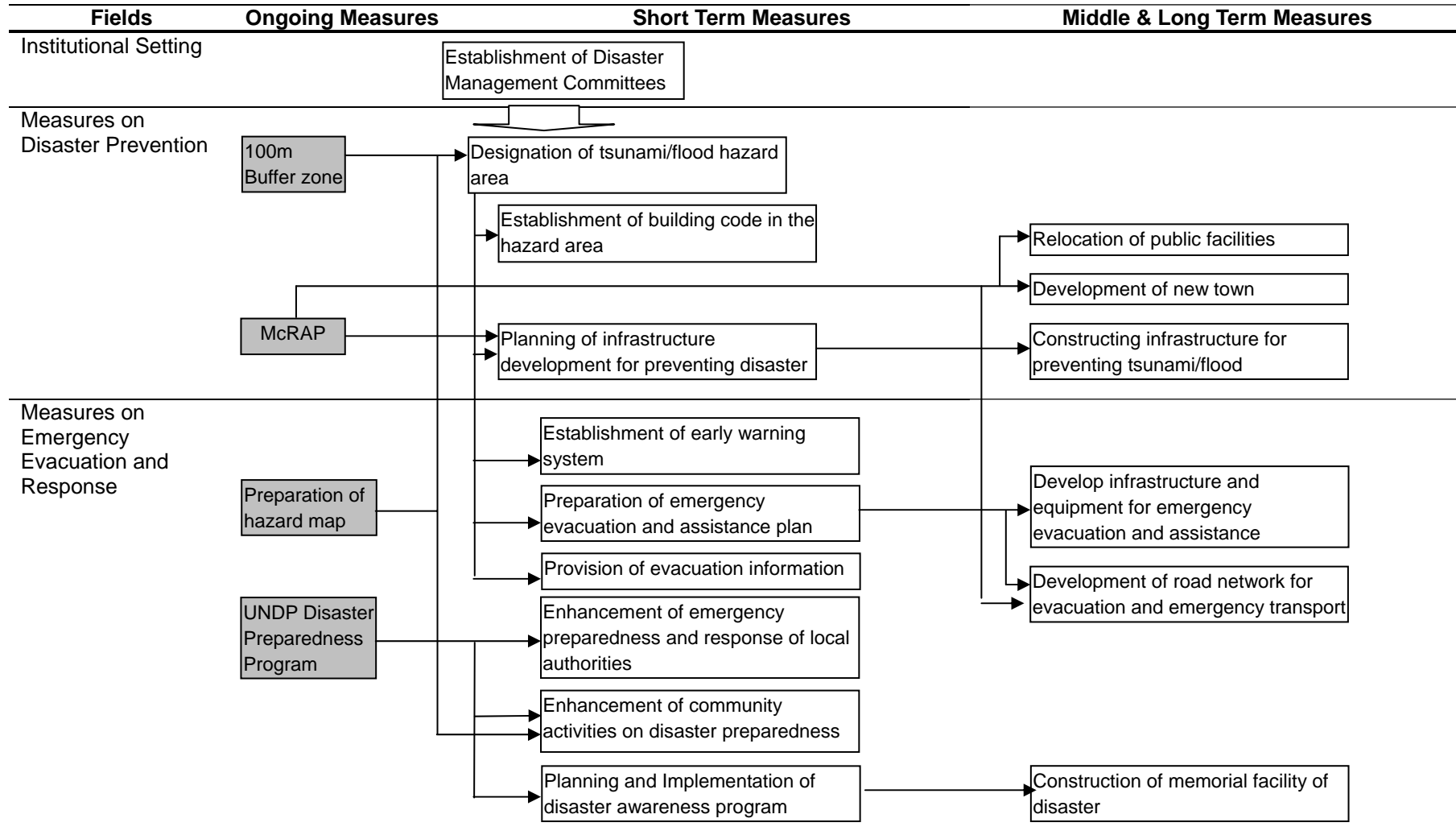
- Members of a newly formed society should be of a similar background (as much as possible);
- Societies should be given an opportunity to negotiate with external organizations to the extent possible;
- Meetings should be held as frequently as possible;
- Micro-finance can act as good glue to keep society cohesive, while its interest payments can be used for the society's own activities;
- Training can enhance the standing of society to individuals, stronger individuals strengthen the society, which becomes even stronger in strengthening individuals, a mutually-reinforcing cycle; and
- Formation of internally-cohesive and outwardly-oriented societies enables them to link up with existing organizations to enlarge their scope.

(3) Recommendations on Disaster Management in Matara Urban Area

The JICA Project Team developed recommendations on disaster management measures. These recommendations are mainly focused on the existing urban area, with tsunamis and floods selected as targeted disasters.

The disaster management measures consist of two kinds of measures: disaster prevention and emergency preparedness and response. Disaster prevention measures are expected to prevent or reduce physical disaster damage directly, while emergency preparedness and response are measures on planning and preparing emergency activities. An important point is that government authorities need to implement both kinds of countermeasures in a balanced manner because neither of them can adequately prevent disaster alone. Table 4 summarizes recommended measures and the implementation schedule.

Table 4 Summary of Proposed Measures on Disaster Management



ES-22

Source: Project Team

(4) Preparation of a Hazard Map

As one of the recommended measures, the JICA Project Team prepared a preliminary tsunami hazard map and tsunami/flood disaster maps. These maps can be used for planning of disaster management and preparedness activities of residents. Table 5 shows the characteristics of these maps.

Table 5 Characteristics of Disaster Map and Preliminary Hazard Map

Information Contained in Map	Disaster Map	Preliminary Tsunami Hazard Map
Target disaster	2003 Flood and 2004 Tsunami	2004 Tsunami
Disaster- prone area	Past results	Simulation results
Hazard level	Past results (inundation depth only)	Simulation results (Inundation depth, arrival time)
Information for disaster reduction activities	Past results (flow direction, evacuation direction)	Simulation results (flow direction and velocity*)

Note: *The evacuation information will be excluded in the preliminary tsunami hazard map because this information should be decided through discussions among the local government and residents.

Source: Project Team

(5) Awareness Program

The JICA Project Team organized two JICA-Net seminars on disaster and rehabilitation in order to facilitate the transfer of knowledge to the local people as follows:

- Community Initiatives in Disaster Management and Rehabilitation; and
- Role of Local Authorities in Disaster Management.

These two seminars were held in December via the JICA-Net system that connects the studio in Colombo with a studio in JICA's Tokyo Headquarters.

In addition, the JICA Project Team has already held seminars on first aid in refugee camps. Furthermore, the Team held seminars on disaster management in March 2006, which aim to not only explain the entire project, but also to promote a disaster management plan recommended in the report, as well as to introduce the hazard map.

11. Conclusions

(1) Conclusions

1) Summary of Conclusion

As described above, the JICA Project Team has done various work in the rehabilitation process in the southern region of Sri Lanka. Against the stated objectives of the Project, some conclusions can be drawn as detailed below:

1. The JICA Project Team formulated a set of recommendations for the recovery, rehabilitation, and development of the tsunami-affected area, including strategies for rehabilitation and disaster management, which should be useful in planning and implementation of a disaster-resistant Matara city;
2. The JICA Project Team assisted the implementation of the reconstruction of the Matara Aqueduct Bridge and the rehabilitation of fishery harbors in Galle and Tangalle, which was funded under Japanese Non-project Grant Aid; and
3. The JICA Project Team shared Japanese experiences in disaster management through the implementation of the Project. The bottleneck identification and co-assistance approaches, which were adapted from Japanese experiences, proved quite effective in Sri Lanka as well. However, fine-tuning of the approaches to Sri Lankan realities is needed for the future.

2) Lesson Learned from the Project

- Identification of Bottlenecks

The list of possible bottlenecks, adapted from the one prepared in Japan, was by and large proven quite useful. However, it is strongly recommended that the list be modified to reflect the actual circumstances in Sri Lanka by planners of the regional rehabilitation plan.

- Co-Assistance

The co-assistance approach proved to be quite effective in post-disaster management. There are a number of points that have emerged in the course of implementing the Pilot Projects, such as effect of different backgrounds of community members, enhancement of internal bonding through training and finance schemes, and capacity building through negotiating opportunity with outside agencies (details are shown in section 10 (2) 2)). Consideration of these points would make the approach even more effective.

- Priority Projects for Infrastructure

The activities at the Matara Aqueduct, and the Galle and Tangalle fishery ports were funded by Japanese Non-Project Grant Aid. The JICA Project Team was in a position to assist

technical works of these projects. The lesson learned from this implementation scheme was summarized as follows:

- Establishment of the Steering Committee, which included both Sri Lankan and Japanese representatives related to the Non-Project Grant Aid, promoted consensus-building between concerned agencies and enabled the quick identification of projects; and
- Since the JICA Project Team was in charge of drafting tender documents, the documents could be promptly prepared within two months after project commencement, which contributed to quicken implementation of the project.

(2) Recommendations

1) Preparation of a list of lessons and checkpoints on disaster rehabilitation

Through implementation and evaluation of the Project, it became clear that a list of lessons and checkpoints is a useful tool for identifying bottlenecks and necessary activities quickly. However this list needs to be adapted to the situation in Sri Lanka. Thus, the Sri Lankan Government is recommended to collect information on various issues in tsunami rehabilitation and summarize them in a single list. Besides a list for tsunamis, ones for floods and landslides are considered useful for effective disaster rehabilitation.

2) Enhancement of co-assistance activities for community rehabilitation

Through implementation and evaluation of the pilot projects, the JICA Project Team concluded that the enhancement of co-assistance activities can promote disaster rehabilitation at the community level. It is recommended that local authorities take the initiative of enhancing co-assistance activities in all affected communities, while closely cooperating with NGOs and donors.

3) Promotion of regional disaster management

As well as rehabilitation, disaster prevention is quite important at this stage. According to a review of the existing measures, it is clear that disaster management in the Matara region is still insufficient. It is recommended that comprehensive disaster management be introduced in the Matara area as soon as possible.

4) Dissemination of the Project Result

All three recommendations (including a list of lessons and checkpoints, co-assistance, and disaster management), need to be disseminated to central government agencies and local

authorities through workshops and seminars. The following three steps to disseminate co-assistance are proposed:

- (i) Survey of existing community-based organizations and their achievements;
- (ii) Policy development at the government level including training on public administration for co-assistance facilitation, training on enhancement of co-assistance activities for tsunami-affected communities, and policy coordination with NGOs; and
- (iii) Dissemination at the community level including group training for community leader, assistance of establishment of community organization, and monitoring of co-assistance activities.

5) Subsequent Follow-up for the Project

Regarding the implementation of recommendations, the following activities are recommended by the Sri Lankan side and JICA in the short-term.

- Sri Lankan side
 - Dissemination by distributing copies of the report to concerned agencies
 - Handover of the Pilot Project from the JICA Project Team to government agencies
 - Continuation of the Pilot Projects by government agencies closely cooperating with Berendina
 - Promotion by the following three steps to disseminate co-assistance: (i) survey of existing community-based organizations and their achievements; (ii) policy development at the government level; and (iii) trainings and seminars.
 - Preparation of lists of lessons and checkpoints (according to rehabilitation phase and disaster type) by a committee specifically formed for the purpose
 - Promotion of short-term measures for disaster management, such as the implementation of an awareness program with hazard maps and the establishment of a disaster management committee
- JICA
 - Continuation of support for the Pilot Projects (the projects are expected to be implemented by GA and Berendina (an NGO))

Chapter 1 Introduction

1.1 Background

In response to an official request of the Government of the Democratic Socialist Republic of Sri Lanka (hereinafter referred to as “GOSL”), the Government of Japan (hereinafter referred to as “GOJ”) decided to undertake and implement a project, the “Recovery, Rehabilitation and Development Project for Tsunami Affected Area of Southern Region in the Democratic Socialist Republic of Sri Lanka” (hereinafter referred to as “the Project”), in accordance with the relevant laws and regulations in force in Japan for ODA assistance.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as “JICA”), the official agency responsible for the implementation of the technical cooperation programs of the Government of Japan, was entrusted to implement the Project, in close cooperation with the concerned authorities of GOSL. An expert team comprised of consultants from PADECO Co., Ltd., in association with Nippon Koei Co., Ltd., and from the Overseas Agro-Fisheries Consultants Co., Ltd. (hereinafter referred to as the Project Team) was engaged by JICA to undertake the project.

The Ministry of Fisheries and Aquatic Resources (hereinafter referred to as “MOFAR”), the Ministry of Urban Development and Water Supply (hereinafter referred to as “MOUDWS), as well as the Ministry of Provincial Council and Local Government (hereinafter referred to as “MOPCLG”), have been designated to act as counterpart agencies to the Japanese team and also to act as the coordinating body with other relevant organizations for the smooth implementation of the Project, on behalf of the GOSL.

The Project was commenced in mid-March 2005. This final report describes all results of project activities undertaken since then to the end of March 2006.

1.2 Project Objectives

A document entitled, the “Scope of Work on Recovery, Rehabilitation and Development Project for Tsunami Affected Area of Southern Region” (the SW Document) was signed by the four aforementioned agencies, as well as the Department of External Resources and the Ministry of Finance. The stated Project objectives are as follows:

1. To formulate a plan for a recovery, rehabilitation, and development program for the tsunami-affected area in the southern region of Sri Lanka;

2. To assist and monitor technically the implementation of recovery and rehabilitation projects to be funded under Japanese Non-project Grant Aid and ODA loans; and
3. To share Japanese experiences in disaster management through implementation of the Project.

However, after commencing the Project, it became apparent that to formulate a definitive plan would be a futile exercise as a large number of activities were being conducted concurrently by various organizations to cope with the emergency situation. No concerted planning effort involving the large number of players was possible as priority was obviously given to accommodating the demand of people in distress. It was therefore decided that the Project should emphasize the third objective noted above, so that Japanese experience in disaster management could be tested in the context of the real situation in Sri Lanka, with lessons learnt being applied elsewhere in Sri Lanka on other occasions.

This report details the activities undertaken by the Project Team and the lessons elicited from these activities.

1.3 Subject Areas and Project Scope

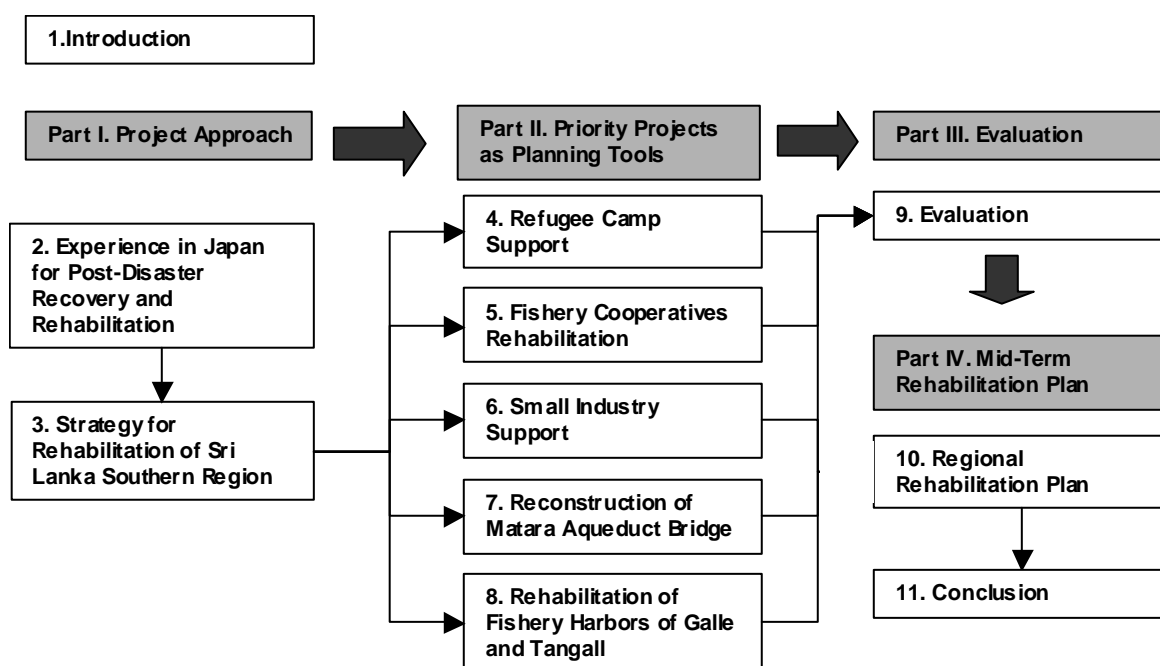
Areas subject to this Project include Galle District, Matara District, and Hambantota District, and the Project mainly focuses on the Galle Fishery Harbor, Tangalle Fishery Harbor, and Matara District. The later areas were to be studied on a limited basis.

Post disaster recovery/rehabilitation can generally be divided into four phases: emergency rescue, evacuation, rehabilitation initiation, and full-scale rehabilitation. This Project does not cover the first emergency rescue and the second evacuation phases, but the third rehabilitation initiation and the fourth full-scale rehabilitation phases. The Project examines the methodologies, planning and implementation of pilot projects, and verification of their effectiveness. For the fourth phase, the project is limited to recommendations for an effective rehabilitation plan considering mid-term objectives.

1.4 Structure of This Report

The structure of this report follows the Project structure and is divided into four parts. Part I focuses on the analyses methods developed in Japan through experiences in post-disaster rehabilitation and the manner that such methods could be applied to Sri Lanka. Part II focuses on the planning and implementation of priority projects designed to elicit

lessons for establishing effective post-tsunami rehabilitation in Sri Lanka to be reflected in the mid-term rehabilitation plan as well as the emergency physical rehabilitation projects. Part III focuses on the evaluation of the post-disaster management methodology identified in Part II above. Part IV deals with the formulation of strategies and policies for the planning of mid-term regional/township rehabilitation plans, together with a rehabilitation plan of fisheries in the region. Part IV also deals with the identification of key general conclusions from the noted activities undertaken. This report/project structure is illustrated in Figure 1.1.



Source: Project Team

Figure 1.1 Report Structure

PART I

PROJECT APPROACHES

Chapter 2 Japanese Experiences with Post-Disaster Recovery and Rehabilitation

2.1 Needs for Efficient Rehabilitation

Natural disasters, including earthquakes, tsunamis, typhoons, cyclones, tidal waves, floods, volcano eruptions, and so forth, are one of the most serious threats to sustainable and stable national development, regardless of the level of development of a country. Over the last decade, many disasters have hit people and regional economies across the globe.

After such disasters, resource mobilization is necessary immediately after the disaster to restore former development levels and plot the course for sustainable growth. However, in developing countries, it is difficult to spare such extra effort due to budgetary and human resource constraints. Consequently, their ability to cope with natural disasters is low and they continue to agonize over such threats.

The damage of natural disaster can be wide and deep. Due possibly to climate changes, damage by high-water and floods have become wider and more severe. Population increases and the prevalence/persistence of poverty increases the vulnerability of people to natural disasters.

Previously, Sri Lanka had not experienced such a large-scale natural disaster for hundreds of years. It was unprepared for such an event and did not allocate adequate funds for disaster management. Expenditure for disaster control has not been enough in last two decades, and institutional systems for disaster preparedness were underdeveloped. People did not pay heed to such disasters and were likewise under-educated about the threat of natural disasters.

In such a situation, it is important to utilize proven methods for an efficient and a substantive rehabilitation. In the actual situation, however, such knowledge is often ignored because entities/governments tend to be occupied in on-site emergency assistance on an ad-hoc basis, rather than on a systematic basis.

2.2 Application of Japanese Experiences in Disaster Rehabilitation

Throughout its history, Japan, one of the countries most prone to natural disasters, has accumulated experience in how best to cope with natural disasters.

After the Kobe Earthquake that damaged much of the urbanized area of Kobe in 1995, it became apparent that methodologies for efficient and substantive rehabilitation were important as were the methods for preventing and restoring physical damage. In Kobe, there were many conflicting issues in regards to resource distribution, rehabilitation planning, and personal life strengthening during the rehabilitation process among the various stakeholders. Therefore, it was considered extremely important to establish a method of systemizing the interests of various stakeholders.

Rehabilitation activities can be classified into two levels: (i) administrative activities; and (ii) on-site activities.

To understand the administrative activities, a study¹ undertaken by the Office of the Cabinet of the Government of Japan provides an adequate guide, which summarizes all activities recorded by public organizations, universities, academic societies, newspapers, private volunteers, and internet websites, generalizing this knowledge into the following questions: (i) what were the bottlenecks for social rehabilitation; (ii) what worked for regional economic rehabilitation; and (iii) what should be controlled politically or administratively.

For on-site activities, the Manual for Earthquake Rehabilitation, prepared by the Tokyo Metropolitan Government, is a good reference. This manual shows institutional development methodologies to rehabilitate one's personal/family life, local industries, and public services as quick and efficiently as possible. It offers ways to educate people on how to act and rehabilitate their lives individually, while also encouraging smooth assistance work through administrative functions in the rehabilitation phase.

For example, in the last severe earthquake in the Chuetsu region, which damaged industries and generated some 100,000 refugees, rehabilitation activities were appreciated by more than 70% of residents, as lessons learned from Kobe were fully applied.

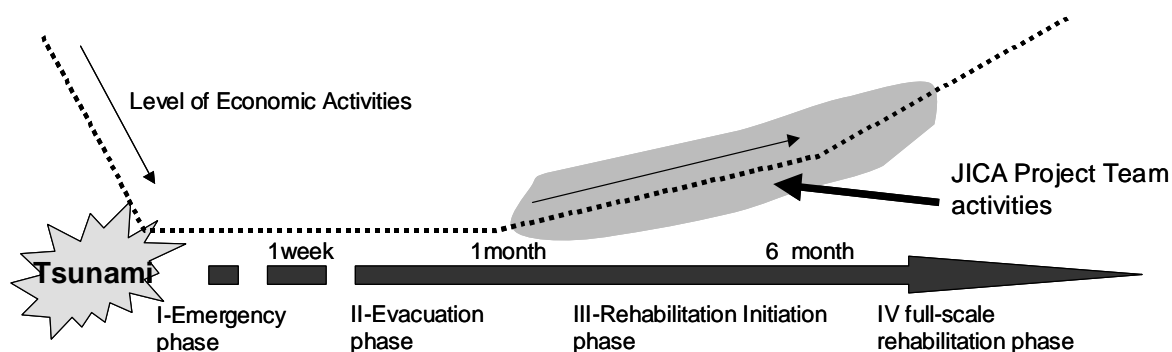
¹ <http://www.hanshin-awaji.or.jp/kyoukun/>

The following sections of this chapter review the two documents mentioned above, and introduce a clear idea for methodologies for rehabilitation phases after severe natural disasters.

2.3 Approach for Effective Rehabilitation

2.3.1 Definition of Phases

There are four phases of rehabilitation after a disaster, the: (i) emergency rescue phase (until one week after the disaster); (ii) evacuation phase (until one to two months after a disaster); (iii) rehabilitation initiation phase (until three to six months after a disaster); and (iv) full-scale rehabilitation phase. This JICA project deals with activities for Phases III and IV (the rehabilitation initiation and full-scale rehabilitation phases as shown in Figure 2.1).



Source: Project Team

Figure 2.1 Phases for Rehabilitation Activities after the Tsunami

In addition, disaster rehabilitation methodologies can be classified into two levels: (i) administrative activities; and (ii) on-site activities. These levels are described below.

2.3.2 Administrative Activities - Identifying Bottlenecks

The following table, which is extracted from the study of the Office of the Cabinet of the Government of Japan, explains the lessons learned from rehabilitation activities in the rehabilitation phase after the Kobe Earthquake. The JICA Project Team extracted lessons that were not solely specific to Japan, but also applicable to the initial and subsequent recovery phases that are relevant to this particular Project. Consequently, issues of health and education, which are only applicable in the first two phases in the Kobe case have been excluded. Seventy-five lessons were classified into five major fields with 22 sub-fields. The checkpoints shown below can screen actual needs, with one efficiently utilizing lessons from the Kobe disaster.

The checkpoints for post-disaster management, compiled by the Cabinet Secretariat of the Government of Japan, are classified into the following:

1st Phase: Rescue (Conduct Period - until 72 hours after the earthquake)

Damage Outbreak / Initial Rescue / Victim Behavior / Emergency Treatment / Emergency Transport / Emergency Procurement and Delivery of Materials / Public Health / Lifeline Provision / Emergency Response of Enterprises and Banks / Prevention of Secondary Damages

2nd Phase: Evacuation (Conduct Period - from between four days to three weeks after)

Operation and Management of Refugee Camp / Support and Normalization of Refugee Lives / Damage Measurement and Registration / Volunteers/ Restoration of Infrastructure and Public Services

3rd Phase: Initial Recovery (Conduct Period - from between four weeks to six months after)

Refugee Area Closing and Temporary Housing Provision / Reconstruction of Houses / Township Rehabilitation Planning and Institutional Development / Demolition of Damaged Buildings and Debris Disposal / Industry Rehabilitation

Checkpoints for the first two phases did not apply, as the Project commenced only in the third phase. Therefore, the list of checkpoints for the third phase was examined by the JICA Project Team and adopted with some modifications for this Project.

Table 2.1 Lessons Learned from Rehabilitation Activities after the Kobe Earthquake

Field	Sub-field	Lessons	Checkpoints
1. Refugee camp closing and temporary housing provision	Prolonged refugee camp	01. Management organization of refugee camp became weakened due to reduction of refugees. 02. Some refugees who depend on volunteer assistance tended to become reluctant to lead independent lives. 03. Managers of the refugee facility (school, gymnasium, etc) had to work to restart the facility. 04. Life refreshment programs for refugees were necessary.	<ul style="list-style-type: none"> • How do we manage the shrunken refugee camps efficiently? • How do we manage the original facility where refugee camps stand?
	Refugee camp closing	01. Media reports portrayed poor images of temporary housing for refugees, which delayed their closing. 02. Merging of refugee camps was difficult.	<ul style="list-style-type: none"> • How do we encourage refugees to move out of temporary housing?
	Offers for temporary provision of existing public housing in other area	01. Public housing organizations of neighboring regions offered 30,000 vacant room provisions. 02. 13,000 households moved to such vacant rooms in nearby regions. 03. Quality of vacant rooms was highly variable.	<ul style="list-style-type: none"> • How to ensure the adequate supply of temporary housing to meet demand? • Is there any capacity for provision of housing in other regions?
	Provision of temporary housing	01. Main implementing body of temporary housing changed to the prefecture agency from the municipality. 02. Demarcation of roles among the state, prefecture, and municipality needed to be discussed more thoroughly. 03. Volume of housing demand could not be specified.	<ul style="list-style-type: none"> • Does institutional coordination for the provision of temporary housing work efficiently?
	Construction and leasing of temporary housing	01. Land for temporary housing was limited, as local residents objected. 02. Some materials for housing were imported. 03. Some housing blocks hosted over 1,000 households, which impacted the surrounding environment. 04. Various designs were adopted to fit the various needs of refugees, particularly handicapped and elders. 05. Suburban housing areas were inconvenient, although some tenants appreciated a good and healthy environment.	<ul style="list-style-type: none"> • Does land acquisition and materials for housing meet the demand? • Will the plan for temporary housing negatively impact the surrounding environment? • Does the design of temporary housing fit the demand of refugees?

Field	Sub-field	Lessons	Checkpoints
2.Reconstructi on of life and houses	House repairs	<p>01. House repairs were not treated as being important. People tended to scrap the damaged houses without considering repairs.</p> <p>02. The livability of some deconstructed buildings could have been prolonged with adequate repairs.</p> <p>03. Materials and technical assistance were limited.</p>	<ul style="list-style-type: none"> • How and who decides the measures for building rehabilitation? • Does the decision process work properly?
	House reconstruction	<p>01. Many substandard buildings appeared after the earthquake.</p> <p>02. Reconstruction/repair of shared-ownership apartments faced difficulties in obtaining consensus among the shared owners.</p> <p>03. A law for housing in emergency cases was applied, but the law was too old to put into practice.</p> <p>04. A prefecture could not specify the number of scrapped housing in its area because of post-earthquake confusion.</p>	<ul style="list-style-type: none"> • How are the existing substandard buildings treated? • How are the shared-ownership building treated? • How does the public sector specify the demand for housing?
	Budgetary assistances program	<p>01. Public reconstruction funds were used for private housing development. People purchased housing materials in groups to decrease costs.</p> <p>02. Another public fund was prepared for elders and those who had a loan for previous damaged houses.</p>	<ul style="list-style-type: none"> • Is there any public fund to assist housing reconstruction?
	Charitable donation money	<p>01. Charity donation money was collected through the Red Cross, broadcasting stations, and municipalities. However, the amount decreased after April 1995 due to other social security issues in Tokyo.</p> <p>02. A committee for charity donation money collection was established on 25 Jan. 1995, unifying 26 related agencies.</p> <p>03. At first, the distributed amount of donation money became large (by several times more than expected) due to a misunderstanding in the qualification of victims.</p> <p>04. Distribution and justification of usage rule of donation money were discussed.</p>	<ul style="list-style-type: none"> • Does institutional coordination for the distribution of charity donations work efficiently? • Are the criteria for the distribution of charity donation prepared properly?

Field	Sub-field	Lessons	Checkpoints
	Public assistance and loan	01. Municipalities gave money to victims in the municipality, however, the amounts varied among different municipalities. 02. Money for condolence became problematic in the disaster. Relationships between death and disaster were not specified. Approval of money payment was delayed. 03. Application period and timescale for public loans did not fit the demand of victims. 04. Taxation reduction and exemption was implemented including health insurance payment.	<ul style="list-style-type: none"> • Are there such assistance and loans to rehabilitate the life of victims? • Are the criteria for condolence money provision prepared properly? • Is there such a reduction or exemption for taxes?
	Reconstruction foundation	01. Foundation for housing reconstruction was established for victim assistance, based on a municipality bond and lottery proceeds. 02. The amount of the foundation reached 900 billion JPY. 03. The foundation was utilized for several varied fields.	<ul style="list-style-type: none"> • Has such a public foundation been established? • Are the criteria for funding prepared properly?
3. Township rehabilitation planning and implementation	Governmental actions	01. The Central Government established a taskforce for rehabilitation and reconstruction, headed by the Prime Minister. 02. An Advisory Committee to the Prime Minister for Rehabilitation and Reconstruction was established. 03. The Central Government funded a total of 5.2 trillion JPY in five years from 1995 to 2000 for reconstruction. 04. Finance resource preparation and justification of assistance for victims were discussed.	<ul style="list-style-type: none"> • Are there activities for the Central Government for financial support?
	Municipality action, and related institutional issues	01. Municipalities need to finalize their reconstruction plans within six months due to the deadline of the budget request schedule of the Central Government. 02. Hyogo Prefecture prepared a master plan for reconstruction on the 4th of August, which forecast a 17 trillion JPY expenditure, including 660 projects within the next 10 years. 03. Hyogo Prefecture established a three year infrastructure development master plan that prioritized urban infrastructure development. 04. Hyogo Prefecture prepared an action program for the master plan of reconstruction.	<ul style="list-style-type: none"> • Does the public sector prepare such investment/rehabilitation programs? • Does the public sector prioritize any sectors for early reconstruction?

Field	Sub-field	Lessons	Checkpoints
	Township planning	<p>01. The reconstruction program for the Kobe Municipality started on the 20th of January, just three days after the earthquake.</p> <p>02. The Municipality published a guideline of reconstruction on 26th of January. Land use and zoning plans were published and enacted on 16th of February, just a month after the earthquake.</p> <p>03. Hyogo Prefecture did not authorize the municipalities plan, partly due to the lack of participation of residents.</p> <p>04. At the end, a township rehabilitation program was enacted within two months after the earthquake.</p> <p>05. Some township planners did not appreciate such swift decision-making in township programming.</p>	<ul style="list-style-type: none"> • How quickly do the municipalities start to prepare township rehabilitation programs? • Does the public sector issue guidelines for reconstruction? • Are the rehabilitation programs of the public sector referred to public opinion properly?
	Township improvement activities	<p>01. A local township committee was established at the district level. Members of the committee faced difficulties in the initial phase, however, several assistances by experts stimulated its activities.</p> <p>02. Several coordinating activities among stakeholders were implemented in the initial phase.</p>	<ul style="list-style-type: none"> • Are existing committees and groups involved in the township improvement program development?
4. Demolition and clearing of damaged buildings and garbage control	Public assistance	<p>01. Residents requested the removal of damaged buildings. The public sector decided to provide funds for demolishing and clearing damaged buildings.</p> <p>02. Institutional capacity of fund distribution for demolition assistance was limited.</p> <p>03. Demolition of shared-ownership apartments needed time for the building of consensus among all owners, as such, the project period was extended in some cases.</p> <p>04. Private coordinators were employed to expand the demolition capacity and clearing assistance fund, which accelerated the removal of damaged buildings.</p>	<ul style="list-style-type: none"> • Is there any public service to stimulate the removal of damaged buildings? • Is there any bottleneck in the removal of damaged buildings?

Field	Sub-field	Lessons	Checkpoints
	Garbage control	<p>01. Quantity of garbage and wreckage was not projected properly.</p> <p>02. The target period of deconstruction was decided, with the wreckage of all scrapped buildings to be removed within 15 months and disposed within 27 months after the earthquake. There were enough repository sites, however, the transport of wreckage and temporary collection site preparation caused environmental problems.</p> <p>03. Garbage separation at the site was requested for material reuse. Debris was transferred to other regions by train, to be disposed in other facilities.</p>	<ul style="list-style-type: none"> • Is there any target month for wreckage disposal? • Who manages the wreckage disposal?
	Environmental issues	<p>01. Pollution at deconstruction sites, due to dust and asbestos, became a big social issue.</p> <p>02. In the initial phase, garbage was burned at the site because there was not enough landfill space for the amount of garbage - this also produced air pollution.</p> <p>03. Measures for asbestos processing encountered many difficulties.</p>	<ul style="list-style-type: none"> • Is there any pollution generated through wreckage disposal activities? • Do countermeasures exist to ease the produced pollution?
5. Industry rehabilitation	Damage to industry and financial support	<p>01. The direct extent of the damage in Hyogo Prefecture was estimated at as much as 2.54 trillion JPY. Another estimate was 6 trillion JPY.</p> <p>02. There was also indirect damage.</p> <p>03. The Japan Central Bank prepared an emergency fund for the damaged area.</p>	<ul style="list-style-type: none"> • Has damage to industry been quantified? • Is there any financial assistance for industry rehabilitation?
	Manufacturing and the local industry	<p>01. Some companies left Kobe because of uncertain business conditions, however, most industries steadily recovered.</p> <p>02. Famous local industries including the shoe and brewing industries were damaged severely.</p> <p>03. Integration of local industry characteristics and township design was discussed and planned.</p>	<ul style="list-style-type: none"> • How is the overall condition of business recovery? • What is the major local industry and how severe is the damage to the industry?
	Service sector, commercial, trading, and tourism	<p>01. One third of shopping malls and half of local markets were burned down. It was expected that the reconstruction of local markets faced difficulties due to the lack of successors and the poor feasibility of the business.</p> <p>02. Although supermarkets restarted rather quickly, department stores sustained much damage and were slow to restart.</p> <p>03. Tourism and convention facilities were also damaged heavily. The recovery of tourism was delayed, even though tourism facilities were rehabilitated.</p>	<ul style="list-style-type: none"> • Has damage to the commercial, fishery and tourism sectors been quantified? • Have any recovery bottlenecks been identified for these sectors?

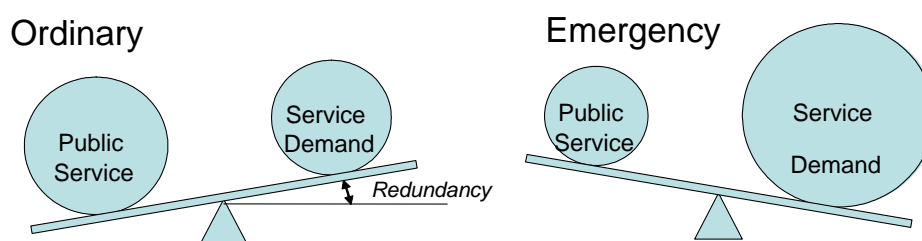
Field	Sub-field	Lessons	Checkpoints
		04. Amount of damage to agro-fishery facilities went up to 91 billion JPY. Wholesale markets were rehabilitated under public rehabilitation funds.	
	Harbor and international trading	<p>01. It was estimated that the amount of direct damage to port facilities was 1 trillion JPY, with indirect damages at 360 billion JPY annually.</p> <p>02. Freight addressed to the Kobe Port was forwarded to other ports in Japan.</p> <p>03. Emergency rehabilitation of the port was implemented within two weeks after the earthquake. Afterwards, full-scale rehabilitation was implemented.</p> <p>04. The service level of international trading recovered to 60% of the previous levels, within a half year.</p>	<ul style="list-style-type: none"> • Has damage to trading and harbor management been quantified? • Have recovery bottlenecks been identified for these sectors? • Are there any criteria to evaluate the level of industrial recovery?

Source: Project Team

2.3.3 Approach for On-Site Activities - Co-Assistance

The following text was extracted and edited from the Manual for Natural Disaster Rehabilitation Activity prepared by the Tokyo Metropolitan Government, 2003. The manual mainly details institutional coordination at the micro/site level to stimulate the activities of regional rehabilitation.

In the rehabilitation phase after a disaster, institutional arrangements that fairly distribute public services are a universal issue. For example after a disaster, public service functions are often paralyzed and its ability to provide reduced temporarily, while demand for public services suddenly jump in terms of rescue, medical assistance, security, etc. Generally, public administration maintains some backup service reserves. However, the larger the disaster, the greater the strain becomes on public services (Figure 2.2). Moreover, in developing countries, the capacity of the public administration to deal with such situations often is hamstrung by severe shortage of resources, funds, etc.



Source: Project Team

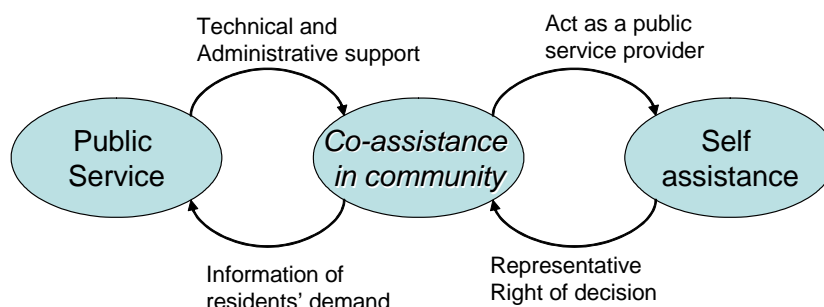
Figure 2.2 Balance Change in Emergency Cases

As for institutional arrangements, the case of the 1995 earthquake in Kobe may be referred to. The Kobe disaster results in over 5,000 fatalities and produced over 300,000 refugees in a high density area. Comprehensive arrangements were sought/established, recorded/analyzed in all sorts of approaches, and summarized throughout the following decade. The key to such an arrangement system is, in short, the provisional substitution of the right to deliver public services by community-based organizations (CBOs). The institutional structure of this arrangement consists of three levels: public service organizations; community based organizations; and individual households. This substitution mediates between public services and individual, and strengthens the capacity of the public service organization.

The experience indicates that solutions for quick and concrete rehabilitation activities in the disaster area are necessary. In this section, the advantages of these experiences are described, while the feasibility of the transfer of such experiences is considered.

(1) Three Level Model Structure

The ordinary public security system is composed of two levels: *public services* and *self-assistance*. In the reconstruction phase after a disaster, when public service levels are reduced, *co-assistance* (mutual assistance among victims), supported by a CBO, mediates between the two levels (Figure 2.3).



Source: Project Team

Figure 2.3 The Three Level Model

The function of co-assistance is strengthened during the rehabilitation phase, and substitutes for public service functions at the end of the phase. Table 2.2 shows the difference in functions at the three levels (rows), and the extension of functions of co-assistance in different stages of the services required (columns).

Table 2.2 Roles and Functions of the Three Level Organizations in Time Series

	Role of public service (ko-jo)	Role of co-assistance (kyo-jo)	Role of self assistance (ji-jo)
Emergency Evacuation Stage	Procure goods for life and security operations in the administrative area	Organize the CBO in democratic ways as a representative of the community	Secure safety at the personal/household level
Planning Stage	Propose a master plan for reconstruction	Coordinate demand for reconstruction plans at the community level Report the summarized demand to administrative levels	Participate in the CBO
Full-scale Rehabilitation Stage	Develop and implement the project for reconstruction	Undertake urban reconstruction as well as industrial rehabilitation and other related projects, as an implementation body	Participate in project implementation

Source: Project Team

A similar table, Table 2.3, is presented below, which relates service considerations without co-assistance.

Table 2.3 Issues without Co-assistance Level Organization

	Role of public service (ko-jo)	Problems	Role of self assistance (ji-jo)
Emergency Evacuation Stage	Procure goods for life and security operations in the administrative area	Collapse in food and goods distribution Black market for food and goods established	Secure safety at the personal/ household level
Planning Stage	Propose a master plan for reconstruction	Inability to meet demand for services	Participate in the CBO.
Full-scale Rehabilitation Stage	Develop and implement the project for reconstruction	Uncoordinated master plan with personal property Collapse and delay in implementation	Participate in project implementation

Source: Project Team

(2) Structure of the Co-assistance Organization

The organization for co-assistance consists of a rehabilitation committee for the area and residents in the area. Such co-assistance can be channeled by a regional rehabilitation committee (RRC) consisting of representative of the residents (including self-applying persons). The RRC can be divided into several sub-committees that cover special issues in housing, industry, education, hygiene, social work, urban planning, etc.

A RRC can be established after a disaster, assisted by experts dispatched from public administrative agencies. The RRC substitutes for public administrative agencies as the implementation body for regional reconstruction projects during final reconstruction phases. In establishing an RRC, there are no specific size requirements, and they should be specified geographically and economically.

In Japan, residential autonomous bodies covering 10 to 300 households are ordinarily established for fire prevention, regional festivals, etc. Such autonomous bodies play a significant role in the basic organization of the RRC. Chambers of Commerce and PTA (Parent Teacher Association) also play roles within the industry and education sectors. Several NPOs and CBO also play such roles in the area of social work.

(3) Issues in Transferring the Three Level Model to Sri Lanka

Issues in the transfer of the three level model are examined next.

Substitution of the Right of Delivering Public Administrative Services

In terms of the basic concept of independence of the three branches of government (legislative, administrative, and judicial), the administrative service must be committed to a

body through legislative power or decree. The RRC may takeover administrative powers temporarily, although this may be contrary to the institutional system of the country. In any case for such a power shift, whether temporary or otherwise, social acceptability and effectiveness will differ by society. A careful approach is called for. A flexible arrangement that can be adjusted with ease is desirable.

Substitution for a Limited Period

The termination administrative powers for the RRC must be considered. In Japan, RRCs have been maintained as they were, serving as coordinators to develop Public and Private Partnerships in urban planning and industry development. As in Japan, establishment and operation of such a organization can be used as a social experiment.

Existing Social Systems

If there were existing systems that can work as a RRC, the efficiency of implementation would be improved. As is often the case, local society has formal as well as informal community organizations. During trying times, a well-established informal organization could be much more efficient than an official formal organization. A careful and flexible approach is called for.

2.3.4 Hypotheses for Effective Rehabilitation Methods

The above two approaches developed in Japan after the Hanshin-Awaji Great Earthquake, which recognized the importance of administrative and social factors in post-disaster management, were applied in the post-disaster management of the Chuetsu Earthquake of 2003. The two approaches were proven quite useful. As such, the JICA Project Team took up the following two hypotheses, that each one of them would be equally useful in Sri Lanka.

- (1) Using a list of lessons and checkpoints can facilitate the easy identification of bottlenecks and necessary administrative activities for disaster rehabilitation for the authorities.

With a list of lessons and checklists, authorities can quickly identify what they should implement and what problems are expected to arise, as the majority of disaster rehabilitation activities are common across different situations. However, since the Japanese lists are originally designed for earthquake disaster rehabilitation, it was assumed that the list could not fully apply to the Sri Lanka case. In this project, the JICA

Project Team examined the effectiveness of using this kind of list rather than examining the contents of the list.

(2) Enhancing co-assistance can promote community rehabilitation under the condition of reduced levels of public assistance

As mentioned above, the co-assistance approach can promote rehabilitation at the community level through enhancement of community activities. Assistance to enhance co-assistance is quite a different approach from physical or financial assistance. Adopting these two approaches, the JICA Project Team developed the implementation strategy and examined the validity and effectiveness of the approaches through the evaluation of Project results. Details of the strategy are found in the next chapter.

Chapter 3 Strategy for Rehabilitation of Sri Lanka Southern Region

3.1 Survey of Tsunami Damages

3.1.1 General Description for Tsunami Disaster Damages

(1) Previous Matara District

Matara, historically known as Matota or Mahatota, lies 68 km downstream from the origin of the Nilwala River in the Gongola Mountains, located in Sinharaja Forest, the last remaining rainforest of Sri Lanka. The Nilwala River reaches the ocean at Matara, formerly a trading post along the riverfront. In recent history, the Dutch built a fort, the Nupe Old Market, and Canal, all of which remain as part of the colonial legacy. More importantly, the 20th century has seen Matara as a town that produced many intellectuals, monks, cultural icons, professionals, and leading national businessmen with roots in all parts of the island.

Matara with an area of 316,905 hectares is only 1.9% of the land mass of the island. It had 55 km of beach affected by the tsunami. Matara has 16 Divisional Secretary divisions and 650 grama sevaka divisions. The district population in 2003 was estimated to be 779,821, 94% of which are Buddhist, with the remainder being Hindus, Christians, and Muslims. Some 44% of the people are farmers, while 75% of the land is for agriculture. Rice, tea, coconuts, rubber, and cinnamon are the main crops.

The four coastal divisions of Matara, Devinuwara, Dickwella, and Weligama have a thriving fishing industry, with 31,075 residents purported to work as fishermen. Some 94% of the industries in Matara are home-based informal sector activities. Another important activity in the coastal belt is the coir industry.

(2) Impact on Human Lives and Damage to Residences

The tsunami on December 26th 2004 caused 12,300 deaths/disappearances and produced 157,768 refugees in three districts (Matara, Galle, and Hambantota). As shown in Table 3.1, 38.3%, 48.7%, and 45.5% of residences in the coastal belt of Matara, Galle, and Hambantota districts were impacted, respectively. Non-residential buildings were also affected (34.3% in Matara, 50.9% in Galle, and 40.2% in Hambantota, respectively).²

² Source: Census Department. The percentages used indicate the total number of non-residential buildings that were destroyed, partly damaged and unusable, and partly damaged, but still usable.

Table 3.1 Damage to Residences in the Three Districts

District	Division	# of Residences Before Tsunami	Residences Destroyed	Residences Partly Damaged and Unusable	Residences Partly Damaged, but Usable	Residences without Damage	
1 Matara	Weligama	5,682	739	282	1,627	3,034	
	Dickwella	2,907	278	136	518	1,975	
	Devenuwara	2,074	88	64	243	1,679	
	Matara Municipality Division	5,592	562	252	1,449	3,329	
	District Total	16,255	1,667	734	3,837	10,017	
	Ratio	100%	10.2%	4.5%	23.6%	61.7%	
2 Galle	Bentota	200	6	0	37	157	
	Balapitiya	4,917	800	207	1,357	2,553	
	Galle Municipality Division	5,440	649	839	1,061	3,471	
	Ambalangoda	865	324	24	203	314	
	Habareduwa	4,116	511	152	830	2,623	
	Hikkaduwa	9,513	2,192	465	2,552	4,307	
	District Total	25,051	4,482	1,687	6,040	13,425	
	Ratio	100%	17.8%	6.7%	24.1%	53.5%	
	3 Hambantota	Hambantota	1,515	480	33	186	816
		Tangalle	2,770	277	198	769	1,526
Ambalantota		433	83	16	72	262	
Tissamaharama		507	179	24	57	247	
District Total		5,225	1,019	271	1,084	2,851	
Ratio		100%	19.5%	5.1%	20.8%	54.6%	

Source: Census Department

Note: Divisions unaffected by the tsunami are not included in the table.

(3) Damage to the Fishery Sector

The fishery sector, one of the most important industries in the three districts, was significantly impacted, with damage sustained by related facilities, equipment, and communities, located along or near the coast. The affected fishery harbors operated by CFHC include: (i) Hikkaduwa; (ii) Galle; (iii) Mirissa; (iv) Puranwella; (v) Kudawella; (vi) Tangalla; and (vii) Kirinda.

In addition, the following anchorages were also affected: (i) Balapitiya; (ii) Dodandua; (iii) Kathalua; (iv) Kapparatota; (v) Polathumodara; (vi) Totamuna; (vii) Gandara; (viii) Kotuwegoda; (ix) Niwella; (x) Unakuruwa; (xi) Rekawa; (xii) Kalamatiya; and (xiii) Kirinda.

Damage to the fishery communities and damage to Tangalle and Galle Fishery Harbors are detailed in Chapter 4 of the Progress Report. The damage to fishing crafts in the southern province are shown in Table 3.2. In total, nearly 93% of all crafts were destroyed or seriously damaged.

Table 3.2 Damage to Fishing Craft in Southern Province

Southern Province	No. of Vessels	
	Before Tsunami	Affected by Tsunami
Galle	1,253	1,213
Hambantota (Tangalle)	1,733	1,597
Matara	1,489	1,367
Total	4,475	4,177

Source: Fisheries Ministry Web Site

(4) Damage to Matara Township

Many public facilities in Matara township were damaged. Table 3.3 shows the type of major damaged sustained by public facilities, aside from large-scale infrastructure, in the Matara Municipality.

Table 3.3 Major Damage Sustained by Public Facilities in the Matara Municipality

Facility; Division	Damage	Amount of Damage (million Rs)
1 Kotue Goda Market; Kotuwegoda	Destroyed/ frame remains	8
2 City Hall and Ancillary Buildings; Matara Municipality	Damaged	2.8
3 Buildings for Sunday and Wednesday Markets; Medagoda	Destroyed	2.5
4 Beach Facilities and Toilets; Paramulla	Destroyed	1.8
5 Sanath Jayasunia Ground; Kotuwegoda	Nearly destroyed	1.8
6 Facilities for Municipal Commissioners and Officers	Nearly destroyed	1.2
7 Road Facilities (e.g., Street Lamps)	Nearly destroyed	1.2
8 Main Bus Terminal	Largely damaged	1.0
9 Heavy Construction Equipment, Tankers	Damaged	1.0
10 Computers (City Hall)	Damaged	1.0
11 Books and Furniture in Library	Damaged	0.8
12 Slaughterhouse	Damaged	0.5
13 Community Center; Kadaweediya	Damaged	0.4
14 Community Center; Polhena	Damaged	0.3
15 Community Center; Kasiwattapura	Damaged	0.1
16 Community Center; Kotuwegoda	Damaged	0.1
17 Community Center; Totamura	Damaged	0.1
18 Community Center; Paramulla	Damaged	0.1

Source: "General File; Matara Municipality" as of 2005/03/29

Government agencies provided camp sites to NGOs and donors for refugees and connected the sites with power lines and water supplies. The camp sites tended to be far from the original communities, constrained by the limited availability of government land.

For people that lost their residences in Matara District, a total of 22 refugee camps were established, accommodating 3,091 people. In addition to the fishery sector, local industries such as that for palm fiber, construction, footwear, sewing, steel processing, and vehicle repair were also affected. The tsunami not only decreased their production and income, but also increased overall unemployment in the area.

The general communities were further affected by damage to social infrastructure, such as the Matara Aqueduct, which supplied water to nearly 78,000 residents. It was completely damaged and washed away. Its damage is explained in detail in Chapter 6 of the Progress Report.



Note: The photo shows a temporary pipe and support at low tide.

Figure 3.1 Damage to the Matara Aqueduct

3.1.2 Damage to the Fishery Sector from Tsunami

Soon after the tsunami disaster occurred, various NGOs and donors began providing assistance for the recovery of the fishery sector, while MOFAR began a damage assessment. The damage assessment report, prepared by MOFAR, covers damage to human resources (dead or missing fishermen), houses (in relation to their distance from the shoreline), as well as fishing boats by category and fishing equipment. As for the damage to fishery harbors, CFHC studied and prepared a damage assessment report.

(1) Death of Fishermen and Damage of Fishermen's Housing

On February 15, 2005, the death of 376 fishermen was recorded in the Galle District, 378 in the Matara District and 438 in the Hambantota District, respectively, as shown in Figure

3.2. The large number of deaths recorded in the eastern part of the province was due to the fact that the tsunami wave came from the east, combined with the fact that more fishermen were living in the eastern areas before the tsunami. Looking at the damage to fishermen's houses within 100 m of the shoreline (also shown in Figure 3.2), we can see that there was less damage in the Matara District than the other two districts, despite the existence of more houses. Fewer than 30% of the houses were totally destroyed, while more than half of the houses were totally destroyed in the Galle and Hambantota Districts.

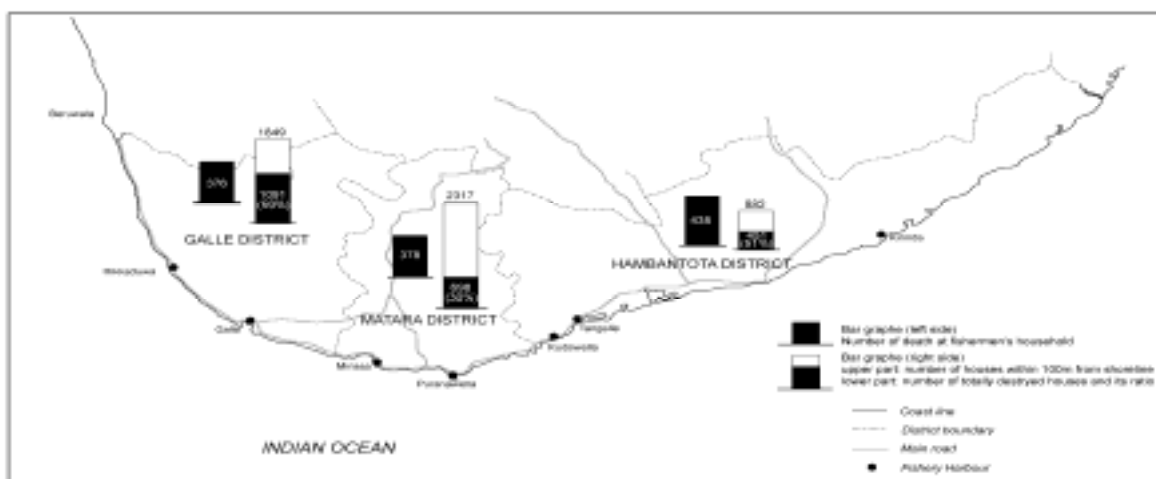


Figure 3.2 Death of Fishermen and Damage to Houses

(2) Damage to Fishing Boats

Damage to fishing boats in the three districts is shown in Figure 3.3. There was less damage to fishing boats in the Matara District than in the two other districts. The number of damaged multi-day boats have in particular, sustained less in Matara. More damage to ORU and FRP outboards was recorded in Hambantota, as more than half of these were totally destroyed. The Hambantota District has fewer fishery harbors for its long coastline, resulting in there being more small fishing boats that do not require port facilities. Many of these were hauled up to the beach and were damaged, since there was no protection when the tsunami wave hit.

Fishing boats in general do not unload their fishing equipment after every fishing trip. For both fishing boats in the harbor and small fishing boats on the beach, fishing equipment was stored inside the boat. When fishing boats in this situation were damaged, the fishing equipment was also naturally washed away or damaged. MOFAR reported the value of the loss to be 106 millions Rs in Galle, 156 million Rs in Matara and 156 million Rs in Hambantota, respectively.

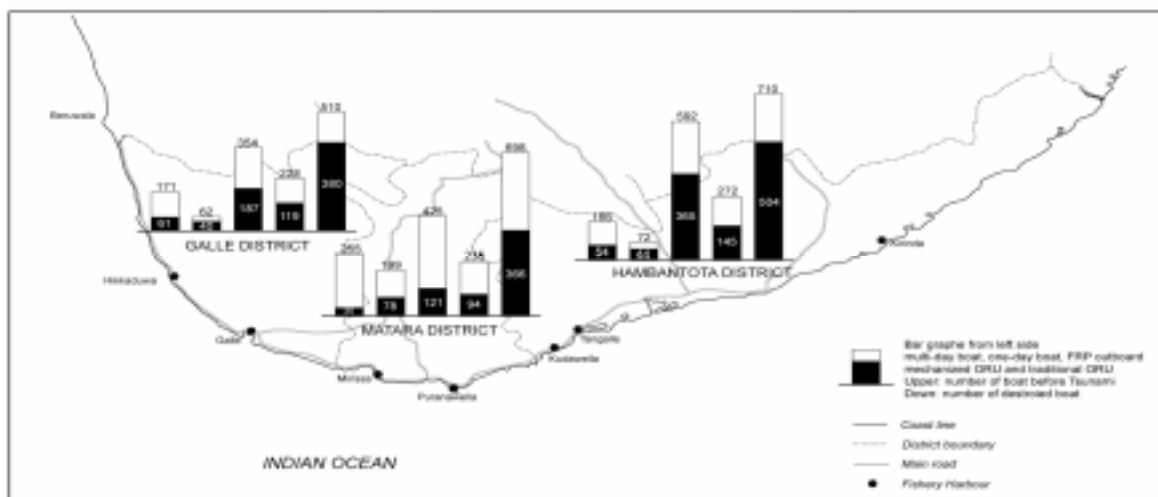


Figure 3.3 Damage to Fishing Boats by Type

(3) Fishery Resources and Their Level of Exploitation

Before discussing the recovery of fish landing after the tsunami disaster, it is necessary to evaluate the fishery resources available in the maritime territory of Sri Lanka and the level of exploitation by the national fishing fleet. However, since the main subject of this project is not fishery development, but the recovery of fisheries, no provision has been made for a resource assessment survey. It was therefore recommended to conduct an analysis of an existing survey report. Few resource assessment surveys have been carried out at present.

Continental Shelf

Sri Lanka is an island located in the Indian Ocean. The marine fisheries being operated there are typical ocean fisheries, with production consisting mainly of migratory fish such as skipjack and tunas. We see a lot of migratory fish in the Colombo fish market, the biggest consumer market, but see very little demersal fish, such as sea bream and groupers. This is because the island of Sri Lanka has a narrow continental shelf and demersal fishing has not developed traditionally.

As shown in Figure 3.4, the continental shelf around the island is narrow and extends on average only 25 km from the shore. However in the area between the island and the Indian continent, there is a relatively wide and



Figure 3.4 Continental Shelf of Sri Lanka

shallow shelf. There is also a Pedro bank off the northeast coast and a Hambantota bank off the southeast coast. Except for those specific areas mentioned above, the depth of sea turns abruptly to several hundred meters after an hour's cruise with an outboard motor.

Fishery Resources and the Level of Exploitation

The fishery resource survey of the continental shelf has been conducted only once previously, in collaboration with a Norwegian research vessel called the "Dr. Fridjof Nansen" and a FAO. Because of the distinct seasonality in Sri Lanka, with the southwest monsoon season from May to September and the northeast monsoon season from October to February, the survey was conducted in three consecutive years to cover different seasons. The first survey was carried out from August to September in 1978, which corresponds to the end of the southwest monsoon, the second one from April to June in 1979 (corresponding to the beginning of the southwest monsoon) and the third one in January and February in 1980 (corresponding to the Northeast monsoon). The survey contents included a fishery resource survey using a quantitative echo sounding apparatus, a bottom trawl, a bottom long line, and a general oceanographic survey measuring temperature, salinity, and dissolved oxygen. The survey area was in principle along the continental shelf, excluding shallow areas where the depth was less than 10 - 15 m.

The survey revealed that the standing stock (biomass) was 25,000 - 385,000 tons. This range results from the dispersion of the three surveys. The breakdown of the standing stock was 250,000 - 330,000 tons for demersal fish resources and 70,000 - 135,000 tons for pelagic fish resources, respectively. However, since this is a standing stock, this total amount must be considered from a viewpoint of sustainability. Species with a large body size and long lifespan need more time for reproduction, so that the sustainable yield should be 20% of the total biomass. For species with a smaller body size and shorter lifespan, half of the standing stock can be considered a sustainable yield. In this sense, the sustainable yield of demersal fish resources is estimated to be 50,000 tons (i.e., 250,000 x 0.2) and that of pelagic fish to be 49,500 tons.

Comparing the sustainable yield of 50,000 tons and the actual production of so-called "rock fish", which was only 17,540 tons in 2004, it can be concluded that there is still enough room to expand production. Multiplying the standing stock of 30,000-100,000 at the Hambantota bank equally by 0.2, the sustainable yield is estimated to be 6,000 - 20,000 tons. Supposing that the only fishing boats operating on the bank are those registered in the Hambantota and Matara districts, the production of rock fish in the two noted districts is 810 and 670 tons respectively, a total of 1,480 tons. The rate of exploitation would be 25% in more conservative estimates.

On the southwest coast of the island from Negombo to Galle, there is also a relatively rich source of demersal fish, ranging from 105,000 - 220,000 tons. Applying the same methodology, the sustainable yield would be 21,000 - 44,000 tons. Comparing this to the 2004 figures (1,140 tons in the Negombo district, 10 tons in Colombo, 180 tons in Kalutara and 1,420 tons in the Galle district, respectively), the rate of exploitation is 13% lower than the forecast.

As far as the demersal fish resource is concerned, it is obvious that there is enough room to expand production. However, the marketing aspect of the said species should also be examined at the same time. Looking at the wholesale price of fishery products in the Colombo fish market, the price of large bottom fish ranges from 110 - 200Rs/kg, whereas small bottom fish are priced between 100 - 180Rs/kg. Judging from the fact that the wholesale price of skipjack, one of the most popular fish nationwide, is 60 - 120Rs/kg and that of yellow fin tuna is 100 - 180Rs/kg, the bottom fish gets a reasonable price, meaning that this category of fish is evaluated properly among consumers. In addition, bottom fish is preferred by foreigners and therefore purchased by hotels and restaurants that are mostly frequented by foreigners. There are also some companies exporting bottom fish in Negombo.

With respect to the pelagic resource, in particular tuna-like species, it is difficult to estimate clearly the standing stock, since they migrate over the boundary of the EEZ. According to an ADB financed and NARA executed resource survey in 1995-97 on deep-sea large pelagics (skipjack and tuna), the sustainable yield of these species is estimated to be 62,000 tons, while the fishery statistics of 2004 report the landing of some 113,530 tons. This means that the landings of 2004 exceeded the sustainable yield. According to NARA, the ADB survey report only covered the EEZ, however, actual deep-sea fishing is also carried out in the international zone, meaning that the actual landing data includes the catch in both the EEZ and the international zone. How then is the current situation of resources in the international zone? Although the scientific data has not been publicized, according to an unofficial statement of IOTC (Indian Ocean Tuna Commission), which is an international organization responsible for the management of tuna resources and tuna fishing fleet, there is still enough room for skipjack and yellow fin tuna in the Indian Ocean.

Survey of Fish Catches at Landing Sites

Fish is an important food source in Sri Lanka. It is consumed by all income groups. Most fish produced in Sri Lanka are consumed fresh, with marine preferred over freshwater fish.

It is necessary to understand the real state of fish marketing through an interview survey of fish distributors and fishing boat owners at fishery harbors. A questionnaire survey was carried out over the period of a week at the Galle and Tangalle fishery harbors using local surveyors. Questionnaire surveys were carried out from the end of April to the middle of May, by interviewing fish distributors according to the attached document (Annex 2-1). Due to seasonal changes, fishery activities are relatively sparse during this time of the year. The sea conditions in the south are marked by a very strong southwest monsoon that is active for the five months from May to September. The results from Tangalle and Galle Harbors are shown in Tables 3.4 and 3.5, respectively. The questionnaire concerned trading, distribution processes, and the usage condition of the Kirinda fishery harbor after the tsunami.

Tangalle Harbor

According to the survey, 50 - 60 tons of fresh fish are sold in Tangalle Harbor every week, or an estimated 240 tons per month. Most multi-day and one-day boats sell fresh fish at landing sites, as the entry point to the distribution chains. During the period of the survey, an average of 68 multi-day boats and 17 one-day boats were anchoring at the harbor, respectively. The majority of fish caught are migratory fish, comprising more than 80% of the total catch (Table 3.4). In particular, skipjack and yellow fin are the most incremental fish and likely to be purchased among all distributors. The price of locally traded fish is based on a time-series price, depending on the season and the catch. In the monsoon season, Spanish mackerels are rarely purchased in Tangalle Harbor. Linna, sardines, and kalawenno are sold to local buyers and fishermen for local consumption and as bait for longline fishing.

Table 3.4 Fish Production in the Tangalle Harbor from April 25 - 30 2005

Common Name	Quantity		Average Price (Rs/kg)	Total price (Rs)
	(kg)	(%)		
Spanish Mackerel	20	(0%)	220	4,400
Skipjack	20,141	(34%)	159	3,653,525
Yellow Fin	18,659	(32%)	194	4,237,370
Horse Mackerel	2,730	(5%)	155	423,000
Other Bloodfish	6,406	(11%)	123	561,560
Sharks & Rays	3,065	(5%)	180	365,070
Rockfish	1,688	(3%)	68	137,390
Shore Sein Varieties	2,432	(4%)	68	136,730
Prawns	-	-	-	-
Pothubti	170	(0%)	34	8,475
Linna	120	(0%)	200	24,000
Sardines/Herrings	20	(0%)	50	1,000
Bollo	50	(0%)	68	51,000
Kalawenno	3,321	(6%)	65	102,380
Total amount	58,822			9,649,000

Prior to the tsunami, almost all buyers obtained flaked ice from the Tangalle Harbor ice plant. However, these purchases are now being made from private companies operating inland. With the use of a refrigerated truck, ice is carried all the way from Colombo for the sake of price. Many local buyers, especially those who use a bicycle, purchase the remaining soiled-ice from multi-day boat owners. The following characteristics were identified from the survey:

- Price of ice is high, quality of ice is low, and stock of ice is low in Tangalle Harbor;
- Low consumption of fish is caused by a shortage of fish (resulting in high prices);
- Damage to local distributor vehicles;
- Scale balances destroyed;
- Fish boxes and insulator boxes were washed away; and
- Low quality of fish and poor-post-harvesting.

Among respondents, 30% were wholesalers, 60% were retailers, with the remainder being boat owners. Twenty-two percent of their residences are in the Tangalle area, while 62% are from the Hambanthota and Tissamaharama areas.

Galle Harbor

Table 3.5 Fish Production in the Galle Harbor from May 2 - 6, 2005

Common Name	Quantity (kg)	(%)	Average Price (Rs/kg)	Total price (Rs)
Spanish Mackerel	4,577	(4%)	143	470,640
Skipjack	28,346	(41%)	135	4,355,464
Yellow Fin	18,946	(36%)	178	3,858,205
Horse Mackerel	3,002	(5%)	163	562,900
Other Bloodfish	2,188	(2%)	109	252,530
Sharks and Rays	735	(1%)	53	68,330
Rockfish	72	(0%)	10	9,280
Shore Sein Varieties	1,507	(1%)	10	99,380
Prawns	12	(0%)	0	1,680
Pothubti	0	(0%)	-	0
Linna	5,786	(9%)	101	938,640
Sardines/Herrings	0	(0%)	50	0
Bollo	163	(0%)	10	19,708
Kalawenno	40	(0%)	88	2,996
Total amount	65,374			10,639,753

The survey revealed at least 65 tons of fresh fish are collected in Galle Harbor each week, an estimated 240 tons per month. In 2002, 25,060 tons of fish were produced in Galle Harbor annually (MFOR), which is almost equal to the peak of production. The majority of fish caught are migratory fish constituting more than 88% of the total. Skipjack (41%) and yellow fin (36%) are mostly likely to be caught by multi-day boats, and to be purchased among all distributors. An average of 51 multi-day boats and 10 one-day boats were anchoring in the harbor, respectively. The maximum cost for yellow fin (a load of 45 kg) was priced at 300 Rs/kg, carried straight to Colombo markets.

Sharks and rays are commonly sold as fillets without fins. The fins are collected during fishing and distributed separately to special buyers without going through the fishing market. Additionally, linna, bollo, and kalawenno are sold at a low price for making dry fish or for use as bait for longline fishing. However, prices tended to be higher during this time of the year, since the season for these fish is from November until April.

The following characteristics were identified from the survey:

- The high price of ice; and
- The shortage of fish (high price).

Among respondents, 21% were wholesalers, 70% were retailers, with the remainder being boat owners.

(4) Survey of Fish Marketing

The major wholesale markets in Sri Lanka are at Colombo and Kandy. Fish not transported to these markets are mostly sold in the local markets. Much of the fish supplied to domestic consumers is transported by several private distributors and retailers.

Tangalle Harbor

The destinations of fish products collected in the Tangalle Harbor are to three main consumption areas, the Colombo and Negombo districts (35%), the Ratunapura district (30%), and the Hambatuta district (30%). The majority of wholesalers purchasing fishery products (skipjack and yellow fin) at Tangalle Harbor were from Colombo, Negombo, Ratunapura and Bandarawella districts (getting there in the early morning). Distributors from Colombo and Ratunapura use refrigerating trucks for long-distance supplies. Most of the Colombo and/or Negaombo buyers visit Tangalle Harbor every other day with information provided from fishermen by telephone. In contrast, local buyers commonly use

three-wheelers or motorbikes. These local buyers purchase fresh fish at Tangalle Harbor on a daily basis.

Prior to the tsunami, almost all distributors obtained flaked ice from the Tangalle Harbor ice plant. However, now they are purchasing it from private companies operating in the area (Mirrisa, Matara or Mahawela). In the case of refrigerated trucks, these carried ice all the way from Colombo due to the high price. Many local buyers, especially those who use bicycles, are purchasing the remained soiled ice from multi-day boats.

Galle Harbor

The destination of fish products collected in Galle Harbor is shown in Figure 3.5. The major destinations were the Colombo and Negombo districts (97%). On the other hand, consumption in the inland district (11%) and the Galle district (10%) remains. The majority of wholesalers and retailers purchasing fishery products (skipjack and yellow fin) was coming from the Colombo area. These buyers collect them in the early morning and carry them in refrigerated trucks to their destinations. Local consumption tended to be low, compared to that in Tangalle Harbor.

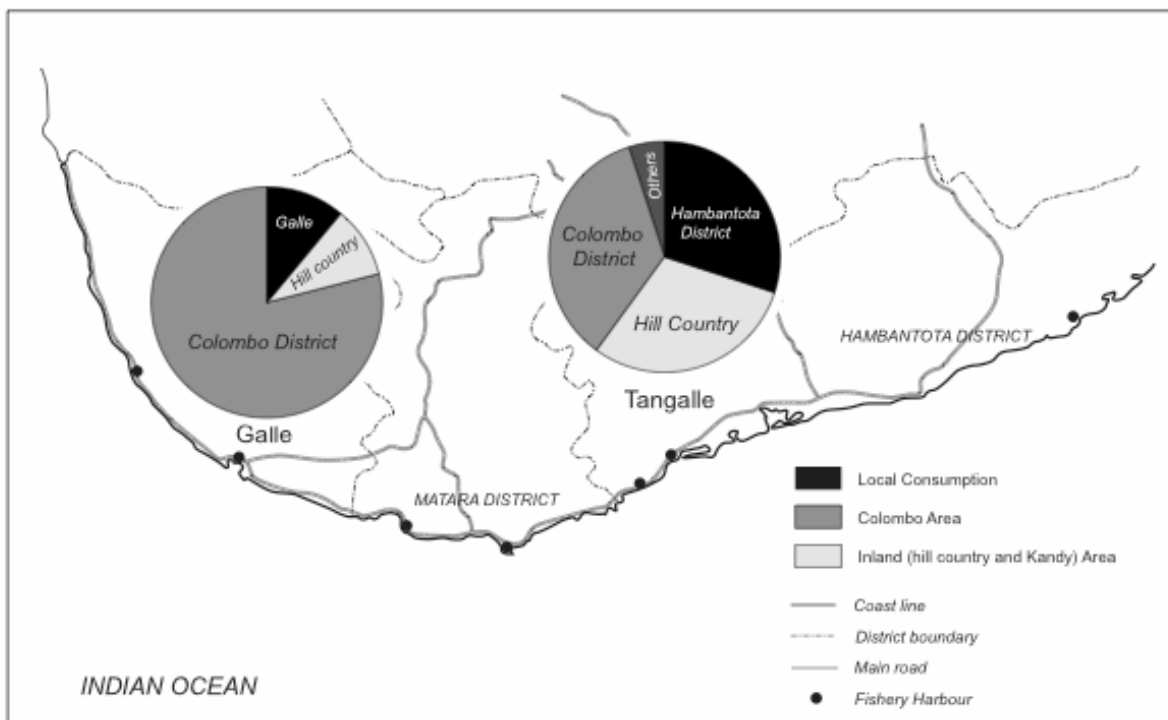


Figure 3.5 Destination of Fish Products Collected in the Galle and Tangalle Harbors

3.1.3 Post-Tsunami Activities and their Management

(1) Government Roles

A few days after the tsunami, the Government established the Centre for National Operations (CNO) to plan and coordinate all tsunami-related work. This was, however, disbanded in January, with the Task Force for Rebuilding the Nation (TAFREN) established under the President as the primary national body for planning and coordinating tsunami related work. In each sector, TAFTRAN sets policy and guidelines. TAFTRAN also develops Memoranda of Understanding with donors and INGOs (international non-governmental organizations) for all assistance, including housing in partnership with other relevant government agencies.

The District Secretary Office and the Divisional Secretary Office, which directly belong to the Central Government, are the main sources of information on affected people at the local levels. The central government distributed food coupon valued at 375 Rs per week per person to surviving tsunami victims through the District Secretary (Government Agent) and Grama Niladhari (Village Agent). The Ministry of Social Services distributed 5,000 Rs per family per month through the Government Agent, but this was discontinued after two months.

So far, a very minimal role has been given to the Provincial Councils and Local Government in tsunami assistance work. Immediately after the tsunami, the Southern Provincial Council provided each affected Pradeshiya Shaba with 1.5 million Rs from the budget of the Council for relief work, and 3.4 million Rs for each of the multipurpose co-operatives in the tsunami affected area for provision of food, respectively.

Sri Lanka maintains a dual system of local governance, one directly under the Central Government and the other attached to elected councils of several levels. This appears to be one of the major reasons for weak local administration, as explained in Appendix 3-1 in some detail.

(2) Role of Non-Government Organizations and Their Activities

The bulk of the implementation role for donor projects lies with the INGOs and local NGOs. This work is co-ordinated by the Centre for Humanitarian Assistance (CHA). These agencies have indicated their willingness to work in 16 sectors, namely capacity building/governance, disaster response, education, environment, fisheries, health, shelter, livelihoods, micro-finance/SMEs, power, protection/psychosocial, railways, roads and ports,

tourism, water and sanitation, and coordination, with a majority interested in the livelihood sector. It has been estimated that an amount ranging from US\$750 million to US\$1.0 billion is already in the hands of the non-profit sector for post-tsunami recovery. As of April, 347 humanitarian agencies working in the 12 affected districts, have provided details to the Government's Centre for Non-Governmental Sector (CNGS). Of this total, 110 of the agencies are new and seeking registration to work in Sri Lanka.

The extent and role of government in the NGO partnership depends on the nature of the work. For instance, in the construction of houses (temporary or more importantly permanent ones), it is necessary for NGOs to partner with the government very closely, as it is the government that allocates land and decides which people stay where. In providing relief and assistance to people in camps, there is also a close partnership with the government, as government workers at the divisional level identify the role of each party. In other areas such as livelihood, the partnership between government and NGOs is less clear and consists of direct work by the NGOs.

3.2 Assessment of Necessary Rehabilitation Activities

3.2.1 Assessment of Bottlenecks for Administrative Activities

(1) Field 1. Refugee area closing and temporary housing provision

Semi-field	Checkpoints	Assessment
Prolonged refugee area	How do we manage the shrunken refugee camps efficiently?	All temporary refugee camps will be closed by August, with refugees moved to semi-permanent houses. Some sites were used for schools, but the school functions were moved to neighboring schools.
	How do we manage the original facility where refugee camp stands?	Most camps located on temple properties can be used for a while.
Refugee area closing	How do we stimulate the refugees to move out of temporary housing?	The quality of semi-permanent houses is better than temporary tents, however, some of the affected do not like the location of temporary housing as they were not consulted prior to choosing the sites. Some have adjusted to camp life and prefer to move to permanent housing without the intermediate stage of temporary housing. Agencies, government, and CBOs have to motivate all to move.

Semi-field	Checkpoints	Assessment
Offers for temporary provision of existing public housing in other areas	Is the supply of temporary housing enough for the demand? Is there any capacity for provision of housing in other areas?	There are no empty units existing in other areas. 47,000 temporary housing units have been constructed to meet the needs of all the affected people in the buffer zones of Sri Lanka. 90% of these were completed by July 2005 according to TAFREN.
Provision of temporary housing	Does institutional coordination for the provision of temporary housing work efficiently?	The lack of ability to stick to targets by the agencies responsible for permanent housing has resulted in the need for temporary housing being higher than estimated earlier. The government and agencies have met this challenge. Coordination between the government and agencies making permanent housing is in a state of confusion due to the inexperience of both parties, as well as that of NGOs in the construction of such large-scale housing.
Construction and leasing of temporary housing	Is there a shortage in land acquisition and materials for housing? Will the temporary housing plan damage the surrounding environment? Does the design of the temporary housing fit the demand of refugees?	Housing material prices rose by 2.0-2.2 times from June 2005, due to the increase in demand. Some Buddhist temples and other donors donated their properties for temporary housing, however, most land is government land. The width and length of designed temporary housing is the same among various implementation bodies. However, the height of ceilings and the types of materials differ by the bodies, resulting in a difference in comfort.

Current status of the schools used as campgrounds are shown in Table 3.6.

Table 3.6 Current Status of Schools Used as Campgrounds

District	Schools	Used for Evacuation Refugee Camp	Closed due to Refugee Camp
Matara Division	Nupe Gemunu Vidyalaya		Closed
	Matara Maha Vidyalaya	Grounds used for camp, school functioning	
Dickwella Division	Maliyadee Vijaya Vidyalaya		Closed
Weligama Division	Pathegama Kanishta Vidyalaya		Closed
	Guru Bibile Vidyalaya		Closed

Source: Matara Education Department

In addition to the noted five schools, a further 13 schools were used to host tsunami victims. Most schools were freed after one month, with the maximum period that evacuees stayed in schools (besides these five) was three months. Thus, educational activities in the schools used for evacuation (except for those shown above) started after three months at the latest, with the majority starting within one month. The four closed schools had fewer than 50 students and as such were merged with other nearby schools. At Matara Maha Vidyalaya, the ground is used as a camp, but the school functions. One problem the education department faced was that evacuees who were placed in schools temporarily did considerable damage to school equipment and buildings due to overcrowding. This was especially so in Wevahanmanduwa Vidyalaya in Matara, where 1,800 refugees stayed. They broke school toilets, taps, doors, and many other facilities. Donors were quick in building schools destroyed by the tsunami, but did not assist schools such as in Wevhanduwa, which was away from the water, but still hosted evacuees.

Schools that were directly affected by the tsunami were repaired very quickly and reasonably efficiently with the Ministry of Education and UNICEF taking the lead role, and with many donors coming forward to take responsibility for specific schools. The majority of such repair work was done with minimal delays to children's schooling.

At the time of this report, the following camps are still hosting individuals and families as shown in Table 3.7.

Table 3.7 Number of Families and People in Camps

Camp	Families	People
Matara D.S. Division		
Hittatiya Raja Maha Viharaya Camp	115	383
Gamunu Vedyalaya Camp - Nupe Matara	39	124
Matara MV Welfare Camp	80	290
Kithulewela Piriwena Camp	59	240
Transition Camp near the Solies Restaurant, Nupe Matara	30	105
Pamburana Valukaramaya Camp	36	132
Sub Total	358	1274
Weligama D.S. Division		
Thalaramba Mahindaramaya Camp	65	293
Bandaramulla Sudarshanaramaya Camp	13	29
Pradesiyashabuwa Weligama Camp	63	220
Labema Camp	15	63
Sucharithodaramaya Mirrissa	7	23
Gurubewila Camp	70	250
Senanayaka Ground Camp	75	354
Samudragiri Vihara Camp	8	38
Godakanda Samurathira Camp	80	237
Pathagama Kanishta Vidyalaya Camp	41	156
Total	430	1663
Dickwella D.S. Division		
Belideniya Camp	10	36
Maliyadda Welfare Centre	65	228
Walasgala Ground Camp	4	19
Devinuwara D.S. Division		
Thalalla Rural Hospital Camp	16	67
Kandagodalla Camp, Gandara	19	86
Total	79	283
Grand Total	902	3373

Source: GA Office Matara - Situation as of 12th May 2005

Note: Now nearly all have moved to temporary houses.

The main challenge in providing camps or temporary houses is that people from different villages, different castes, different trades and in some cases different races were mixed in same camp or temporary accommodation site. This was inevitable due to the size of sites and the number of people from each of these specific types differing. Some people resented this. This was more noticeable when mixing fishermen and farmers. The Government too was under pressure to provide campsites early and could not give too much time for planning. The lack of foresight of government officers also led to the lack of more careful planning to ensure the better matching of people at each site.

The next biggest problem people had was the distance from camps and temporary houses to their original places of living and occupation. Some fishermen were placed in the Pahathagama Camp and subsequent temporary housing that was 6 km from the sea, seriously inconveniencing them. Small traders, who used to trade in the market place in Galle Road Weligama, were also inconvenienced. Children too had to travel 7 km or more to schools when earlier they were traveling a mere 1 - 2 km maximum.

The survey system for temporary housing is decentralized. The needs of temporary housing were surveyed by the Grama Sevaka level, which covered 100 to 150 families, with results summarized at the AGA and GA levels. The Secretary of the Ministry of Housing assembles all figures for temporary housing needs. The system worked properly and the government was able to ascertain the number of refugee families in need of housing. The key issues in temporary housing are:

- Reluctance of some refugees to leave the camps as temporary houses are away from main roads and from their former forms of livelihood. They also prefer to await permanent house without having to shift frequently; and
- As camps have obtained utilities such as electricity and garbage disposal service, etc. and some of the temporary housing does not have such utilities, refugees prefer to stay in the camps.

The rise in the price of construction materials is summarized in Table 3.8. This increase impacts the assisting agencies and individuals trying to repair or construct houses.

Table 3.8 Material Costs before and after the Tsunami

Item	Price in March 2005 (Rs)	Price in Aug 2005 (Rs)	Increase (%)
Woodbar (for 2 x 4)	190	200	-
Woodboard (for 2 x 4)	250	250	-
Cement (10 kg)	490	525	7
Labor cost (1 day)	500	550	10
Gas (12.5 kg)	800	900	12
Gasoline (1 litter)	68	80	18

Source: Records of three private shops in the Matara district

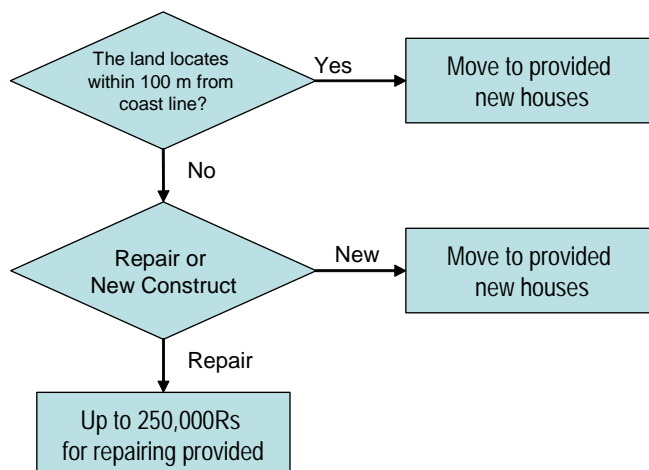
The real impact has still not been felt as permanent housing construction work by NGOs has only just begun. The biggest impact of price increases in building materials has been felt by donors and by those impacted by the tsunami and trying to repair or build using their own funds (supplemented by government grants). The government grant is only Rs.250,000 and the balance has to be covered by loans.

(2) Field 2. Reconstruction of Houses

Semi-field	Checkpoints	Assessment
House repairs	How are building rehabilitation measures determined and who decides this?	Inside the buffer zone, no one can rebuild houses that were destroyed. Outside the buffer zone, people can rebuild and the Government provides grants of US\$2,500 from funds received by IDA. In addition, each house owner entitled to this grant can get a loan of Rs.500,000 /- at a 6% interest rate. Some NGOs also support the repair of houses outside the buffer zone.
	Does the decision process work properly?	Though people within the buffer zone cannot rebuild houses within the zone, this rule has increasingly been violated by people (with police turning a blind eye due to lack of coordination between agencies). For example, the Matara Municipality broke the law by permitting a donor agency to rebuild a public toilet on the beach in Polhene Beach without approval of the Coastal Conservation Board. Thus, the lack of coordination between agencies in tsunami rehabilitation work is a major issue.
House reconstruction	How are the existing disqualified buildings treated?	If a house outside the buffer zone is damaged (to at least 40% of its value), the owner is eligible for a grant of Rs.250,000. If damage is below 40%, owners are eligible for a grant of Rs.100,000 for repair. In addition, owners can obtain loans up to Rs.500,000 at subsidized interest rates.
	How are the shared building treated? How does the public sector specify the demand for housing?	If houses are shared by more than one family, then only the owner of the house gets the assistance, not the others (such as married children living in the same house). There are very few apartments in the tsunami affected areas.
Budget assistance programs	Is there any public fund to assist housing reconstruction?	An amount of US\$2,500 per house is the maximum for houses damaged outside the buffer zone. If the damage sustained is less than 40% of the value, then only Rs.100,000 is given per house. By June, 20,770 families received such funds throughout Sri Lanka.

Semi-field	Checkpoints	Assessment
Charitable donation money	Does institutional coordination for the distribution of charity donation work efficiently?	The Government gave Rs.5000 per family for several months immediately after the tsunami (234,000 families received this for two to three months), Rs.175 worth of rations, and Rs.200 cash per person were given for six months (881,000 persons).
	Are the criteria for distribution of charity donations prepared properly?	The eligibility criteria were quite lenient and nearly everyone even slightly affected received this. There was no clarity as to how many months or how frequently the Rs.5,000 would be given.
Public assistance and loan	Does such assistance and loans to rehabilitate the life of sufferers exist?	Loans scheme are mainly for business revival (details given below).
	Are the criteria for condolence money provision prepared properly?	Rs.15,000 per family was paid per each dead family member.
	Do tax reductions and exemptions exist?	NGOs have distributed some condolences in the form of widow and orphan assistance.
Reconstruction foundation	Has such a public foundation been established?	The Task Force for Rebuilding the Nation (TAFREN) is the main agency for coordination and policy formulation regarding tsunami work.
	Are the criteria for funding prepared properly?	An authority named the Transitional Accommodation Project was created for housing.

The process of house reconstruction/repair and its assistance are depicted in Figure 3.6.



Source: Project Team

Figure 3.6 Process of House Reconstruction/Repair

According to this procedure, the house owner can choose the manner of home rehabilitation (as specified under the administrative order without legislative background). This process was consulted by the Grama Servak level, and summarized by AGA, and at the GA level. The land owner can use land within a 100 m buffer from the coastline, other than for permanent housing. The issues are different for people who depend on the Government to provide housing and those who are doing it themselves with their own funds and loans. It is primarily the poor who are dependent on the Government to provide housing. The issues confronting people dependent on the Government to provide housing are:

- Dislocation and distance from original homes and livelihoods;
- Unsatisfactory surroundings;
- Limited choices as to who neighbors are;
- Standard houses of small size and potential inferiority compared to the original house;
- Quality of construction may also be an issue in the future as the NGOs are contracting house builders, even though the majority of NGOs have no experience in housing construction;
- Those that lived within the buffer zone and can repair the houses were the worst affected as they were not permitted to do so by law. However, the law has not been enacted by the Parliament, but merely via a legislative order; and
- Delays in providing houses (due to a number of reasons - first the difficulty in finding land, then various procedural issues between the Government and NGOs that undertake construction), as well as the lack of experience of NGOs in house building and the lack of capacity, especially skilled labor in the country, to meet the sudden demand for housing of this magnitude.

The issues faced by people who are building with their own funds, or via grants and loans are as follows:

- Even with the loan, the total entitlement is Rs.750,000, which can roughly build a small house of 60 m² (although many lived in much larger houses);
- The ever increasing costs of raw materials and labor;
- The difficulty of accessing quality skilled labor to do the work; and
- The removal of wreckage of old buildings.

In the initial months, many more people than those affected benefited from the monthly payments and rations given by the Government. However within a few months, the Grama Sevaka's and Divisional Secretary's were able to ensure that only the affected were paid allowances. The weekly payments are paid without any problem. But the monthly payment of Rs.5000/- is not paid every month due to budgetary constraints.

Loan Schemes in Operation for Small and Medium Enterprises

A US\$50.0 million fund has been set up to provide Susahana with loans from banks and financial institutions. The loans can be obtained for micro-, small-, and medium-sized enterprises. Presently, US\$19.4 million has been disbursed to 4,154 recipients.

- A US\$7.0 million loan scheme has been made available for micro-industries through the National Development Trust Fund (NDTF). Loans can be accessed through partner organizations such as NGOs that are registered with the NDTF. US\$1.36 million has been disbursed to 37 partner organizations, of which US\$0.7 million has been provided to 2,070 borrowers.

Planned Loan Schemes

- A loan of US\$28.0 million will be made available through donor assistance for small- and medium-sized industries.
- A US\$20.0 million loan scheme will be created for micro-enterprises with funds provided by a donor nation.

(3) Field 3. Township Rehabilitation Planning and Institutional Development

Semi-field	Learns	Assessment
Governmental actions	Do activities for financial support from the Central Government exist?	The Central Government did not allocate additional funds to the Municipal Council for post-tsunami township development. They are seeking donor assistance to do this work; some work in Matara has been funded by agencies such as JICA, KOICA, and SDC.
Municipality action and institutional issues	Does the public sector prepare such investment/rehabilitation programs?	The Matara Municipality prepared a plan independently, while UDA also made a plan. Priority has been given to sewerage, drainage, and roads.
	Does the public sector prioritize any sectors for early reconstruction?	The departments concerned such as the Electricity Board, Road Development Authority, as well as the Water and Drainage Board took action to re-commence services disrupted by the tsunami. These repairs and construction works were done from their own budgets, supported by the Central Government. Though basic repairs are done, major reconstruction works such as the aqueduct have not been completed due to a lack of funds.
Township planning	How quickly do the municipalities start to prepare their township rehabilitation programs?	The UDA Matara prepared a renewed township program by the end of June.
	Does the public sector issue guidelines for reconstruction?	Municipal Council also prepared a small plan.
	Are the rehabilitation programs of the public sector referred to the voice of residents properly?	So far nothing, but very minimal work has started due to a lack of funding.
Township improvement activities	Are existing committees and groups involved in the township improvement program development?	The UDA township was prepared by officers of UDA, together with some limited inputs from municipality members. Lack of coordination between the two is a key factor in poor planning.

- Due to very poor budget and income sources, very few technical and competent staff such as engineers or town planners work for the Municipality (the agency responsible for management of Matara Town is the Municipality, which has an elected Chief Executive, as well as elected members supported by a Commissioner and his staff).
- Lack of preparation and expertise in town planning after a disaster is a major issue, as staff of all agencies lack experience in town planning under disaster conditions.
- Lack of capital budget also makes it difficult to meet the town's increasing needs due to the significant increase in population. They do a minimal job of trying to remove garbage, as well as maintain the sewerage system and drainage, but the budget and resources do not make it possible to meet even existing needs. As a consequence, when the tsunami struck and the town was seriously affected, the Municipality was only able to provide minimum assistance. So far, the majority of facilities of the Municipality (such as tractors), which were damaged by the tsunami, have not been replaced or repaired due to a lack of funds.
- Lack of coordination between agencies is also a major issue in township development. The agency responsible for planning is the Urban Development Authority (UDA), while the implementing agency, the Municipality, works independently and does not coordinate adequately.

(4) Field 4. Demolition of Damaged Buildings and Debris Disposal

Semi-field	Checkpoints	Assessment
Public assistance	Is there any public service to stimulate the wrecking of damaged buildings?	The main source of assistance for removal of debris was “Cash For Work” (in the first six months after the tsunami), however, most of this was manual labor and very few NGOs provided machinery for this work.
	Is there any bottleneck in the wrecking of damaged buildings?	The Government has not provided any assistance for debris removal at private houses, although each relevant department has removed debris at government buildings coming under their jurisdiction.
Removal of debris	Is there any target month for debris removal?	No such target month has been set. There is also no responsible body as wreckage removal is not the responsibility of any existing government department, but is the responsibility of each private/public owner.
	Who manages the debris removal?	Garbage is a different issue from building wreckage debris. It is the responsibility of the local government to remove garbage.
Environmental issues	Is there any pollution generated through debris removal activities?	No wreckage treatment was done. In Matara town, debris is put in a site in the town close to the river. The impact of this has to be assessed by conducting a Environmental Impact Study.
	Are countermeasures to ease pollution implemented?	So far no one has done this.

Debris removal was not given much emphasis by the Government or agencies working on tsunami rehabilitation. The main response was manual removal through “Cash for Work”. This may be because garbage removal is the responsibility of the local government (as opposed to the Central Government, which was mainly handling tsunami work). Absence of a key role for the local government in tsunami work could be one key reasons for reduced emphasis on wreckage removal in tsunami assistance work (this is so in Matara town where this issue came up at monthly agency-government coordination meetings only six months after the tsunami). Despite this fact, no coherent plan was developed. The whole issue of leftover debris (as well as its optimal usage and disposal) is still to be looked

at. The lack of expertise in NGOs as well as the Government is the key reason for this situation.

(5) Field 5. Industry Rehabilitation

Semi-field	Checkpoints	Assessment
Damage to industry and financial support	Are damages to the industry quantified?	A number of agencies performed assessments. A joint donor group (ADB, USAID, etc.) conducted a broad survey and came up with very rough estimates of damage to businesses from the tsunami, which are to be used by the Government. Some sectors such as tourism were surveyed. The IDB did a very hurried survey of damage to micro-enterprises. Most detailed surveys at the district level were done by district chambers, however, each district has a separate chamber and quality of the survey varies.
	Is there any financial assistance for industry rehabilitation?	So far, financial assistance has been mainly in terms of loan schemes described elsewhere in the report. Besides this, very minor assistance in the form of grants or machinery replacements have been offered by chambers and donors. TAFREN still has no clear program developed for assistance to industries. The ILO is the main agency assisting TAFREN on this subject, but it has not developed a clear strategy yet. Regarding fisheries, the situation is good, with FAO (playing the lead role in coordination) and many donors (including FAO) providing boats, nets, and equipment. All the losses have been quantified. Donor assistance has also been coordinated to some extent, although initially uncoordinated assistance was given by NGOs. The main constraint is in manufacturing of boats (and at times in the quality of this supply).
Manufacturing and local industry	How is the overall condition of business recovery?	Due to the initiative of owners, many industries and businesses have re-commenced partial activities. The main ones that could not commence them are fishermen awaiting boats, as well as some shops and industries in the buffer zone. In Matara, the coastal belt fisheries, as well as coir

Semi-field	Checkpoints	Assessment
		and ornamental fish harvesting are some of the main activities. Fisheries have partially recovered, but await more boats. The ornamental fish season was lost (it ends in April), but will start again in October. This Project is assisting this sector.
	What is the major local industry and how has this industry been damaged?	The lack of trade associations for each industry sector at the district or regional level is a major shortcoming. This has resulted in poor lobbying for assistance.
Service sector, commercial, trading, and tourism	Are there any bottlenecks identified in the recovery of these sectors?	<p>The biggest bottleneck is the lack of support to small- and medium-sized industries, as they only have the option of loans (and some of them cannot take loans out due to lack of collateral).</p> <p>Secondly it is not just the replacement of assets that is needed, but also businesses counseling to restart after such a disaster. Some have had to relocate or downsize, while others need assistance to develop a new business plan and also training and consultancy.</p> <p>The final bottleneck is that most businessmen, particularly those in districts such as Matara, are not organized into trade associations to enable them to work together to assist each other, as well as to jointly lobby and receive assistance. There is a Matara Chamber of Commerce, but this is new and has only 150 members, mostly medium- and large-sized businesses. Sector-wise associations do not exist.</p>

The industry sector covers fishing and industry, as well as other businesses. Here too there are large-, small-, and medium- as well as micro-sized businesses. Most of the attention of NGOs and donors is on micro- and self-employed businesses due to their poverty focus. In business and industry, most assistance has also gone or is planned for micro- and self-employed businesses due to the poverty focus of NGOs.

There is also a major sector focus, however. For example, major support is available for the fisheries sector, as well as for other major sectors such as coir and tourism. Coir making is the activity of poor women and donors have rushed to replace the machines lost as they are relatively cheap in price and easy to replace. The tourism sector also has been assisted by the Tourist Board (mainly through loan schemes and re-scheduling of previous loans).

The most neglected are the small- and medium-sized sectors employing 5 to 25 people, as now, they only have the option of a loan. JICA chose some people from this sector in food processing. Capital is not the only need that tsunami-affected businessmen and women need. They need business counseling to face the new post-tsunami challenges and they need to develop a new business plan. They need to be organized into groups to make assistance more feasible and for them to rise up as a group.

3.2.2 Assessment of Institutional Issues

Nationwide tsunami assistance commenced with the establishment of a Centre for National Operations under the President. This was closed within one month and the Task Force for Rebuilding the Nation (TAFREN) was created with an independent board and professional staff reporting to the President. The Taskforce for Rebuilding the Nation (TAFREN) was established after the tsunami with the objectives of rebuilding the infrastructure and the livelihoods, restoring trading, commerce, and business, and recreating normal life in the affected areas in a better and sustainable manner, as quickly as possible. TAFREN's role centers around four elements:

1. Ensuring coordination among relevant stakeholders by providing forums to make decisions in a timely manner, and by ensuring that the information necessary to do so, is available;
2. Helping ensure accelerated and coherent reconstruction by providing stakeholders with the necessary frameworks and guidelines;
3. Facilitating, enabling, and empowering to ensure that the conditions are in place for effective implementation; and
4. Monitoring that progress is being made, and that the benefits of all investments reach the beneficiaries in an equitable and sustainable manner.

Hence, TAFREN primarily takes a facilitation/coordination role. Different agencies at the national level are responsible for some key tasks. For example, the National Housing Development Authority (NHDA) is responsible for coordination of permanent house construction. TAFREN also created a project named Transition Accommodation Project

(TAP) to coordinate the building of over 40,000 temporary housing. The Fisheries Ministry and Department is responsible for revival of the fisheries sector. Similarly other ministries at the central, not provincial, level are responsible for other tasks. Different UN agencies are assisting each of the key sector. For example fisheries and agriculture is led by FAO and other livelihoods are led by ILO, who is advising TAFREN. The Centre for Humanitarian Assistance (CHA), a non-governmental network formally coordinating northeast relief and rehabilitation is the main body responsible for coordination of tsunami donor agency work. Of course, despite the responsibility of these departments, most of the ground work is done by donors, INGOs, and NGOs. Over 150 international NGOs have come to work in Sri Lanka after the tsunami adding to the INGOs that existed already. To add to the confusion, hundreds of informal groups (especially Sri Lankan expatriate funded projects), private companies (or individual financed projects), as well as foreigners (friends of Sri Lanka funded and led projects) exist, making any coordination a nightmare.

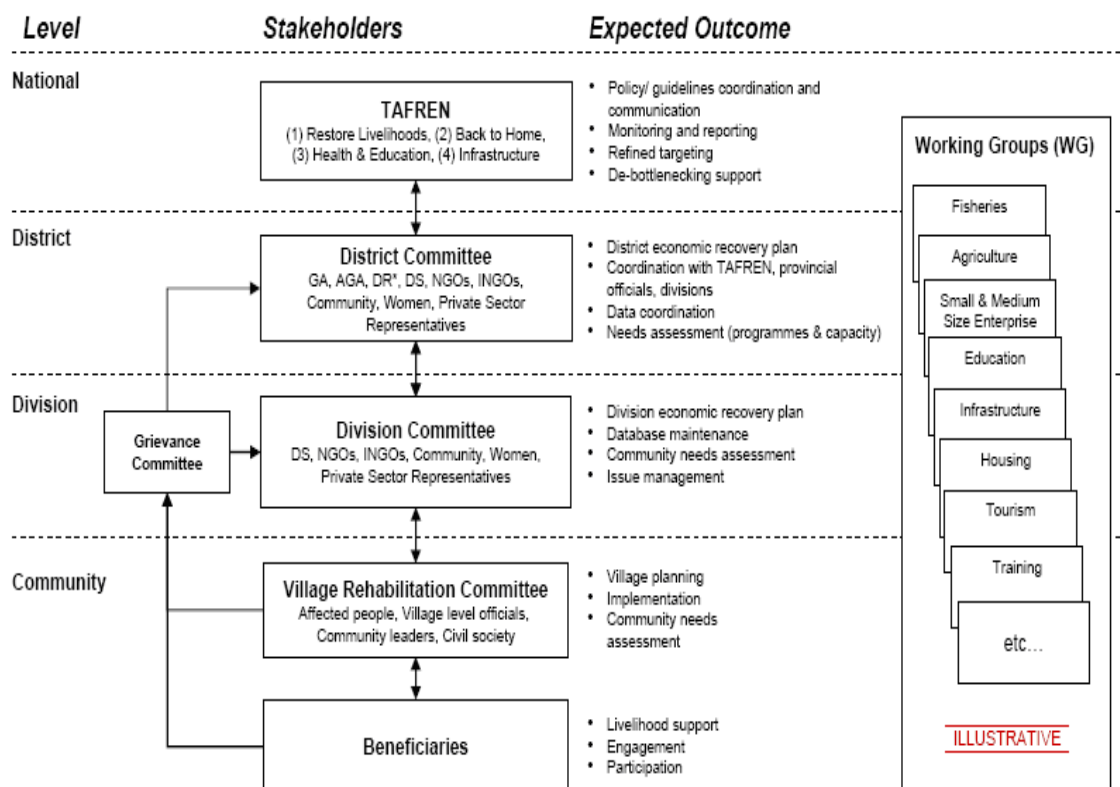
However at the ground level in the districts, the lead agency in conducting tsunami relief coordination is the District Secretary and Divisional Secretary Offices, which come under the District Secretary Office. The Divisional Secretary Office conducts the monthly tsunami agency coordination meetings at each level and also conducts sector-wide meetings for livelihood, fisheries, house construction, and general agency coordination. They were also responsible for setting up and management of camps with NGO collaboration. They co-coordinated the provision of utilities to these camps and were assisted by TAP in ensuring provision of utilities to temporary housing. These departments lacked the capacity to do this work, but are heavily assisted by INGOs. For example in Matara, different INGOs or UN bodies have taken the responsibility for each sector such as fisheries, livelihood, and even sub-sectors. NGOs and donors have also taken responsibilities to construct and provide for the needs of camps. The Government task is mainly to coordinate such assistance, however, the Government lays down the laws and makes important decisions such as who will live in which transitory or permanent housing. NGOs and donors cannot decide this.

The main issues faced in this work were lack of coordination. Despite all the forums available for coordination, not all NGOs and donors used them. Many go directly to affected people and provide assistance. This has resulted in duplication of efforts, with some people getting more assistance than required and some none. For example in a small camp in Weligama, 15 people who never owned boats have received boats, while in other areas of the same district, people who owned boats have yet to receive them. This lack of a co-coordinated effort is one of the biggest institutional barriers to tsunami assistance.

The elected local government, such as the Provisional Councils and the Pradeshiya Shaba, has a minimal role in tsunami work due to a perceived lack of capacity. Organized community groups are also not prominent in tsunami work. In the 22 camps surveyed, only JICA has formed functioning community groups. Trade associations too have not been formed. However, some INGOs and NGOs formed small, village-level community groups (primarily of women) to provide assistance. This is notably so with INGOs such as CCF, Oxfam, and Save the Children.

The diagram below gives TAFREN's view of the institutional structure to assist tsunami rehabilitation (although Village Rehabilitation Committees are more in theory than in practice so far). This is due to the lack of capacity within TAFREN and the government sector so far to form such committees. TAFREN informed the donor agency coordination meeting of 16th September that 50 graduates have been recruited by TAFREN to commence such work. However in Sri Lanka, most government-initiated village committees have not been very cohesive and strong.

Figure 3.7 shows the expectations of the government for its own institutional structure and role for tsunami recovery.



*DR: District Representative hired by TAFREN to support GA in meeting reconstruction targets and "building back better"

DRAFT

Figure 3.7 Expectations of the Government for Its Own Institutional Structure and Role for Tsunami Recovery

3.3 Identification of Necessary Rehabilitation Activities

3.3.1 Necessary Activities in Regional Approach

Activities to cope with bottlenecks as shown in Table 3.9 are described below. This exercise resulted in the identification of necessary actions.

3.3.2 Action Program

Consultation with the GA Office and other concerned agencies and communities resulted in a prioritized program of necessary actions as shown in Table 3.10.

Table 3.9 Bottlenecks and Necessary Activities in Regional Level

Fields	Bottlenecks	Necessary Activities
1. Refugee camp closing and temporary housing provision	<ul style="list-style-type: none"> • Location of semi-permanent housing - need to keep the location of semi-permanent housing near the center of their living activities in the planning phase or provide adequate facilities to secure their livelihood • Absence of land in areas preferred by people • Mixing of people from different villages, casting them in the same housing scheme • Lack of utilities 	<ul style="list-style-type: none"> • Provide transportation services as well as facilities for filling the gap between present and previous lives • Provide utilities such as drinking water wells
2. Revival of industry	<ul style="list-style-type: none"> • Large amount of people who lost their livelihood and the diversity of such livelihood • Loss of productive assets like machinery, equipment, and boats due to the tsunami • Slowness in provision of such assistance • Lack of trade associations to enable the affected to work together • Lack of technical assistance • Lack of access to capital in the form of credit or grants to replace lost assets • Loss of infrastructure 	<ul style="list-style-type: none"> • Identify key sectors such as fishing, coir, food processing, and ornamental fishing, and conduct needs assessments • Form community based organizations or trade associations • Provide assistance to develop business plans to resume businesses • Provide grant, credit, and lease arrangements to procure productive assets lost by the tsunami • Provide any other training and accessibility to markets • Revive collapsed markets and infrastructure • Assure better coordination between agencies to avoid duplication and missing needy people
3. Reconstruction of houses	<ul style="list-style-type: none"> • Large amount of land required for construction of new houses • Legal transfer of these lands from existing ownership (even government agencies) to new owners • Poor location and quality of some of the lands identified • The buffer zone rule and people's reluctance to leave this area • Lack of capacity of NGOs to construct houses • Lack of skilled labor required for construction • The price of construction materials impacts housing construction 	<ul style="list-style-type: none"> • Expedite construction work - 90% of land has been identified and agencies have allocated land, but construction has begun on only about 30% of the land (while in Matara, an MOU has already been signed with donors for 3,187 houses and this land has already been allocated) • Meet training needs to enlarge the pool of skilled labor • Finalize legal formalities • Consider efficient approaches for procurement (joint procurement)

Fields	Bottlenecks	Necessary Activities
4. Township rehabilitation planning and institutional building	<ul style="list-style-type: none"> • The township program preparation activities started one month after the disaster since the public sector's capacity to make decisions during the disaster situation was insufficient. • Lack of expertise in township planning during the disaster situation 	<ul style="list-style-type: none"> • Provide advice on township program development and implementation • Conduct disaster preparation training for officials of Matara Municipality
	<ul style="list-style-type: none"> • Infrastructure - delay in infrastructure rehabilitation can be seen, particularly in the public sector (such as the expensive aqueduct rehabilitation). 	<ul style="list-style-type: none"> • Identify bottlenecks in infrastructure rehabilitation and funds to rehabilitate (i.e., Matara Aqueduct, and Galle and Tangalle Harbors)
5. Demolition of damaged buildings and debris disposal	<ul style="list-style-type: none"> • Lack of expertise • Lack of resources and machinery • Lack of knowledge in reuse of material 	<ul style="list-style-type: none"> • Provide consulting/planning services for wreckage disposal management • Provide machinery to assist in wreckage removal. • Transfer technology for wreckage re-use as construction materials • Develop a capacity for garbage management throughout the country and in both the private and public sectors

Source: Project Team

Table 3.10 Consideration of Implementation and Prioritization

Fields	Necessary Activities	How to Implement	Priority
1. Refugee area closing and temporary housing provision	<ul style="list-style-type: none"> • Provide transportation services as well as facilities for filling the gap between present and previous lives • Provide utilities such as drinking water wells 	<ul style="list-style-type: none"> • Pick some camps and identify such issues, putting adequate facilities and services, and considering the impact of the provision in with/without the Project • With community participation, construct wells and other utilities 	High
2. Revival of industry	<ul style="list-style-type: none"> • Identify key sectors such as fishing, coir, food processing, and ornamental fishing, and conduct needs assessments • Form community based organizations or trade associations • Provide assistance to develop business plans to resume businesses • Provide grant, credit, and lease arrangements to procure productive assets lost by the tsunami • Provide any other training and accessibility to markets • Revive collapsed markets and infrastructure • Assure better coordination between agencies to avoid duplication and missing needy people 	<ul style="list-style-type: none"> • Utilize survey and secondary data from the GA Office followed up by questionnaires/interviews for needs assessments • Organize those who need assistance into CBO or trade associations by raising awareness of the benefits of such organization • Provide business consultants (Business Development Centre, Matara etc.) to develop business plans and to provide training, consultancy, and marketing assistance • Develop savings and credit programs or link associations to existing programs • Lobby the Government to build infrastructure and link other agencies working on market development • Have JICA provide assistance within their budget and for needs such as credit, boats, nets, and equipment, as well as to link associations to agencies • Participate actively in the District Secretary Office-led coordination meetings at Matara and the CHA-led coordination meetings in Colombo. • Provide all information regarding assistance to avoid duplication 	High
3. Reconstructi on of houses	<ul style="list-style-type: none"> • Expedite construction work - 90% of land has been identified and agencies have allocated land, but construction has begun on only about 30% of the land (while in Matara, an MOU has already been signed with donors for 3,187 houses and this land has already been allocated) • Meet training needs to enlarge the pool of skilled labor 	<ul style="list-style-type: none"> • Provide monthly targets and schedules to agencies doing construction and close monitoring • Introduce joint procurement techniques 	

Fields	Necessary Activities	How to Implement	Priority
	<ul style="list-style-type: none"> • Finalize legal formalities • Consider efficient approaches for procurement (joint procurement) 		
4. Township rehabilitation planning and institutional building	<ul style="list-style-type: none"> • Provide advice on township program development and implementation • Conduct disaster preparation training for officials of Matara Municipality 	<ul style="list-style-type: none"> • Provide adequate consulting services for planning agencies • Provide consulting services for tender, design and supervision. • Consult with JICA HQ for implementation budget for rehabilitation work • Conduct disaster management training and consultancy for municipality offices and other government agencies • Achieve greater coordination and leadership for township development 	High
5. Demolition of damaged buildings and debris disposal	<ul style="list-style-type: none"> • Identify bottlenecks in infrastructure rehabilitation and funds to rehabilitate (i.e., Matara Aqueduct, and Galle and Tangalle Harbors) • Provide consulting/planning services for wreckage disposal management • Provide machinery to assist in wreckage removal. • Transfer technology for wreckage re-use as construction materials • Develop a capacity for garbage management throughout the country and in both the private and public sectors 	<ul style="list-style-type: none"> • Contract consultants and provide training and consultancy • Provide assistance to buy machinery or provide money for renting machinery • Provide state-of-the-art consultancy and technology on wreckage and garbage re-use 	Medium

Source: Project Team

The above evaluation process resulted in the identification of five priority projects. The necessity for establishing a comprehensive township rehabilitation plan with a longer view is also to be shown.

3.3.3 Selection of Priority Projects

(1) Rehabilitation of Infrastructure

With the bottleneck analysis (Table 3.9) and tsunami damage survey (Chapter 3.1) as well as detailed discussion with concerned authorities of the Sri Lankan Government, the JICA Project Team selected the following two infrastructure reconstructions as priority projects:

- Rehabilitation of Matara Aqueduct; and
- Rehabilitation of the fishery harbors in Galle and Tangalle (and a limited part of the harbor in Kirinda).

(2) Co-assistance of Tsunami Affected People

The Project Team used a co-assistance approach for basic human needs and livelihood rehabilitation. Considering the bottlenecks in industry rehabilitation (Field 5 of the bottleneck analysis on Page 3-25), advice from the Industrial Development Board, the District Secretary, the Fishery Department, and the Cooperative Department, as well as demarcation among other donors, the JICA Project Team selected the following three pilot projects:

- Support of refugee camp associations;
- Support of fishery cooperative societies; and
- Support of associations of small industry (food-base and ornamental fish industries).

In order to define the project activities, a series of participatory workshops and needs assessment surveys have been conducted.

Contents and progress of these priority projects are mentioned in Chapters 4 to 8 of this report. In addition to the noted five projects, the JICA Project Team is working on the Matara township rehabilitation plan. Relevant plans for infrastructure and urban development are being examined in order to make proposal for Matara city that are strong against disasters.

3.3.4 Implementation Scheme of Priority Projects

(1) Implementation Scheme of Priority Projects

Out of the five priority projects, two rehabilitation projects (the Matara Aqueduct and the fishery harbors at Galle and Tangalle), are implemented by Japanese Non-Project-Type Grant, with the JICA Project Team in charge of assisting in these projects. The rehabilitation of Kirinda Harbor is implemented directly by the JICA Project Team. The remaining projects, including the three community support projects, are implemented by the JICA Project Team as Pilot Projects.

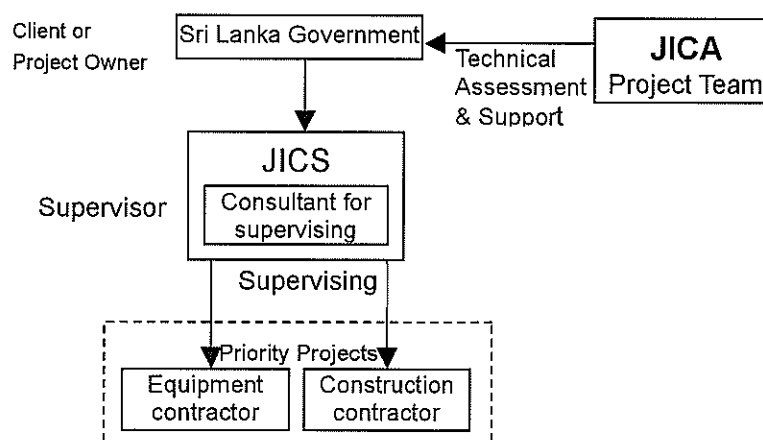
Table 3.11 Implementation Scheme for Priority Projects

Project	Implementation Scheme
Rehabilitation of Matara Aqueduct Rehabilitation of fishery harbor in Galle and Tangalle	Implemented as Japanese Non-Project-Type Grant and assisted by the JICA Project Team
Rehabilitation of fishery harbor in Kirinda	Implemented by the JICA Project Team
Support of refugee camp associations Support of fishery cooperative societies Support of associations of small industry	Implemented by the JICA Project Team as Pilot Projects

Source: Project Team

(2) Technical Support for Non-Project Grant Aid

The fund for rehabilitating the Matara Aqueduct, as well as the Galle and Tangalle fishery ports came from the Japanese Non-Project Grant Aid. Figure 3.8 shows the position of the JICA Project Team in the reconstruction work for the noted infrastructure. The Japanese Non-Project Grant Aid included many more projects for infrastructure reconstruction and procurement of equipment.



Source: Project Team

Figure 3.8 Role of JICA Project Team in Infrastructure Projects

(3) Roles of the JICA Project Team

The JICA Project Team undertook the following works during the conduct of the priority projects funded by the Non-Project Grant Aid.

- 1) Damage survey of the facilities and structures
- 2) Survey of natural conditions
- 3) Development of a rehabilitation plan
- 4) Selection of facilities that should be rehabilitated
- 5) Rehabilitation design of facilities
- 6) Cost estimation
- 7) Preparation of draft tender documents
- 8) Technical support for tendering (including technical assessment of tenders and qualification)
- 9) Technical monitoring of the construction works

3.3.5 Three Pilot Projects

Out of the five priority projects, three are called Pilot Projects and have a social development nature. These Pilot Projects have been very carefully selected after application of the following procedure.

(1) Damage Survey

The Project Team surveyed tsunami damage to identify the sectors and fields to assist as Pilot Projects.

(2) Survey of Current Assistance Activities

When the Project Team came to Matara, many rehabilitation activities were being undertaken by the Sri Lankan government, donors, as well as local and international NGOs. Regular coordinating committees held at the District Secretariat allowed the Project Team to obtain precise information on tsunami rehabilitation assistance. The demarcation of target sectors and groups were considered.

(3) Coordination of Public Administration

The JICA Project Team repeatedly held meetings with government agencies such as the

District Secretary, Divisional Secretary, Matara Municipal Council, Department of Fishery, Urban Development Authority, Department of Corporative Societies, and Industrial Development Board (IDB). Some of these governmental agencies have become counterpart organizations for the Pilot Projects.

(4) Consistency of Bottleneck Approach

Candidate Pilot Projects were examined to see if they are consistent with bottleneck approaches proposed in this project.

(5) Participatory Workshops with Potential Target Groups

After the JICA Project Team initially selected a target, participatory workshops were conducted to facilitate mutual understanding between the Project Team and the prospective project beneficiaries. During these series of workshops, the Project Team mentioned that JICA will take a co-assistance approach, meaning that JICA will enhance the institutional capacity of tsunami-affected persons, rather than just delivering items for daily necessities. Discussion topics of the workshops included what participants have and what participants can do, instead of what participants need and what JICA can give. These workshops were very successful, with participants understanding the necessity to initiate organizations for their own co-assistance. Two refugee camp societies and three small business associations were set up during this period.

3.4 Project Implementation Strategy - Co-assistance Approach

3.4.1 On-Site Co-assistance Approach

Pilot Projects, particularly those dealing with community involvement, have been designed to test the on-site, co-assistance approach as explained in Chapter 2. Roles and functions of the administration, co-assistance organizations, and individuals are assessed and defined under the prevailing situation in each of the targets of the Pilot Projects. In the process, the substitution of the right of public service delivery by the CBO vis-à-vis established government agencies was considered in its extent and possible time period. Existing social systems were also given due considerations. Successes and failures of this approach in the context of the subject area will be monitored and evaluated against criteria, including those listed in Chapter 2.

3.4.2 Structure of the Co-assistance Organization

The Project combines three forms of co-assistance organizations.

(1) Community-Based Organizations (CBOs) at Camps

All camp residents become members, with the only qualification for membership being residence in a camp. Normally, organizations are registered under the Social Welfare Act as legal entities. However, there was a temporary stoppage of such registrations after the tsunami. In Sri Lanka under normal circumstances, CBOs are formed at the village (hamlet) level and consist of 20 - 50 members. They are more popular among women who are more active in such forums. In a normal Sri Lankan village, there are several CBOs and these include Death Donation Societies, Sarvodaya (National NGO) formed societies, Samurdhi Societies (these are societies formed by the government poverty alleviation program), and other NGO formed societies.

(2) Trade Chambers (TC)

Criteria for membership is being part of the same trade and being from a specific geographic area, which is the case with the Matara District. In Sri Lanka, trade chambers are more common in urban areas like Colombo. At the district level, there are district chambers covering all trades and the requirement for membership is ownership of a business. The Matara Chamber of Commerce is such an entity. Besides Colombo, it is not common to find many industry specific district level associations. This is the first time that sectors such as garage owners or food processing entrepreneurs have formed such trade associations in Matara.

(3) Fisheries Co-operatives

Fishery cooperatives existed as more formal organizations and were registered under the Co-operative Act. These co-operatives are common in fishing villages and their main role is savings and credit, both for employment-related needs and the personal needs of fishermen and their families.

In Sri Lanka, a CBO is distinguished from an NGO in that a CBO is a beneficiary created and beneficiary managed organization, while an NGO is an institution organized and managed by outside people. The Project only formed CBOs and trade associations, which are beneficiary organizations.

3.4.3 Issues in Transferring the Three Level Model to Sri Lanka

Issues in transferring the three-level model are examined below.

- 1) The government and other donors welcomed this approach as it gave them a forum to work with rather than to have to contact a huge number of individuals separately.
- 2) Some Camp Managers, provided by other donors, found this to be a threat to their control of the refugees and reacted negatively to the idea, but later accepted it.
- 3) Most people welcomed the idea as they realized the benefit of being united in such a time, but few who had political and other contacts felt threatened by the democratic nature of the CBO institution.
- 4) The government decision that registration of Community Based Organizations was to be suspended after the tsunami resulted in newly formed CBOs in camps and trade associations that still do not have legal statutes. The Government reset this rule as successful NGOs were being formed after the tsunami to obtain aid, but this too has affected CBO formation.
- 5) The CBO and trade organization committees develop a life and power of their own and do not consult membership frequently. This tendency common in most CBOs in Sri Lanka. This has also been witnessed in the newly formed associations.
- 6) Normally in Sri Lanka, most CBOs are formed by villagers living close to each other and this has been the case for decades. Hence, in most cases, they come from the same caste, and share religions and have similar occupations. Although tsunami camps consist of different people from different villages, as well as people from different castes, having different occupations and even religions, the common dilemma has brought them together and acted as a glue to unite them. Whether this unity will survive the year or so after they obtain permanent housing has yet to be seen.
- 7) The most successful and sustainable CBOs in Sri Lanka are the Death Donation Societies and CBOs that engage in savings and credit activities. The reason for this is that these are essential and indispensable services supplied by such societies that require frequent interactions. The project aims to facilitate the development of savings and credit components in all CBOs and trade associations, in partnership with other agencies.

3.4.4 Co-assistance Approach for Pilot Projects

Co-assistance approach for the three Pilot Projects are explained below with implementation methods including objectives, time periods, related agencies and organizations, major approaches, evaluation criteria, and project details.

(1) Refugee Camp Support

Two camps have been selected in the Weligama Division, with the application of co-assistance in mind. In the selection of camps, emphasis was placed on camps where the refugees showed a spirit of self-reliance and a willingness for co-assistance. This selection was done in meetings conducted by project consultants, who explained how this approach was practiced successfully in Kobe. Needs for assistance were identified through a participatory approach and rehabilitation (improvement) plans were formulated by the people. Cooperation with the GA Office was obtained through meetings with the District Secretary and the Divisional Secretary. The Development Officers attached to the Divisional Secretary Office participated in some of the field visits and initial meetings to facilitate the partnerships. The initial stress was on making them realize the importance of developing a strong society and in facilitating the formation of such societies. The next step was in identifying needs. Stress was placed on communal needs such as water and sanitation with some assistance for individual needs. Future training and capacity building needs, as well as needs for small amounts of capital for loans were identified during a training needs assessment session facilitated by consultants and staff of the project. The Project Team will be assisted by a local NGO in actual implementation.

(2) Small and Medium Enterprises Rehabilitation

Three trades, consisting of motor garages, food processing (women), and divers, were chosen for assistance. These trades were chosen based on the extent of loss, degree of popularity of these trades prior to the tsunami, and current available assistance. The JICA Project Team observed that most assistance was given by donors to coir and fishing, with these three trades given relatively less assistance at that point of time. Once again, the emphasis was on co-assistance and the need to form strong trade associations for these three sectors. This was facilitated through training and regular meetings, while also referring to the Kobe experience. The Industrial Development Board (IDB) is the government agency partnering with JICA and the trade associations in this project. Its

role included identifying affected people, providing such a list to JICA, being a member of the steering committee and, where possible, providing assistance to garage owners. Most importantly, it will provide support to trade associations once the Project is over, as this is part of its initial mandate. Its work includes assessing damage to each of the assisted businesses, obtaining lists of assistance from other donors (to avoid duplication), and agreeing with the society as to individual and group needs. Training needs were identified in a workshop facilitated by project staff and consultants. The trade associations formed under project facilitation are now quite strong and are involved in a number of activities to strengthen membership outside of the JICA Project involvement. However, one of the most tangible benefits of forming trade associations is that most donors are now not as keen to assist individual entrepreneurs, but want to work with associations. The presence of an existing strong society is a major advantage to beneficiaries. A local NGO has been retained to assist in the actual implementation.

(3) Fishery Cooperatives Rehabilitation

The JICA Project Team identified three fisheries co-operatives that were quite active prior to the tsunami and are eligible for assistance through the project. The Fisheries Department in Matara is the government agency collaborating with JICA and the three co-operatives in the rehabilitation program. The first task was to revive the three co-operatives that were dormant after the tsunami due to effects on individual members as well as on co-operative assets such as buildings. The JICA Project Team is assisting the selected three fishery community associations to formulate rehabilitation plans and monitoring activities. One of the key activities the co-operatives were involved in was the provision of small amounts of credit to families of fishermen. The JICA Project is partnering with UNDP and has prepared a proposal for UNDP to provide loan capital for these societies. A local NGO has been engaged to implement various activities.

3.5 Fisheries Sector Rehabilitation Strategy

The JICA Project Team has been making rehabilitation efforts for the fishery sector through engineering services for fishery harbors and product surveys, as well as through support for three fishery cooperative societies in the southern provinces. The first rehabilitation plan was prepared in the Project. A brief summary of the strategy is shown below, with details noted in Annex 3.2.

3.5.1 Backgrounds

Due to the tsunami, the coastal areas of the southern region were heavily damaged. Many human lives including fishermen and their families were sacrificed - their houses, boats, and fishing gear were washed away or damaged. Many local commercial fishing boats, such as one-day or multi-day boats, were lost or damaged. Fishery harbors and supporting facilities such as roads, electricity and water supplies, communication equipment, etc. were destroyed or heavily damaged.

On the other hand, many multi-day boats were fortunately kept out of harm by being offshore at the time of the tsunami due to their operating cycles. The geographic features, with many small capes in the southern region, seemed to largely deflect the tsunami damage. As such, some fishery activities resumed only days after the tsunami, even in damaged fishery harbors. However, the damage by the tsunami was huge enough to substantially decrease fish production, to paralyze fish marketing, and to induce a reluctance to purchase marine products just after the tsunami. Although this resistance has dwindled after the initial shock wore off, the increased fish prices remained, mainly due to the shortage of fish versus the recovered demand.

As shown in the situation from the resumption of some fishery activities soon after the tsunami, fisheries are among the most important industries and are an essential basis of livelihood for many people there. Furthermore, fish are an important and preferable source of animal protein to the people of Sri Lanka. Revitalization of the fishery communities, therefore, is an urgent issue to be solved in the southern region.

Through tsunami damage surveys, field investigations of restrictions and requirements of the fishermen and fishery related communities, as well as discussions on recovery programs from tsunami damage with Sri Lankan government agencies (such as MOFAR, CEY-NOR, CFC, CFHC as a member of the concerned Joint Coordinating Committee and NARA, NIFNE, etc. as the concerned parties), the following points below are considered the basic issues for the revitalization in the fishery sector in the southern region.

3.5.2 Recovery of Fisheries Activities

The fisheries in the southern region are generally borne by traditional OBM fishing boats and larger IBM boats (the former uses fish landing at seashore and the latter fishery harbors, respectively). The former fishery contributes much to self-sufficient consumption in fishery households. Due to the character of the fishing operation cycle, many IBM fishing boats were kept out of the tsunami's influence, with fishing by IBM fishing boats having since been partly resumed in spite of many restrictions and difficulties in fishery harbors. However, since much basic equipment such as fishing boats, fishing equipment, etc. was washed away, the fishing by OBM or traditional fishing boats remained paralyzed for some time. Furthermore, as many fishermen, who suffered from the tsunami, lived in temporary housing or tents located at some distance from the seashore, their fishing conditions, especially in terms of preparation for fishing, have deteriorated due to the need to transport fishing equipment to/from the seashore, the lack of security management of fishing equipment at seashore, etc. On the other hand, the demand for fish supply recovered remarkably as shown in the escalation of retail fish prices (due to the shortage of supply caused by the lack of production activities).

In such circumstances, revitalization of the fishery communities should start through simply encouraging fishing activities and increasing fish production, at least up to pre-tsunami levels. This revitalization, however, cannot be realized without the participation of the majority of the fishery communities. To achieve this, the replacement of lost fishing equipment, or the repair of damaged equipment is necessary. In order to increase fish production to satisfy the demand for marine products, and to stabilize the livelihood of people directly and indirectly engaged in the fisheries sector in the southern region, it is essential to recover fishery activities through an emergency supply of production tools such as fishing boats, fishing equipment, etc., which were lost or damaged by the tsunami. In relation to this and in line with other donors and NGOs, the Government of Japan initiated supporting actions such as the supply of local type fishing boats, engines for these boats, fishing equipment, and materials/tools for repairing damaged traditional boats under the Non-Project Grant Aid Scheme.

3.5.3 Reinforcement of Support Facilities to Encourage Fishery Activities

Though fishing activities have resumed, they cannot continue without efficient connection to consumers or without improvement in working environment. As many of the fishery related facilities such as ice plants, cold storage, etc. (in and out of the fishery harbors) were seriously damaged by the tsunami, the fish marketing process was paralyzed. The promotion of fishery activities should also be useful in relation to the promotion of distribution, marketing, and utilization of fish. The continuation of fishery activities should be maintained under a stable working circumstance. From this standpoint, the reinforcement of support to fishery activities should follow, as the next stage, to revitalize the fishery communities.

In order to support and encourage the recovering fishery activities and to initiate and smooth the utilization of harvested marine products, it is essential to reinforce a variety of support facilities at the activity bases for coastal fishermen, and marketing tools for commercial fishermen and related communities.

This Project tried to encourage self-reliance and community empowerment actions in the affected fishing communities through pilot projects. In addition, the Government of Japan initiated supporting actions such as the supply of temporary ice plants and cold storage, as well as freezer trucks under the Non-Project Grant Aid scheme.

3.5.4 Rehabilitation of Fishery Harbors

While fisheries for OBM or traditional fishing boats are essential in terms of a self-sufficient fish supply or local community recovery, the majority of fisheries in the southern region was and is supported by the IBM fishing boats. As shown in Table 3.12, the contribution of the southern region to national fishing production is twice as high as the region's relative share of boats. This is due to the high productivity of IBM fishing boats and the relative concentration of such boats in this region due to the advantageous accessibility to targeted fishing grounds for tuna, skipjack, king fish, etc.

Table 3.12 Contribution of the Southern Region to Marine Fisheries in 2004

Fishery District	All Boats		IBM Boats		Fish Production	
	Number	Ratio	Number	Ratio	Tons/Year	Ratio
Nationwide	30,567	%	3,074	%	253,190	%
Total from Four Southern Districts	5,556	18	1,407	45	88,170	35

Remark: The Southern Districts include Kalutara, Galle, Matara and Tangalle.
Source: MOFAR

Although the coastal fisheries have recovered, true revitalization of the fishery sector cannot be done without a strong orientation to accelerate commercial fisheries activities. As an example, the fishery for IBM boats that did not sustain damage from the tsunami, initiated the recovery of marine fisheries in the southern region and maintained sources of fish supply to local diets soon after the tsunami. As fisheries for IBM boats supply fish not only to local consumption, but also for export opportunities, various kinds of persons were engaged from in all aspects of the trade. Fishery harbors are the most crucial infrastructure for fish landing, fuel, water and ice loading, fish net maintenance, boat/engine maintenance, as well as emergency escape for this fishery.

A fishery harbor, while being a base for fishing boats, is an infrastructure that connects the products harvested from the ocean with the products distributed to consumers by fish marketing through fish landing and the dealing processes. It is therefore very important to rehabilitate fishery harbors, especially in the southern region, where major commercial fish species such as skipjack, tuna, kingfish, etc. are caught by IBM local fishing boats that utilize these harbors. Fishery harbor oriented activities bring various benefits directly and indirectly to people in terms of the style of fish processing, maintenance services, and assistant labor opportunities, etc.

This Project therefore conducted design services for the rehabilitation of the Galle Fishery Harbor and the Tangalle Fishery Harbor, which were implemented under the Non-Project Grant Aid scheme.

3.5.5 Development Challenges to Accelerate the Recovery

Even after a natural disaster, some sort of development or re-development challenge should accelerate the recovery from damage and contribute to the revitalization of the fishery sector. In Galle Fishery Harbor, establishment of such facilities utilizing the land

area of the facilities damaged by the tsunami is planned by the Government of Sri Lanka in order to encourage the commercial fisheries activities and to stimulate recovery. Such kinds of development activities thus attracted attention from concerned governmental parties for the Non-Project Grant Aid and this project.

Over the long history of the Galle Fishery Harbor, which was constructed 35 years ago as an industrial harbor, various investment actions were conducted there, as it was a commercial center of the southern region. As such, commercial support facilities such as cold storage, freezers, and many ice plants were constructed. Some of these were damaged by the tsunami, while others had been out of order before the tsunami. As Galle Fishery Harbor still has various advantages in load distance, access, accumulation of commercial sectors, communication infrastructure, etc., the Government of Sri Lanka intends to redevelop a refrigeration plant for the processing of frozen products for the local market and for supporting fish export, to be operated by CFC, a state enterprise engaged in these semi-commercial activities. In this connection, this Project conducted design services for the establishment of the related facilities in Galle Fishery Harbor, which have been implemented under the Non-Project Grant Aid scheme.

PART II

IMPLEMENTATION OF PRIORITY PROJECTS

Chapter 4 Refugee Camp Support

4.1 Background

Human lives, property, infrastructure, and much more were lost in the tsunami, which resulted in nearly 10,000 refugees in the Matara District alone. Approximately half of the refugees have been accommodated in 22 camps, with the rest having sought shelter with relatives and friends.

After visiting about half of the camps, and receiving recommendations from the District Secretary Office as well as the Weligama Divisional Secretary Office, the JICA Project Team decided to support the Gurubewila and Pathegama Camps in the Weligama division. Loadster, a prominent private company, provided the initiative in setting up these camps (with a few NGOs assisting the camps). Camp management was a part of the company's philanthropic activities and they welcomed cooperation from any other donors. These conditions were ideal for implementing the Pilot Project and also ideal in avoiding conflicts with other donors.

4.2 Plan of Refugee Camp Support Pilot Project

- (1) Project Title: Refugee Camp Management Support Pilot Project
- (2) Location: Weligama Division in the Matara District
- (3) Counterpart Organization: District Secretary Office
- (4) Project Duration: July 2005 to February 2006
- (5) Current Condition

Since the tsunami struck on December 26th, 9,730 people in Matara were displaced from their homes due to partial/complete destruction of their homes. While relatively wealthier people moved in with relatives and/or friends, others, after initially staying in schools and public buildings, were accommodated in camps. As of April 2005, 3,325 people from 911 different families lived in 22 camps in the four divisions of Matara District.

Minimum living requisites such as shelter, water, food, and toilets were assured in the camps. However, many issues needed improvement including facilities, education, health, transportation, quality of shelters and toilets, water quantity, power supply, and

employment. Refugees were not organized and were unable, on their own initiative, to fix these issues.

(6) Beneficiaries

1) Refugees in the Model Camps

The Gurubewila and Pathegama Camps were the model camps. Seventy families from nine villages stayed in the Gurubewila Camp in the Weligama Division of Matara. They were mainly those displaced from Gurubewila Village (26 families), Maha Vidiya (12 families), and Denuwara (15 families), respectively. There were 39 households and 29 school children in the Pathegama Camp, also located in the Weligama Division of Matara. All families originated from a single village called Samraweera Pedesa. In both camps, people lost everything including their houses, all their furniture, and also their livelihoods. Both camps had families whose members were killed in the tsunami.

2) Refugees in 22 Camps in the Matara District

This Pilot Project supports all 22 refugee camps in the Matara District in terms of mutual learning on how to organize refugees and manage their camps. Good practices were disseminated by newsletters and study tours among the camp leaders. Therefore, approximately 3,000 refugees obtained some sort of benefit from this Pilot Project.

(7) Goals and Objectives

- The immediate objective of this Pilot Project was getting camp residents ready to live sustainably with community co-assistance.
- A higher-level objective of the Pilot Project was verifying the effectiveness of the co-assistance approach for disaster rehabilitation.

(8) Project Components

- Creation of an organizational structure so refugee camp associations can learn from each other's good practices (several newsletters were issued for this purpose).
- Development of a strong society of affected persons capable of lobbying for their own rights, receiving assistance, and contributing to the improvement of their own lives.
- Improvement of basic household needs, water, sanitation, as well as the improvement in environmental conditions at the temporary housing sites, working in partnership with affected people.

(9) Implementing an Organizational Structure

Each model camp developed a Camp Refugee Association for co-assistance. The JICA Project Team, together with the District Secretary Office, supported the activities of these Refugee Associations. Implementation of work was contracted out to a local NGO, while important decisions for this Pilot Project were made by the Steering Committee, where each representative of the JICA Project Team, the District Secretary Office, the local NGO, as well as the Refugee Associations met.

(10) Tasks

Table 4.1 Tasks of the Pilot Project

No.	Activity	Contents
1	Establishment of refugee camp associations	This Pilot Project facilitated the creation of refugee camp associations, especially in the two model camps
2	Adoption of good camp management practices	Good practices for co-assistance among refugees in camps were implemented and supported as a Pilot Project activity
3	Issuance of a newsletter	A bi-weekly newsletter was issued to share the ideas of good practices within refugee camps
4	Mutual learning of good practices	Camp associations learned from each other through visits, meetings, and seminars
5	Rewarding of good practices	Good practices were awarded for effective extension and adoption
6	Management of the project	Sub-contracted to the local NGO (office, staffing, vehicle, office equipment, etc.)

(11) Sustainability and Expandability

This Pilot Project aimed at empowering the refugees by assisting their associations in each camp. However, as refugee camps would disappear in the future, the question of how to define project sustainability arose. The social mechanism that developed and the experience of co-assistance from this Pilot Project will endure, with refugees finally being able to organize themselves for future difficult times. Once the camp association becomes active, it was able to lobby on issues and participate in planning activities for permanent housing.

Concerning expandability, this Pilot Project directly facilitated the adoption and dissemination of good camp management practices. Once camp associations realized that learning from other camps was effective in improving their own camps, mutual learning were further encouraged.

(12) Environmental Impact

The population density of refugee camps was very high, meaning garbage disposal and sanitation were important problems. This Pilot Project aimed to mitigate these problems. Concerning the social environment in the camps, solidarity among refugees positively affected this environment.

(13) Relationship to Other Donors' Assistance

A number of other donors including UN agencies, such as UNICEF, and NGOs, such as CHF, Save the Children, CCF, Oxfam, and SewaLanka, also worked on some aspects of camp welfare and livelihood. UNICEF has built toilets, although some of them do need quality improvement. CCF works with children to form children and youth clubs in some camps. Oxfam and Save the Children worked on some livelihood improvement works, as did many other donors. The approach so far has been to provide machinery. The JICA Project Team coordinated its work with other agencies by attending weekly donor/NGO coordination meetings held at the offices of the District Secretary and Divisional Secretary to avoid the duplication of work as sub-sectors and camps were divided among agencies.

(14) Use of Outside Contractors

The Berendina Foundation, a local NGO, undertook implementation of all three Pilot Projects under the supervision of the JICA Project Team. A Dutch woman, Mrs. Berendina Boest, and a Sri Lankan woman, Mrs. Mudalige, started the Berendina Foundation in 1987. In 1992, this foundation shifted its approach from charitable activities to community development. The Berendina Foundation has its base in Yatiyantota and implements various projects for community socioeconomic development. Topics of their development projects include:

1. Small enterprise development;
2. Agriculture and animal husbandry development;
3. Sub-contracting work from companies outside of Yatiyantota;
4. Improvement of youth employment;
5. Provision of health care for the poor;
6. Provision of housing for the poorest of the poor; and
7. Common community facilities (rural roads, water supply systems, communal toilets).

Brendina had only been active in Yatiyantota for a number of years. The tsunami disaster, however, forced them to operate emergency disaster rehabilitation programs in Batticaloa

and Galle. They have sufficient experience in community development and good know-how in disaster rehabilitation. The JICA Project Team and Berendina have agreed on a contract to implement the three Pilot Projects.

4.3 Activities of the Pilot Project

4.3.1 Camp Household Survey

(1) Objectives

Even though the JICA Project Team has agreed to support two refugee camps in the Matara District, detailed information on the living conditions, issues, needs, and management of the camps was not readily available. The JICA Project Team conducted two kinds of camp surveys to get comprehensive data on the tsunami refugees in the two camps. The survey targeted all households in the Pathegama and Gurubewila Camps. The aim of the survey was to understand socioeconomic conditions of households before and after the tsunami, as well as to gather data on their needs. The results were used to identify their particular needs and to formulate a methodology for community development of the people living in the camps.

(2) Methodology and Questionnaires

Three surveyors visited the Gurubewila and Pathegama Camps with questionnaires and interviewed every head of a household between the 3rd and 11th of July 2005. The surveyors themselves filled out the survey sheets based on the answers given by the interviewees. Survey results were tabulated and summarized so that every stakeholder can easily make use of the information. The questionnaire format for this camp household survey is attached as Annex 4-1.

(3) Summary of Survey Result

The JICA Study Team recognized that there are many issues to be addressed in the Pathegama and Gurubewila Camps. These two camps hosted some 141 children and possessed transportation problems for those commuting to school and work. This was especially true for the Pathegama Camp, which was located almost three km away from the seashore, where camp residents used to live before the tsunami. Furthermore, only sporadic public transportation services existed. Education was a big concern of parents since the temperature in tents and transitional houses became so hot that children could not study inside. A tank lorry regularly supplied enough water for drinking and cooking, but camp residents were suffering from a shortage of bathing water.

Transitional houses had a very limited electric wiring system. Residents could have only one light bulb and were unable to use other electric appliances such as fans, irons, radios, and televisions. Problems also arose with cooking and dining equipment. Although residents usually used kerosene cookers that were donated by NGOs immediately after the tsunami, these were in poor condition and little space was available to use these in the transitional houses. A kerosene cooker added unpleasant odors to the house and to the food cooked in it. Residents needed furniture such as tables and cabinets in which to keep their clothes. Interviewees also complained of the lack of privacy due to the close proximity of other houses. The report on the tsunami household survey is attached as Annex 4-2.

4.3.2 Camp Management Survey

(1) Objectives

This survey targeted all 22 camp managers in the Matara District. Collected information included the size and location of the camps, the management system, the socioeconomic background of the refugees, the camp facilities, the relationship between management and residents, as well as the organization and activities of camp residents.

(2) Methodology and Questionnaire

Based on a list of 22 refugee camps offered by the District Secretariat, the JICA Project Team conducted a camp management survey. Three surveyors spent three days visiting all target camps to interview the managers. Camp managers were of varying background (e.g., government official, NGO staff, private company employee, and political party volunteer). The questionnaire for this camp management survey is attached as Annex 4-3 at the end of this chapter.

(3) Summary of Camp Management Survey Results

Various stakeholders including government agencies, NGOs, and donors supported the refugee camps. There were a plethora of items to manage in the camps, which included such things as water supply, power supply, food, security, health, education, transportation, bathing facility, toilet, garbage, post and telecommunication, as well as replacement of tents with transitional houses, etc. For example, the settling of electricity and telephone bills caused many problems. As a result, many telephones were disconnected as bills were never paid. Although the Matara District Secretariat tried to effectively coordinate this, camp managers still faced various difficulties in managing problems.

In regards to living conditions and the needs of residents, camp managers faced similar issues. They mentioned heat, power supply and wiring, toilet maintenance, limited space in transitional houses, education, trouble among residents, as well as supply of nutritious food for infants and pregnant women as some of the major issues.

Regarding community development among camp residents, managers appointed by the District Secretariat did not see much development, while managers from the camp residents saw positive developments in community spirit. The report on the tsunami camp management survey is attached as Annex 4-4.

4.3.3 Institutional Building of Camp Associations

(1) Background and Objectives

After several visits and workshops in the target refugee camps, the JICA Project Team became aware that there was no camp resident organization. They lived in camps and obtained some very basic services (such as shelter, water, food, security, health, and so on) without any active involvement in camp management. Camp managers also did not have a clear idea as to whether it was worth trying to organize the refugees and giving them dynamic roles in camp management.

The JICA Project Team were under the assumption, elicited from lessons learned in recent Japanese natural disasters, that co-assistance among disaster-affected people, as well as their active involvement enhances effective recovery from devastation. In other words, organizing camp refugees was considered an essential factor for the sustainable recovery of communities. Taking this lesson into consideration, the objective for the institutional building of the camp refugee associations was to make it possible for refugees to control the recovery of their own conditions.

(2) Formation of Camp Associations

1) Pathegama Camp

Residents of the Pathegama Camp came from one village. They knew each other and there was mutual assistance among refugees on an individual basis. However, there was no resident association in this camp. The camp manager divided the refugee families into groups for the smooth delivery of food, but no other form of organized activity was observed in the Pathegama Camp. The JICA Project Team therefore advised residents to

create an association for the enhancement of mutual assistance. They established their own association on April 5th 2005 with the following members:

- Chairman - P.M. Chandra Kumara;
- Vice-chairman - Chamara Punchihewa;
- Secretary - M.T. Priyantha Jayawardena;
- Vice Secretary - S.H. Kamani;
- Treasurer - D.A. Nalani;
- Advisor - Mahsh Madusanka (Camp Manager);
- Committee Members - D.W. Dayarathna;
- Committee Members - W.J.A.P. Nishantha Jayalath;
- Committee Members - M.M. Shanthi Priyadarishani;
- Committee Members - Hemachandra Daluwattha;
- Committee Members - S.H. Asoke;
- Committee Members - B.M.P. Prasantha; and
- Committee Members - W.J.A.P. Kamal Shantha.

2) Gurubewila Camp

Residents of this camp came from eight different villages (gama sewake / small villages or hamlets) in the Weligama Division and did not know each other until arrival at the camps. This had caused considerable stress among refugees and the manager. Nevertheless residents recognized that cooperation and mutual assistance was a necessity. In a workshop held on July 1st 2005, the JICA Project Team suggested that they organize a camp association (refugees agreed immediately to this) and establish an association with the following executive members:

- Chairman - D. Chandalatha;
- Secretary - H.A.S. Jayawadana;
- Treasurer - R. Karunawathi;
- Committee members - G.G. Gunawathi;
- Committee members - H.W. Dayawathi;
- Committee members - B.K. Silawathi and
- Committee members - M.P.M. Gihani.

(3) Roles of the Camp Association

Resident associations of the target camps were expected to participate in every aspect of the Pilot Project from planning to evaluation. The associations represented the camp residents and made decisions on how to manage the camp in cooperation with a camp

manager dispatched by the Lordster Company. Decisions made by the association included purchasing necessary equipment and facilities as well as coordinating seminars and training for human resource development and institutional building. In order to improve living conditions, they made requests or petitions to the government and donors. It is interesting to note that board members of the camp associations expect to continue their activities even after refugees shift to permanent houses.

4.3.4 Steering Committee Meetings

A steering committee was created to handle the Pilot Project for camp association support. Major stakeholders met regularly to exchange information and opinions so that maximum cooperation was generated for the smooth implementation of the Pilot Project. This committee also discussed how to continue the activities even after JICA assistance ends in March 2006. The committee includes the following members:

- A representative of Matara District Secretary Office;
- An association chairman, secretary, and treasurer;
- A representative of Berendina (local NGO);
- A coordinator from the JICA Project; and
- A representative of the JICA Project Team.

The steering committee met nearly every month. Minutes of the meetings are attached as Annex 4-6.

4.3.5 Procurement of Equipment

(1) Selection of Items

What equipment should be delivered with priority to the camp residents? Necessary equipment for refugee camp life was determined through the household survey and workshops. The required equipment and activities include:

1. Gas cookers and cylinders for cooking;
2. Bathing water supplies;
3. Cupboards for storing cloth;
4. Fans to mitigate the heat in the temporary houses;
5. Training on how to prepare for natural disasters;
6. Micro-credit programs to start a small business;
7. Educational programs for children and computer training; and
8. Training on how to start a small business in the refugee camps.

(2) Delivery of Gas Cookers

Since all households and the steering committee agreed that refugees needed gas cookers, the JICA Project Team decided to deliver gas cookers to both the Pathegama and Gurubewila Camps. The delivery took place on August 4th 2005, with guests from the Matara District Secretary Office (Director of Planning) and the Weligama Division Secretariat (Additional Secretary and Refugee Camp Development Officer). The overwhelming majority of camp residents attended this event. An engineer from the Shell Gas Company (a manufacturer of gas cookers) gave a small seminar on how to handle gas cookers safely and efficiently.



Figure 4.1 Seminar for Fire Safety by Shell Gas Company



Figure 4.2 Gas Cooker Handover Ceremony at the Pathegama Camp

(3) Delivery of Cupboards, Generators, and Stationery

This event took place on 20th October 2005 at the Gurubewila and Pathegama Camps in the Weligama Division. Sixty cupboards were distributed to the Gurubewila Camp and 30 to the Pathegama Camp, respectively. In addition to this, one generator was given to each camp on the same day. These generators provided security against blackouts, while also being available to be lent for functions and to earn money.



Figure 4.3 Handover of a Generator to the Gurubewila Camp Society



Figure 4.4 Clothing Cupboard Handover to a Camp Family

4.3.6 Coordination among Stakeholders

(1) District Secretary in Matara and Divisional Secretary in Weligama

The District Secretary is a position appointed by the Central Government to coordinate public administration in Matara District. There are 16 divisions in Matara District, with four of them, located along the coast, having been seriously damaged by the tsunami.

The Weligama Division was one of these 16 divisions and two target camps of this Pilot Project were in this Division. The Weligama Division had its own office with a secretary appointed by the Matara District Secretary. The Weligama Divisional Secretary was in a position to certify real tsunami victims within its territory. This certification was important for NGOs and donors, as it was a way of identifying the tsunami-affected households. The Matara District Secretary was a counterpart of the JICA Project Team for the implementation of this Pilot Project for refugee camp support. Both organizations signed a Memorandum of Understanding for this Pilot Project. The Planning Director of the Matara District Secretariat was a member of the steering committee to lead this Pilot Project.

(2) Lordstar

Lordstar is one of the leading tire manufacturers in Sri Lanka. They have a tire factory in the Weligama Division. The Lordstar Company manages the Gurubewila, Pathagama, and Labema Camps in the Weligama Division at its own expense. They appointed a manager for each camp and provided common facilities for refugee residents. This company also constructed permanent houses in this division for refugee camp residents. Any activity in this Pilot Project required collaboration with the Lordstar Company.

4.3.7 Positive Thinking Workshop

A unique workshop to enliven the camp refugees took place on 3rd October 2005. The JICA Project Team coordinated this workshop. The lecturer was a well-known trainer from the Business Development Center of the Matara Branch. The seminar lasted three hours and included 57 participants in each camp. Contents of the workshop were as follow:

- Disasters are a part and parcel of the nature;
- You are compelled to face disasters during your lifetime and it is natural;
- In the life of some people, like the Japanese, disaster is a very common phenomenon;
- Life has to be rebuilt, even after calamities, whether natural or man-made;
- Life has to go on because we have our commitments/responsibilities to the next generation;

- It is always good to think positively since it will bring about positive results; and
- The mind should be free from hatred, jealousy, anger, and other harmful feelings to produce positive results.

4.3.8 First Aid Training

(1) Background and Objective

Refugee camp residents were afraid of a future tsunami and strongly wanted to prepare for one. Different trainings were possible for this topic (such as how to obtain disaster information, how to evacuate, how to avoid epidemic diseases, how to prepare or get water and food, etc.). Possible training programs included first aid skills, a topic that tsunami survivors showed considerable interest in. Some residents regretted that if they had proper first aid skills, they could have saved family members and friends when the tsunami hit.

(2) Implementation of Training

A full-day first-aid training session was held at the Pathegama Camp on August 21st 2005. An instructor and two volunteers from the Sri Lankan Red Cross Society led a seminar for 33 residents from this camp. Participants learned first aid theories/skills and were appreciative of the training as such skills can also be used in daily life. This training contained the following sessions.

- What is first aid?
- Why do we need first aid?
- Introduction to bandages, as well as theory of bandages and practice.
- Introduction to different transportation, as well as theory of transportation and practice.
- Introduction to different sitting/sleeping positions for patients.
- Introduction to mouth-to-mouth and CPR (Cardio Pulmonary Resuscitation) practice.



Figure 4.5 Lecture on First Aid by Red Cross



Figure 4.6 Training of Practical First Aid Skills

4.3.9 Publishing Newsletter

The main objective of the newsletter was to setup a system for the refugees to learn good practices on how to improve their life through mutual assistance. After the tsunami, there were many activities conducted by governmental agencies, official development assistance (ODA) agencies, and NGOs to help refugees. These donors handled many refugee camps and have considerable information on what was going on and where. On the other hand, refugees or recipients of assistance had little information. If it was important to empower them to rebuild their own life in camps, it was essential for them to know what was happening in each camp and to learn from the trials and errors of their counterpart camps.

The newsletters were written in the local language (Shinhala) and contained information on various activities and good practices at different refugee camps so that refugees could learn from each other. Berendina (the NGO that undertook the implementation of Pilot Projects) designated a reporter and an editor. The reporter went around refugee camps to find good practices. This eight-page newsletter was issued every month.

(1) First Newsletter

The first newsletter was issued on August 10th 2005 and contained the following articles, stories, and writeups:

- A description of the JICA assistance to Matara;
- A message from the JICA Study Team;
- Introduction to the three Pilot Projects;
- Photographs and a report of the gas cookers distributed to the Pathegama and Gurubewila Camps in Weligama Division; and
- Lessons learned from the Great Hanshin Earthquake (with articles on Japan).

(2) Second Newsletter

The second newsletter was issued on August 30th 2005 and contained the following articles, stories, and writeups:

- Reconstruction of the Noonawella Fish Auction Hall with photographs;
- Distribution of equipment for small industries with photographs;
- First aid training held at the Pathegama Camp;
- Good practices of the Noonawella fishery society;
- Berendina (a local NGO implementing the Pilot Projects);

- Best examples of people from the food industry; and
- The great earthquake in Kobe, Japan.

(3) Third Newsletter

The third newsletter was issued on September 30th 2005 and contained the following articles, stories, and writeups:

- Reconstruction (foundation laying ceremony) of the Epitamulla Bank Building with photographs;
- Permanent houses from Red Cross;
- SDC assistance for tsunami-affected schools in the Matara District;
- A message from JICA Study Team leader;
- An article for IDB (Industrial Development Board);
- Tsunami-affected ornamental fish industry in the Matara District and a message from the Secretary of the tsunami-affected ornamental fish society;
- Tsunami-affected schools in Matara (with explanations on rebuilding from the principals);
- Tsunami-affected people in a refugee camp at Epitamulla (including the cottage industries for shoemaking and carpet making, as well as small retail shops);
- Poems, essays, and drawings from tsunami-affected schoolchildren;
- An article for a needs identification workshop (tsunami-affected garage and food sectors), as conducted by JICA;
- An article for a tree planting and distributing project at the Epitamulla Camp;
- An article for a needs identification workshop (for the Noonawella and Epitamulla tsunami-affected fishery society); and
- CODE activities around the world.

(4) Fourth Newsletter

The fourth newsletter was issued on October 30th 2005 and contained the following articles, stories, and writeups:

- The cloth cupboard distribution ceremony in the Pathegama and Gurubewila Camps;
- The Food Product Exhibition;
- The positive thinking workshop at Gurubewila and Pathegama Camps;
- Business planning training workshops;
- Banks that provide loans to tsunami-affected people;

- Descriptions of visits to refugee camps at Matara Maha Vidyala (with many self-employment activities);
- An interview with a school principal and two schoolgirls;
- Fishery society study tour;
- Red Cross first aid training at the Gurubewila Camp;
- The tsunami refugee camp at Malayalam, where there are considerable self-employment activities on-going;
- Two beneficiaries of the JICA Project (a yoghurt and a sesame roll businessperson);
- A diving equipment distribution ceremony;
- Description of refugee camp children winning prizes from World Children's Day;
- A Children's Page (with drawings, poems, and essays from tsunami-affected children); and
- Lesson learned in Japan - How to face natural disaster?

(5) Fifth Newsletter

The fifth newsletter was issued on November 30th 2005 and contained the following articles, stories, and writeups:

- Computer and English training at the Pathagama Camp (conducted by the TSF Academy, a French NGO);
- Hazard mapping (under preparation);
- A message from Mr. Goto Ko (JICA Sri Lanka);
- A message from the tsunami relief manager Berendina Development Service;
- The opening ceremony of the Epitamulla Bank Building;
- Buddhist monks build houses for tsunami-affected people in the Matara District;
- A tsunami refugee builds boats at the Maliyada Camp;
- Tsunami-affected school children in school and how schools have recovered;
- Business planning training for tsunami-affected garage sector persons;
- Health education;
- Restarting business (a handicapped shoemaker, a sesame roll producer, and a cement block making woman - the Weligama Divisional Secretary read this article and helped the handicapped shoemaker with Rs15, 000-);
- Lessons learned in Japan (hazard mapping and evacuation signboards); and
- An article chronicling JICA's 50 years of history in Sri Lanka.



Figure 4.7 Newsletters Issued for Tsunami-Affected People in Matara

4.3.10 Study Tour

(1) Background & Objective

There were 22 refugee camps in the Matara District alone, accommodating more than 3,000 persons. The Government, donors, NGOs, and refugees themselves were conducting various activities that camp people could benefit from. Some activities have generated great results, while some others produced negative ones. However, information concerning these activities and their benefits were seldom exchanged, especially among camp residents. This background was the same as that mentioned in the previous section (Section 4.3.9).

The objective of the study tour was to exchange information on how to survive these difficult days and how the camp association could improve living conditions. Upon the request of camp associations, this Pilot Project allocated a vehicle. Camps with successful management were then visited. A coordinator also attended a Berendina or JICA Project Team study tour. For local people, it was much easier for them to learn good practices from people with similar socioeconomic backgrounds, than to learn from those with different backgrounds.

(2) Implementation

The first study tour was held on July 30th 2005 with nine refugee participants from the Pathegama Camp. They include the chairman, treasurer, and members of the Pathegama refugee camp association. This team visited three refugee camps in Matara District

(Samuthdrathira Vihara, Valukarama, and Matara Mahavithyalaya). A coordinator from the JICA Project Team also attended.

When this group visited the Samuthdrathira Vihara refugee camp, they observed that many residents were engaged in small, self-employed businesses with the assistance of an NGO. Study tour participants were so impressed that they wanted to do the same as soon as possible. People in the Samuthdrathira Camp even noted to tour participants that they wanted to start the same kinds of business.



Figure 4.8 Self-employed Woman Making Doormats at the Samuthdrathira Vihara Refugee Camp



Figure 4.9 Shoemaker Starting Business in the Same Camp

4.4 Achievement and Evaluation

Evaluation is a very important part of the Pilot Project. A major topic of the evaluation is whether or not the project assumption's of "co-assistance" is valid for effective rehabilitation of the livelihoods for tsunami-affected people in Sri Lanka's southern region.

4.4.1 Evaluation Plan

The first evaluation sessions were conducted in December 2005 in a participatory workshop style. Evaluation in December, just five months after the commencement, was too early, as some scheduled activities were not completed. Therefore, this evaluation should be regarded as an intermediate evaluation. The JICA Project Team recommends monitoring the Pilot Project and making another evaluation after the passing of at least a one-year period.

Since the JICA Project Team regarded the opinions of beneficiaries as most important, evaluation was conducted using a participatory method. These evaluation sessions had a format throughout all projects (the camp project - Chapter 4, the fishery cooperative project - Chapter 5, and the small industry project - Chapter 6). The topics of each sub-session were as follow:

- Contribution of public sectors and donors besides JICA;
- Contribution of JICA (input for social, human, financial, and physical sources);
- Output of the JICA Pilot Project;
- Co-assistance approaches; and
- Quantitative indicators.

Project summaries or logical frameworks were developed for each Pilot Project and attached to each relevant chapter. The JICA Project Team visited the two refugee camps for this evaluation and participated in the evaluation session.

4.4.2 Evaluation Criteria

In addition to the topics prepared for the evaluation workshop and those mentioned above, there were five criteria that were often employed for the assessment of development assistance. This set of criteria was proposed by the Development Assistance Committee of the Organization for Economic Cooperation and Development (DAC/OECD) and is widely applied. Since the theme of the JICA Pilot Projects is co-assistance, all the Pilot Projects had a common project purpose (i.e., promotion of co-assistance for disaster rehabilitation). The evaluation was to examine if this purpose had been achieved properly or not using the following five criteria.

(1) Relevance

This criterion examines the purpose of the project. The purpose of project “co-assistance” must be meaningful in terms of beneficiary needs, consistent with relevant activities, and be a matter of urgency.

(2) Effectiveness

This criterion is examined by looking at activity achievements and how each activity contributed to overall project purpose. Project approaches, such as the creation of an association, procurement of equipment, organization of a series of seminars, and operation of micro-credit, were evaluated (through its resulting impacts).

(3) Efficiency

This criterion assesses whether each activity achieved its goal. An example of this is the question, “Was the seminar the best way to improve the business skills of association members?”

(4) Impact

This criterion examines the positive and negative changes of target beneficiaries. If the Pilot Project resulted in significant positive changes for the rehabilitation of industries, then the impact is large. This condition is important for a project to be replicable.

(5) Sustainability

This criterion examines if the benefits of the Pilot Project can continue after the conclusion of JICA assistance. The Pilot Project is not just an experiment, but is a serious trial to see if co-assistance works or not in the longer term. Evaluating against this criterion is essential to examine the long-lasting benefits on association members.

4.4.3 Logical Framework

A logical framework for the refugee camp Pilot Project is shown on the next page.

LOGICAL FRAMEWORK

Project Name: Refugee Camp Society Support Pilot Project
Project Management: JICA Project Team with Berendina
Project Commencement: June 2005

Project Area: Matara District, Southern Sri Lanka
Target Beneficiaries: Gurubavira and Pathegama Refugee Camps
Project Evaluation: December 2005

Project Narrative Summary	Indicator	Data Collection	Assumption
Overall Goal			
Co-assistance system prevails for disaster management and rehabilitation	<ul style="list-style-type: none"> Organization for disaster management and rehabilitation have increased or been revitalized These organizations work well 	<ul style="list-style-type: none"> Government statistics Sample surveys 	<ul style="list-style-type: none"> GA, ADA, and Loadstar continuously support the refugee camps
Project Purpose			
Camp residents are ready for sustainable livelihoods with community co-assistance	<ol style="list-style-type: none"> Motivation of members is sufficient Camp society can handle various community needs themselves 	<ul style="list-style-type: none"> Participatory evaluation workshops 	<ul style="list-style-type: none"> No significant events occur that reduce livelihood capitals
Output			
<ol style="list-style-type: none"> Social capital is enhanced Human capital is enhanced Financial capital is enhanced Physical capital is enhanced 	<ol style="list-style-type: none"> Quantity and quality of camp society's activities Effectiveness of seminars, trainings, and classes Effectiveness of micro-credit system Effectiveness of renting equipment such as gas cookers and generators 	<ul style="list-style-type: none"> Records of societies and the JICA Project Evaluation surveys Participatory evaluation workshops 	<ul style="list-style-type: none"> The Sri Lankan Government continues its current support to the camp residents (such as shelter, water and food).
Activities			
<ol style="list-style-type: none"> Facilitate the forming of camp societies in selected camps Support organizational management Conduct seminars, trainings, etc. Facilitate a savings and micro-credit system Lend necessary equipment for camp life 	<p>Input</p> <p><u>Japanese Side</u></p> <ol style="list-style-type: none"> Consultant (international/local) Local NGO and coordinators Equipment Cost for training, etc. Arrangement of a loan program 	<p><u>Sri Lankan Side</u></p> <ol style="list-style-type: none"> Daily logistics for camp lives by public sector Management of cultural and religious support by Loadstar (Ltd) 	<ul style="list-style-type: none"> Commitment of UNDP and Berendina is implemented without failure <p>Pre-condition</p> <ul style="list-style-type: none"> Prospective beneficiaries agree upon a co-assistance approach to the project

4.4.4 Pahategama Camp Evaluation Session

The JICA Project Team visited the Pahategama Camp on 10th December 2005 for this workshop. Eleven camp residents, including executive members of the camp society, participated in this workshop.

(1) Session 1 Assistance Offered to the Society (except JICA Pilot Project)

The Sri Lankan Government, including the District Secretary, Divisional Secretary, Grama Niradari, and Ministry Departments, offered much assistance. A private company, Lordstar, dispatched a camp manager until September and took care of the camp residents. Some NGOs also gave assistance. Almost all support concerned physical resources.

(2) Session 2 Assistance from the JICA Pilot Project

Beneficiaries, including the camp society members, remembered and mentioned the JICA Project Team activities that supported camp society. Participants found that there was a balance among the assistance categories (i.e., social capital, human capital, financial capital, and physical capital). They appreciated the support extended to the capacity building of the society.

(3) Session 3 Output of the Pilot Project Activities

Output or impacts of JICA assistance were examined in terms of four categories: institutional capacity, human capacity, financial capacity, and physical assets.

1) Institutional Capacity

By answering the 11 questions asked at the evaluation workshops, beneficiaries understood that their social capital improved significantly. All residents of the Pathegama Camp are from the same village. Therefore, even before organizing camp society, they knew each other and there were spontaneous mutual help at the individual level. Creating a camp association accelerated this harmonious attitude among the camp refugees.

2) Human Capacity

Various seminars on “Computer and English for Children”, “First Aid”, and “Positive Thinking”, as well as the newsletter improved the individual capacity of the residents. No vocational training was conducted. Educational attainment of residents was relatively high and they wanted to engage in the same type of work before the tsunami.

3) Financial Capacity

The JICA Project Team assisted the camp society to start a small savings and micro-credit system. It also coordinated a credit fund to be donated by Berendina. Residents are eagerly looking forward to getting the micro-credit fund in January 2006.

4) Physical Assets

Based on a needs survey, the JICA Project Team rented out a gas cooker and cloth cupboard to each household. Every family used them in their temporarily shelters. Beneficiaries also remembered some common equipment, such as electric generator and re-chargeable flashlights. These physical assets improved the camp life to some extent.

(4) Session 4 Co-assistance Approach

The JICA Project Team explained the co-assistance approach to the workshop participants. Assistance to enhance social capital, human capital, financial capital and physical capital were all to facilitate co-assistance. Beneficiaries responded with the following comments.

They thought the JICA project approach was the correct way to identify needs and to develop the community. Other NGOs and donors did not have a good approach. They came with some goods and distributed them to the people and never came back. There was no communication to identify the people's needs and to obtain any feedback from the beneficiaries. On the other hand, JICA facilitates the organization of their own societies and any decisions/actions have been agreed upon between two parties. They liked the way JICA treated their organization as an equal partner and visited them repeatedly to facilitate mutual communication.

(5) Session 5 Quantitative Data

Data concerning societal activities was queried. They had 16 working committee meetings and eight general meetings until the day of evaluation. The amount of the community micro-credit system was Rs.6,613.94. Ten members borrowed from this system.

4.4.5 Gurubewila Camp Evaluation Session

The JICA Team visited the Gurubewila Camp on 18th December 2005 for this workshop. Seventeen camp residents, including executive members of the camp society, participated in this workshop.

(1) Session 1 Assistance Offered to the Society (except JICA Pilot Project)

Since the Gurubewila Camp was also taken care of by a private company called Loadstar, assistance from the Government and other donors is very similar with that in the Pahategama Camp. They provided camp residents with shelter, food, water, electricity and other physical items, but attempted very little in terms of social or human development intervention.

(2) Session 2 Assistance of the JICA Pilot Project

The society people mentioned that JICA's assistance was nearly the same as that in the Pahategama Camp. A participant pointed out that selfishness of residents was dramatically reduced. Residents of the Gurubewila Camp were from many different communities and did not know each other. Although there used to be many troubles and quarrels among camp residents, these problems were mitigated after camp society was organized and residents began to manage the camp after the Loadstar camp manager was withdrawn in October 2005. Concerning financial capital, they mentioned that the JICA Team recommends the establishment of a micro-credit system and the transfer of management know-how.

(3) Session 3 Output of the Pilot Project Activities

Output or impacts of JICA assistance were examined under four categories: institutional capacity, human capacity, financial capacity, and physical assets.

1) Institutional Capacity

By answering the 11 questions asked at the evaluation workshops, beneficiaries understood that their social capital had been improved significantly. When Loadstar announced that it would withdraw the camp manager and its assistance from the Gerubawila Camp, camp residents did not panic and decided that camp society would undertake the management task. Their society capacity has been growing with this camp managing experience.

2) Human Capacity, Financial Capacity, and Physical Assets

For these aspects, residents responded in the same way as others in the Pathegama Camp did.

(4) Session 4 Co-assistance Approach

The JICA Project Team explained the co-assistance approach to the workshop participants. Assistance to enhance social capital, human capital, financial capital, and physical capital were all to facilitate co-assistance. Beneficiaries responded with the following comments.

They prefer an institutional capacity building approach to facilitate co-assistance among tsunami-affected people themselves. One participant mentioned that providing physical resources could make them spoiled with a dependent mentality. Since society itself took the leading role in camp management, every society member agreed upon the importance of solidarity and appreciated JICA's approach.

(5) Session 5 Quantitative Data

Data concerning the society activities were asked. They had eight working committee meetings and four general meetings until the day of evaluation. The amount of their community micro-credit system was Rs.11,335. Eight members borrowed from this savings. The purpose for obtaining loans were education and starting small businesses.

4.4.6 Sustainable Livelihood Analysis with Five Capitals

Through the evaluation of each pilot project, the JICA Project Team tried to evaluate the co-assistance approach in terms of sustainable livelihood. The detailed assessment is shown in Section 9.3.3 of the report.

4.4.7 Evaluation Results

(1) Relevance

The project purpose is still appropriate. Camp residents clearly recognize the difference between June and December. In June, there were no camp societies and residents used to be a group of people just waiting for external assistance. In December, they had a clear sense of solidarity and achieved various improvements in their camp life.

(2) Effectiveness

Attainment of project objectives has been so-so. There are two reasons for this. Firstly, camp life has a lot of aspects (such as accommodation, food, clothes, private and common equipment, education, health, job, transportation, water, toilet, garbage, security, etc.) and the JICA Pilot Project handled only a limited number of issues. The government and other

donors took care of almost all of the items among them and they did not adopt a co-assistance approach. If all supporters (governmental agencies, donors, and NGOs) got together and took the co-assistance approach, effectiveness of the Pilot Project would have been much better.

(3) Efficiency

All input from the JICA Pilot Project program has effectively contributed to institutional enhancement, which is the very basic mechanism for co-assistance. People are fairly well educated and trained in terms of group decision-making in traditional setting. Once they understand the co-assistance approach, they quickly agreed to this and selected core members (a president, secretary, and treasurer, as well as committee members). They made necessary decisions with the traditional Yojana-Isteri (proposal and confirmation) method. Therefore with minor input from the JICA side, they organized and managed their camp society by themselves with relatively small assistance from outside.

(4) Impacts

The Pilot Project had a significant impact on the mentality and behavior of camp residents. They developed a culture to care for others. For instance, families in camps could be divided into two categories (the first was the so-called main family, who had their own houses within 100 m of the shore prior to the tsunami, while the second was the sub-family, who did not own their house before the tsunami and used to be tenants or relatives of the main families). According to the government rule, only main families have the right to obtain permanent housing from the Government. In order to improve this situation, camp associations negotiated with donors for permanent houses for sub-families and submitted this petition to the Government. Now, camp society members clearly recognize their mission to care and work for members that are under disadvantageous conditions.

(5) Sustainability

Sustainability is a contradictory topic for this Pilot Project, as refugee camps are temporary facilities, with all residents later shifting to permanent houses. The first issue is the sustainability of camp societies themselves. Now they have a very strong sense of solidarity. Even after shifting to permanent houses in different locations, they will meet regularly like alumni associations of schools. Another connecting mechanisms is micro-credit. The two camp societies have started a savings and micro-credit system by themselves. The credit fund will be enhanced by the contribution of Berendina (a local

NGO), with micro-credit functions having expanded by January 2006. Since financial conditions of camp households have not recovered enough, this micro-credit system will support them and work as a binding mechanism for societies.

4.4.8 Issues for Camp Societies

Even though the Pilot Project has just begun and is still in progress, there are several issues to be addressed for the sustainable development of camp community associations.

(1) Sustainability of Association Activities

Preparation works for the construction of permanent houses started in the Gurubavira Camp. Refugee camp residents may be asked to move to the same permanent housing site. Some camp association members have themselves come up with the idea to organize a small micro-credit system to start self-employed businesses. They say this micro-credit would continuously benefit the people who once lived in the same camp and share the same experiences. A community association works not only for refugees, but also for the ordinary community. There are many issues that community associations in the permanent housing project sites can improve such as common facilities, garbage disposal, health, education, transportation, security, disaster management, and so on.

(2) Advocacy of Camp Residents

The Weligama Divisional Secretary requested that residents of the Gurubavira Camp move away from the site. Room rent was allocated for the relocation term. Main families (who owned house within 100 m buffer zone) will get permanent houses and come back to the same site, but sub-families will not. Camp society requested the Lordstar Company build houses for the sub-families also. However, handover of houses to refugees needs approval of the authorities. This procedure is now under way.

(3) Extension of Co-assistance by Public Sector

The JICA Team has involved officers from the Divisional Secretary in the camp society support. After termination of the Pilot Project, the Divisional Secretary will takeover the position of the JICA Team. Officers in the public sectors may need training to learn how to facilitate co-assistance systematically, in order to extend this approach.

Another idea on how to continue support to camp societies is to assign a coordinator to monitor and facilitate additional institutional development. A coordinator can be assigned from local and international NGOs, donors, or public institutes.

Chapter 5 Fishery Cooperatives Rehabilitation

5.1 Background

Fisheries remain one of the most important sectors of the southern provinces in terms of economic impact, employment, and nutrition. A survey of damage to the fishery sector was conducted at the beginning of the Project. The fishery sector was severely damaged and economic activities in the affected area are still somewhat limited, although many organizations have been working on rehabilitation. Details of the damage in this sector are described below.

Table 5.1 Estimated Damage of the 2004 Tsunami on Affected Co-operative Societies and Unions in the Southern Provinces

District	No. of FCS		Stocks (million Rs.)	Equipment (million Rs.)	Stationary (million Rs.)	Buildings		Total (million Rs.)
	Society	Union				Units	(million Rs.)	
Galle	12	1	0.2	5	-	12	8	13.2
Matara	10	0	-	0.4	0.06	10	-	0.46
Hambantouta	0	1	0.3	0.2	-	-	-	0.5

Source: Ministry of Co-operative Development (MOCD)

In 2004, 104 active Fisheries Co-operative Societies (FCSs) consisting of 12,518 members, were registered in the southern provinces of Sri Lanka. After the tsunami struck this area, the MOCD southern district collected information reports of the facilities and equipment relating to FCS activities. The Galle District suffered a total of 13.2 million Rs. worth of damage, while the Matara and Hambantota Districts each sustaining about 0.5 million Rs. On the other hand, the survey results obtained from the co-operative societies in the Matara District sustained a greater amount of damage.

In 2004, 78 co-operatives registered with the MOCD in the Matara District Co-operative, consisting of 34,255 members. There are a large number of members engaged in FCSs compared to the other associations, especially in the Matara District (as shown in Figure 5.1). According to the survey conducted in the Matara District Co-operative, the amount of damage on FCSs active in Matara was estimated at 1,940,000 Rs. As shown in Table 5.2, the offices of the One-day and Multi-day Boat Owners Association and the Kamburugamuwa South GS Division Epitamulla FCS suffered severe damage.

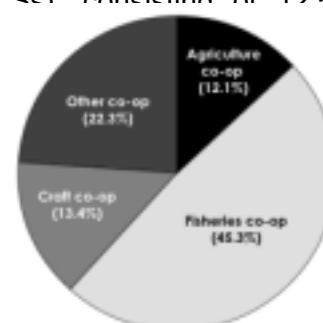


Figure 5.1 Ratios of Different Co-operatives in Matara District

Soon after the tsunami struck the area, several rehabilitation projects were launched by various NGOs. As several months have passed since the tsunami, repairs on ORU and small boats have been completed. NGOs and CEY-NOR have continued their rehabilitation plan for fishing equipment, although supplementary efforts have focused on the rehabilitation of larger fishery facilities. Many of the projects are concentrated in fishery harbors and large-scale vessel owner locations, however, support for the development of fishing communities has been insufficient. This Pilot Project aimed to support community-based fishery activities.

Table 5.2 Estimated Damages in 2004 to Tsunami-Affected Co-operative Societies in the Matara District (Rs.)

Name of the society	Building	Equipment	Stationary	Total
One-day and Multi-day Boat Owners Association	800,000	120,000	15,000	935,000
Noonnawella and Gandara West FCS	80,000	95,000	12,000	187,000
Dodampahala South and Belikatuwella FCS	80,000	25,000	5,000	110,000
Lunukalapuwa Fisheries Cooperative Society		30,000		30,000
Kamburugamuwa South GS Division Epatamulla FCS	500,000	75,000	5,000	580,000
Mirissa South Samagi FCS		25,000	5,000	30,000
Talalla, Uswella and Miriyagala FCS		12,000	8,000	20,000
Nugegoda and Devinuwara FCS		8,000	5,000	13,000
Dodampahala Central FCS		15,000	5,000	20,000
Mirissa South No.1 GN division FCS		12,000	3,000	15,000
Total	1,460,000	417,000	63,000	1,940,000

5.2 Plan of Fishery Cooperatives Rehabilitation Pilot Project

5.2.1 Strategy and Project Design

The basic strategies and concepts of the Pilot Project are described elsewhere in this report. Based on these concepts, the Pilot Project was formulated to support affected fishery communities. In Sri Lanka, immediately after the tsunami disaster struck, different international donors and NGOs began helping. Official Japanese assistance was one of the late starters in terms of fieldwork. It was therefore possible for Japanese official assistance to take a long-term view. Approaches taken by other donors to fishery communities were mostly the expedient supply of fishery gears and/or repairing fishing boats.

In this project, the team proposed to assist the FCSs that play a central role in the fishery community. Reasons for targeting the FCS are: (i) the Government of Sri Lanka has been

promoting the organization of fishery co-operatives for more than three decades; and (ii) fishery co-operatives are voluntary organizations.

FCSs are formed under a cooperative law and led through the guidance of a MOFAR official. Moreover, they are registered under the co-operative law under the Ministry of Agricultural Marketing Development, Co-operative Development, Hindu Affairs, and Assisting Education and Vocational Training.

Two officials of the noted two ministries are assigned to assist each of the FCSs. One is a fisheries inspector from MOFAR, who will provide information concerning fishery activities. The other is a co-operative inspector, who is attached to the Ministry of Co-operative and who supervises the co-operative work. These officials take care of different aspects of FCSs. Fishery inspectors are mainly responsible for coordination activities at a community level and for the registration and licensing of fishing gears. Co-operative inspectors are responsible for conducting an annual audit of the society. Financial matters are handled by a selected board of directors.

For the last several decades, some of the FCSs terminated their activities as they accumulated losses from unpaid loans, incurred unstable profits, and were damaged by exploitative acts by certain members. Japanese FCSs also have had similar experiences in the past. Japanese FCSs went through a mirror-image of the “Mudalari-system,” at the initiative of the government, and reorganization. Nevertheless, Japanese FCSs gradually succeeded in taking greater initiatives that resulted in empowering fishermen. The fundamental concepts of FCSs in both countries greatly resemble each other.

Currently, there are more than 750 FCSs in Sri Lanka. Some of the FCSs have organized banks called “IDHIWARA Fisheries Community Bank”, which function as community financial institutions for credit, savings, and other development activities for its members. Sri Lanka’s FCSs mostly function as micro-lending organizations. In this Project, the concept of the IDHIWARA banking system must remain, but enhancing FCS’s functions are essential. Introducing knowledge held by Japanese FCSs could be considered useful.

5.2.2 Selection of the Pilot Project Sites

In line with the basic strategy of the Project, three FCSs in Matara were chosen to be Pilot Projects. The basic information on the three FCSs is shown in Table 5.3. As part of the site

selection process, questionnaires were sent out to nine FCSs in the Matara District, with survey results shown in Section 5.3.1.

Table 5.3 Outline of the Three Cooperatives

Name of FCS	Establishment (Year)	Registration No.	No. of members	Cost per share (Rs.)	Max. loan amount (Rs.)	other activities				Number of boats				Relocation to Refugees to camps (households)
						Social Activity	Office Building	No. of Meetings (/year)	Common management	Multiday	one-day	FRP	ORU	
Dodampahala South & Belikatuwella fisheries cooperative society	1993	MR 04	102	100	50,000		*	12		18	3	5	60	3
Kamburugama & Epitamulla fisheries cooperative society	1997	MR 12	71	100	5,000			12	x	0	0	2	7	76
Noonnawella & Gandara West fisheries cooperative society	1989	MR724	158	100	50,000	-	*	12	x	10	50		30	7

*washed out by tsunami 2004

The following eight factors were taken into consideration as criteria in selecting the site: (i) existence of an organized fishery community, (ii) damage caused by the tsunami disaster, (iii) reliance on the FCS, (iv) possibility of common (joint) work among members, (v) size of the fishery community, (vi) support and dependence on other donors, (vii) effect of political concern, and (viii) distance from Matara city.

Nine FCSs were evaluated in the Matara District, one from Dodampahala South and Belikatuwella FCS (hereafter Dodampahala South FCS), located east of the Matara District, two FCSs from the Kamburugamuwa South GS Division Epitamulla FCS (hereafter Epitamulla FCS), and Noonnawella and Gandara West FCS (hereafter Noonnawella FCS) close to Matara city. The aim of this Pilot Project was to assist the tsunami-affected fishery communities in a swift manner. The Project Team frequently visited these communities to discuss needs and to hear requests from fishermen and other members in the affected communities.

5.2.3 Plan for Fishery Cooperatives Society Support Pilot Project

- (1) Project Title: Fishery Cooperatives Society Support Pilot Project
- (2) Location: Epitamulla, Noonnawella and Dodampahala FCS in Matara District
- (3) Counterpart Organization: Fisheries District Office and Cooperative District Office
- (4) Beneficiaries: Fisheries Cooperative Society and Members
- (5) Project Duration: May to December 2005

(6) Current Conditions

The tsunami destroyed the office building of the Fisheries Cooperative Society (FCS), which supported local fishermen through funding and a banking system. The auction hall and banking office, which functioned as the center for management and operations, were badly damaged by the tsunami, resulting in difficulties for fish marketing and related activities of the FCS.

Many donor organizations and NGOs have made efforts to rehabilitate fishery harbors and provide fishing equipment and gears. Meanwhile, support to the FCS has been disregarded. FCS plays a central role vis-à-vis rural banking in Sri Lanka. It was and is essential for fishermen to obtain some funds for self-help for revitalization after the disaster. The tsunami wiped out the FCS office building and the FCS was incapable of continuing its banking and credit loan operations. In fishery villages, catch-products are sold in the open field and/or in temporary shelters that can cause contamination and spoilage to products, making them unsuitable for distribution. It was crucial to make greater efforts to decrease losses in each catch since the number of fishing vessels has decreased, as has the size of the catches. It is essential to maintain maximum product freshness when distributing the products.

(7) Goals and Objectives

- To reestablish the livelihood of fishermen at the community level with FCS support.
- To verify effectiveness of the co-assistance approach for disaster rehabilitation.

(8) Project Components

- Increase knowledge and facilitate capacity building in FCS related activities.
- Conduct open seminars.
- Construct a fishing gear locker, a small auction hall, and an FCS office building in FCSs, where necessary.

(9) Implementing Organization Structure

This project has been implemented in partnership with the Matara District Office of DFAR and the Ministry of Cooperative Development (MOCD), respectively. Management seminars have been held for select FCSs communities, fishery inspectors, and cooperative inspectors. Through the participation of these inspectors, other FCSs can also be

instructed on further building capacity. This Pilot Project (management system) sought to improve FCSs as well as the living conditions of its members.

(10) Use of Outside Contractors

Outside contractors must be selected by locals. Berendina, a local NGO, undertook the implementation of this Pilot Project.

(11) Other Japanese Assistance to the FCS

Most fishery equipment that was provided by non-project-type grants were given to individual fishermen and not to the FCS. Although the rehabilitation of the Tangalle and Galle Fishery Harbors was also to be conducted under the same non-project-type grant scheme, no plans existed to support the fishery communities. Once fishery equipment provided by Japan arrived in the hands of the fishermen, FCS fishermen could effectively utilize the cooperative facilities provided by this project.

(12) Applicability of Japanese Expertise and Experience

The fisheries association in Japan is responsible for a variety of activities, such as the financing (banking) system for society members, loans, mutual funds, fishery gear procurement, common fish retailer shops, cooperative management of facility building, fishery education/training, and social activities. This cooperative system has been developed in Japan and proved useful for managing small fishery communities. The technical know-how of the Japanese FSC system has been studied and distributed widely throughout Southeast Asia. It is likely that the Sri Lankan fisheries sectors would find it useful.

(13) Sustainability and Expandability

In this project, three FCSs located in the Matara District were selected. These FCSs had good management backgrounds. It was likely that each FCS would effectively operate these facilities after project completion. Capacity building procedures would also be transferred to other FCSs from the cooperative inspector and members of the FCSs.

(14) Environmental Impact

No additional environmental restrictions concerning the rebuilding of the auction hall and the FCS office building exist, since the project objective was principally to restore the

facilities to pre-tsunami state. In actuality, the provision of the auction hall could decrease the unnecessary waste of fish and increase the value of products due to their handling in cleaner environments. One common practice among southern Sri Lankan fishermen was to remove their boat engines and keep them in the owner's house for security purposes after every workday. Under such circumstances, however, any fuel leakage can cause negative environmental impacts. As such, by constructing engine storage lockers near the landing sites, fuel tanks and engines can be collected and stored in a single place, making risk management easier and concentrating storage on a single site.

(15) Related Activities of Other Donors

Fishery vessel repairs were conducted by several NGOs including GOAL (Ireland), the Belgium Army (Belgium), and CARITAS (NGO). In addition:

- Secours Populaire Français (France) provides bicycles and motorbikes, as well as insulated boxes to store fish for small-scale fishery distributors;
- Japanese and other international donors, as well as NGOs provided and repaired fishing gear, fishing boats, as well as boat engines; and
- The People's Republic of China and the United States of America undertook fishery harbor rehabilitation, with the Mirissa and Puranawella Harbors in Matara District on the list.

5.2.4 Detailed Pilot Project Plan

(1) Dodampahala Project Site

1) Background

Dodampahala is located 24 km east of Matara city. There are stretches of beach in front of the village (as shown in Figure 5.2). Small hills surround this village, which lessened damage by the tsunami. The number of households in this village was estimated at 750 (population 3,500). Eighty percent of households had some sort of involvement in the fishery sector. Besides workers in the fishery industry, there were a few government employees, people working in the clothes industry, and a few drivers of three-wheelers.

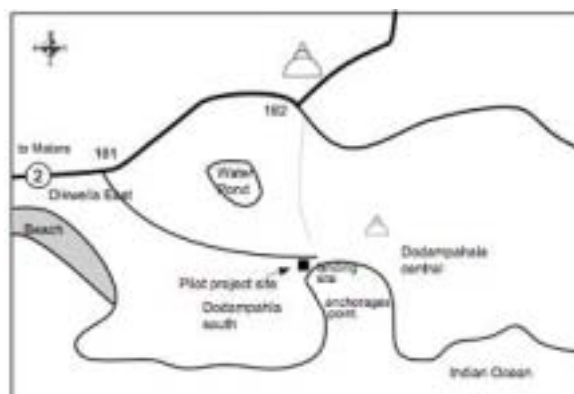


Figure 5.2 Map of Dodampahala South FCS

Before the tsunami, many women worked in a clothes factory for the Tri-Star Apparel Export Ltd. This factory was severely damaged and its management decided to pull out of Dodampahala. As a consequence, more than 400 employees, mostly women, lost their jobs. Three houses were destroyed by the tsunami, and the families moved to a temple and to the houses of their relatives in the village. The majority of households were engaged in the fishery sector, and their livelihoods were seriously affected.

A building used as the FCS office (IDHIWARA Fisheries Community Bank) was completely destroyed by the tsunami. After the tsunami, a safe and an accounting book were retrieved and they were kept in the house of the FCS treasurer for security. The auction hall and meeting house were also damaged by the tsunami, although the condition of the auction hall was not as critical as that of the office building. According to a board director, the mental damage to its members was greater than the physical damage to the office itself. After the tsunami, one NGO (GOAL) visited this community to assist in road construction.

2) Fisheries Activities

Fishermen in Dodampahala south consisted of people aged 16 to 50. Average income was estimated at 15,000 - 20,000 Rs./month - after the tsunami, this decreased. The number of boats owned by this FCS is shown in Table 5.4.

Table 5.4 Damaged Boats after the Tsunami in Dodampahala

	Multi-day boat	One-day/FRP boat	ORU	Engine
No. of vessel	18	8	60	
Damaged	3	1	20	2
Repaired	3	1	20	0

In this community, there are 18 multi-day boats and eight one-day/FRP boats. These multi-day boats need at least 200 kg of ice for one voyage. This community purchases a large amount of ice from a private company amounting to 100 Rs. per 50 kg. The price of fish became fairly stable compared with the price immediately after the tsunami. On the other hand, the price of ice and fuel dramatically increased after the tsunami. In the community, there are 10 fish distributors owning a refrigeration truck. Those distributors purchase fish directly from fishermen and distribute to Colombo and hill country regions. The truck owners and boat owners are completely separated in their work. The wholesale price of mackerels is 60 Rs./kg and that for tunas is 300 Rs./kg. Yearly fish catch in this community is estimated at 1,800 tons and this is mostly sold to the Colombo area. Besides multi-day boat fishermen, there are 10 - 20 divers and 30 - 40 angling fishermen who catch crustaceans (lobsters, shrimps, etc) and bottom-fish using ORU and one-day boats. Women in the village produce dried-fish (karawala) for extra earnings. Its trading value is 200 - 250 Rs./kg, but price varies and can easily be affected by the market. Recently, bottom long-line fishermen have been gradually changing their fishing style from coastal fishing to offshore fishing because of the decrease in natural resources.

In the early 90s, NARA introduced the Fish Aggregating Device (FAD), however, this caused excessive fishing, reducing natural resources in the area. Due to this negative experience, fishermen think FAD is not a trustworthy system. The community recognizes the need for resource management for the future.

3) Fisheries Co-operative Society

Dodampahala South Belikatuwella FCS was established in 1993, with 130 members (102 of which are active and four of whom are females). Current activities are mainly focused on micro-credit loans and social welfare services. The social welfare services include providing cash and food at weddings, funerals, and festivals (such as Peripheral Day and Devadhana Festival).

Loan conditions in Dodampahala South FCS are shown in Section 5.3.1. The highest amount of credit offered to its members is 50,000 Rs. for a 25-month term and an 18% interest rate. There is a penalty for late repayment. These credits are used for purchasing and repairing fishing gears. In November 2004, this FCS opened a new office building. However, one month later, the tsunami struck this area and destroyed the building. Five years were spent from the planning to the opening of this facility. The members of the community provided labor during construction and the Government and DFAR supported 60% of the cost of constructing this building.

4) Pilot Project

At the Dodampahala South FCS, the aim of the project was to create a co-operative work model by sharing common facilities using the new income sources for sustainable operation.

During the first meeting at Dodampahala South FCS, members requested two items for support. First was the rehabilitation of the FCS banking office that was destroyed by the tsunami. The second was to receive advice on sustainable management in a micro-credit scheme at the FCS bank. In this area, no deaths from the tsunami have been reported. However, boats, houses, fishing gear, the clothes factory, and paddy fields were lost or badly damaged. The clothes factory was privately owned and was the second largest factory in this area, providing jobs for more than 400 women. Damage to the factory building was so severe that the owner had given up continuing work in Dodampahala. As a result, women lost their livelihood and communities lost one of their few partners.

According to a FCS board director, members realized the necessity of supporting others through micro-credit for the purchase of new fishing gear, and through initial funds to find new work for women. However, few funds were provided by the FCS. In Dodampahala South FCS, the Project Team proposed a common (sharing) operation system in order to become a more effective micro-credit lending bank. A meeting was held for the FCS and their needs were discussed. Discussions resulted in the rehabilitation of the bank facility and the construction of out-board motor (OBM) lockers as common facilities.

Furthermore, 1,000 m west of the entrance of the village, a Buddhist temple is located on top of a hill. Near this temple, a hut for small-scale (artisanal) fishermen exists. This hut was built with coconut leaves and was used for preparing fishing gears and for waiting areas for fishing (wind and tide) as shown in the picture. There were more than 100 fishermen using this hut every day. Most of these fishermen were relying on ORU which have no engines. In case of a windy day during the monsoon season, these fishermen usually wait in the hut for a few hours (sometimes all night) until the weather becomes moderate. As for the support to the artisanal fishermen, construction of a community hall was requested by the Dodampahala South FCS.

Those issues were carefully taken into consideration, with on-site surveys conducted by the Project Team. OBM lockers are very useful facilities for fishermen and they would be useful for the FCS if monthly charges were collected from locker users. The Project Team recognized the effectiveness and relevance of the community hall in the Dodampahala FCS. Consequently, since the strategy of the Pilot Project was based on the hypothesis of

“co-assistance in community”, the Project Team selected the construction of a bank building as first priority, OBM locker as second, and the community hall as third priority.

(2) Epitamulla Project Site

1) Background

Kamburugamuwa and Epitamulla villages are located 7 km west of Matara city. Before the tsunami struck in 2004, there were 300 households (population of 1,500) living in this village. Major industries include fisheries and coir (cumulatively accounting for 60% of all households). The remaining households are carpenters, constructors, teachers, and government employees. The majority of villagers are Buddhists; they have been living in lands inherited from their forefathers. In the 1980s, some villagers migrated from the northeast of Sri Lanka.

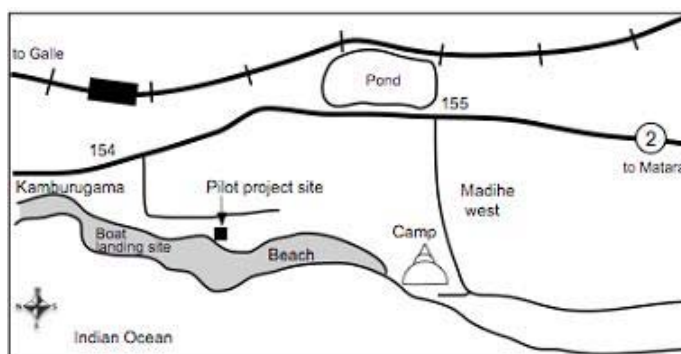


Figure 5.3 Location Map of Epitamulla FCS

The tsunami took the lives of eight villagers including small children and destroyed houses in the village forcing 76 families to relocate to temporary camps. The nearest camp was situated inside of a temple (Godakauda Samudeatheera maha viharayakawlugaiwun), which is located 1.5 km east of Epitamulla village. In this camp, 10 additional families from different villages were relocated. Residents of the camp vary from time to time as people come and go, but the camp was estimated to have 80 - 90 families. This camp was operated by SEWALANKA (NGO) from the beginning of its settlement. Sixty percent of households in the camp had their houses within the a 100 m buffer-zone, where they could not rebuild their houses. USAID was taking the lead in preparing permanent residences near the camp. Some residents were eager to return to their old neighborhoods, but the majority of the residents agreed to this resettlement plan issued by the Government. The land for resettlement was offered to the affected people by the temple.

To increase the livelihood potential in the camp, SEWALANKA arranged a project to hire laborers from the community to prepare construction materials and to clean roads. These construction materials are to be used in permanent houses in the future. The majority of villagers in the camp were temporarily earning 400Rs./day from this labor work.

2) Fishery Activities

Fishery activities are mainly conducted in the coastal reef area, not far from the Rhinigare and Kappagare villages. Rhinigare is 3 km and Kappagare is 6 km away from the coastal line. The depth of the fishing ground is 20 to 25 m. Barracudas, Spanish mackerel, and horse mackerel are commonly caught in this area. However, these sites are open fishing grounds for neighboring fishermen and tourist divers. Also though, fishermen in Epitamulla had less experience working in offshore fishing and recently other multi-day boats users had harassed them (with fishing gear either destroyed or stolen). Most of the fish caught were shared and consumed in the community at 60 - 100 Rs./kg. Some surplus was sold to neighboring communities by housewife-resellers.

3) Fisheries Co-operative Society

This FCS is a relatively new society, established in 1996. There are 150 registered members and half of them work in the fishery sector. The site of the FCS was badly damaged by the tsunami. The tsunami waves completely destroyed the FCS office and bank facilities that were constructed in the coastal side of Epitamulla village. As a result, all notes and account books were washed away. Not having these documents caused problems in continuing business with local banks. The main activity of this FCS was the management of micro-credit loans and savings of its members. Beside these functions, the FCS had been organizing nursery schools, clinics for mothers, and an auction hall.

As mentioned above, the tsunami has made the lives of villagers difficult. Twenty-six out of 76 households were fisheries households. There used to be two FRP boats and seven ORUs for fishing activities, however, after the tsunami, fishing operation was carried out with only two ORUs. Most of boats were shared among three to four members, while the other members were engaged in skin-diving and line fishing, which did not require the use of boats. The majority of female members in the FCS are engaged in the coir industry. This kind of work requires a certain amount of capital for starting the business. In the community when funds are needed, three members gather together to receive loans at an FCS bank. There is a government-related bank called the Ruhunu Development Bank for loans, however, member requested to use FCS banks rather than Ruhunu Banks due to better interest rates and quicker/simpler financial judgments. Credit loan conditions in Epitamulla

FCS are shown in Section 5.6.2. The maximum amount of loans offered to its members is 5,000 Rs. for 12 months, with an interest rate of 15%. The interest rate for a savings account is kept at 10%. However, even the maximum amount of credit loans that can be received is too low to obtain fishing gear, so that the majority of its members end up using the loans when paying for daily necessities or their children's education.

As mentioned before, this FCS runs a nursery school. There were 35 - 40 children learning at the nursery-school before the tsunami. After the tsunami, the FCS re-opened the nursery school by renting a study hall at the Buddhist temple near the camp. The reason for opening this nursery school was that the majority of parents in the village worked and was unable to look after their children during the daytime. This nursery school is open to the community and is managed by the FCS. With the termination of FCS banking because of the tsunami, the nursery school was being managed by village volunteers.

4) Pilot Project

The Epitamulla FCS was severely damaged by the tsunami and all assets including ledgers were lost. The documents including deeds and bank account proofs were completely lost. During the first meeting at the Epitamulla FCS, the members discussed the livelihood conditions after the tsunami. Members asked for assistance, first in reconstructing the FCS banking office and recreating a micro-credit scheme, and second in reconstructing the nursery school. Members also discussed employment. Eight people were killed in this village, and 76 households were temporarily relocated to camps. Government assistance, donors, and NGOs were mainly focused on temporary items, such as shelter, equipment, and food. There was also a great demand for creating alternative ways of making income. These requests by FCS were only natural as the fishery sector was Epitamulla's main industry and members of the FCS were composed mainly of fishermen, women, and other vocational employees. For this reason, the micro-credit loan system could be considered to be useful and beneficial in assisting its members. The Epitamulla FCS realized the necessity of supporting its members by providing urgent micro-credit loans for purchasing fishing equipment and for acquiring initial funds to create opportunities for women in new sectors. However, there was a lack of initial funds in Epitamulla.

In the Epitamulla FCS, the Project Team held discussions and proposed a common management system that would strengthen the FCS's potential as a micro-credit loaning bank. By taking up this issue, members held discussions and reached a conclusion that they needed assistance for the construction of a banking facility and fishing gear lockers.

(3) Noonawella Project Site

1) Background

Noonawella is located 10 km east of Matara city. The village is surrounded by small hills (shown in Figure 5.4). The total number of households in this village was estimated to be 700 families (3,000 person population).

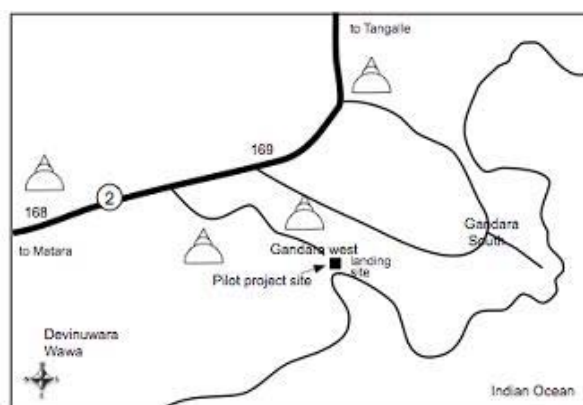


Figure 5.4 Location Map of Noonawella FCS

The majority of families in this community are somewhat involved in the fishery sector. Other than fisheries, their income sources are the coir industry, a nylon factory, and the service industry. In the 1950s, there were only 75 households in this community. The community gradually increased in number over the last two decades. During this period, the community accepted migrants from the northeast of the island. This, however, has changed in the last few years because of a peace treaty signed by the Central Government. The tsunami forced seven households to relocate to temporary camps, called the Dewgampura community, located in the Kandegodalle Temple. All villagers considered themselves devout Buddhists. After the tsunami, the community constructed a small Buddhist house (Kuda Pansala) near the landing site and donated a Buddha statue to pray.

Table 5.5 Damaged Boats in Noonawella FCS

	Multi-day boat	FRP boat	ORU	Engine
# of vessel	10	50	30	
Damage	5	3	7	5
Repair	4	0	7	

2) Fisheries Activity

The number of boats in the community, which were damaged by the tsunami is shown in Table 5.4. There are 50 one-day/FRP boats catching tunas using a long-line fishing method. Net-fishing methods are not commonly used in this community. Post-harvest handlings

need to be improved in this community. Currently, fish are sold on the beach and laid on the ground without cases. Nearly all of the fish caught from one-day/FRP boats are consumed in the Colombo and Matara areas. ORUs are mainly used for in-shore fisheries, and their landing sites are located in the southwest side of the beach. Different kinds of shore fish are caught, varying from cuttlefish and rockfish (snapper/breams) to sardines, etc. In the off-shore reefs near Noonawella, many fishing points consisting of natural reef rocks exist. These areas are a good habitat for rockfish and bottom fish. FRP boats used for skin-dive fishing are also used for lobster catching. In this village, 20 to 25 families are involved in lobster fishing. The price of lobsters sold to distributors (middlemen) is 1,600-1800 Rs./kg. Large rockfish collected from this area have a high market value and are sold in Colombo for 360 Rs./kg for groupers (weighing more than 7 kg) and 180 - 200 Rs./kg for sea breams (weighing more than 3 kg). In recent years, most fishermen have realized that fish are becoming smaller in size.

Multi-day boats are harbored in the coastline near the village. However, weather conditions can easily influence the unloading of a catch at the landing site, thus a majority of ship owners would prefer to use a larger fishery harbor.

Women in the community produce dried-fish (called karawala) products from what remains from the catch for extra earnings. Production of dried fish is mainly given to women in the communities. The wholesale price of dried-fish is 200 - 300 Rs./kg, which appears to be very high, but 7 kg of fish is needed to produce 1 kg of dried fish. This makes dried fish less enticing as a product than fresh fish. The average income of fishermen in this village varies, but it is estimated to be 20,000 - 30,000Rs. per month.

Table 5.6 Micro-credit Schemes in Noonawella FCS

Amount (Rs.)	Repayment periods (month)	Interest rate (%)
5,000	3	4.09
10,000	6	4.09
15,000	9	6.05
20,000	12	9
25,000	15	12
30,000	20	15
35,000	25	20
40,000	36	25
50,000	36	30
60,000	36	30

3) Fisheries Co-operative Society

The Noonawella and Gandara West FCS were established in 1989 and consisted of 286 members (with 158 active members). Active and inactive members are determined based on attendance at meetings, savings in the FCS Bank, and repayment of credit loans.

The main purpose of establishing an FCS is to make and offer a credit scheme for its members to purchase fishing gear (as such, the main activity of the FCS is to set credit loans). Credit schemes and amounts are selected from Table 5.5. The credit system program works as follows: (i) the maximum loan a first-time borrower can receive is 5,000 Rs.; (ii) if the borrower repays the loans without delay, the second loan ceiling is increased to 10,000 Rs; and (iii) a penalty is given to delayed repayment (see Section 5.3.5). The majority of loans are used for the repair of out-board engines and the purchase of fishery equipment.

A general meeting is held on the last day of each month and members are basically required to participate unless they are out of the village during the fishing season. Whenever they are out of the village, they must submit a letter of attorney to the society.

This FCS in 2004 was named the best FCS in the southern provinces by the MOCD. As part of its activities, the FCS operates a nursery school. There are 70 children in the nursery school. Operating expenses and allowances to teachers are paid through donations and funds raised by villagers.

4) Pilot Project

The Noonawella FCS was named by the Ministry of Co-operatives as one of the best co-operatives in terms of loan recovery. In the Noonawella FCS, the aim of the project was to create a co-operative work model by sharing common facilities using the new income sources for sustainable management.

During the first Noonawella FCS meeting, members requested the participation of assistants from our Project Team. They asked technical know-how questions about boat repairs, fishing equipment, and GPS and radio communication systems. They also wanted advice on the management of resources and on the FCS banking system.

We explained the main concept of this. As for the FCS, they realized the necessity of supporting members by providing different loans for purchasing new fishing gears and radio communication systems (although few funds were available in the FCS). The

Noonawella FCS has limited sources of income from their activities, with the majority of funds raised through donations, membership fees and government grants.

5.2.5 Credit Activities in FCSs

Based on the information obtained through several meetings with the three societies, it is evident that the FCS's main function is the promotion of savings and disbursement of loans to its members. Types of loans provided by the three FCS are shown (Table 5.7) below.

(1) Under Urgent Disaster, Loaned Equipment is Granted for the Following Purposes:

- To purchase or to repair fish vehicles;
- To make dried fish and Maldives fish (umbalakada);
- For boat engine repair;
- For the sawing industry; and
- For the coir industry.

Table 5.7 Types of Loans Provided by FCS

Noonawella FCS	Dodampahala FCS	Epitamulla FCS
Urgent loans	membership loans	Urgent loans
Urgent Disaster loans	-	General loans
Essential loans	-	-
Membership loans	-	-

Society members are entitled to obtain credit for their urgent requirements. Membership loans are provided mainly for three activities: fishing activities/fish industry, self-employing activities, and repayment of external loans. The total amount of loans granted by each society is shown in Table 5.8.

In the Epitamulla FCS, all documents including ledgers and related files were washed away by the tsunami. The Project Team was involved in the reconstruction of the association and in the preparation process of appropriate documents. Details and conditions of the credit schemes for each FCS are attached at the end of this chapter (Section 5.6).

Table 5.8 Loan Amounts Granted from FCS

FCS	Type of loans	Years	
		2000	2005
Noonawella FCS	Urgent loans	19,500	22,000
	Membershiop loans	975,000	1,620,000
	Urgent Disester loans	-	415,000
	Essential loans	165,000	30,000
Dodampahala FCS	Membershiop loans	368,000	710,000
Epitamulla FCS ^{*1}	General loans		
	Membershiop loans		

^{*1} All the documents, Ledgers and related arewahed off by the tsunami. (Rs.)

(2) Credit Recovery Rate

The credit recovery rates of the Noonawella FCS and the Dodampahala South FCS are virtually 100%. In the Epitamulla FCS, before the tsunami, they maintained a 95% recovery rate. These three FCSs are well-experienced in handling micro-credit activities among its members. Members are given training on “society management” by the Fisheries Co-operative Department.

5.2.6 List of the Board of Directors in FCS

The FCS is governed by the Board of Directors that consists of a chairman, a secretary, a treasurer and four committee members. This board is given the authority to govern the association by the general assembly of FCS. The Board of Directors include the following.

Dodampahala South FCS

Chairman:	M.M. Nimal
Secretary:	H.H. Ranjith
Treasurer:	Y.G. Sunil Shantha
Committee Member:	K.H. Chandrasena
Committee Member:	A.P. Mitrapala
Committee Member:	E.J.P. Gamini
Committee Member:	K.H. Nalani

Epitamulla FCS

Chairman:	H.M.S. de Silva
Secretary:	K.G. Karuna
Treasurer:	P. Gnanawathi
Committee Member:	K.G. Sandi
Committee Member:	Harsha Kumari

Committee Member: Karuna Palliyaguru

Committee Member: D.K. Hemalatha

Noonawella FCS

Chairman: B. Neilaweera

Secretary: Renuka Nallaperuma

Treasurer: Piyadasa Amadoru

Committee Member: K.M. Mangalika

Committee Member: K.G. Saminona

Committee Member: H.A.P. Piyaseeli

Committee Member: A.W.M. Anura Prasanna

5.3 Activities of Pilot Projects

5.3.1 Questionnaire Survey

A survey was carried out at the Board of Directors of nine coastal FCSs in the Matara District. The Project Team asked questions by collaborating closely with the Cooperative Inspector in accordance with the sheets attached in Annex 5-1. However, the FCS demand for assistance was big and some of the demand was not appropriate for the Project. So setting priorities for each FCS was a necessary step. A survey was then conducted to collect information to set the priorities for assistance. The survey results are shown in Annex 5-3.

5.3.2 Steering Committees

As an important part of the Pilot Project, the steering committee meetings met regularly at the JICA project office in Matara. Representatives from each FCS, the JICA Team, the Berendina Foundation, the Fishery Department, and the Cooperative Department Office attended. Every major activity was discussed and approved by this committee. This aimed to treat the three selected FCS as partners rather than just silent beneficiaries. Table 5.9 lists these committee meetings. Records of meetings are attached as Annex 5-6.

Table 5.9 List of Steering Committee Meeting Met Monthly

No	Steering Committee Meeting	Date
1	July Meeting	5 th July 2005
2	August Meeting	11 th August 2005
3	September Meeting	8 th September 2005
4	October Meeting	14 th October 2005
5	November Meeting	9 th November 2005

Source: JICA Team

5.3.3 Workshop for FCS Needs Assessment

A series of needs assessment workshops were conducted to identify the needs of each FCS through discussion with the beneficiaries. Details of these workshops are shown in Annex 5-4. Table 5.10 lists these workshops.

Table 5.10 List of Workshop for Identifying FCS Needs

No	Target FCS	Number of Participants	Date
1	Noolwella	21	29 th August 2005
2	Eppitamulla	46	30 th August 2005
3	Dodanphala	61	17 th September 2005

Source: JICA Team

5.3.4 Seminars, Workshops, and Trainings

The Project Team conducted the following seminars (in Table 5.11) that were expected to increase the skill and knowledge of beneficiaries. The subjects of these seminars were selected based on need assessment workshops and discussions of the steering committee meetings. Details of these seminars and workshops are presented in Annex 5-5.

Table 5.11 List of Seminars and Workshop for FCS

No	Name of Seminar	Number of Participants	Date
1	Positive Thinking Workshop	46	5 th October 2005
2	Business Plan Preparation training	14	22 nd & 23 rd October 2005

Source: JICA Team

5.3.5 Study Tours (Contents of Visit)

The JICA Project Team designed and conducted two types of study tours in collaboration with the commissioner of the Co-operative Department Office of the Southern Province. The tours were to offer the opportunity to learn among the beneficiaries and learn from good practices of nearby cooperative societies. Executive members of FCSs participated in these tours. Details of these study tours are shown in Annex 5-5. Table 5.12 lists these workshops.

Table 5.12 List of Study Tours Conducted for FCS

No	Destination	Number of Participants	Date
1	Noonnawella FCS	5	19 th September 2005
2	Kotopola Multi Purpose Cooperative Center	6	15 th October 2005

Source: JICA Team

5.3.6 Coordination among Stakeholders (DFAR, Co-operative District)

(1) Role of Department of Fisheries and Aquatic Resources (DFAR)

DFAR is a government organization that is responsible for the sustainable management of fishery production and the conservation and preservation of the Sri Lankan coastal line.

The following is a list of the organization's functions:

- To manage, regulate, conserve, and develop fishery activities in a sustainable manner in conformity with national and international laws and conventions;
- To promote local and foreign investment in the fishing sector;
- To introduce new technology for the exploitation of fishery resources in national and international waters;
- To lift the socio-economic status of the fishing communities;
- To ensure the quality and safety of fish and fishery products exports in conformity with international standards; and
- To minimize post-harvest losses and improve the quality of local fish products.

Also, there are regional DFAR offices in each district division (with the DFAR Matara District office situated at the center of Matara city). There are nine fishery inspectors covering inland and coastal fisheries in the Matara District. This office has been the responsible organization that conducted tsunami damage surveys and published the tsunami recovery plan for the fishery sector. Also, the JICA Project Team and the Department of Fisheries and Aquatic Resources agreed on the implementation of this Pilot Project and exchanged Memorandum of Understanding (MOU) in July. These two organizations are closely collaborating in many aspects of the Pilot Project implementation.

(2) Role of Co-operative District Office

The District Co-operative Office (Ministry of Agricultural Marketing Development, Co-operative Development, Hindu Affairs and Assisting Education and Vocational Training, Southern Provincial Council) is a local governmental organization that is responsible for sustainable management of co-operative activity pursuant to the "Cooperatives Act." The co-operative's major activities include improvements in accounting and auditing practiced by the cooperative societies and enforcement of amended school cooperative bylaws. These activities are undertaken by the cooperative sector. The following programs are formulated in the co-operative's implementation policy:

- Co-operative Development including Co-operative Education, Extension and Promotion;

- Organization, Registration and Audit of Co-operative Societies at the APEX Level; and
- Matters connected with Employees of Apex Co-operative Societies.

In addition to these areas, a project for Restructuring Cooperative Rural Banks is being implemented with financial assistance from the Asian Development Bank, under the Rural Finance Sector Development Program implemented by the Ministry of Finance and Planning.

The JICA Project Team and the Co-operative in the Southern Province agreed on the implementation of this Pilot Project and exchanged a Memorandum of Understanding (MOU) in July. These two organizations are closely collaborating in all aspects of the Pilot Project implementation.

5.3.7 Construction Work

Table 5.13 Proposed Construction Schedules and Priority

FCS	Name of Facility	priority	2005				
			August	September	October	November	December
Dodanpahara south FCS	Bank office	3			■		
	OBM locker	5				■	
Epitamulla FCS	Bank office	1		■			
	Fishing gear locker	4			■		
Noonnawella FCS	Auction hall	2	■	■			
	OBM locker	6					■

■ Termination period of construction

Source: JICA Team

In the Matara District, all construction materials and fees have significantly increased after the tsunami due to the special procurement demand after the tsunami struck. Considering the limited budget and the demands/needs of FCSs, the Project Team has set priorities for construction as shown in Table 5.13. These buildings are designed with minimum requirements.

The first construction site for the Pilot Project started on August 22nd at the auction hall in Noonnawella FCS. On that day, the society prepared a ceremony to mark the official start of construction activities, however, soon after this ceremony, construction was halted due to issues regarding the right to use the land where the FCS was to build the auction hall. A few complaints were made from one villager, who lacked a deed to the land. Since the land is located within a 100 m buffer zone, there is no doubt that the land belongs to the Sri Lankan Government. To clear up this matter, board members in the Noonnawella FCS prepared the necessary files and letters to submit to the responsible offices, DFAR and

CCD in Colombo. This land issue should be cleared up within a few weeks. However, to solve the issue, FCS members must work together and think of a sound solution to the problem. It will take some time before the issue is solved, but certainly this experience will enhance the empowerment and knowledge of FCS members.

For further construction at Pilot Project sites, an agreement was made between the Project Team and FCS stating that FCS must prepare the necessary land for construction. The selection of each construction site is to attach importance to the independency of the FCS. As for capacity building, the Project Team focused on technical advice for obtaining land clearance and construction clearance to FCS. As of the middle of September 2005, however, there was no progress. As such, the Project Team has decided to assist on obtaining those documents.

As for the different sites, different procedures were required for each construction site. Figure 5.5 shows a case-study example (numbered flowchart) to explain each case. In September 2005, the MOFAR announced new buffer zone guidelines. These guidelines contains the reduction of length of new facilities constructed near the coastline, which could create negative impacts on the project, concerning land offers to FCS from land possessors.

(1) Noonawella FCS

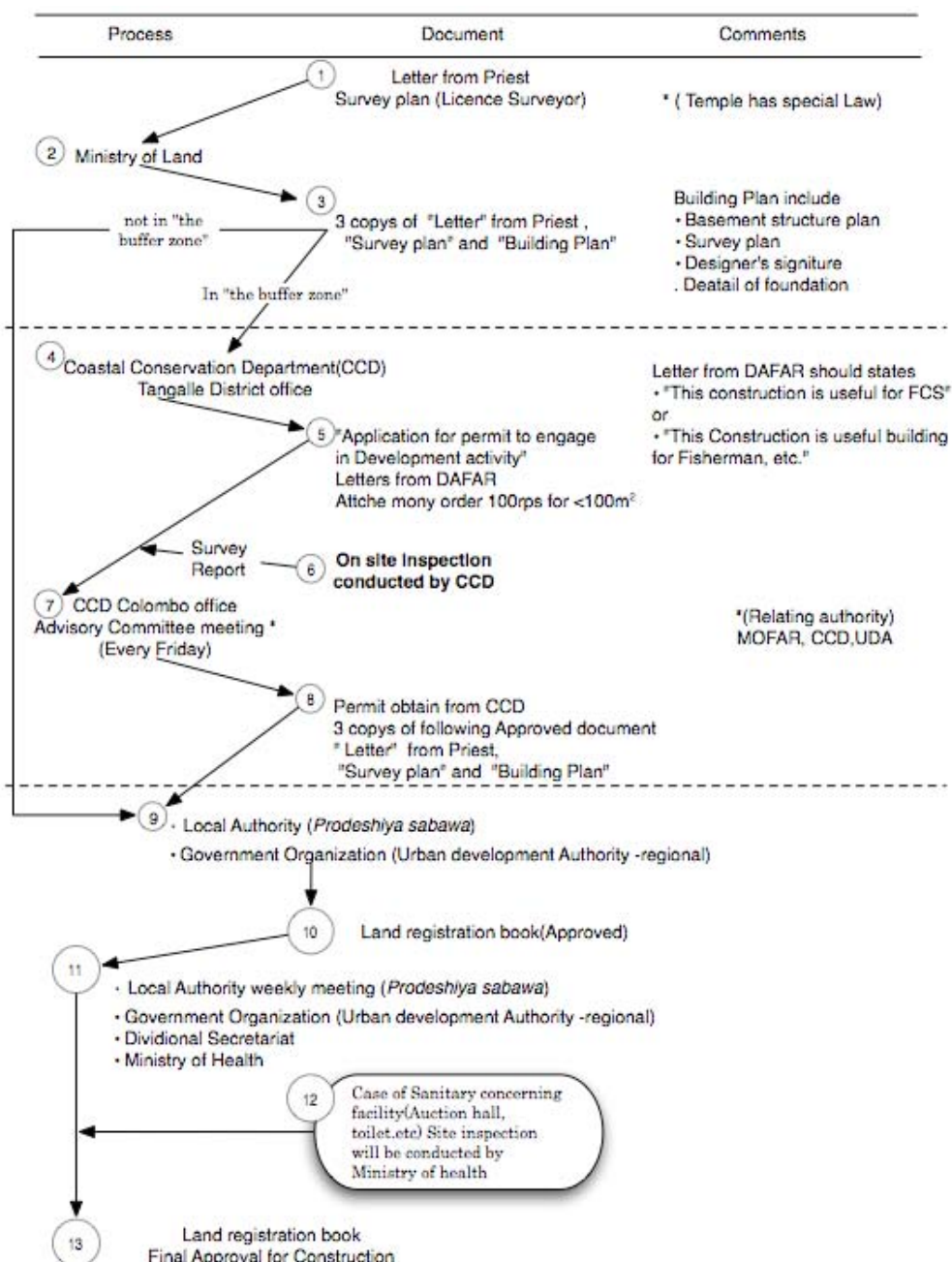
It was initially planned to build one auction hall and an OBM locker. Construction started on 23rd August 2005. The site selected by FCS was a public area situated within the buffer zone that had been confirmed and approved by authorities. However, a problem arose when a possessor, without a legal deed, filed a complaint with a human rights group. According to the pre-survey, the site itself was not used for more than two years before the tsunami. Therefore, the Project Team decided to support the FCS, but decided to avoid being in the center of negotiations. Being in those circumstances, the practice of solving problems and negotiation improved mutual-help relationships in/out of the community. However, in this case, the illegal possessor requested a large indemnity from the Project Team, which resulted in the halting of construction on that site.

This land issue has also spread to the construction of the OBM locker. In November, FCS relocated the site for an auction hall and started to obtain approval from CCD. On the other hand, land, designated for the construction of an OBM locker, was privately-owned (owned by the elderly Mudarali¹), who was willing to rent to FCS at the beginning of the project, but

¹ Fish Brokers

later found out this land was situated in buffer-zone, which could net reimbursement from the government in the future. As such, FCS members continued trying to search for an applicable site for the OBM lockers. By the start of November, FCS members still could not locate a site. As a result, they declined to build OBM lockers for the society at the steering committee. The Project Team consented to this offer.

Figure 5.5 Case Study for FCS Common Facility



For the exploration process to obtain land approval from the authorities, the case study shown in Figure 5.5 was used. For the auction hall, the following processes were undertaken: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, and 14.

(2) Epitamulla FCS

In the Epitamulla FCS, the original plan was to build one FCS bank and one OBM locker. The land for the FCS bank office was lent out from the temple. This site had been proposed for permanent housing construction by an American NGO (relocating residents of the Epitamulla Camp). Commission members led the rent negotiation with the chief monk. Since the monk was sympathetic towards those in the camps, he offered a portion of the temple grounds (the transfer process between the temple and FCS was registered smoothly). It was the first time for the FCS to gain construction approval from authorities. For this reason, society members were required to visit authorities in Colombo several times. The processes to obtain construction approval for the bank office included the following: 1, 2, 3, 9, 10, 11, and 13. Subsequently, the bank office held an opening ceremony on October 9, 2005.

An OBM locker was initially planned to be built on the site where the FCS office was previously situated before the tsunami. Formerly, this site was owned by a private owner (the former "Mudalari") and small lending was given as a subsidy to FCS. The FCS and the Project Team held negotiations with the owner, but because of indemnification from the Government, he did not allow the FCS to extend the lending period. Board members of FCS searched for a new site near the beach, but most areas were occupied by foreign owners and/or the former Mudalaris. One of the society members had offered her own land to society, but this land was given by the Government in 1998 to support the destitute and thus could not be transferred. Furthermore, they had continued to search for new locations, but unfortunately succession was not gained by the end of October 2005. As a consequence, they declined to build the OBM lockers at the steering committee. The Project Team accepted this decision.

At the beginning of December 2005, the construction of permanent houses started in the Epitamulla Camp near the bank office building. These permanent houses are planned to open at the end of March 2005. In addition, Sarvodaya (a local NGO) has decided to construct a pre-school for children, besides the FCS Bank Building.

(3) Dodampahara FCS

The FCS Bank Building and the OBM lockers were initially planned to be build on a site selected by the FCS society. This site is within the buffer zone and belongs to the public. In this case, the following processes were conducted to obtain approval for construction: 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, and 14.

From the initial point of this project, this society showed enthusiasm to obtain site approval by dispatching members to authorities. Consequently, the society received approval letters and started construction on October 17, 2005. Construction of the bank office was subsequently finished and an opening ceremony was held in December 2005.

In addition to this construction, the Project Team decided to build a “community hall”, which was not in the initial plan. At the needs assessment workshop conducted in September, the society identified needs for the community hall, but the Project Team gave priority to the bank office and the OBM lockers from the viewpoint of effective mutual-support. In October, the Dodampahala South FCS demanded to support the construction of a community hall to the Project Team. The Project Team realized the necessity of construction from a mutual support outlook (community support among fishermen), but the input of physical capacity to this Dodampahala South FCS would have created an imbalance with other FCS that would not construct. However in the steering committee meeting held in November, the Epitamulla FCS and the Noonawella FCS agreed and consented to the construction of a community hall in the Dodampahala South FCS. The Project Team conducted a survey on the site and decided to build after land issues were clarified. Due to the efforts of committee members, land issues were clarified by the middle of December, with construction beginning on December 20th 2005, and an opening ceremony held in January 2006.

The progress of construction works is presented in Table 5.14.

Table 5.14 Progress of Construction Works

FCS	Construction	Progress
1 Dodanpahala	Bank Office	Completed on 18 th December 2005
2 South FCS	OBM Locker	Completed on 2 nd January 2006
3	Meeting Hall	Plan Added. Will complete by end of January 2006
4 Epitamulla FCS	Bank Office	Completed on 4 th November 2005
5	Fishing Gear Locker	Plan Abandoned
6 Noonawella	Auction Hall	Will complete by middle January 2006
7 FCS	OBM Locker	Plan Abandoned

Source: JICA Team

5.4 Achievement and Evaluation

The objective of the evaluation is shared by all three Pilot Projects, that is to examine if the assumption of “co-assistance” is valid for effective rehabilitation of livelihoods for tsunami-affected people.

5.4.1 Evaluation Plan

Please refer to Section 4.4.2 (Evaluation Plan) of this report. The JICA Project Team visited all three FCSs and conducted participatory workshops in the following topics:

- Contribution of public sectors and donors other than JICA;
- Contribution of JICA (input for social, human, financial, and physical sources);
- Output of the JICA Pilot Project;
- Co-assistance approach; and
- Quantitative indicators.

The Evaluation Study was conducted during the 10 - 20th December 2005. The evaluation team consisted of staff from the JICA Project, DFAR, and MOCD. The team included the following persons:

- Mr. SAKAMOTO - Assistant Chief of the JICA Project;
- Mr. Ryo ISHIMOTO - Member of the JICA Project Team;
- Mr. D.P. WICKRAMASINGHE - Local Project Coordinator;
- Ms. Chamalie JAYALATH - Project Coordinator of the JICA Team;
- Mr. H.K.M. PREMADASA - Cooperative District Officer; and
- Mr. W. UBEYSIRINARAYANA - Berendina.

The team visited three FCSs in order to collect information through interviews and workshop-style meetings with members of FCSs.

5.4.2 Criteria of Evaluation

Please refer to Section 4.4.3 (Criteria of Evaluation). Five criteria of the DAC of OECD are employed for the evaluation of the FCS Pilot Project also:

- Relevance;
- Effectiveness;
- Efficiency;
- Impact; and
- Sustainability.

5.4.3 Logical Framework

A logical framework for the Fishery Cooperative Society Pilot Project is shown on the next page.

LOGICAL FRAMEWORK

Project Name:	Fishery Cooperative Society Pilot Project	Project Area:	Matara District, Southern Sri Lanka
Project Management:	JICA Project Team in association with Berendina	Target Beneficiaries:	Three Tsunami-Damaged FSCs
Project Commencement:	June 2005	Project Evaluation:	December 2005

Project Narrative Summary	Indicator	Data collection	Assumption
Overall Goal			
Livelihood of fishery villages in Matara has recovered from the tsunami	• All the FCSs are revitalized	• Total amount of micro-credit • Household income of fishery households	
Project Purpose			
FCS members are ready for sustainable livelihoods with co-assistance	• Capability of the three FCSs is good enough	• JICA project check with scoring list	• Relevant authorities in Matara keep supporting the business associations
Output			
1. Social capital is enhanced	1. FCSs are enhanced enough in terms of social capital	1. Evaluation survey and workshop	• Commitment of UNDP for micro-credit is implemented without failure
2. Human capital is enhanced	2. Skill of additional income and FCS management are enhanced	2. Evaluation survey and workshop	
3. Financial capital is enhanced	3. Micro-credit scheme is enhanced	3. Evaluation survey	
4. Physical capital is enhanced	4. FCS buildings are fully used for its activities	4. Evaluation survey	
Activities		Input	
1. Support institutional management	<u>Japanese Side</u>	<u>Sri Lankan Side</u>	• Assistance to fishery villages from other donors does not decrease significantly
2. Hold seminars and trainings for FCS management and sustainable livelihood	1. Consultant (international and local)	(Fishery Department & Cooperative Department)	
3. Enhance conventional micro-credit system and make it more business-oriented	2. Local NGO and coordinators	1. Technical assistance to the associations and members	Pre-condition
4. Build necessary facilities such as micro- credit offices, auction halls, meeting rooms, etc.	3. Buildings for FCS activities		• Prospective beneficiaries agree upon the co-assistance approach for the project

5.4.4 Epitamulla FCS Evaluation Sessions

The JICA Project Team conducted an evaluation workshop in the Epitamulla Camp meeting hall with 20 participants on 10th December 2005.

(1) Session 1 Assistance Offered to the Society (except JICA Pilot Project)

FCS members recognized that the biggest supporters of their camp life were governmental offices and the temple, within whose premises the camp was built. NGOs such as Sewa Lanka, Red Cross, Sanasa, Agromat Foundation, and Sarvodaya Movement made contributions to the damaged community. However, most assistance was offered to the refugees in general, with little support focused on the Fishery Cooperative Society. Also, much of the support (except houses and boats) were implemented at early stages of the tsunami rehabilitation. In fact, the majority of the assistance was to enhance the physical capital of refugee resources.

(2) Session 2 Assistance of JICA Pilot Project - INPUT

Concerning social capital enhancement, the JICA Team assisted the FCS on how to effectively manage the organization, via a study tour to other cooperative societies displaying good practices and related meetings and workshops. Assistance for human capital enhancement included business plan training, Maldives fish processing, and net mending. The structure for financial capital enhancement was just developed, but not fully operational yet. A bank building has just been completed with office equipment donated from the UNDP to enhance physical capital improvement.

(3) Session 3 Output of the Pilot Project Activities

Outputs or impacts of JICA assistance were examined under four categories: institutional capacity, human capacity, financial capacity, and physical assets.

1) Institutional Capacity

Even though this FCS is more than 10 years old and maintained continuous activities before and even after the tsunami, many members recognized moderate to significant improvement in items queried in the evaluation workshop. Their answers were negative on the involvement of members and further cooperation with other FCSs.

2) Human Capacities

Beneficiaries acknowledged the value of human resource development that the JICA Team offered (such as business planning, positive thinking, and Maldives fish processing).

3) Financial Capacities

FCS members appreciated the expansion of loan capacity with the UNDP fund donation, which was coordinated by the JICA Team.

4) Physical Assets

The bank building contributed to the enhancement of beneficiaries' physical assets. This building is equipped with furniture and stationery with the UNDP donation that was coordinated by the JICA Team as well.

(4) Session 4 Co-assistance Approach

The JICA Project Team explained the co-assistance approach to the workshop participants. Assistance to enhance social capital, human capital, financial capital, and physical capital were all to facilitate co-assistance. Beneficiaries fully agreed to this approach and appreciated the repeated visits and long-term caretaking philosophy of the JICA Team. They are well aware that assistance from other supporters is almost all physical in nature, with very little assistance in terms of human capacity and institutional building. An FCS member mentioned that, "Other donors gave us fish, but JICA give us skills how to catch fish." Epitamulla FCS members think that building institutional capacity is more important than other areas since it ensures sustainability. Building of human resources has second priority, as it strengthens society. They said physical assets have the least priority. As JICA does all these activities, society appreciates the integrated and repeated assistance.

(5) Session 5 Quantitative Data

Characteristics on society activities was also asked. Members have increased to 86 and participate in society meetings with a higher rate than prior to the tsunami. Three micro-credits have been issued with a total amount of Rs8,000- (the loans were for medical treatment and other emergencies).

5.4.5 Dodanpahala FCS Evaluation Sessions

The JICA Team conducted an evaluation workshop in the Dodanpahala Camp meeting hall with 16 participants on 15th December 2005.

(1) Session 1 Assistance Offered to the Society (except JICA Pilot Project)

FCS members recognized that assistance came from government agencies, the village temple, Red Cross, Save the Children, World Vision, OXFAM, FAO, GOAL (an Irish ONG), Small Fisheries Union, and Southern Fisheries Organization. Almost all support was for the individual household/fisherman, with little assistance offered to the FCS.

(2) Session 2 Assistance of JICA Pilot Project - INPUT

Workshop participants recognized that the JICA Team provided necessary ideas and skills to work according to community needs as well as to make connections with other good practice cooperatives in order to strengthen social capital. Development of business planning and management skills was the major input in terms of human capital. Arrangement of loan fund donations from the UNDP and loan-handling skill improvement were what members remembered vis-à-vis financial capital enhancement. For physical capital, the JICA Team constructed three buildings (the OBM locker, the bank building, and the meeting hall) with some facilities coming from UNDP. A fish freezer truck is another donated item (from UNDP) that JICA coordination helped acquire.

(3) Session 3 Output of the Pilot Project Activities

Outputs or impacts of JICA assistance were examined under four categories: institutional capacity, human capacity, financial capacity, and physical assets.

1) Institutional Capacity

Improvement of this category was not so significant comparing with that in the Epitamulla FCS. The Dodanpahala FCS is one of the biggest FCSs in the Matara District and has been continuing with energetic activities. They have approved very few subsistence contributions to its members. This could be improved when all the facilities are in use and the loan program is operated at full capacity.

2) Human Capacities

Beneficiaries acknowledge the human resource development efforts by the JICA Team, including the regularly issued newsletter to encourage good practices among the tsunami-affected population.

3) Financial Capacities

FCS members appreciated the expansion of loan capacity to Rs 50,000-.

4) Physical Assets

Evaluation participants appreciated the three buildings and the fish freezer truck.

(4) Session 4 Co-assistance Approach

The JICA Team explained the co-assistance approach to the workshop participants. Assistance to enhance social capital, human capital, financial capital, and physical capital were to facilitate co-assistance.

All 16 members, participating in the evaluation session, unanimously agreed on the JICA method implemented during the Pilot Project. The reasons for this were as follows:

- Compared with post-tsunami activities carried out by the rest of the organizations, the JICA methodology was completely different. Other stakeholders spent very limited time with the community and just provided required materials;
- The JICA process was a friendly, trustworthy, and sustainable approach;
- The approach followed by JICA helped the FCS to reawaken;
- There was a remarkable contribution from members to societal activities; and
- JICA introduced sustainable paths and helped to extend societal activities.

(5) Session 5 Quantitative Data

Data concerning society activities was tabulated. In total, the number of members has increased from 30 to 93. The micro-credit fund holds more than Rs350,000, excluding the UNDP Fund. They issued 40 loans after the tsunami, with the loans being used for the coir industry, Maldives fish processing, and the business of diesel oil for fishery boats.

5.4.6 Noonawella FCS Evaluation Sessions

The JICA Team conducted an evaluation workshop in the Noonawella Camp meeting hall with 10 participants on 15th December 2005.

(1) Session 1 Assistance Offered to the Society (except JICA Pilot Project)

Various organizations supported the tsunami-affected people in this community, such as government agencies, the Red Cross, the World Vision, OXFAM, the Isuru Foundation, the Ernst & Young Foundation, and Sarvodaya. Many donors provided fishery gear such as fishing nets, boat engine parts, and fishing boats. Almost all support was for the individual household or fisherman, while little assistance was offered to the FCS.

(2) Session 2 Assistance from the JICA Pilot Project - INPUT

Workshop participants recognized that the JICA Team provided skills to manage society. The development of business planning skills and the Pilot Project newsletter (Vera) was the major input in terms of human capital. FCS members appreciated this newsletter because articles on disaster management improved awareness and submission competitions for children made them happy. The arrangement of loan fund donations from UNDP was what members remembered vis-a-vis financial capital enhancement. For physical capital, the JICA Team constructed an auction hall and coordinated the procurement of telephones and fax machines from UNDP.

(3) Session 3 Output of the Pilot Project Activities

Outputs or impacts of JICA assistance were examined under four categories: institutional capacity, human capacity, financial capacity, and physical assets.

1) Institutional Capacity

Institutional capacity did not significantly improve as the activities prior to the tsunami had already reached a certain level. Beneficiaries recognized the need for deeper relationships with government organizations for the operation and development of the FCS. Trust among FCS members and member involvement were two issues that were not improved by the Pilot Project.

2) Human Capacities

Beneficiaries recognized that the JICA Team addressed various hidden capabilities of the members and supported their development.

3) Financial Capacities

FCS members appreciated the coordination with the UNDP Fund, the management training, and the development of by-laws for the new loan scheme.

4) Physical Assets

Evaluation participants appreciated the auction hall and fee charging system for its usage.

(4) Session 4 Co-assistance Approach

The JICA Team explained the co-assistance approach to the workshop participants. Assistance to enhance social capital, human capital, financial capital, and physical capital were all to facilitate co-assistance.

All participants unanimously agreed on the JICA approach and noted that the approach was effective and sustainable, as well as being the most suitable approach to strengthening grass-root organizations. The participants especially appreciated that the JICA approach aimed to strengthen existing society and the recognition given to society as a representing body of the community.

(5) Session 5 Quantitative Data

Data concerning the society activities was tabulated. In total, membership rose from 180 to 340, with the micro-credit fund amounting to more than Rs 700,000 (excluding the UNDP Fund). More than 80 loans were disbursed after the tsunami for the purpose of net purchasing, boat repair, etc.

5.4.7 Sustainable Livelihood Analysis with Five Capitals

Through the evaluation of each pilot project, the JICA Project Team also evaluated the entire co-assistance approach applied to the Pilot Project (from the perspective of sustainable livelihood). The detailed assessment is contained in Section 9.3.3 of this report.

5.4.8 Conclusions

(1) Relevance

Evaluation of relevance examines if the project purpose (if FCS members are ready for sustainable livelihood with co-assistance) remains valid at the time of Pilot Project completion. The co-assistance approach to rehabilitate communities from natural disaster damage was a very useful methodology especially for the case of FCSs as they were already operating prior to the tsunami, thus making executive members motivated to rehabilitate their co-assistance system after the JICA Team completed its survey. Even though all scheduled Pilot Project activities had not been completed by the time of evaluation, the motivation of members improved significantly in the months after the Pilot Project started. In the initial period of the project, the rehabilitation of basic living conditions was still on-going and the

FCS had just restarted loan schemes with considerable difficulty. However in December 2005, the banking scheme was greatly enhanced, with some members planning to expand their business through the new loan system. The FCS Bank (the saving and credit system) is an essential system for socio-economic development in each FCS. Beneficiaries believe that they are ready for sustainable livelihood with the co-assistance.

(2) Effectiveness

Evaluation of effectiveness examines if the project objectives had been achieved and fulfilled by the time of evaluation. As a matter of fact, it is too early to fully assess this question. The scheduled construction of FCS facilities encountered significant delays, while anticipated UNDP loan funds have just been disbursed - this means that actual FCS activities have just restarted. As such, it can be stated that a sustainable livelihood could be achieved if the proposed FCS structure really works in the future. Regarding the social and human capital, the beneficiaries are very convinced that they have been enhanced.

(3) Efficiency

Evaluation of efficiency examines if all the resource inputs and activities direct result in outputs and achievements for project purposes. As the new FCS structure was just constructed and the operation has yet to reach its full level, it is too early to make a final evaluation of the efficiency of the Pilot Project. However at the evaluation workshops held at FCSs, beneficiaries fully understood the correlation between activities and output (which are social, human, financial, and physical capital). They also agreed these four capitals contributed to the improvement of co-assistance. Therefore, if the FCSs will be operated as planned, efficiency could be easily proved.

(4) Impact

There were significant institutional impacts on the selected three FCSs. After the tsunami disaster, FCSs had difficulties in recovering micro-credit loans since members lost their livelihood and the FCSs lost their loan records. Members are now convinced that the FCSs have recovered from these difficulties and are ready for further development.

Impacts at the output level were sufficient. The impact on physical capital was significant due to the facilities built by the Pilot Project. The impact on financial capital will be improved once the new credit loan scheme can be operated to its full scale. Human capital has been developed with business planning and other livelihood training and produced

adequate impacts. As a result of the aforementioned improvements and assistance in institutional management, the social capital of FCSs showed considerable progress.

This being said, the impact on the overall objectives is not enough. A pilot project is to initially demonstrate or to prove the effectiveness of a methodology, while the second stage is to disseminate these lessons to other groups and areas. Even though officers from the Fishery Department and Cooperative Department have been involved in the Pilot Project implementation, the JICA Team received no commitment that the departments would take this co-assistance methodology and apply it elsewhere. Also there was no operating extension granted.

(5) Sustainability

Each FCS has around 10 years of experience and established status in the community. Some FCS had a branch of SANASA, a popular micro-credit organization. However, FCS members are very proud of having their own micro-credit system in their community. FSC presidents and executive members take good care of the fishery societies, although on a voluntary basis. As such, the attitudes and solidarity of the members to maintain the society is sufficient to maintain the FSC, especially its micro-credit activities.

One risk to sustainable development of the FCS is that they are still vulnerable to disasters, as a disaster management system has yet to be established. As such, FCSs could sustain similar damage during the next disaster and subsequently require significant external assistance for recovery. Under recovery and development activities of the Pilot Project, FCS sustainability has been enhanced in the following aspects.

1) Business-oriented micro-credit scheme

The conventional micro-credit program in these FCSs was not necessarily business-oriented, as major credit beneficiaries were housewives. For instance, such housewives borrowed money: (i) to adjust the uneven household income of the fishery communities); and (ii) to make rope out of coconut husks (the coir industry) – this is popular among women in coastal village. They often apply for the micro-credit as running capital of this small business. Thus, the FCS credit program made relatively small contributions to the development of the fishery industry. However, each FCS has started new business-oriented credit programs (with low interest for large amounts of money). The new system is expected to facilitate the purchase of fishing gear and even fishing boats. This business-oriented credit scheme has increased the momentum of the activities.

2) Buildings constructed

The JICA Project has constructed the following buildings to support FCS activities:

- Offices of micro-credit;
- Lockers for fishing gear and engine;
- An auction hall; and
- A meeting hall.

Some of these will also generate revenue for the FCS, while others will strongly facilitate FCS activities.

3) Mutual learning

With study tours, newsletters, and seminars supported by the JICA Project Team, FCS executive members became aware that there were abundant good practices of other nearby cooperative societies to learn from. Cooperative societies will learn with/from each other and enhance their capacity for more profitable and sustainable operation.

Information Box

Land and Construction Cost Issues of FCSs

The biggest difficulty the JICA Team met during this Pilot Project implementation was land acquisition. The Pilot Project planned to build two buildings each for the three FCSs selected. Each FCS was requested to prepare appropriate land, clear up ownership issues, and obtain permission from the authorities. FCSs met the same difficulties in preparing appropriate land for construction.

Epitamulla FCS

Most members lived in the refugee camp. Both project buildings suffered from a difficulty in obtaining the use of the land. In this fishery village, the new buffer-zone regulation had created project bottlenecks as any building planned within the 100 m buffer zone along the coastal line needed permission from the Coastal Conservation Office. The permission procedure took much longer than expected.

Noonawella FCS

In this FCS, there have been problems in the use of public land. A piece of land is allocated from the authority to build the FCS building. People that lacked legal status occupied some of the public land. In many cases, the legal status of public land occupants is unclear and this takes time to settle. Although clearance procedures will take a long time, it must be cleared before the construction of facilities starts.

Dodampahara FCS

At this site, there has been no problem. Committee members had a strong motivation for project success and did their best to obtain agreement on the sites for buildings. Land and building permission were obtained from the authorities via their own efforts.

Construction Cost

Soon after the tsunami in Sri Lanka, construction prices rose three to four times higher than what they had been before. During the planning stage of the Pilot Project, the JICA Team decided to abandon input on facility construction because of unclear overall construction price. However, the needs survey revealed that the rehabilitation of common facilities was inevitable for the rehabilitation of the FCSs. Under such circumstances, the JICA Team decided upon the construction of a bank office, an auction hall, a community hall, and OBM lockers. The construction of these facilities faced difficulties, however, due to the high construction costs and the land issues mentioned before. Overall, the Pilot Project constructed five facilities instead of the six facilities planned.

5.4.9 Issues

(1) Involvement of Village Population to FCS

The Pilot Project has finished, but FCS rehabilitation activities are still in progress in each fishery community. Several issues need to be addressed for sustainable development of FCS operation. The first issue is the position of the FCSs in the village community. In the selected three FCSs, their functions used to be limited to that of micro-credit, which supports households with savings and micro-credit. However, the FCS consists of not only fishermen, but also housewives and people with other occupations (meaning that the FCS holds an important position in community improvement as a whole). If more villagers are involved in FCS activities, FCSs would work as social and economic engines to improve living conditions in the communities.

(2) More Business-Oriented Credit System

In order to stimulate economic activities in the three FCSs, the JICA Pilot Project coordinated the following issues:

- Additional loan funds from UNDP;
- Trainings for business planning for the FCS staff; and
- Rules and regulations for new business loans that are separate from conventional micro-credit.

The problem of the existing micro-credit program was that the majority of the loan users were housewives (whose purpose was either to adjust their irregular household incomes or to operate their small coir manufacturing businesses). Fishermen seldom used the loan for the improvement of fishing gear, while the micro-credit scheme had a very limited economic impact for households and the community. Newly proposed loan schemes are very business-oriented, with larger loan sizes and lower interest rates. Even though this has been a new trial for the FCSs, it should be well-managed for the sustainable economic rehabilitation and development of tsunami-damaged communities.

(3) Operation and Maintenance of FCS Facilities

1) The Bank Office

The bank buildings (small office buildings for micro-credit practices) have been reconstructed in the Epitamulla FCS and the Dodampahala South FCS. Both societies had bank buildings that were washed away by the tsunami. Constructing these banking facilities, which play the core function in society, without doubt facilitates the rehabilitation

of the FCS. Both FCSs have experience in banking management. However, with advance training in banking operation organized by the Pilot Project, the micro-credit operation of FCSs will be improved. Since the expected micro-credit fund from UNDP was allocated in December 2005, the improved micro-credit schemes achieved nothing so far. The FCSs should get proper interest with this micro-credit program so that they can maintain the activities and bank buildings.

2) Out-Board Motor (OBM) Lockers

OBM lockers in the Dodampahala FCS and Noonawella FCS have been constructed by the Pilot Project. FCSs are to collect money charged for the facilities and pool it together in an operational fund in the FCS bank. During the initial stage, this fund can only be used for the maintenance of banks and lockers. Once the fund grows, it can be used for micro-credit, or for funds for a nursery school. Fees for lockers will vary based on FCS conditions and locker users. Accurate collection of monthly fees from users, however, is essential for good maintenance of the facilities.

3) Auction Hall

An auction hall is being built in the Noonawella FCS. This FCS should keep an accurate record of facility usage and charge users, as in the case with OBM lockers. The Noonawella FCS created its own plan for operating the auction hall. Moreover, the collection of basic information (i.e., date, kind, amount, and price) would be necessary not only for charging fees to auctioneers, but also for managing natural resources. Gathering this basic data will enhance their knowledge and help them achieve more effective fishing operation and resource management.

4) Meeting Hall

A meeting hall is being built in the Dodampahara South FCS. This facility is used for general meetings, working meetings, and other activities. Previously, there was a small hut made of coconut leaves for the same function. This hut easily collapsed from strong winds resulting in maintenance and re-roofing (by donation) twice a year. Hereinafter, the FCS will undertake management and daily maintenance. Furthermore, constructing a meeting hall would enable those individual labor fishermen to participate in the FCS. A problem of this meeting hall is that it does not generate any revenue by itself, as long as FCS used it. Therefore, the FCS should appropriately estimate the maintenance cost of this facility and allocate budget from the total FCS program.

Chapter 6 Small Industry Support Pilot Project

6.1 Background

The tsunami that struck on the 26th of December 2005 devastated various small industries in the affected area. Small industries in the Matara District had not been organized and business owners did not know how to revive their business. Table 6.1 shows how the tsunami impacted small businesses in Matara District.

Table 6.1 List of Tsunami-Affected Small Businesses in Matara District

No.	Name of Industries	# Business Affected	No.	Name of Industries	# Business Affected
1	Coir Yarn Making	365	9	Leather Industry	31
2	Ornamental Fish Industry	200	10	House Painting	26
3	Tailoring	165	11	Bicycle Repair	22
4	Carpentry	94	12	Welding Workshop	22
5	Food Processing Industry	55	13	Grinding Mills	22
6	Vehicle and Motor Cycle Repair	51	14	Making Cement Blocks	21
7	Mason Workers	37	15	Coir Mills	10
8	Fish Mongers	33	16	Jewelry	10

6.2 Plan of “Small Industry Support Pilot Project”

- (1) Project Title: Small-scale Industry Support Pilot Project
- (2) Location: Matara City and Vicinity
- (3) Counterpart Organization: Industrial Development Board (IDB)
- (4) Beneficiaries: Food processing industry (40 businesses); Ornamental fish industry (198 businesses)
- (5) Project Duration: June to December 2005
- (6) Current Condition

The tsunami destroyed not only houses, but also offices, factories, and workshops. Tsunami-affected people included those who lost their business facilities and jobs.

Employment was a critical issue for regional rehabilitation from tsunami damage. A governmental institution, the Industrial Development Board, conducted a detailed survey of damage to the manufacturing industry. The IDB facilitated donor assistance to this sector so that donors could correctly target individuals and companies that needed external assistance for recovery. The JICA Project Team worked together with IDB to identify the following sectors as target groups for the Pilot Project.

- Food Processing Industry

Previously, many small business establishments, a significant proportion being housewives, in and around Matara city manufactured small cakes and other food items with rice powder or wheat flour. They sold these products to restaurants and shops in the city. Even though the scale of their businesses was relatively small, many women used to be engaged in this type of business, complementing household income. These businesses needed external assistance for recovery, as no other donors were supporting this sector.

- Ornamental Fish Industry

The export of ornamental fish is a fast-growing industry in Sri Lanka. Young men along the coastline engage in this business, mainly as divers. Divers go into the deep sea to catch ornamental fish and sell them to local suppliers (brokers), who then sell the fish to buyers from Colombo for export. Divers previously enjoyed high incomes (Rs 15,000 - 20,000 per month). Due to the tsunami, divers and brokers lost their equipment and were unable to restart their activities without external assistance. Few donors were conscious of this sector. Recovery in this sector was deemed to produce a significant economic benefit to communities.

(7) Goals and Objectives

- To let each small business establishment recover from tsunami damage, both in terms of sales and employment.
- To verify effectiveness of the co-assistance approach for disaster rehabilitation.

(8) Project Components

- Forming small business establishment owner associations for targeted sectors to enhance co-assistance.
- Lending necessary equipment and tools for business operations.
- Providing technical and management advice.

(9) Implementing Organizational Structure

There were six kinds of stakeholders in this Pilot Project.

- Association of Food Processing Industry

This association was initiated in May 2005 to facilitate co-assistance among the tsunami-affected people in the same sector.

- Association of Ornamental Fish Industry

This association was also formed in May 2005 to facilitate co-assistance among the tsunami-affected people in this sector.

- Industrial Development Board (IDB)

IDB is a government entity that helps target industries with technical consultation.

- Enterprise Development Service Center (EDSC)

EDSC is a non-profit organization (NPO) supported by the Sri Lankan Government, which offers consulting advice to small business owners to formulate their business plans.

- Berendina (Local NGO)

This Pilot Project expects that its local NGO will undertake the implementation of the Pilot Project.

- The Project Team financially and technically supported this Pilot Project.

(10) Tasks of the Pilot Project

The tasks of this Pilot Project are shown in the following table.

Table 6.2 Tasks for Small-scale Industry Support Pilot Project

No.	Activity	Contents
1	Establishing two business associations	After holding workshops for the two targeted sectors, tsunami-affected business people formed business associations. Registration work incurred some cost.
2	Processing membership registry	The Pilot Project determined if association applicants were truly tsunami-affected people or not.
3	Formulating a business plan	Each business enterprise created its own business plan for realistic rehabilitation support.
4	Lending equipment	Equipment and tools for reopening businesses were available for rent.
5	Providing seminars and consulting	IDB conducted technical consultation, while EDSC supported business management.
6	Managing the project	A sub-contract for local NGOs (office, staffing, vehicle, office equipment, etc.) was awarded.

(11) Use of Outside Contractor

The Berendina Foundation, a local NGO, undertook implementation of all three Pilot Projects under the supervision of the JICA Project Team. Please refer to Section 4.2.1 (14) for information on the Berendina Foundation.

(12) Other Kinds of Japanese Assistance

The Japan Bank for International Cooperation (JBIC) allocated a Rs 10.0 billion soft loan to the Sri Lankan Government for tsunami rehabilitation work. Parts of this fund were allocated for industrial rehabilitation through a two-step loan program (beneficiary companies of this soft loan should possess banking credit with sufficient collateral). Much of the smaller business establishments could not apply for this loan program. This Pilot Project focused on smaller industries, which complemented the JBIC loan program.

(13) Applicability of Japanese Expertise and Experience

Various kinds of industrial sector associations exist in Japan such as chambers of commerce, as well as various business associations that are active in co-assistance, technical and human resource development, as well as dialogue with relevant public administration. The JICA Project Team tried to transfer this know-how and expertise to enhance the functionality of small business associations in Sri Lanka.

(14) Sustainability and Expandability

This Pilot Project was to support small industries in restarting their business. Since each beneficiary had business know-how and obtained revenue from their own activities, benefits gained from the project must be sustained once beneficiaries revitalize their business activities. Business associations would continue their activities in human resource development, business improvement, and so on.

(15) Environmental Impact

The purpose of this Pilot Project was to recover the functionality of small industries to pre-tsunami levels. This project had no additional negative impact on the natural environment. However, some kinds of ornamental fish should be protected as stated in the Washington Treaty. This Pilot Project actually had positive social impacts. For instance, the formation of business associations enhanced co-assistance among small business establishments and further developed the regional economy.

(16) Related Activities of Other Donors

Some local industries such as coir (coconut fiber) and lace were assisted by NGOs such as OXFAM. A French NGO offered some financial assistance to damaged small industries through IDB, although this assistance did not include technical assistance and/or institutional building. The Save the Children NGO was preparing a loan program to improve the livelihood of women affected by the tsunami.

6.3 Activities of the Pilot Project

6.3.1 Institutional Building of Small Industries

(1) Food Industry

1) Background of Organizing an Association

The JICA Project Team worked together with IDB to identify the food industry as one of the target groups for the Pilot Project. The JICA Project Team wanted to facilitate, in a holistic manner, the revival of livelihoods. The first strategy was to form a business association composed of food processing businesspersons, who could enhance their own efforts and contribute to the revival and further development of the sector. There were many issues such as taxes, licenses, and support from relevant institutions such as the Industrial Development Board (IDB), the Enterprise Development Service Center (EDSC), as well as foreign donors. Lobbying for these issues could be much more effective, once small businesspersons create their own business associations. Another potential advantage of creating business associations is that business people can learn from each other and conduct activities for mutual benefit.

In response to a recommendation made by the JICA Project Team, the “Association of Food Processing Industries Affected by the Tsunami in Matara District” was created in May 2005 to facilitate co-assistance among the tsunami-affected people in the sector.

2) Objectives, Functions and Actions of the Associations

Objectives were as follows:

- Working together to reopen businesses;
- Working together to improve businesses;
- Lobbying for matters relevant to the trade such as licenses, taxes, and inspection procedures;

- Enhancing the social/economic status of both employees and employers; and
- Appealing to obtain necessary assistance from the Government, NGO, and donors.

Associations were expected to play the following roles:

- Reopen businesses through provision of equipment and share experiences and techniques with others in the same business;
- Identify needs for business improvement through seminars, training, and study tours (a needs identification workshop was held on September 10th 2005);
- Lobby government institutions and politicians to improve issues relevant to their businesses such as licenses and police inspections; and
- Cooperate with relevant organizations and banks to obtain assistance or low interest loans to develop businesses owned by association members.

The Food Base Industry Association had 42 members, which covered 12 sectors of the food-based industry. These sectors and the number of memberships are shown in the table below. The majority of the members were women.

Table 6.3 Membership and Sectors of the Food Based Industry Association

No.	Sectors	Number of Members
1	Catering Service	3
2	Table Salt Iodization	1
3	Snack Making	2
4	Rice Powder Making	2
5	Cake Making	3
6	Milk Based Products	4
7	Sesame Roll Making	3
8	Sweets Making	7
9	String Hopper Making	8
10	Bakeries	7
11	Bakery Equipment Making	1
12	Dry Fish Making	1
Total		42

The Food Based Industry Association in Matara was controlled by a managing committee, which consisted of a chairman, a secretary, a deputy secretary, a treasurer, and five committee members. The Association General Assembly was to discuss important issues at least once a year. The following is a list of managing committee members:

- Chairman - Mr. N. D. Jayaweera;
- Secretary - Mr. Tisara Hettiarachchi;

- Sub-secretary - Mrs. K. Sunethra Kanthi;
- Treasurer - Mrs. A. G. Sumanalatha;
- Committee Member - Mr. H. N. Sunanda;
- Committee Member - Mr. W. S. Bandula;
- Committee Member - Mrs. M. N. Malani;
- Committee Member - Mrs. Chathuri Rathnaweera; and
- Committee Member - Mrs. Chintha Nilmini.

(2) Ornamental Fish Industry

1) Background of the Formation of the Association

The JICA Study Team also selected the ornamental fish industry as a target group for industrial rehabilitation. With advice from the JICA Study Team, IDB called affected ornamental fishery people, who then assembled at the Samanmal Hotel in Matara on May 2005. The JICA Study Team suggested these tsunami-affected divers and suppliers in the ornamental fish industry form an association.³ The divers and suppliers were convinced and agreed to create the “Association of Ornamental Fish Industry Affected by Tsunami in Matara District” so that they could overcome the difficulties they were facing. Although an Ornamental Fish Suppliers Association in Matara already existed, solely supporting the existing association was deemed insufficient to revitalize the whole industry of ornamental fish.

2) Association Objectives and Expected Functions

Objectives of this association are defined as follows:

- Working together to reopen businesses;
- Working together to improve business;
- Lobbying on matters impacting the trade such as licenses, taxes, and inspection procedures;
- Enhancing the social/economic status of the industry;
- Appealing for necessary assistance from the Government, NGOs, and donors; and
- Preserving aquatic resources.

³ Suppliers buy ornamental fish from divers and sell it to exporters in Colombo.

3) The Association was Expected to Play the Following Roles:

- Provision of equipment to reopen the businesses; and
- Institutional and human resource development, such as training by the Marine University of Tangalle, study tours to relevant businesses (exporters in Colombo, for example), and a workshop with the National Aquatic Resource Authority.

4) Members and Business Category

The Association of Ornamental Fish Industry had 198 members in the Matara District, all of whom were tsunami-affected people. These memberships covered four sub-sectors of business as mentioned in the table below.

Table 6.4 Members of Sub-sectors in the Ornamental Fish Industry Association

No.	Sectors	Number of Members
1	Lung Diver (operates with aqualung)	106
2	Skin Diver (operates without aqualung)	80
3	Collector (middleman who buys the catch)	7
4	Inland ornamental fish producer	5
Total		198

5) Association committee members

The Association was governed by a working committee that consisted of a chairman, vice-chairman, secretary, sub-secretary, treasurer and five committee members. This working committee was given the authority to govern the Association by the general assembly of the Association of Ornamental Fish Industry. The following is a list of managing committee members:

- Chairman - Mr. Priyantha Abegunawardana;
- Secretary - Mr. M. M. Dammika;
- Sub-secretary - Mr. Laxman Thennakon;
- Treasurer - Mr. J. P. Chaminda;
- Committee Member - Mr. M. M. Upul Rohana De Silva;
- Committee Member - Mr. K. H. Thaminda Kumara;
- Committee Member - Mr. W. H. Karunapala; and
- Committee Member - Mr. K. V. Karunathilaka.

6.3.2 Survey of Required Equipment for Beneficiary Industries

(1) Background and Objectives of the Survey

The beneficiaries who needed assistance to reopen their businesses were identified by the JICA Study Team in close collaboration with IDB. The JICA Study Team agreed to extend its assistance to members of both the food and the ornamental fish industry. However, the conditions needed to receive assistance from the two target industries were much higher than the JICA Study Team expected. Since the Team was required to set priorities among these conditions, the survey was conducted to collect information to formulate a priority list regarding the conditions for receiving assistance.

(2) Methodology and the Questionnaire

In order to save time and manpower and also to confirm the real voice of the beneficiaries, the JICA Project Team requested that all applicants appear at the JICA Project Office in Matara for an interview. Questionnaires were prepared by the JICA Project Team to interview members of both associations. The format of the interview questionnaire is shown in Annex 6-1A and Annex 6-1B.

(3) Survey Results

Tables summarizing the required equipment (from the survey) are shown in Annex 6-2 and Annex 6-3.

6.3.3 Steering Committee Meetings

The JICA Study Team and relevant organizations agreed to form a steering committee in order to discuss important issues for Pilot Project management.

(1) Structure of the Steering Committee

The committee consisted of representatives of the following organizations:

- President and Secretary from each association (six persons);
- Representative of the Industrial Development Board (one person);
- Representative of the Berendina Foundation (one person); and
- JICA Team (three persons).

(2) Objectives

This committee coordinated major issues for the effective implementation of the Pilot Project and met once a month. Representatives of beneficiary groups were essential members of this committee, who facilitated the granting of truly needed assistance and enhanced the institutional strength of the groups.

(3) Main Functions

- Discuss contents and methodology of JICA assistance.
- Maintain a close relationship with the Government, NGOs, and other stakeholders.
- Decide on financial matters.
- Disseminate information and decisions made by the steering committee.
- Identify training needs, skill development, and workshops, etc.
- Maintain a close relationship with counterpart organizations like the Berendina Foundation and the IDB.

6.3.4 Delivery of Equipment

(1) List preparation

Based on the results of the interviews conducted by the JICA Study Team, lists of equipment for both the Food Based Industry Association and the Ornamental Fish Industry Association were prepared. Since the beneficiaries requested necessary equipment based on priority, the JICA Project Team selected the most important equipment requests so that the effects of this assistance could be maximized within the limited budget.

(2) 1st Handover of Equipment

The first handover of equipment to the Food Base Industry was conducted by the JICA Project Team, with the assistance of Berendina Development Services (a local NGO) on 26th August 2005 at the Hemalee Reception Hall in Matara. The ceremony was organized by the Food Based Industry Association in a very interesting manner. The District Secretary of the Matara, the Deputy Director of IDB Matara, the Director General of Southern Development Authority and a representative of the International Organization of Migration (IOM) were invited to the ceremony. Each association member received equipment needed for their businesses.



Figure 6.1 Commemorating Tsunami Victims



Figure 6.2 Handover of Food Processing Equipment

6.3.5 Coordination among Stakeholders (IDB, UNDP)

(1) Role of IDB

The Industrial Development Board of Ceylon is a semi-governmental organization set up as a statutory board to promote and develop small- and medium-sized enterprises in Sri Lanka. IDB is controlled by a Board of Directors, which consists of representatives of the chamber of commerce, corporate organizations, and other private sector entities. The IDB is funded by self-generated income and financial support from the state. Self-generated income is from the following sources:

- Preparation of feasibility studies and project reports;
- Conduct of training workshops in entrepreneurship and management for owners and employees of enterprises;
- Sale of model project reports;
- Conduct of technology transfer programs;
- Conduct of exhibitions on behalf of entrepreneurs;
- Lease of developed plots and factory space;
- Technical advice in selection of machinery and equipment, construction of building, installation of machinery, etc;
- Counseling and guidance for entrepreneurs on an individual basis; and
- Conduct of diagnostic studies to identify problems in enterprises and recommendations for solutions to overcome such constraints.

Financial support from the Government is provided wherever self-generated income is insufficient to meet all budgetary commitments.

IDB maintains a head office in Colombo and a network of nine regional offices and 25 district offices covering the entire country for the promotion and development of private sector entrepreneurship. The IDB regional office in the south mainly covers the three districts of Galle, Matara, and Hambantota, while the regional office is located at the heart of Matara town. This regional office works as the nerve centre for carrying out livelihood programs in the tsunami-affected areas in the southern provinces, particularly in the Matara District.

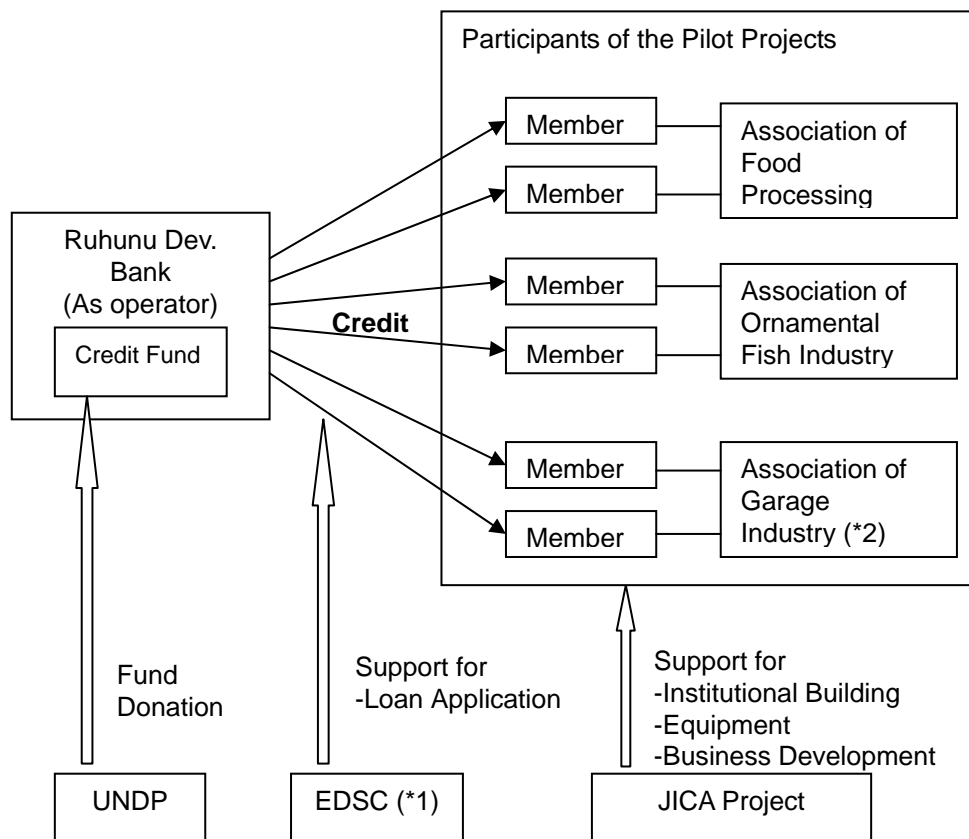
IDB conducted a survey of tsunami-affected small enterprises and maintained a database regarding the tsunami-affected livelihood projects in order to coordinate donor assistance. In August, the JICA Project Team and IDB headquarters agreed to implement this Pilot Project and exchange a Memorandum of Understanding (MOU). These two organizations were in close collaboration in every aspect of the Pilot Project implementation.

(2) Micro-credit Plan Supported by UNDP

Micro-credit, which supplies working capital for small businesses, was regarded as one of the most effective forms of financial assistance for tsunami rehabilitation of the affected industries. However, the JICA Project Team placed priority for budget allocation on the procurement of lost equipment, training, as well as micro-credit (as it had been removed from the financial assistance list of the Pilot Project).

In Galle, however, the United Nations Development Program (UNDP) emphasized the efficiency of a micro-credit scheme, acquired a considerable amount of funds, and looked for operators, who would coordinate micro-credit schemes for the appropriate tsunami-affected groups.

In July 2005, UNDP and the JICA Project Team held a meeting and agreed to commence a micro-credit scheme for the small industry groups covered by JICA's Pilot Project.



*1 EDSC stands for Enterprise Development Service Center. This organization supports the micro-credit applicant so that they can create business plans and prepare credit applications.

*2 Funding to support the Association of Garage Industry did not come from JICA but from Brendina

Figure 6.3 Structure of Micro-credit Program for Small Industries

The structure of this micro-credit scheme is shown in Figure 6.3. The JICA Project Team coordinated two organizations, the Ruhunu Development Bank (RDB) and the Enterprise Development and Service Center (EDSC), both of which were very experienced in micro-credit management. RDB would receive credit funds donated by UNDP and lend it in small amounts to beneficiaries. RDB would charge 6% for annual interest, which is significantly lower than the market rate. EDSC is a specialist group, which assists small business owners in preparing applications for loans. The loan application should include a business plan for the small business, which in turn motivates applicants to plan and manage their businesses. EDSC charges were to be settled by UNDP. Only members of these three business associations had access to this loan program.

6.3.6 Workshop for Needs Identification

(1) Objectives

To identify needs and training, which are both necessary to improve businesses. Needs were based on a short-term perspective. The JICA Study Team set priorities among the needs identified and coordinated assistance within the limited budget and time.

(2) Methodology - Workshop

Based on a decision made during the second meeting of the steering committee, the JICA Study Team organized two workshops for both the Food Based Industry Association and the Garage and Vehicle Repair Association to identify their training needs. The two workshops were held on the 10th and 11th of September 2005, respectively, at the Samanmal Hotel in Matara. Mr. D. P. Wickramasinghe, who was well experienced in entrepreneur development, facilitated both workshops. Assistance to the Garage Association was managed and financed by Brendina and not by the JICA Project.

Identifying the needs of the Ornamental Fish Industry Association was done during the working committee on the 12th of September 2005 (at the office), based on the decision of the steering committee.

(3) Results

1) Training Needs of the Food Based Industry

Members of the food based industry association agreed that they needed the following training for the recovery and sustainable development of their businesses:

- Training on yogurt and milk-based food products;
- Training on marshmallow products;
- Training on standard food packaging;
- Seminar on marketing strategies;
- Seminar on business management;
- Training on new bakery products; and
- Training on food preservation.

2) Training Needs of the Ornamental Fish Industry Association

The executive member of this association discussed their capacity building on the 12th of September 2005 and agreed that the following training should be prioritized:

- A business management seminar;
- Seminar on maintaining sustainability of a business by natural resource management;
- Training on diving skills in cooperation with Marine University of Tangalle; and
- Issues concerning a PADI license.

3) Training Needs of the Garage and Vehicle Repair Industry

- Training on plastic injecting molding systems.
- Training on electronic systems of motor vehicles and motor bikes.
- Training on electronic-printed circuit boards.
- Training on air conditioners.
- Training on vehicle painting with new technologies.
- Training on auto gear box repair.
- Training on four-stroke engine repair in three-wheelers and motorcycles.
- Business management training.
- Training for hydraulic system repair.

6.3.7 Exhibition of Food Products

(1) Objectives and Aims

As evidence that the tsunami-affected food processing industry showed signs of revival, a food product exhibition was planned after equipment was lent to the association members on 26th August 2005. Objectives of this event were:

- To develop market linkage with buyers;
- To give more attraction to products;
- To get comments from food processing experts;
- To arrange opportunities to develop products;
- To exchange ideas and familiarization among members; and
- To meet service providers and develop linkages to obtain their services.

A business development seminar also was implemented as a part of this event. The following officers and persons supported this exhibition:

- Mrs. Athukorala, Divisional Secretary, Matara;
- Mr. K. Gunawardana, President of Lucky Yoghurt, expert in entrepreneurship;
- Mr. Chopra Edirisinghe, ITDG on technical support;
- Mr. Vijitha, Public Health Inspector of the Matara Municipal Council on hygienic aspects of food production;

- Mr. J. Basnayake, Cathey Reech Institute Embilipitiya; and
- Mrs. K. Hettiarachchi, Expert in food product quality.

(2) Implementation

The exhibition was held on 13th October at a reception hall in the Solis Hotel, Nupe, Matara.

The items exhibited were:

- Bakery products like bread, buns and pastries;
- Hoppers and string hoppers;
- Sweet meals like milk toffees, dodol, kewum, aasmi, helapa, sesame rolls and musket;
- Cakes;
- Maldives fish;
- Yoghurt;
- Table salt;
- Curry powder; and
- Tea packets.

Even food producers not belonging to the associations were eager to participate in the exhibition. They were accepted until the exhibition hall finally filled up with all the food products. After the exhibition was declared open and the speeches delivered, Mr. Keerthi Goonawardana gave a lecture on how to manage and develop a small business. The lecturer was a president of the famous Lucky Yogurt Company, which also used to be a small business.

In order to improve the exhibited food items, an evaluation session was convened. Officers and experts examined each of the exhibited food items. Evaluation sessions were completed with an open forum, where all evaluators and food society members took part. Exchange of views and ideas took place during the session. The exhibition was held from 10.00 a.m. to 1.00 p.m., ending up with a lunch for all invitees and association members.



Figure 6.4 Ms. Atukorala, Divisional Secretary of Matara, Addressing the Gathering



Figure 6.5 Food Business Owners Waiting for Evaluators at the Exhibition Hall

6.3.8 Handover Ceremony of Diving Equipment

(1) Objective

Equipment for ornamental fish industry was lent to the Ornamental Fish Association in order to enhance the opportunities for livelihood rehabilitation of those who used to be engaged in the ornamental fish industry, and to facilitate institutional capacity building of a newly organized Ornamental Fish Association Matara. Since the total cost of the necessary equipment considerably exceeded the budget of the Project, Berendina (a local NGO) offered assistance with equipment valued at less than Rs7, 000 (mainly for skin divers).

(2) Implementation

This handover was held on 21st October 2005 at the New Hemali Reception Hall in Walgama Matara. Expected beneficiaries received relevant equipment (this included 81 lung divers, 85 skin divers, four inland ornamental businesspersons, and 16 suppliers). One hundred and twenty-five members attended the handover ceremony and 25 of them received equipment from the JICA Team as the procurement of the rest of the equipment was delayed. The funding to support skin divers came from the Berendina Foundation. Equipment for skin divers, valued at Rs. 3.3 million, was procured by the Berendina Foundation and delivered at the same occasion. Finally, an agreement was reached on the ownership of equipment, that is equipment belonging to the Ornamental Fish Association was lent out to its members free of charge.



Figure 6.6 Exchange of Agreement between the Association and the JICA Team



Figure 6.7 Photograph at the End of the Handover Ceremony

6.4 Achievement and Evaluation

The objective of the evaluation is common for all three Pilot Projects, that is to examine if the “co-assistance” approach is valid for an effective rehabilitation of livelihood for tsunami-affected people.

6.4.1 Evaluation Plan

The JICA Team conducted participatory workshops in its office for the Food Processing Association and Ornamental Fish Association on the following topics (see Section 4.4.1 for more details):

- Contribution of the public sector and donors other than JICA;
- Contribution of JICA (input for social, human, financial, and physical sources);
- Output of the JICA Pilot Project;
- Co-assistance approaches; and
- Quantitative indicators.

6.4.2 Criteria of Evaluation

The five criteria of the DAC of OECD were employed for the evaluation of the small industry Pilot Projects (see Section 4.4.2 for more details). The criteria were:

- Relevance;
- Effectiveness;
- Efficiency;
- Impact; and
- Sustainability.

6.4.3 Logical Framework

A logical framework for the small-industry Pilot Project is shown on the next page.

LOGICAL FRAME WORK

Project Name: Small-Scale Industry Support Pilot Project Project Area: Matara District, Southern Sri Lanka
 Project Management: JICA Project Team in Association with Brendina Target Beneficiaries: Tsunami-Damaged Small-Industry Owners
 Project Commencement: June 2005 Project Evaluation: December 2005

Project Narrative Summary	Indicator	Data Collection	Assumption
Overall Goal			
Livelihood and employment of Matara has recovered from the tsunami	<ul style="list-style-type: none"> Business associations for rehabilitation are increased or revitalized These organizations work well 	<ul style="list-style-type: none"> Evaluation of project National statistics 	<ul style="list-style-type: none"> Industrial Development Board in Matara keeps supporting the business associations
Project Purpose			
Business association members are ready for sustainable livelihood with co-assistance	<ol style="list-style-type: none"> Motivation of members is high enough Industrial society can handle various common needs themselves 	<ul style="list-style-type: none"> JICA Project checks the application for scoring 	<ul style="list-style-type: none"> The micro-credit fund is not reduced significantly
Output			
<ol style="list-style-type: none"> Social capital is enhanced Human capital is enhanced Financial capital is enhanced Physical capital is enhanced 	<ol style="list-style-type: none"> Achievement and expectation of business associations are high enough Business skills and knowledge of members are enhanced Micro-credit for business is available Ratio of association members who restarted their businesses is higher than 80% 	<ol style="list-style-type: none"> Association and project record and document Evaluation survey Evaluation survey 	<ul style="list-style-type: none"> Commitment of UNDP for micro-credit is implemented without failure
Activities			
<ol style="list-style-type: none"> 1.1 Facilitate the forming of business associations in selected industries 1.2 Support institutional management (e.g., industrial exhibition) 2. Support members with business and technical know-how 3. Coordinate micro-credit systems and business plan development 4. Lend out necessary equipment for restarting business 	Input <u>Japanese Side</u> <ol style="list-style-type: none"> Consultant (international/local) Local NGO and coordinators Equipment 	<u>Sri Lankan Side</u> <ol style="list-style-type: none"> Technical assistance to the associations and members 	<ul style="list-style-type: none"> Assistance to fishery village from other donors does not decrease significantly <hr/> Pre-condition <ul style="list-style-type: none"> Prospective beneficiaries agree on a co-assistance approach for the project

6.4.4 Food Processing Association Evaluation Sessions

The JICA Team conducted an evaluation workshop in the project office with 21 beneficiaries on 17th December 2005.

(1) Session 1 Assistance Offered to the Society (except JICA Pilot Project)

For the rehabilitation of food and other industries, a governmental organization, the Industrial Development Board, identified industrial damage from the tsunami and conducted matchmaking between tsunami-affected industries and donors. Numerous donors and NGOs made contributions in terms of delivering equipment, training, and micro-credit. No organization had taken actions for institutional building.

(2) Session 2 Assistance of JICA Pilot Project - INPUT

The most distinguished action of the JICA Team was facilitating tsunami-affected food business owners to organize an association. All support from the JICA Team including training, micro-credit, and delivery of equipment were offered to the association. The participating beneficiaries remembered that all support was based on a needs identification survey and were in full agreement with their association.

(3) Session 3 Output of the Pilot Project Activities

Output or impacts of JICA assistance were examined under four categories: institutional capacity, human capacity, financial capacity, and physical assets.

1) Institutional Capacity (Social Capital)

By answering the 11 questions asked at the evaluation workshops, beneficiaries understood that there were many aspects to be improved for a meaningful association. Some disadvantages of this organization were:

- They were scattered over four divisions along the coast of the Matara District, making frequent meetings difficult;
- The association president, secretary, treasurer, and committee members were active, while ordinary members were not sufficiently active; and
- Association members were expected to be cooperative, despite the fact they may be business competitors.

Even though beneficiaries recognized that the level of institutional capacity or social capital of their business community was not so high, they were well-motivated to stay in the association.

Concerning the capacity for “information access” and “external negotiation”, beneficiaries were not so self-confident, as the JICA Team might have taken care of them too much. After JICA leaves Matara in March 2006, the Foods Association may need another supporter for its activities such as the Matara Food Exhibition 2006, etc.

2) Human Capacity

With various training activities, food product exhibitions, as well as business registrations (many of them did not register themselves as businesses before the tsunami), the association members became more business-oriented than before. This trend will be enhanced when the micro-credit program starts for them with practical training in business plan development.

3) Financial Capacity

All of the association members restarted their business with the equipment lent by the JICA Team. In fact, some were earning more revenue than they did before the tsunami. The prospective micro-credit program will further enhance the financial capacity of the businesspersons in this association.

4) Physical Assets

JICA lent out food processing equipment to businesses whose equipment was lost during the tsunami, but only after careful survey and preparation. All recipients used this equipment and reopened their production lines. All members also joined the Food Exhibition in September. Some equipment was of superior quality to that which was lost, thus improving productivity in many cases.

(4) Session 4 Co-assistance Approach

JICA Team explained its co-assistance approach to the workshop participants. JICA's support to enhance social capital, human capital, financial capital, and physical capital were all to facilitate co-assistance. Beneficiaries responded with the following comments.

Participants from the Food Processing Industry Association mentioned that institutional capacity building is more important than any other capital enhancement, and further noted that, “To do a good thing needs more time”. Even though increasing social capital took a long time, it is what they needed most. Now, the association has more confidence to face the next disaster. From the JICA Project, they understood the merits of a business organization. Institutional capacity building ensured the sustainability and enhanced

human resources. Physical capacity came last in priority as it could be washed away by another tsunami, but institutional capacity could not be. As JICA's efforts have been focused on this aspect, society members appreciated the approach.

(5) Session 5 Quantitative Data

Data concerning society activities was tabulated. In total, there were 66 members. Ten committee meetings and four general meetings were held by the day of evaluation. A newcomer must pay Rs350 for registration and Rs40/month as a membership fee. There were five business owners who had not started their business among the 24 late members (with 10 types of businesses such as yogurt, sesame roll, Sri Lankan pudding, etc.).

6.4.5 Ornamental Fish Association Support Evaluation Sessions

The JICA Team conducted an evaluation workshop in the project office with four beneficiaries on 18th December 2005.

(1) Session 1 Assistance Offered to the Society (except JICA Pilot Project)

Some organizations such as the Industrial Development Board, NGOs, universities, ornamental fish exporters, as well as foreign individuals offered assistance that focused on divers. However, selection of beneficiaries was not always fair, and the majority of divers received no such assistance.

(2) Session 2 Assistance of JICA Pilot Project - INPUT

What the JICA Team had done by the evaluation day was organizing associations and lending out of equipment (as this was due to the delay in identifying tsunami-affected divers). Once the JICA Team announced a workshop for the affected people who used to be engaged in the ornamental fish industries, many misunderstood that "wealthy" Japan would just give them what they wanted. Over 200 divers rushed to the workshop hall, making a normal workshop impossible. The JICA Team then selected a few people from each village and asked the rest to complete an information sheet and leave the hall. In the subsequent discussions, the JICA Team realized there were many applicants that did not have diving equipment prior to the tsunami, yet still claimed it. At this point, the JICA Team then decided to interview all applicants and examined what they lost.⁴

⁴ All applicants had a "Certificate of Tsunami-Affected Person" issued by the Divisional Secretary. Since this governmental office issued certificates based on a person's claims without any investigation, these documents actually certified nothing.

In addition to the above, the procurement of diving equipment took a long time. Since there were no expert dealers for this particular equipment, the Pilot Project Team spent weeks to assign an ornamental fish exporter to deal with this issue. This dealer went to Singapore twice to import the equipment. As such, these myriad of procedures postponed the actual lending of equipment until October. No other activities had been implemented so far, except for the association and committee meetings.

The diving season begins in November. All beneficiaries restarted their diving business and are earning a decent income for their catches. As the equipment was recent, divers helped each other to learn how to handle it. They considered improving knowledge on using the new equipment was also a kind of human capacity development.

(3) Session 3 Output of the Pilot Project Activities

Output or impacts of JICA assistance were examined under four categories: institutional capacity, human capacity, financial capacity, and physical assets.

1) Institutional Capacity

Many aspects of institutional capacity or social capital have not been developed, as they should be. Divers within the same village used to have very close relationships and helped each other out even prior to the tsunami. This custom was not washed away by the tsunami. The divers have requested dive training from external organizations (a needed institutional capacity issue). Since no human resource or financial resource development has been conducted, many members did not realize the value of this association, especially divers. Suppliers were more aware of the necessity to maintain this kind of business society. There was an Ornamental Fish Suppliers Association in Matara.

2) Human Capacities

No training had been conducted by the time of the evaluation session. Many agreed that diving training as well as business development training (for ornamental fish suppliers) would be very useful for human resource development. Suppliers were more interested in business expansion and fish resource management, as well as more aware of the importance of training than divers were.

3) Financial Capacities

A stable job and regular income can also be regarded as a kind of financial capacity. In this aspect, association members have started their activities and been earning income for it.

Some divers have even started bank deposits from their daily surpluses. Therefore, financial capacities have been greatly enhanced (indirectly) through the lending of diving gear.

4) Physical Assets

Physical assets of beneficiaries have increased significantly after the JICA Team delivered diving equipment in October. All divers appreciated this equipment, although some were too happy that they forsake the necessity of training and financial capital development. They recognized their job as labor and not as a business affair.

(4) Session 4 Co-assistance Approach

The JICA Team explained the co-assistance approach to the workshop participants. Assistance to enhance social capital, human capital, financial capital, and physical capital were all to facilitate co-assistance. Beneficiaries responded with the following comments.

The Ornamental Fish Industry Association thought that institutional capacity building was more important than any other capacity, however, they regretted that they were somewhat backward compared to the other two associations under the small- and micro-entrepreneur rehabilitation project by JICA (suffering from lack of cooperation among association members). They appreciated the JICA Project Team for the formation of their association, as they thought they understood the merits of a business organization through this Pilot Project. In general, evaluation workshop participants believed that institutional capacity was important for the skill improvement, resource preservation, and security of members and negotiation of fish price. Some problems pointed out vis-à-vis this association were the following.

- Association size

The Ornamental Fish Industry Association was too large with nearly 200 members. Disseminating information, holding general meetings, and making important decisions were not easy for executive members, who were not accustomed to this kind of management. One opinion voiced was that each village or division (there are four divisions along the coast in the Matara District) should have a useful organization that would be easy to handle.

- Two different groups in one association

Members of the Ornamental Fish Industry Association can be categorized into two groups: divers and suppliers. The business of suppliers is to buy fish cheaply from divers and sell it

to exporters at higher prices. Divers are always suspicious that suppliers buy their fish at excessively low prices - producing conflicts of interest between the two parties. One suggestion was that an association be formed for divers and for suppliers.

(5) Session 5 Quantitative Data

Data concerning societal activities was tabulated. Overall, there were 177 members (who held 11 committee meetings and two general meetings by the evaluation day). Annual membership fees vary (Rs50- for skin divers, Rs100- for lung divers, and Rs200- for suppliers). All recipients have restarted their jobs, while 10 divers started collection work.

Information Box

Circulation Chain of Ornamental Fish from Matara

There are three kinds of major stakeholders in the ornamental fish industry (divers, suppliers, and exporters). Figure 6.8 illustrates the circulation chain of ornamental fish.

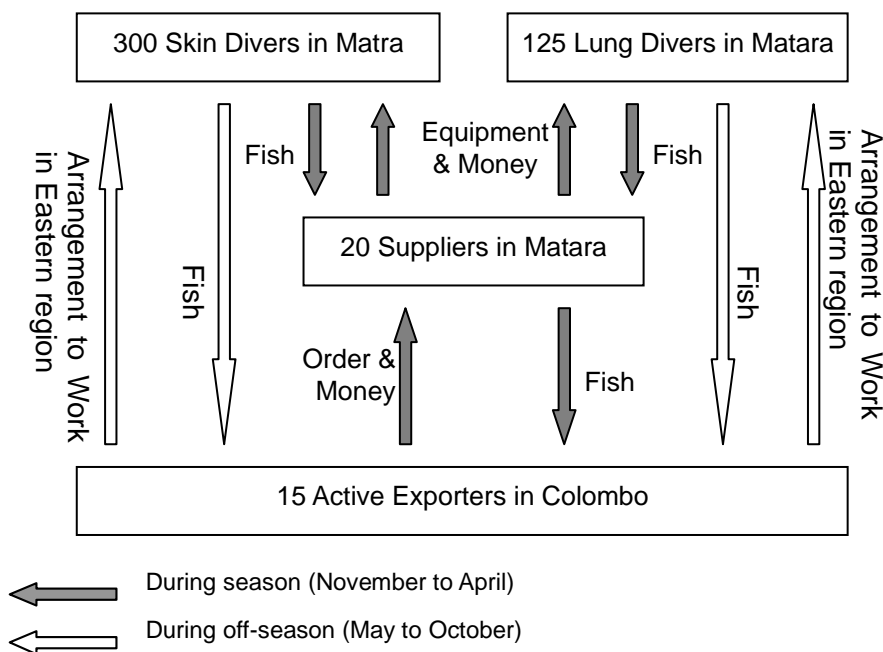


Figure 6.8 Circulation Route of Ornamental Fish from Matara District

Divers

There are approximately 300 skin divers and 125 lung divers in the Matara Division, respectively. Lung divers use aqua-lung equipment, while skin divers do not. Lung divers dive and catch fish and sell it to suppliers, with many of them borrowing equipment from suppliers. Diving season for ornamental fish along the southern coast is from November to April every year. During the Christmas season, Europeans stay longer at home and demand for ornamental fish peaks in this period of the year. The seas are rough during May to October, with nearly half of the divers going to the eastern coast. Exporters in Colombo make arrangements for this work away from home. Each diver gets approximately Rs15, 000- per month during the season, which is a very high income compared with other types of labor.

Suppliers

Suppliers are in a position to buy ornamental fish from divers. Suppliers “supply” ornamental fish to the exporters in Colombo. There are 20 suppliers in the Matara Division. This number has doubled after the tsunami, when divers became independent from conventional suppliers. Suppliers have fish tanks, air compressors, engine boats, and diving equipment. They lend diving equipment to divers and subtract some cost from the money they pay for the fish catch to the divers. Suppliers often take care of divers when they need support. As such, there is a sort of “load-and-retain” relation between these two stakeholders. Suppliers put a fish in a polyethylene bag with filled oxygen, which keeps the fish alive at least 24 hours. Exporters should carry these fish bags to Colombo and release fish to the exporters' aquarium within 24 hours.

Export Companies

There are about 100 ornamental fish exporters registered in Sri Lanka. Most of them are in Colombo, but just 15 are active. Major exporting destinations are Europe, the US, and Japan. They get orders from agents in client countries, call local suppliers, and request the catch of specific ornamental fish for the client orders. All ornamental fish are exported by air in polyethylene bags in plastic cases. This time, fish can survive for 24-40 hours with the oxygen-filled bag.

Information Box

“Garage Association”

Other than the Food Processing Association and the Ornamental Fish Association, there is a Garage Association in Matara. The garage industry deals with vehicle repairs. This organization contains some 60 garage owners affected by the tsunami. The JICA Team facilitated the creation of this organization. Berendina decided to help this association with equipment and the JICA Team has been treating this business association as quasi-beneficiary association under the umbrella of the Pilot Project.

Among the three small industry associations, the Garage Association showed the highest participation rate of members at the meetings. It was helping the most damaged garages with their own decision and donation. At the one-year anniversary of the tsunami, the association gathered together, visited the Matara Central Hospital, and cleaned the building as organized volunteers.

Generally, each garage business is bigger than a food processing or diving business. Garage owners are often more educated and motivated towards further deployment. Although the JICA Team made little contribution to this association, the association greatly appreciated the effort of the JICA Team (for the creation of the association) and gave a metal plaque of appreciation to the JICA Team in December.

6.4.6 Sustainable Livelihood Analysis with Five Capitals

Throughout the evaluation of each Pilot Project, the JICA Project Team also evaluated the entire co-assistance approach applied to the Pilot Project from the perspective of sustainable livelihood. The detailed assessment is shown in Section 9.3.3 of the report.

6.4.7 Evaluation Results

The following sections summarize the evaluation conducted for the small industry support Pilot Project whose beneficiaries were the Food Processing Association and Ornamental Fish Association.

(1) Relevance

The objective of this Pilot Project, the promotion of co-assistance is valid with some conditions. Beneficiaries needed specific advantages to become association members. Institutional building or improving social capital was a very important topic for disaster rehabilitation. However, project assistance for three other aspects (human capital, financial capital, and physical capital) also appeared to be essential inputs for the facilitation of institutional building. Through an integrated approach for the four capacities, the institutional capacity can grow.

Business associations are not well-developed in Sri Lanka, especially small businesses in rural areas. Small business owners are not familiar with organizational management. Therefore, the association should be well designed, in terms of member advantages, association size, and member characteristics.

(2) Effectiveness

The project objective was half achieved by the Food Processing Association. Their livelihoods had recovered with equipment from JICA. All association members have revived their small businesses and earned money as they used to. They also hold association meetings with relatively active participation. The successful Food Exhibition in Matara District made members realize the advantage of being an association member. Some seminars are still to be held as Pilot Project programs. Some difficulties in association management include the fact that members are scattered all along the coast of the Matara District and there are many sub-sectors in the food processing category (such as bread, yogurt, sesame rolls, fried snacks, etc.). As such, one skill-training program can hardly cover all these sub-fields.

Many divers believed that they had returned to a sustainable livelihood with the equipment lent by the JICA Team. Divers are essentially freelancers and are not convinced of the necessity of joining a business association for their daily work. Co-assistance mechanisms had not been established yet in the Ornamental Fish Association. In spite of the comments from the association executives that they would do their best to develop the association, it may prove difficult to maintain this association. The JICA Team could not provide enough input to enhance human and financial capital, which could have facilitated institutional capacity. Instead of the newly established Ornamental Fish Association, an existing Ornamental Fish Suppliers Association would lead the sector in the Matara District.

(3) Efficiency

To support the Food Processing Association, all Pilot Project inputs and activities were directly connected to outputs and the project objective (sustainable livelihood with co-assistance). However, delivering food-processing equipment took much more time than expected, as such, activities to enhance human and financial capital had not been sufficiently implemented by the time of this evaluation. These interventions should have been better synchronized with equipment delivery.

Regarding the Ornamental Fish Association, delivery of diving equipment had directly enhanced the physical capital, with all divers recovering their livelihoods. Divers are very encouraged by the new equipment and five of them have started supplier businesses. Instead of selling their fish to suppliers, they start to sell it directly to exporters in Colombo. For the co-assistance side of the Pilot Project, the Pilot Project had not successfully changed divers' mentality. There should have been more training sessions, seminars, and business events to show the advantages of an association.

(4) Impacts

There were significant economic impacts on the livelihoods of association members both in the food processing and the ornamental fish sectors. All beneficiaries came back to their businesses and recovered their incomes.

However, recovered livelihoods are fragile against another disaster. The assumption of the Pilot Projects is that beneficiaries can be resistant to another disaster with co-assistance mechanisms within the associations. Association capacity, however, has not matured, especially the Ornamental Fish Association. However, realistically, it is impossible for any associations to mature within the few months of the Pilot Project. Building co-assistance mechanisms and mentalities take time.

The extension of co-assistance to other cases has some problems. The majority of the Pilot Project stakeholders, the beneficiaries, the local partner NGO "Berendina", and the Industrial Development Board, were convinced that the co-assistance approach worked. Nevertheless, co-assistance approaches may not become popular by themselves. Methodologies based on the Pilot Project experience as well as training for co-assistance facilitators should be established to extend this approach.

(5) Sustainability

The purpose of this Pilot Project was to assure that business association members were ready for sustainable livelihoods with co-assistance. Concerning livelihoods, they have recovered with through self-employment, enhanced by the equipment lent by the JICA Team. Sustainability of livelihoods may be sufficient, with each member managing his/her business in a conventional way.

But simple business recovery is not what was expected. Co-assistance should be focused as a sustainable mechanism of industrial rehabilitation and development. Business associations can work as security against another disaster because associations can appeal their needs as organizations and coordinate together with donors and members. Business associations can also work as facilitators of business development beyond rehabilitation. There could be a variety of advantages to enhancing association activities for business management and promotion.

The Food Processing Association has good potential to survive and develop itself. Members realized the advantages of holding a business promotion exhibition, while also looking forward to borrowing working capital from prospective micro-credit systems. As long as these advantages last, these association members will continue to participate. In addition, executive members are devoting themselves to the association activities.

The Ornamental Fish Association is less sustainable. There are two very different groups in this association, the divers and the suppliers. Divers are laborers rather than businesspersons. Once they lost their equipment during the tsunami, most of them registered to receive equipment delivered by the JICA Project. An interview revealed that divers are more interested in the price that suppliers pay to them, rather than in the expansion of their businesses. Even though the two groups have common issues such as safety, insurance, fish prices, resource management, etc, the divers feel little advantage in joining association activities.

On the other hand, suppliers are very business-oriented (for instance they established an Ornamental Fish Suppliers Association before the tsunami). This association will continue its activities, but this newly established Ornamental Fish Association (a mixture of divers and suppliers) will not last long with the existing structure. The positions and interests of divers and suppliers are very different and often conflicting (making management of one association ineffective and unworkable). The JICA Project was on the way to establishing a

micro-credit system for the Pilot Project beneficiaries with funding from other donors (only suppliers from this association would have access to the loan). Even though the organization may be unsustainable, the lending or delivering of diving equipment was greatly appreciated by all association members. Now, divers are content to catch fish, while suppliers revive their businesses to sell fish to exporting dealers in Colombo.

6.4.8 Issues

Even though the Pilot Project was just six months old and still in progress, several issues have arisen to be addressed to meet the sustainable development of the business associations.

(1) Association Revenue for Sustainable Management

For example, the Food Processing Association charges 250 Rs. for the annual membership fee. Members are expected to pay for association shares that cost 100 Rs. per unit. Members are very serious about joining this association and about continuing the association's activities. However, revenue from membership fees is not enough to maintain these activities after assistance from the JICA Project is terminated. There is a whole range of assistance for the tsunami-affected people and business owners provided by government institutions, NGOs, and donors. Business associations of the Pilot Project should find relevant assistance programs and actively apply for them. This may make the business associations cultivate revenue sources, such as donations from donors as well as subsidies from the public sector.

(2) Business Collaboration

Each association member can enjoy much more favorable conditions if they collaborate in actual business activities such as in the procurement of equipment and raw materials, as well as in the marketing, advertisement, and retail price negotiation of their products, insurance, and so on. Association members did not know each other until they created the association. It is important to build trust among members and to move forward for business collaboration.

(3) Institutional Governance

Business associations formed by the Pilot Project have been under probation, with the assistance of the Pilot Project scheme. The JICA Project Team has closely assisted decision-making procedures of associations, such as steering committee meetings and a

series of participatory workshops. It is preferable for associations to take full initiative when they develop plans and make consensus in associations.

Concerning the Ornamental Fish Association, it needs restructuring. The following is an idea how to revitalize the association:

- 1) Reorganize the existing Suppliers' Association and make it as a group in the Ornamental Fish Association;
- 2) Organize small groups of divers at the Grama Niladari level, so that every member knows each other and co-assistance can be naturally generated; and
- 3) Encourage representatives from suppliers and small divers groups to meet regularly for the coordination of the industry.

(4) Support from Public Sector

The JICA Team has involved officers from the Industrial Development Board and a branch office of the Fishery Department. After termination of the Pilot Project, it is desirable that these public institutions take care of the business associations. Even though they are willing to take care of the associations, no specific budget has been allocated yet. Raising public support for business associations may need some skill and know-how. Government officers in charge should obtain additional training.

Another idea on how to continue support to business associations is to assign a coordinator to monitor and facilitate further institutional development. The coordinator can be assigned from a local or international NGO, donors, or public institutions.

Chapter 7 Reconstruction of Matara Aqueduct Bridge

7.1 Introduction

7.1.1 Background

The Matara Aqueduct was completely destroyed and washed away by the historic tsunami on December 26th 2004. It was located close to the seashore, about four km east of Matara City in southern Sri Lanka.

Before the tsunami, the aqueduct supplied water to the Dondra Area from the Nilwala River Basin (catchment area: 1,070 km²), upstream of Matara city, through a 500 mm (diameter) steel water pipe running in parallel with the Wellamadama Bridge of National Road No.2. After the tsunami destroyed the aqueduct, a polyethylene-type water pipe was installed to act as a temporary stopgap facility.

7.1.2 Necessity and Objective of the Project

The beneficiaries of water supply by the Matara Aqueduct are estimated to be about 13,000 houses and 78,000 people in the Dondra area, about six km east of Matara City. Therefore, for the beneficiary's area, permanent restoration of the aqueduct by a new steel-type water pipe (500 mm diameter) was urgently required against the coming monsoon season and possible floods.

The Government of Sri Lanka has requested the Government of Japan to support restoration works of the aqueduct, including its planning, design, and reconstruction.

7.1.3 Scope of Work

The JICA Project Team has conducted the following activities to prepare detailed designs and draft tender documents for urgent restoration works of the Matara Aqueduct:

- Geological Investigations;
- Topographic Surveys;
- River Investigations and Hydraulic Analyses (for high water level design);
- Preparation of Draft Tender Documents and Design Drawings for the aqueduct; and
- Monitoring of the Reconstruction Work.

7.1.4 Sequence of the Project

The fund for Non-Project Grant Aid has been given from the GOJ to the GOSL in the Emergency Evacuation Phase. Prior to implementation, discussion by the Steering Committee to select the most effective project components enabled the assistance and strengthening of local communities to provide quick impacts to those impacted by the disaster. In order to implement project components and to utilize technologies of the JICA Project Team, design and draft tender documents were prepared and submitted to GOSL. The tender of the project component took place among local contractors, with the tendering process having been conducted by GOSL with technical assistance from the JICA Project Team. During the construction stage, the project was supervised by consultants selected by GOSL, while technical quality and project effectiveness was monitored by the JICA Project Team. Reconstruction work on the Matara Aqueduct Bridge is scheduled to be completed by April 2006.

7.2 Site Survey

7.2.1 Natural Conditions at Matara

(1) Topography

The project site of the Matara Aqueduct is in the Matara District, between the Galle and Hambantota Districts, in southern Sri Lanka. The project site is located 40 km east of Galle, 40 km west of Tangalle, and 70 km of Hambantota on National Road No. 2 along the coast, respectively. It is close to the Dondra Top and within one km of the Matara side (on the west side of the Dondra Top, which is famous as the southernmost tip of Sri Lanka.) The project site is situated at the midpoint between Galle and Tangalle.

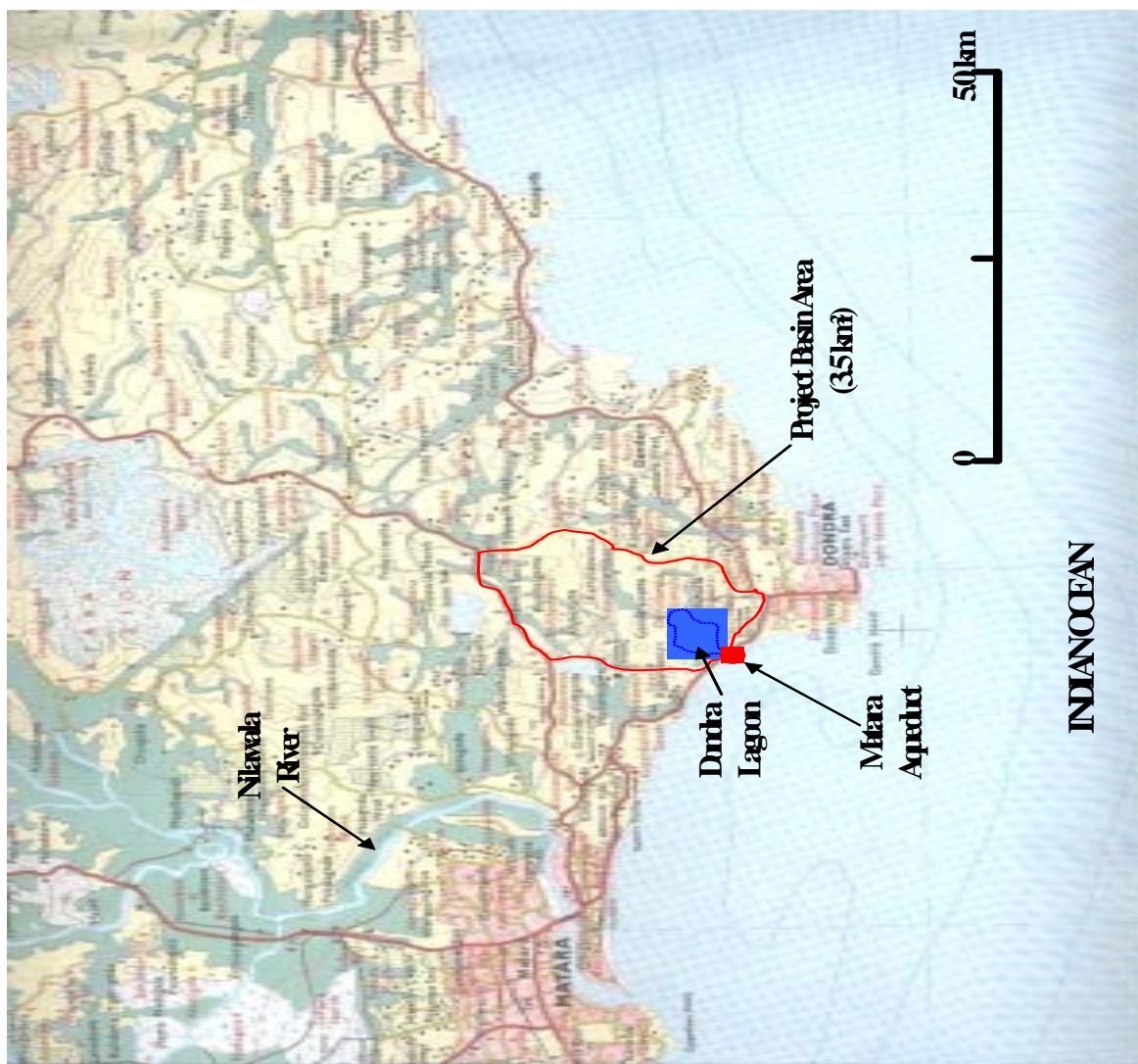
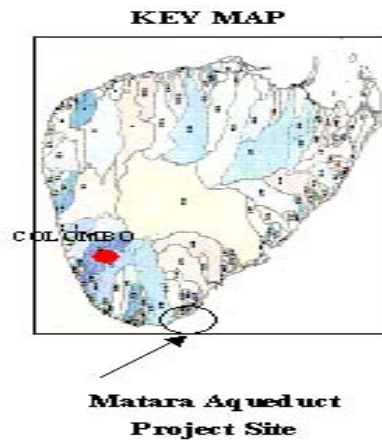
The Matara Aqueduct crosses the outlet channel of the Dondra Lagoon, where the channel's width is between 25 - 50 m, while the distance between the lagoon and the seashore (sea level) is about 80 m. In the project basin, there are no obvious courses for the river, upstream of the Lagoon. Since the project basin area has been created and developed originally from that of the Lagoon, the basin slope is almost flat. Figure 7.1 shows the site location of the Matara Aqueduct and its catchment basin.

(2) Natural Conditions

Natural conditions at the Matara Aqueduct Bridge project site (climate, rainfall, temperature, humidity, wind, and tide) are referred to in Annex 7.

(3) Flood Situation

A historically heavy rainfall (heavier than that seen over the last half century) hit the southern area of Sri Lanka from the 17th to 18th of May 2003, causing flooding and landslides over the area, killing 300 people, partially or completely destroying houses, damaging agricultural products and infrastructure, and blocking road networks. This historic rainfall caused widespread destruction in both human and physical capital.



Map: 1:40,000 scale (No. 91, Matara), Survey, Department

Figure 7.1 Project Location and Catchment Area

7.2.2 Topographic and Geological Investigation

(1) Outline of Geomorphological and Geological Conditions

1) General Geomorphology

A geomorphological map of the central and southern parts of Sri Lanka is shown in Figure 7.2. As shown in the map, this area consists of the peneplain, which is based on Precambrian rocks. This peneplain is divided into three geomorphological surfaces based on the altitude of each, as follows:

- Highland Surface (500 meters or more above sea level);
- Intermediate Surface (between 300 - 500 meters above sea level); and
- Lowland Surface (less than 300 meters above sea level).

Highland Surfaces occupy the highest mountain areas in Sri Lanka. These mountain areas include plains, basins, and plateaus with many monad nocks. Intermediate Surfaces are distributed as the widest peneplain surrounding the Highland Surfaces. These surfaces consist of gently sloped mountains, hills, and flat plateaus with monad rocks.

The Lowland Surfaces consist of gently sloped hills and flat plateaus. They are divided into two sub-surfaces, based on climatic conditions as the Dry Zone and Wet Zone, respectively. Generally, the Dry Zone is covered with thin soil, with many inselbergs, while the Wet Zone is covered with thick soil, with a few inselbergs in the area. The investigation site in Matara is located on the Lowland Surfaces.

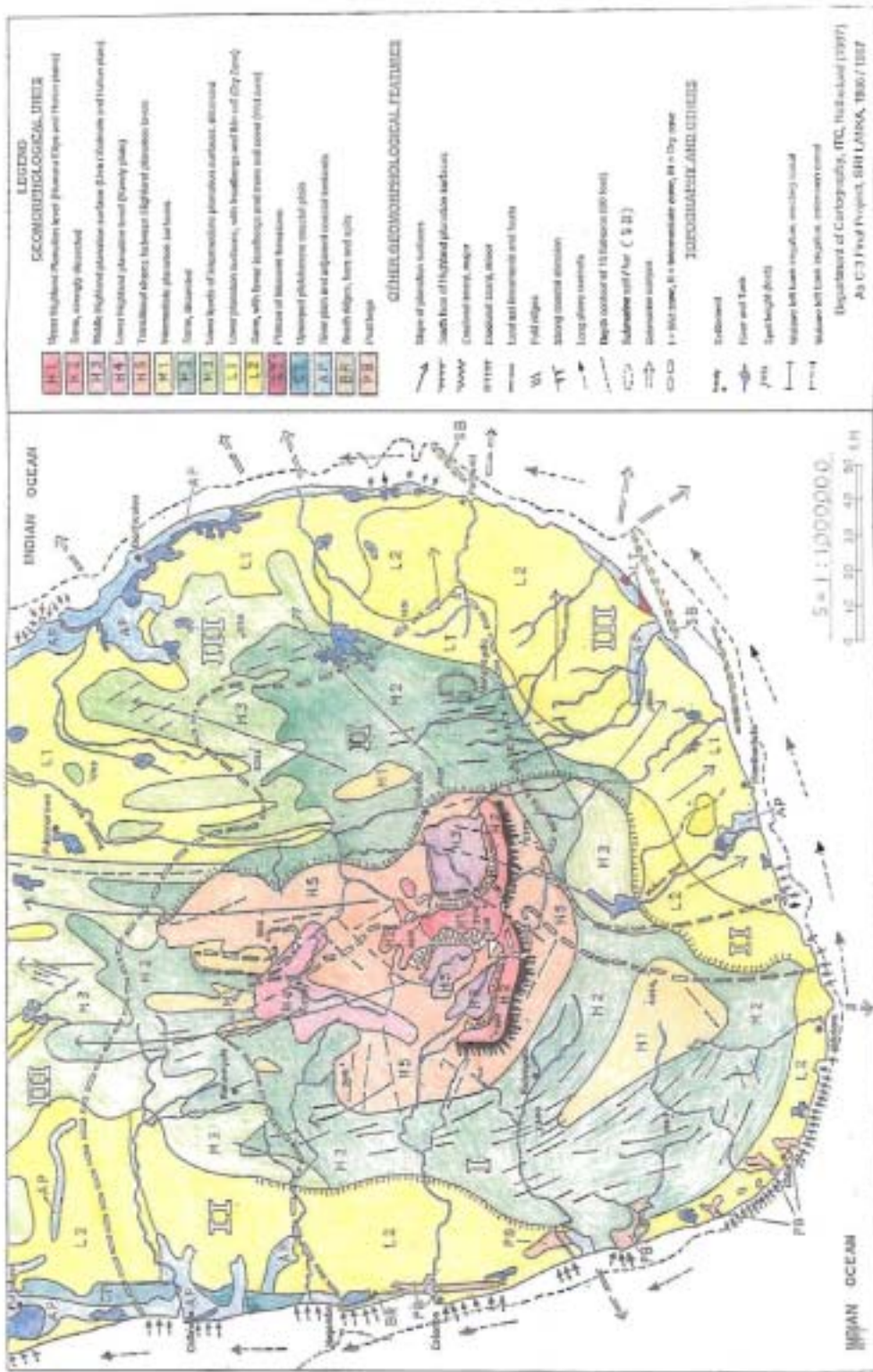


Figure 7.2 Geomorphological Map of the Central and Southern Parts of Sri Lanka

2) General Geology

A compiled geological map is shown in Figure 7.3. The island of Sri Lanka is divided into the coastal region and the central highland. The coastal region narrows along the eastern and southern sides of the island and widens along the west side and entire northern half of the island. The central highland comprises the southern central part of the island, with mountain peaks reaching heights exceeding 2,300 m. Most of the island consists of crystalline and foliated metamorphic rocks of the Precambrian age, with only a narrow fringe of more recent sediments from the Jurassic, Miocene and Quaternary ages along the coast.

The stratigraphy of Sri Lanka is shown in Table 7.1.

Table 7.1 Stratigraphy of Sri Lanka

Era	System	Epoch	Formation
Cenozoic	Quaternary	Recent	Alluvium Deposit
Cenozoic	Quaternary	Pleistocene	Terrace Deposit
Cenozoic	Tertiary	Miocene	Sedimentary Rock
Mesozoic	Cretaceous	-	Dolerite Dyke
Mesozoic	Jurassic	-	Sedimentary Rock
Precambrian	-	-	Metamorphic Complex

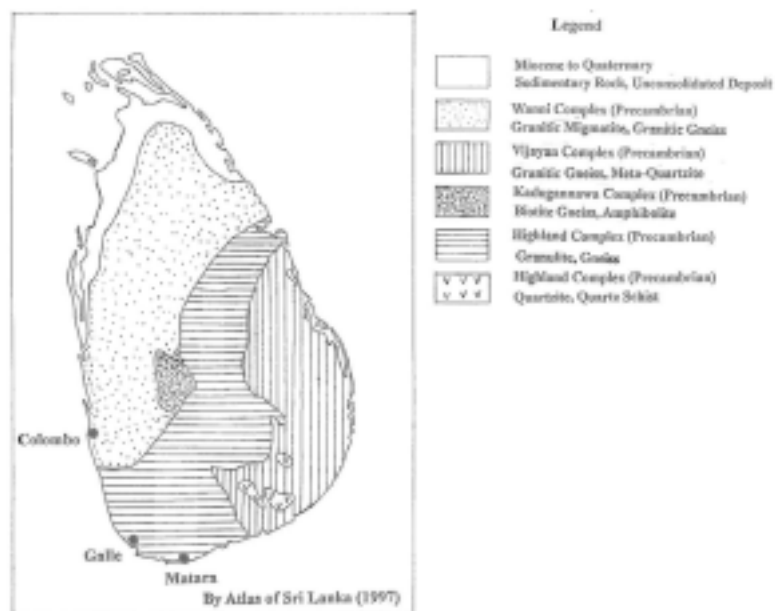


Figure 7.3 Geological Map of Sri Lanka

The Precambrian complex is divided into four series, the Highland Complex (HC), the Kadugannawa Complex (KC), the Vijayan Complex (VC) and the Wannu Complex (WC), respectively. The characteristics of those complexes are as follows:

- Highland Complex (HC)

The Highland Complex occupies the central highland and extends from the southwest to the northeast of the island. The rocks of the HC are estimated to be about 2,000 to 3,000 million years old and consist of granulite facies, meta-sediment, quartz-sediment, quartz-feldspathic, and charnockitic gneiss.

- Kadugannawa Complex (KC)

These rocks are surrounded by the HC and are distinct, well-defined, elongated upright, and boat-shaped around Kandy city. The rock age is unclear. They consist mainly of biotite-hornblende gneisses and amphibolites, concordant with each other.

- Vijayan Complex (VC)

The Vijayan Complex occupies the lowland, to the east of HC. It consists of granite gneisses, granitoid rocks, migmatites, and calc-silicate rock. The rock age of the VC is estimated at about 1,100 million years old.

- Wannu Complex (WC)

The Wannu Complex occupies the lowland to the west of HC. It consists of grano-diorites, granite migmatites, granitoid rocks, and charnockitic gneisses. The rocks of WC show lower metamorphic grades than those of the HC, but there is no clear structural break between these two units, although several N-S zones of shearing are present between them. The rock age of the WC is estimated at between 1,000 - 1,100 million years old.

(2) Contents and Quantity of the Survey

The investigation contains a topographic survey, drilling work, and laboratory test.

1) Topographic Survey

The topographic survey was carried out to create a base map for the design work. The survey area is shown in Figure 7.4. Specifications for the survey are detailed in Table 7.2.

Table 7.2 Specifications for the Topographic Survey

Item	Quantity
Topographic Survey	50 m × 100 m (5000 m ²)
Scale of Mapping	1/200
Contour Line	1.0 m
Longitudinal Section along the Bridge	100 m
Longitudinal Section along the River	50 m
Cross Sections	7 sections

2) Drilling Works

The drilling works were carried out by rotary drilling machines. The drilling sites are shown in Figure 7.4. Table 7.3 shows quantity of the surveys.

Table 7.3 Quantity of Geological Survey

Item	Quantity
Drilling Site	3 sites
Total Drilling Depth	63 m
Standard Penetration Test	48 times
Undisturbed Sampling	2 samples

3) Laboratory Test

The laboratory test was carried out for disturbed and undisturbed samples. The undisturbed samples were obtained from thin wall samples, while the disturbed samples were obtained from a standard penetration core tube. The quantity and standard of tests are shown in Table 7.4.

Table 7.4 Quantity and Standard Laboratory Test

Item	Quantity	Standard
Specific Gravity	2	AASHTO T100
Moisture Content	30	ASTM D2216
Atterberg Limit	12	ASTM D4318
Grain Size Analysis	30	AASHTO T/27/T88
Unit Weight	2	AASHTO T265
Unconfined Compression	2	AASHTO T208
Triaxial Compression (UU)	1	JSF T524
Direct Shear Test	1	-
Chemical Analysis of Soil	3	JSF T231

(3) Results of Geological Survey

1) Results of Drilling Work

- The results of the drilling works are shown in Annex 7-1 and in Figure 7.5.
- The three drilling sites are located along both banks of the aqueduct and the center of the riverbed.

- From the Geological Cross Section, the geological formations are divided into five formations.
- These formations consist of river or sea deposits (RD), alluvial sands (AS), alluvial silts (AC), highly weathered rocks (HWR), and weathered rocks (WR).
- These formations, as a whole, slope towards the right bank.
- The alluvial sand (AS1) consists of low alluvial terraces on both banks. The thickness of the formation is thin on the left bank and is thick on the right bank. Also, this formation is found on the highly weathered rock as a thin layer. This thin layer is named AS2.
- The alluvial silt (AC) is found between AS and AS2.
- The depth of the highly weathered rock (HWR) is 14.0 m on the right bank and 10.0 m on the left bank, respectively.
- The depth of the weathered rock (WR) as a bearing layer shows 18.5 m on the right bank and 17.5 m on the left bank, respectively.

2) Description of Geological Formations

A description of the geological formation is as follows:

- River Deposit (RD)

This formation is distributed on the river bed. Its thickness ranges up to 3.0 m, with facies showing fine sand or medium sand. Its color is dark gray, while its relative density is very low.

- Upper Alluvial Sand (AS1)

This formation consists of an alluvial terrace on both banks. Its thickness is between 5.5 - 9.5 m. The facies show mainly silty sands, with medium sands and shell fragments. The color of the top soil is yellowish orange, but changes from brown to dark gray with increasing depth. The relative density is low.

- Alluvial Silt (AC)

This formation is covered with upper alluvial sand (AS1). Its thickness ranges from 1.5 - 3.0 m. The facies show litemitic red soil with granules of oxide. The color changes from reddish brown to yellowish orange. The consistency changes from soft to hard.

- Lower Alluvial Sand (AS2)

This formation is covered with alluvial silt (AC). The thickness ranges from 0.5 - 2.0 m. The facies show silty sands or fine sands with thin litemitic silt. The color is mainly gray white and partially brown. The relative density is medium.

- Highly Weathered Rock (HWR)

This formation is covered with lower alluvial sand (AS2). The thickness ranges from 4.5 - 7.5 m. The facies show mainly unconsolidated medium and coarse sands with granules of feldspar and quartz. The color is yellowish gray or brown. The relative density is high.

- Weathered Rock (WR)

This formation, which is a bearing layer, gradually changes from highly weathered rock. The facies show mainly consolidated medium sand with fine or coarse sands. This formation keeps its texture of original rock as granite gneiss. The color is yellowish gray or, brown with purple color. The relative density is very high.

3) Results of Standard Penetration Test (SPT)

The standard penetration test was carried out 48 times at the three bore holes. The N-values of each geological formation are shown in Table 7.5.

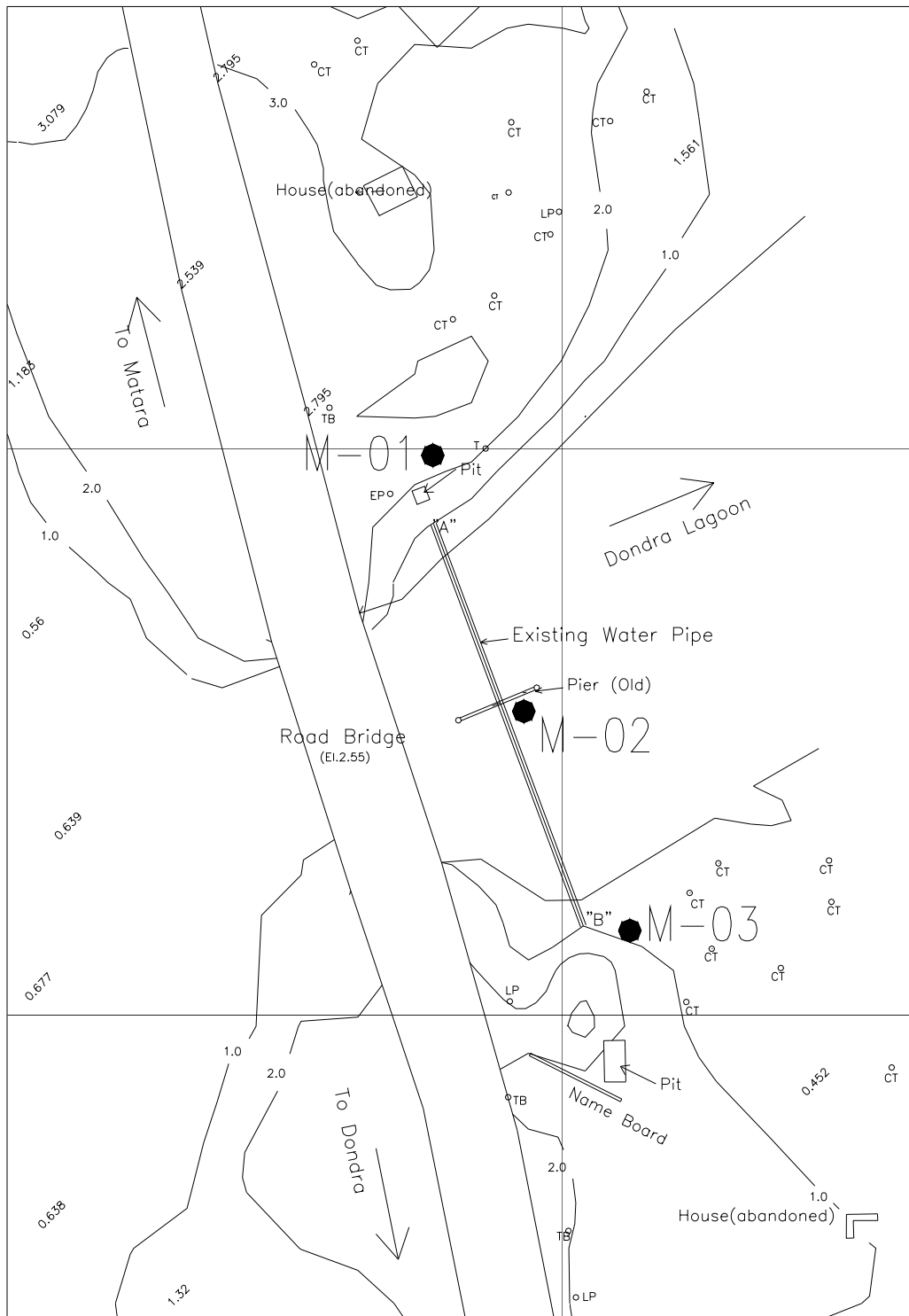
- The N Values of the river deposit (RD) show 0. This deposit is very loose because of influence from both river and sea water.
- The N Values of the upper alluvial sand (AS1) range from 2 - 13. This change results from quantity changes in fine materials.
- The N values of the alluvial silt (AC) range from 2 - 22. This change results from the quantity of granules of oxide.
- The N values of the lower alluvial sand (AS2) range from 13 - 24. This formation is medium dense.
- The N Values of the highly weathered rock (HWR) range from 15 - 50.
- The N Values of this formation change according to weathering condition.
- The N Values of weathered rock (WR) are higher than 50 as refuse or rebound for penetration.

Table 7.5 Results of the Standard Penetration Test (SPT)

Formation	Number of Tests	Max. Value	Mini Value	Av. Value
RD	2	0	0	0
AS1	16	13	2	6
AC	6	22	2	11
AS2	3	24	13	19
HWR	17	50	15	46
WR	2	Refuse	Refuse	Refuse

(4) Laboratory Test Results

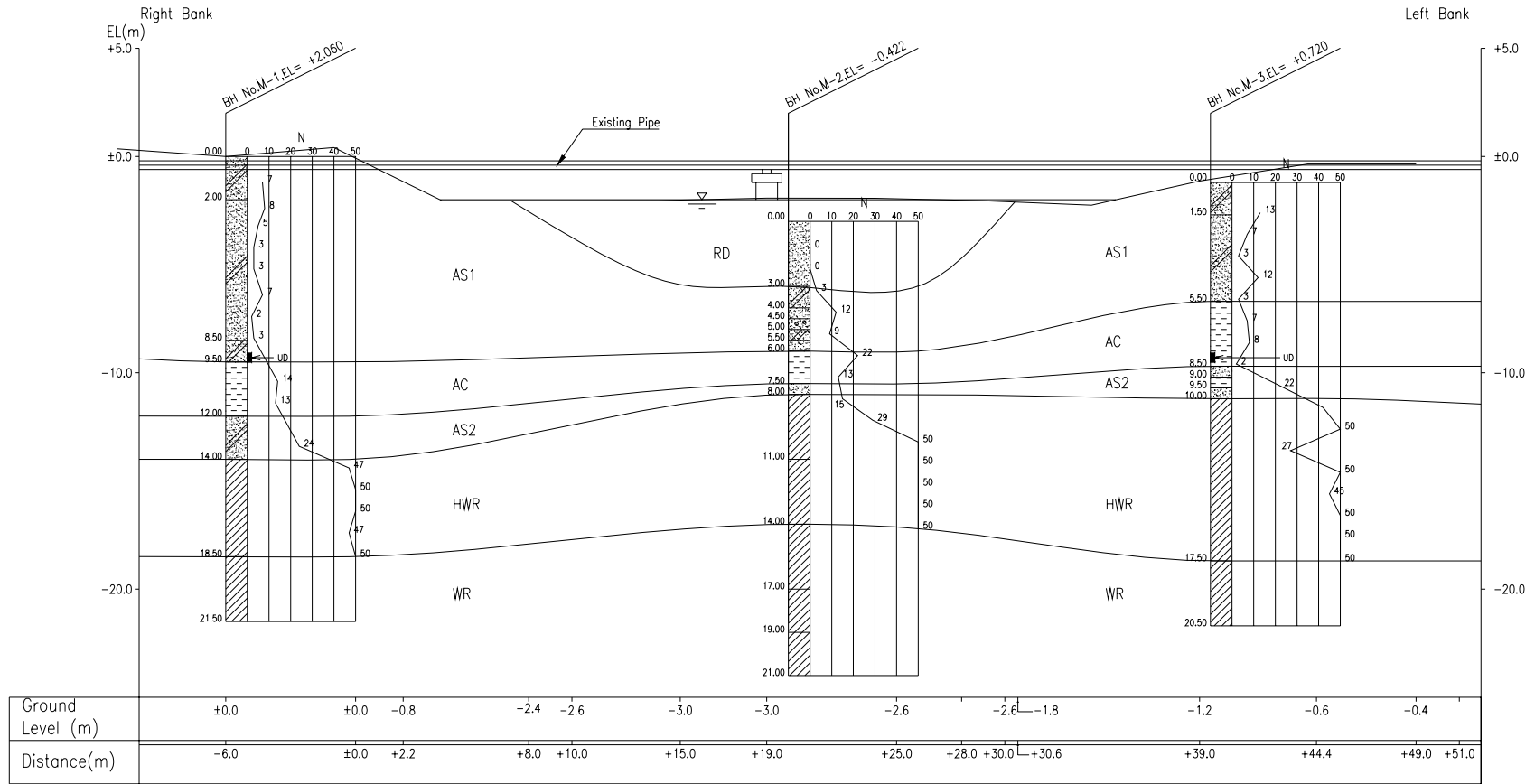
Laboratory test results are summarized in Table 7.6.



Source: JICA Project Team

Figure 7.4 Borehole Location Map at the Matara Aqueduct Site

7-13



Source: JICA Project Team

Figure 7.5 Geological Profile of the Matara Aqueduct Site

Table 7.6 Summary of Laboratory Test Results

BH No.	Depth	Soil Description	Unified Soil Class	NMC %	SG	Atterberg Limit			Grain Size Analysis			UCT Soil q _u kPa	Direct Shear Test			Triaxial Compression test C _u kPa	Chemical Analysis		
						LL %	PL %	PI %	Fines < 0.075 %	Sand 2.00-0.075 %	Gravel >2.0mm %		C kPa	σ _v	PH		Chloride %	Sulphate %	
BH1	1.00-1.45	Silty Sand	SM	12.48	-	NP	NP	NP	19.15	68.75	12.10	-	-	-	-	-	-	-	
	2.00-2.45	Poorly Graded Sand	SP	13.00	-	NP	NP	NP	1.30	98.70	0.00	-	-	-	-	-	-	-	
	3.00-3.45	Poorly Graded Sand with Silt	SP-SM	26.13	-	NP	NP	NP	5.75	92.10	2.15	-	-	-	-	-	-	-	
	5.00-5.45	Poorly Graded Sand with Silt	SP-SM	17.30	-	NP	NP	NP	7.59	92.07	0.34	-	-	-	-	-	-	-	
	6.00-6.45	Poorly Graded Sand with Silt	SP-SM	17.81	-	NP	NP	NP	11.11	86.86	2.03	-	-	-	-	-	-	-	
	7.00-7.45	Silty Sand	SM	18.12	-	NP	NP	NP	19.12	75.28	5.60	-	-	-	-	-	-	-	
	8.00-8.45	Silty Sand	SM	15.42	-	NP	NP	NP	16.07	80.90	3.03	-	-	-	-	-	-	-	
	9.00-9.50	-	-	-	2.62	NP	NP	NP	-	-	-	123.0	-	-	43.0	-	-	-	
	10.00-10.45	Clayey Sand	SC	18.05	-	37.00	23.00	14.00	38.65	46.47	14.88	-	-	-	-	-	-	-	
	11.00-11.45	Clayey Sand	SC	16.35	-	34.00	15.00	18.00	33.73	47.83	18.44	-	-	-	-	6.300	0.280	0.071	
14.00-14.45	Silty Sand	SM	14.10	-	NP	NP	NP	20.33	78.03	1.64	-	-	-	-	-	-	-		
BH2	3.00-3.45	Silty Sand	SM	19.75	-	NP	NP	NP	24.90	74.01	1.09	-	-	-	-	-	-	-	
	4.00-4.45	Poorly Graded Sand	SP	18.51	-	NP	NP	NP	4.80	94.70	0.50	-	-	-	-	-	-	-	
	5.00-5.45	Clayey Sand	SC	19.53	-	52.80	25.40	27.40	47.63	41.49	10.88	-	-	-	-	-	-	-	
	6.00-6.45	Inorganic Clay with High Plasticity	CH	21.59	-	52.40	22.40	30.00	57.62	36.24	6.14	-	-	-	-	-	-	-	
	7.00-7.45	Clayey Sand with Gravel	SC	20.23	-	40.60	23.20	17.40	26.86	49.15	23.99	-	-	-	-	6.500	0.290	0.065	
	8.00-8.45	Clayey Sand	SC	27.63	-	30.90	22.00	3.90	41.19	57.78	1.03	-	-	-	-	-	-	-	
	9.00-9.45	Clayey Sand	SC	23.48	-	34.00	19.40	14.10	45.26	53.62	1.12	-	-	-	-	-	-	-	
	10.00-10.45	Clayey Sand	SC	20.41	-	29.20	18.60	10.60	26.05	61.76	12.19	-	-	-	-	-	-	-	
	12.00-12.45	Clayey Sand	SC	20.07	-	NP	NP	NP	41.23	55.07	3.70	-	-	-	-	-	-	-	
13.00-13.45	Silty Sand	SM	14.70	-	NP	NP	NP	21.95	76.26	1.79	-	-	-	-	-	-	-		
BH3	1.00-1.45	Poorly Graded Sand with Silt	SP-SM	14.24	-	NP	NP	NP	5.96	79.32	14.72	-	-	-	-	-	-	-	
	2.00-2.45	Poorly Graded Sand	SP	22.28	-	NP	NP	NP	2.93	97.04	0.03	-	-	-	-	7.300	0.135	0.054	
	3.00-3.45	Poorly Graded Sand	SP	25.16	-	NP	NP	NP	4.98	94.04	0.98	-	-	-	-	-	-	-	
	4.00-4.45	Poorly Graded Sand with Silt	SP-SM	21.35	-	NP	NP	NP	6.51	91.41	2.08	-	-	-	-	-	-	-	
	5.00-5.45	Silty Sand	SM	16.31	-	NP	NP	NP	15.67	82.12	2.21	-	-	-	-	-	-	-	
	6.00-6.45	Clayey Sand	SC	21.69	-	58.00	19.80	38.20	36.61	41.04	22.35	-	-	-	-	-	-	-	
	7.00-7.45	Inorganic Clay with Low Plasticity	CL	28.03	-	48.30	26.20	22.10	62.85	25.84	11.31	-	-	-	-	-	-	-	
	7.45-8.00	-	-	-	2.57	-	-	-	-	-	-	88.0	29.0	24.8	-	-	-	-	
	8.00-8.45	Clayey Sand	SC	34.22	-	39.25	15.30	23.95	40.25	56.03	3.72	-	-	-	-	-	-	-	
	9.00-9.45	Clayey Sand	SC	26.56	-	34.70	19.30	15.40	33.15	55.66	11.19	-	-	-	-	-	-	-	
15.00-15.45	Silty Sand	SM	19.63	-	NP	NP	NP	29.12	68.77	2.11	-	-	-	-	-	-	-		

Source: JICA Project Team

(5) Analysis of Design Values for Geological Formation

An analysis of design values was carried out to determine cohesion (C), angle of internal friction (ϕ), and unit weight. The formulas for calculation and reference data are as follows, with general design values shown in Table 7.7, and calculated design values shown in Table 7.8.

- Soil with Clay Cohesion $C = N \times 1/15 \text{ (kgf/cm}^2\text{)} \text{ (}\phi=0\text{)}$
Japan Highway Association
- Soil with Sand Angle of Internal Friction $\phi = \sqrt{15N} + 15 \text{ (N>5, } \phi \leq 45, C=0\text{)}$
Japan Highway Association

Table 7.7 General Design Values for Soil

Formation	Condition	Unit Weight (tf/m^3)	Angle of Internal Friction ($^\circ$)	Cohesion (kgf/cm^2)
Gravel	Compact or Good Grade	2.0	40	0
Gravel	Not Compact or Poor Grade	1.8	35	0
Gravel with Sand	Compact	2.1	40	0
Gravel with Sand	Not Compact	1.9	35	0
Sand	Compact or Good Grade	2.0	35	0
Sand	Not Compact or Poor Grading	1.8	30	0
Soil with Sand	Compact	1.9	30	0
Soil with Sand	Not Compact	1.7	25	0
Soil with Clay	Hard	1.8	25	0
Soil with Clay	Soft	1.6	20	0
Clay and Silt	Hard	1.6 - 1.7	20	0
Clay and Silt	Soft	1.4 - 1.5	15	0

Source: Japan Highway Corporation

Table 7.8 Design Values for Geological Formations

Symbol	Average N Value	Unit Weight (g.f/cm^3)	Qu Value (kgf/cm^2)	Cohesion C (kgf/cm^2)	Angle of Internal Friction ϕ ($^\circ$)
RD	0	1.7	0.0	0.0	15
AS1	6	1.7	0.0	0.0	24
AC	11	1.8	1.4	0.7	0
AS2	19	1.9	0.0	0.0	32
HWR	46	2.0	0.0	0.0	42
WR	Refusal	2.2	0.0	0.0	45

(6) Geotechnical Considerations

The formation proposed for the bearing layer appears to be either highly weathered rock (HWR) or weathered rock (WR). The mean N value of highly weathered rock is 42, however, N values for this formation change according to weathering conditions. On the other hand, all N values for weathered rock (WR) are greater than 50 or refusal. Thus it follows that the weathered rock (WR) is suitable for the bearing layer of the aqueduct.

7.3 Design Work

7.3.1 Bridge Design Criteria

(1) General

The new aqueduct bridge was designed to supply drinking water. All structures (superstructure, substructure, and foundation) were designed using Japan Industrial Standards (JIS) and “Specifications for Highway Bridges” issued by the Japan Road Association (JRA).

(2) Design References

In addition to bridge and site-specific criteria, pertinent sections of the following standards or codes have been employed:

- Water Steel Pipe Standard Specifications (WSP), Japan;
- Japanese International Standards (JIS), Japan;
- Design Specifications of Highway Bridges, Part II, Steel Bridge Design, Japan; and
- Design Specifications of Highway Bridges, Part IV, Substructure Design, Japan.

(3) General Features of the Design

Bridge lengths were determined based on water pipe diameter, river profile, terrain, hydraulic considerations, and existing bridge conditions. The selected water pipe diameter is 500 mm, the same diameter as that of the old aqueduct pipe. Bridge width was determined based on water pipe diameter, maintenance, and installation of the water pipe.

(4) Design Load

1) Dead Load

The dead load consists of the weight of the entire structure, including the main truss, cross beam, inspection passageway, and water pipe. Unit weights of dead loads are noted below.

- Steel Weight : 77.0 kN/m³
- Reinforced Concrete : 24.5 kN/m³

2) Live Load

The live load consists of the weight of the applied moving load of pedestrians on the inspection passageway. All components of the bridge affected by the live load are designed to carry WSP load.

- Pedestrian Live Load : 1.3 kN/m²

All substructures are designed for the live load.

(5) Design Flood Water Level

The design flood discharge of the Matara Aqueduct has been calculated by the Rational Method, applying Regional Rainfall Intensity Factors in Sri Lanka, specifically to design standards for the Irrigation Department. Values of Regional Rainfall Intensity Factors (X and Y on the Rainfall Intensity Formula; $I = X \times D - Y$) are also utilized with the same standards. In this study, storm duration (the time of the flood concentration), the runoff coefficient, and the basin storage factor are considered using two calculation methods as alternative calculations.

Since the aqueduct is an important water supply facility for the Dondra Area, a 50-year flood is a reasonable base for the design of the aqueduct; this is the same as the design standard for the road/bridge in Sri Lanka, which crosses the lagoon. It is therefore determined that the design flood water level for the aqueduct is a 50-year return period. A summary of calculation factors and results are shown in Table 7.9.

Table 7.9 Summary of Calculation Factors and Results

Item	Calculation Method for Peak Discharge	
	1) Sri Lanka Standards (Irrigation Department)	2) Calculation Methods Applied in Other Asian Countries
Catchment Area (km ²)	3.5 km ²	3.5 km ²
Time of Concentration T _c (min)	124.0 min	58.1 min
Runoff Coefficient: C	0.30	0.45
Storage Factor: S	-	1.30
Rainfall Intensity (mm/hour)	97.46 mm/hour	110.8 mm/hour
Peak Discharge (50-year flood)	28.43 m ³ /sec	48.5 m ³ /sec

Flood water levels along the channel were calculated with an adopted design peak flood discharge of 50 m³/sec (the 50-year flood), taking flood inundation on the left bank floodplain into consideration. When the cross-section data were inputted into the HEC-RAS program, the range of the floodplain was established. The calculations were conducted based on a basin model, the Dondra Lagoon Basin Water Flow System, as shown in Figure 7.6.

Calculation factors and the results for the two cases noted above are summarized below. The calculation details are attached in Annex 7-2. The designed flood water level of the aqueduct against a 50-year flood is set to be EL. 1.59 m.

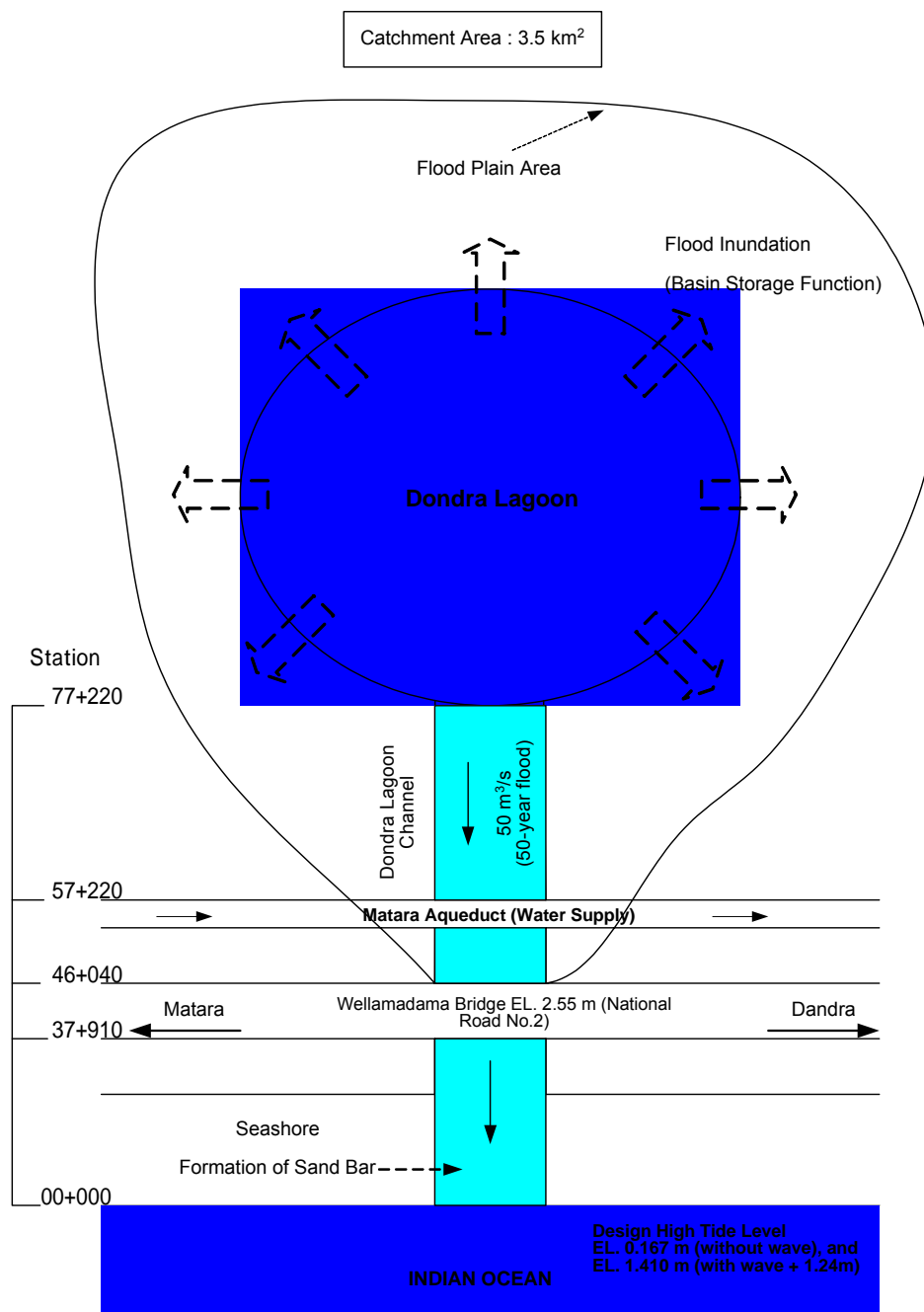


Figure 7.6 Dondra Lagoon Basin Water Flow System

(6) Seismic Design Criteria

Sri Lanka has had no major earthquakes in its history, and seismic design is not mentioned in Sri Lanka standards. Therefore, the minimum horizontal force of 0.1 g, as specified in Japanese standards, was applied.

(7) Design Methods

All structures are designed with the Allowable Stress design method, in accordance with Design Specifications of Highway Bridges, Part II and Part IV, of Japanese standards.

(8) Materials/Allowable Stress

All steel materials conformed to the below standards or approved equivalents, and were supplied in the grades as represented in the drawings.

1) Material Standards

Structural Steel

- SS400: JIS G3101
- SM400A, SM400B: JIS G3106

High-Strength Bolts

High-strength bolts consist of the hexagon bolt, hexagon nut and two plane washers, which are for the friction grip joint.

- F8T: JIS B1186

2) Allowable Stress

Allowable stress conforms to Specifications of Highway Bridges, Part II and Part IV, from Japan.

Structural Steel

- SS400: 140 N/mm²
- SM400A, SM400B: 140 N/mm²

High-Strength Bolt

- F8T: 39 kN

(9) Allowable Deflection

The main girder deflection caused by the load is less than the value below:

- Allowable Deflection (mm) < $L / 500$
- Where L = Span Length (mm)

7.3.2 Study of Bridge Span Length

(1) Existing Pier

According to an inventory survey of the pier, some cracks have appeared on the surface of the pier, which compromise structural stability. Therefore it follows that the existing pier should not be used for the new aqueduct bridge. Furthermore, the span length has been considered without the existing pier.

(2) Abutment

The abutment for the new aqueduct bridge is to be installed behind the old abutment, in order to avoid interference with the old abutment. Therefore, the new abutment is to be installed 5.0 m behind the old abutment.

(3) Span Length

The length between old abutments was 20.0 m. The new abutment is 5.0 m from the old abutment. Therefore, the span length was determined as $20.0 \text{ m} + 5.0 \text{ m} + 5.0 \text{ m} = 30.0 \text{ m}$ long.

7.3.3 Study of Bridge Types

(1) Superstructure Bridge Type

Three alternatives were considered, based on three essential criteria: (i) cost performance; (ii) construction; and (iii) maintenance.

Alternative-1: Steel I section girder

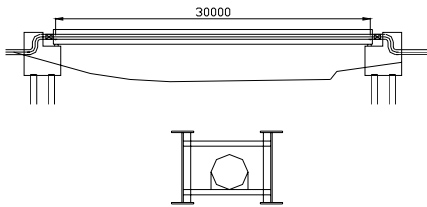
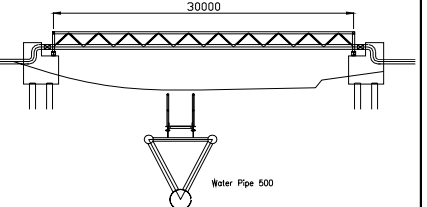
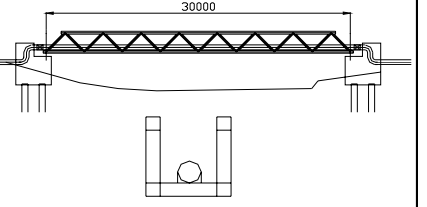
Alternative-2: Steel pipe truss bridge (all structural steel is pipe)

Alternative-3: Steel truss bridge (main structural steel is H-shaped steel)

All alternatives are planned with a 30 m simple span, since the existing pier should not be used. A comparative study of the types of superstructures is provided in Table 7.10, citing several factors for consideration in the selection. The corresponding advantages and disadvantages of the various types are also noted.

Alternative-3 was selected due to the following reasons: (i) lowest level of maintenance of the three alternatives; (ii) economical; and (iii) construction (easy to install).

Table 7.10 Comparative Study of the Types of Superstructure

Description	Alternative-1	Alternative-2	Alternative-3
Type of Bridge	Steel I - Girder	Steel Pipe Truss Bridge	Steel Truss Bridge
Side View and Section			
Structural Aspect	<ul style="list-style-type: none"> • Economical Span : 25 m - 40 m • Steel Material : Plate, L-shape • Steel Weight : Approximately 23 tons • Surface : Painting at shop and site 	<ul style="list-style-type: none"> • Economical Span : 25 m - 50 m • Steel Material : Pipe • Steel Weight : Approximately 15 tons • Surface : Painting at shop and site 	<ul style="list-style-type: none"> • Economical Span : 30 m - 60 m • Steel Material : H-shape • Steel Weight : Approximately 20 tons • Surface : Painting at shop and site
Constructability (Erection Method)	<ul style="list-style-type: none"> • Steel girders are fabricated at shop and erected at site. • Erection method :Truck crane method • Ductile pipe will be applied, which is installed at site. 	<ul style="list-style-type: none"> • Steel girders are fabricated at shop and erected at site. • Erection method :Truck crane method • The water pipe is a steel pipe, which is welded at the fabrication shop. 	<ul style="list-style-type: none"> • Steel girders are fabricated at shop and erected at site. • Erection method :Truck crane method • Ductile pipe will be applied, which is installed at site.
Aesthetic Aspect	<ul style="list-style-type: none"> • Simple aesthetic appearance • Appearance is somewhat inferior to other alternative bridges since the girder is an I section 	<ul style="list-style-type: none"> • Appearance is stylish due to the type of pipe used. • This pipe truss will become a landmark. 	<ul style="list-style-type: none"> • Appearance is stable.
Maintenance Aspect	<ul style="list-style-type: none"> • The maintenance of exterior painting surfaces needed. • The water pipe can be replaced easily. • Ductile is good for rust prevention. 	<ul style="list-style-type: none"> • The maintenance of painting surfaces needed. • The water pipe cannot be replaced. 	<ul style="list-style-type: none"> • The maintenance of painting surfaces needed. • The water pipe can be replaced easily. • Ductile is good for rust prevention.
Construction Period	6 months / 30m	6 months / 30m	6 months / 30m
Evaluation	• Less Recommended	• Less Recommended	• Recommended

(2) Type of Abutment

The abutment uses applied Reinforced Concrete (RC) due to economic considerations. Considering the subsoil conditions and the magnitude of the dead load, an optimum type of foundation was selected. Conceivable alternatives include the cast-in-place RC pile and the driven RC pile. The bearing stratum is placed less than 15 m in depth. A steel tubular pipe with a 500 mm diameter is selected as the best, considering economic factors.

7.3.4 Superstructure Design

(1) Cross-Section

The bridge width is determined based on water pipe diameter, maintenance, and installation of the water pipe. A typical bridge section is shown in Figure 7.7.

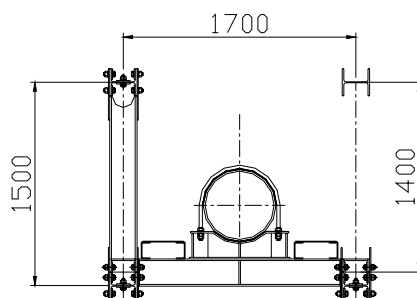


Figure 7.7 Typical Section

(2) Materials of Main Structures

According to structural analysis, main structures were designed by the Allowable Stress method. The materials of each member and their respective stress levels are shown in Table 7.11.

Table 7.11 Materials and Stress

Member	Material	Actual Stress	Allowable Stress
Upper Chord	H-200 x 200 x 8	62 N/mm ²	106 N/mm ²
Lower Chord	H-200 x 200 x 8	72 N/mm ²	140 N/mm ²
Diagonal	CH-200 x 90 x 8	73 N/mm ²	90 N/mm ²

Deflection

Actual deflection of the live load = 34.8 mm < allowable deflection = 60 mm

7.3.5 Substructure Design

(1) Abutment

The abutment was designed according to the Allowable Stress method. Results of the stress check and required re-bar area are noted in Table 7.12.

Table 7.12 Check of Abutment

	Axial Force (N)	Bending Moment (kNm)	Compressive Stress (N/mm²) (Allowable Stress)	Tensile Stress (N/mm²) (Allowable Stress) D13@250	Re-bar Area (cm²) (Requirement Area) D13@250
Body	174.577	164.879	0.144(7.00)	0.811(180)	5.068(5.00)
Back Wall		37.067	0.307(7.00)	45.722(180)	5.068(5.00)

(2) Foundation

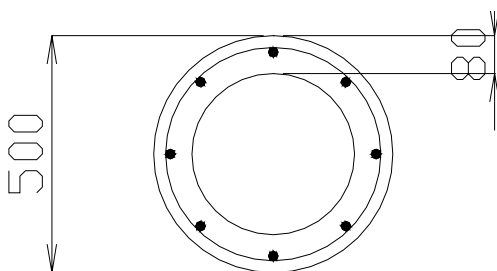
1) Material

PHC (Pre-stressed High-strength concrete) pile: JIS A5337

2) Dimension

- Diameter : 500 mm
- Thickness : 80 mm

3) Section



7.3.6 Water Pipe

The selected water pipe material is applied ductile, as it has corrosive resistance, can be procured at site, and has superior maintenance (i.e., easier and cheaper to maintain) compared to steel pipes.

7.3.7 Miscellaneous

(1) Air Valve

One air valve is installed on the pipe at the bridge center.

(2) Expansion Joint

An expansion joint is installed on each abutment. Expansion joints are required to meet the following conditions for thermal expansion and construction errors.

- Amount of Expansion : 60 mm
- Flexibility (Degree) : 6°
- Eccentricity : 8 mm

7.3.8 General Arrangement

The general arrangement of the aqueduct bridge including the superstructure, abutment, pile, ductile pipe, and miscellaneous are noted in the attached drawing.

7.4 Cost Estimates

(1) Estimated Costs

A cost estimate is shown in Table 7.13.

Table 7.13 Estimated Costs

Lot	Item	Contents	Cost (Rs, Tentative)
1	Preliminaries	Mobilization and Demobilization, Common Temporary Work, Demolition, etc	1.7 mil
2	Excavation and Backfill	Excavation and Backfill	0.2 mil
3	Abutments	Supply of Steel Pipe Pile, Driving of Steel Pipe Pile, Reinforcing Bar, Formwork, Concrete	3.6 mil
4	Steel Truss Girder	Fabrication of Truss Girder, Installation	7.9 mil
5	Ductile Iron Pipe	Supply of Ductile Iron Pipe and Accessories, Installation, Water Pressure Test, Connection with Existing Pipes	9.1 mil
6	Miscellaneous Work	Relocation and Restoration of Existing Electric Wire, Removal of Existing Temporary Water Pipe	3.6 mil
	Total		26.1 mil

(2) Conditions for the Procurement of Construction Materials

Cement, aggregate, and brick are to be purchased in the local market, although materials that are difficult to procure, as well as high-quality materials, may be imported from Japan or a third country. Imported material should be free of customs and internal taxes.

(3) Quotation Methods

Quotations were estimated based on the Sri Lankan quotation system. Material and labor costs are surveyed at each construction site, then the data is inputted according to the unit rate for each working item.

(4) Indirect Construction Cost

The contractor shall submit a monthly progress report including photographs, construction quantities, a quality control record, safety procedures, etc, to related organizations. The manpower and expenses incurred in this procedure must be considered.

7.5 Implementation Plan

The rehabilitation of the Matara Aqueduct is a project of the Japanese Government, which provides technical assistance for the recovery, rehabilitation, and development made necessary by the tsunami. This is a brief description of the construction methods employed in the rehabilitation of the aqueducts in the Matara area.

7.5.1 Scope of the Work

The task is to rehabilitate and reconstruct the aqueduct in the Matara area. The project consists of the following major activities:

- Construction of Abutment;
- Fabrication and Installation of Truss Girder for Water Pipes (Ductile Pipe);
- Installation of Ductile Iron Pipe with Accessories; and
- Ancillary Work.

The work sequence is shown in Figure 7.8.

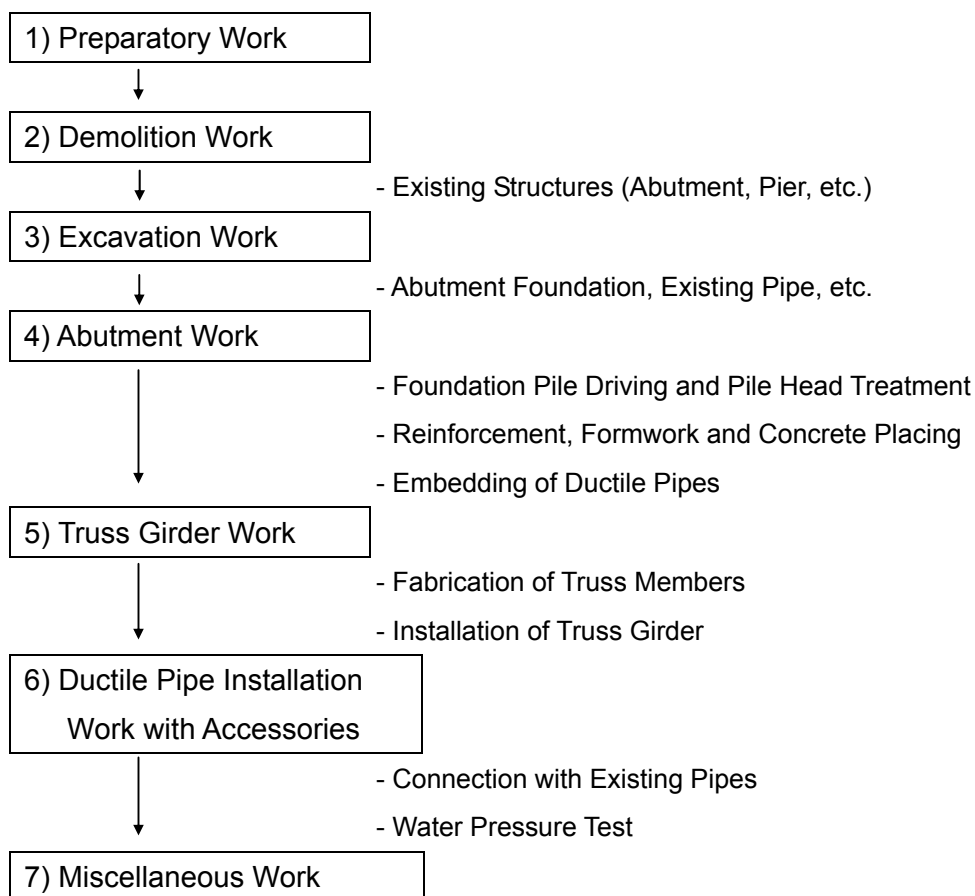


Figure 7.8 Sequence of Work

7.5.2 Brief Description of Construction Methods for Each Task

(1) Preparatory Work

Immediately after the issuance of the Notice to Commence, survey work for the confirmation and determination of structure locations that are to be constructed shall commence. Based on survey results, shop drawings for every aspect of construction shall be prepared by the Contractor. Preparation of the site for both temporary facilities such as offices, stockpile/workshop yards for materials, and permanent structure areas will follow.

(2) Demolition Work

Currently damaged abutments located around the abutment to be newly constructed will be demolished immediately after the approval. A backhoe and a dump truck are employed for this task. Debris resulting from the operation are disposed of in areas where permission from relevant authorities has been obtained in advance and then prepared by the Contractor.

The expected productivity and equipment to be employed, are as follows.

Expected productivity will be 50 m³/day.

- Backhoe (0.7 - 1.0 m³ class) with extended arm: 1 backhoe
- Dump truck (5 m³ loading class): 3 - 4 dump trucks

(3) Excavation Work

Excavation work consisting of the abutment foundation and ductile water pipe follows. Prior to the excavation operation, both the location of abutments and the alignment of the ductile water pipe are determined. Temporary sheeting to enclose the abutment is prepared in advance. Excavated soil is stockpiled in the nearest yard, and then separated into suitable and unsuitable material for backfilling.

Expected productivity and equipment used are as follows.

Expected productivity = 100 m³ per day.

- Backhoe (0.7 - 1.0 m³ class) with Extended Arm: 1 backhoe
- Dump Truck (5 m³ Loading Class): 3 - 4 dump trucks

(4) Abutment Work

1) Procurement of the PHC Pile

Immediately after issuance of the Notice to Commence, procurement of the PHC pile is arranged. The expected period for such arrangement is at least 2.5 months.

2) Driving of the Foundation PHC Pile

Prior to the commencement of the work, the existing electric wire on the surrounding houses is protected and pre-checked, because of pile driving operations. PHC piles are transported by trailer truck and unloaded onto the ground by the crawler crane-mounted pile driver.

The crawler crane-mounted pile driver with the PHC pile is lead by theodolite, then positioned. During pile driving, penetration at each blow, plus the final set at the last meter, is observed, in order to confirm the bearing capacity of the driven pile. The final set is confirmed in the presence of the consultant's supervisor.

The pile head is to be treated, if necessary, at the specified elevation for the following reinforcement work.

Expected productivity and equipment used are as follows.

Expected productivity shall be four piles per day.

- Trailer Truck (20 Ton Loading Class): 1 trailer truck
- Crawler Crane-Mounted Pile Driver (1.3 - 2.5 tons): 1 set
- Survey Equipment (Theodolite, Level, etc): 1 set of survey equipment

3) Reinforcement

Prior to assembling the reinforcement, blind concrete is placed beneath the abutment. The reinforcement is to be cut and bent at the fabrication yard in accordance with the drawings. Transportation of reinforcements to the site is done manually, where they are assembled. Ductile pipes to be embedded in the abutment are set together with reinforcements, so as to support and fix itself with L-shaped steel.

The equipment to be employed is as follows.

- Steel Bar Cutter: 1 steel bar cutter
- Steel Bar Bender: 1 steel bar bender set
- Generator (50 Kva class): 1 generator set

4) Formwork

Scaffoldings that are well-tested for strength and arrangement are assembled in advance. Following the assembly of the scaffolding, the formwork is assembled from either plywood or steel. Form-ties, having enough strength to resist fresh concrete, are placed in the appropriate position.

The equipment to be employed is as follows.

- Flat Deck Truck (4 Ton Class): 1 flat deck truck

5) Concrete Placing

Concrete is placed immediately upon completion of the formwork, in which a mobile concrete pump is employed. Concrete placing is carried out in two steps. In the first step, concrete is placed until it is below the embedded ductile water pipe, in order to prevent its deviation. After confirmation of the alignment of the embedded ductile pipe, a second set follows, with concrete that is already mixed. An agitator truck is employed for the transportation of concrete.

During both stages of concrete placing, the concrete is well-compacted using vibrators and cured appropriately.

The equipment to be employed is as follows.

- Agitator Truck (4 - 5 m³ class): 3 agitator trucks
- Mobile Concrete Pump (30 m³/hr class): 1 mobile concrete pump
- Vibrator (Immersion type): 4 vibrators
- Generator for Above (10 Kva class): 1 generator

(5) Steel Truss Girder Work

1) Fabrication of Steel Truss Girder (l = 30m, w = 14.9 tons)

The steel truss girder is fabricated, assembled, and painted at the manufacturer's factory. The truss girder is divided into two parts (l = 15 m each) for transportation and installation reasons. A trailer truck is employed for transportation from the factory to the site.

2) Installation of Steel Truss Girder

Upon completion of the abutments, necessary preparation work such as the installation of the shoe, etc. is carried out. At the same time, existing electric wires are temporarily relocated to the other side of the road during this operation.

The steel truss girder is installed using a crawler crane or a truck crane (50 - 60 ton class). In order to minimize traffic interference, the crawler crane is positioned on the outer boundary of the existing road as much as possible, with necessary precautions provided. Tightening of bolts is carried out using a pneumatic torque wrench following manufacturer instructions. Upon completion of installation, touch-up paint for damaged areas is applied.

The equipment to be employed is as follows.

- Trailer (20 Ton Class): 1 trailer
- Crawler/Truck Crane (50 - 60 Ton Class): 1 crawler/truck crane
- Compressor (7 m³ Class): 1 compressor
- Pneumatic Torque Wrench: 1 pneumatic torque wrench

(6) Ductile Iron Pipe Work

1) Ductile Iron Pipe

The ductile iron pipe is prefabricated. Approximately 45 m of ductile iron pipes are provided by the Executing Agency on-site. The remaining parts and necessary fixtures are supplied and delivered by the Contractor, taking the condition of the site into account.

2) Installation of Ductile Iron Pipes

The same procedure is taken as those described in item b) of Clause (5).

3) Connecting with Existing Pipes

Immediately after the installation of ductile iron pipes, they are connected with the existing pipes. The work is carried out in an appropriate manner in the presence of the supervisor from the Executing Agency in order to minimize interruptions to the ordinary water supply.

4) Water Pressure Test

Upon completion of the installation and connection of ductile pipes, a water pressure test is carried out in accordance with the regulation and methods designated by the concerned authorities.

(7) Cleanup Work

Upon completion of the entire project, the site (including temporary facilities) is cleaned up and restored to the existing conditions.

(8) Working Schedule for Matara Aqueduct

Figure 7.9 shows the working schedule for the Matara Aqueduct.

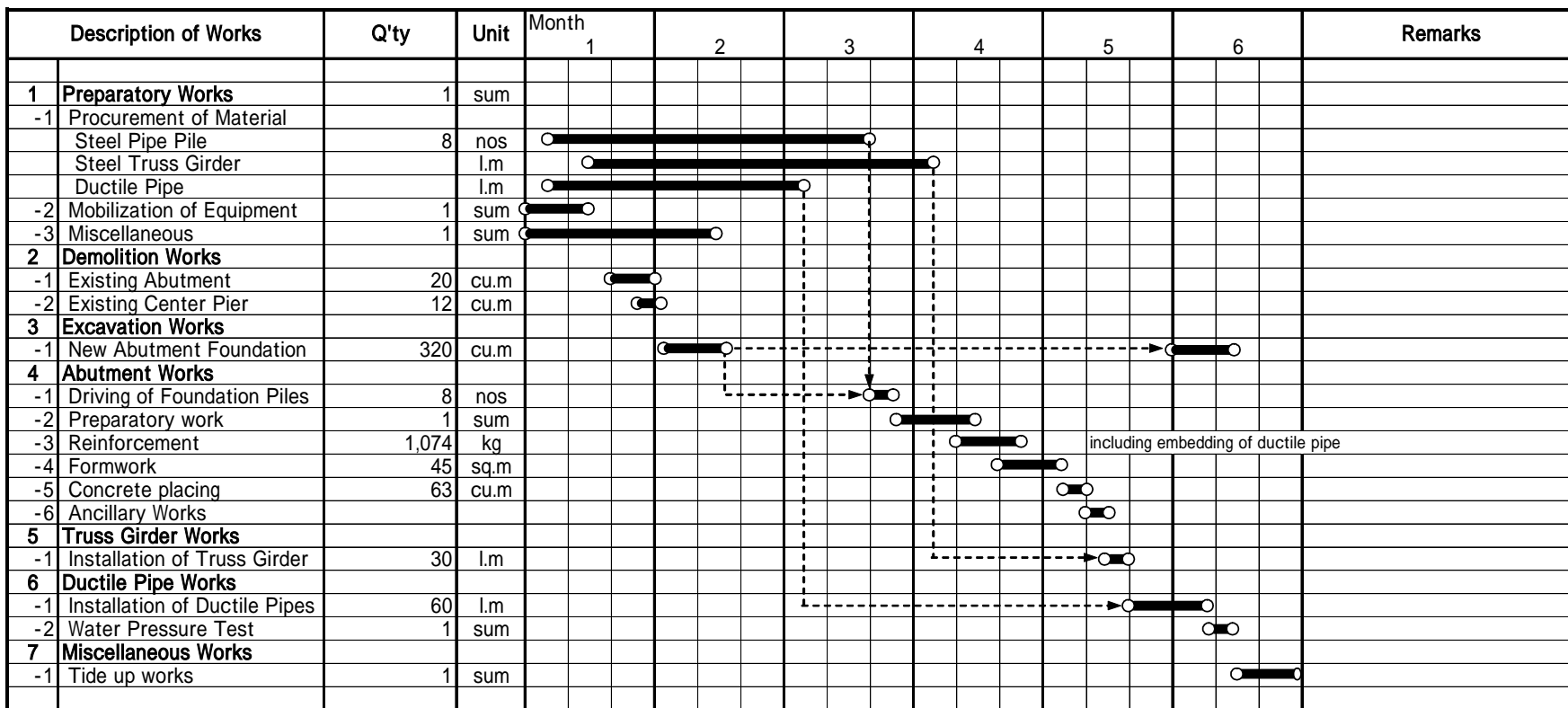


Figure 7.9 Working Schedule for Matara Aqueduct

7.6 Tendering Progress

7.6.1 Tender Document Preparation

Draft tender documents have been prepared and were submitted to the Sri Lanka side at the end of May 2005. The contents of the documents are as follows:

- Instruction to Bidders;
- Forms;
- Conditions of Contract;
- Particular Conditions;
- Form of Bid;
- Bidding Data and Contract Data;
- Specifications;
- Estimated Costs; and
- Drawings.

7.6.2 Prequalification

Tenders for Construction Works of the Project for Reconstruction of Aqueduct Damaged by the Tsunami Disaster in Matara District (Tender No.; NPTSL04-030) have been held by JICS (the agent for the Sri Lanka Government) in accordance with the current portion of the program execution. In order to recruit tenderers for the project, the prequalification of tenderers was announced on 13th June 2005.

A total of five contractors applied for the prequalification by the closing date (23rd June 2005), with the following four contractors having passed prequalifications and obtained the tender documents from the JICS Sri Lanka Liaison Office:

- Wakachiku Construction Co., Ltd;
- Access Engineering;
- Sierra Construction; and
- Taisei Corporation.

7.6.3 Tender Opening Procedure

Tender opening was held at 14:00 on 25th July 2005 at the 3rd Floor Conference Room, 3rd floor, Hilton Colombo Residence. Among the four pre-qualified contractors mentioned above, the following three contractors participated in the tender opening and submitted tenders:

- Access Engineering;
- Sierra Construction; and
- Taisei Corporation.

In accordance with the general practices of Japan's Non-Project Grant Aid, the tenders were opened in the presence of the National Water Supply and Drainage Board (executing agency), JICS (agent of Sri Lanka Government), JICA, and the tendering companies.

7.6.4 Financial Evaluation

The tender submitted by Taisei Corporation was the lowest. Simultaneously, the employer proceeded by further examining and evaluating the tenders made by Taisei Corporation in the light of the following:

1. Whether computations were free of material errors;
2. Whether submitted documents were substantially responsive to the tender documents;
3. Whether required certificates were provided;
4. Whether documents were properly signed; and
5. Whether the tender was in order.

Finally, it was confirmed that the Taisei Corporation's tender was sound enough in every respect.

7.6.5 Tender Evaluation Results/ Conclusion

Technical and financial evaluation was then carried out, focusing on the clarification of execution abilities, technical matters, and legitimacy/reasonableness of the tender price which might, altogether, affect the project implementation. This was based essentially on the evidence provided in compliance with technical/financial requirements of the tender concerning the tenderer's experience, delivery time, etc.

Through the noted evaluation, it was again confirmed that there was no problem in implementing the project from the technical/financial point of view. As such, the employer judged that the tender submitted by the Taisei Corporation was acceptable, and recommended the Taisei Corporation to the execution agency (NWSDB) as a successful tenderer, or as the contractor who would undertake the construction work of the project.

7.7 Monitoring of the Rehabilitation Work

(1) Review of Shop Drawings

Upon request of GOSL, the JICA Project Team checked and reviewed shop drawings submitted for approval by the supervising consultant. The JICA Project Team checked and reviewed the process in order to technically support the approval procedures for the shop drawings.

(2) Construction Stage

The JICA Project Team has technically monitored the work progress to ensure achievement of milestones for the construction stage. It has also provided various engineering advice to the Sri Lanka side.

7.8 Lessons Learnt through the Project

In the course of selecting candidate project components under the Non-Project Grant Aid scheme, the Steering Committee of the scheme widely gathered information of components with urgent restoration needs (from local governments and government agencies). This action was performed within a short period and resulted in the selection of project components with more obvious needs for urgent and swift restoration for local residents affected by the tsunami.

Draft tender documents were prepared within two months after the commencement of the study due to the urgency of aqueduct restoration and to resume water supply as early as possible. It could be achieved since the project component did not require a complicated planning study, but only the restoration of its original functions. Therefore, it can be said that the work with urgent restoration and high priority needs are the most suitable types of schemes to be funded under the Non-Project Grant Aid scheme (to realize early implementation and quick impact).

Chapter 8 Rehabilitation of Fishery Harbors at Galle and Tangalle

8.1 Survey of Tsunami Damage

8.1.1 Damage at Galle Fishery Harbor

Constructed in 1970's by French Government assistance, Galle Fishery Harbor has an important role as a base for offshore and deep-sea fishing fleets. Prior to the tsunami, 243 multi-day and single-day boats were registered. Table 8.1 shows facilities of the harbor.

Table 8.1 Facilities of the Galle Fishery Harbor

Port Facilities		On-Land Facilities		Freezing and Ice Making Facilities		
Quay wall	265 m	Auction hall	1,580 m ²	Flake ice (1)	30 tons/day	Not working
Jetty	91 m	Net mending	225 m ²	Flake ice (2)	25 tons/day	Not working
Depth	6 m	Store	4,180 m ²	Block ice	5 tons/day	Not working
		Workshop	3,492 m ²	Cold storage	400 tons	Destroyed
		Office	271 m ²			

Adjacent to the commercial harbor as well as the navy base, the principal breakwater is shared by three services. Access by foreigners is strictly controlled at the gate.

(1) Damage of the Harbor

- Half of the east quay wall was damaged (11 concrete blocks fell down into the seaside, while the quay wall head sank).
- The backfill was sucked away by wave action and surface levels fell.
- Asphalt pavement in the harbors was slightly damaged in places.
- Surface water drainage was clogged.
- The slipway was destroyed (although it was not utilized prior to the tsunami).

(2) Damage of On-land Facilities

- Piping for water tanks and the water pump was damaged.
- While some concrete pillars broke, part of the roof was destroyed, the outer wall (about waist high) was also partly damaged, and lighting equipment was no longer working due to immersion in seawater.
- The privately-owned ice plant was being repaired.

- Two icemaking towers, constructed in the 1970s, were not in use, even prior to the tsunami.
- The block ice machine was destroyed by the tsunami and was still not working by June.
- Cold rooms were totally destroyed by the tsunami.
- The steel structure of the auction hall was broken, the canteen and welfare shop (under the roof of the auction hall), were totally destroyed. This structure itself is a very old one constructed in the 1970s and corrosion was pervasive throughout the building.
- The fuel supply pump at the end of the jetty was recovered and was put back into use, however, the office for the fuel supply pump, situated next to the pump, lost its roof.
- A large storehouse that accommodates the CFHC Office and stores workshop tools, machinery, as well as fishing materials, lost both its outer and inner walls. All these materials were also lost.
- The ground floor of the office for district fisheries was damaged.

(3) Current Situation of Usage

Since most damage was concentrated among on-land facilities, no problems have been encountered for the berthing of boats, or the loading/unloading of fish and materials. A fuel supply pump was recovered at the initial stage because of the urgent requirement of boats. The biggest problem at the moment is the supply of ice. Since both CFHC and privately-owned ice plants are not operational, boat owners and fish venders must bring ice from Colombo. The auction hall is used as it previously was. The CFHC office occupies a corner of the storehouse.

8.1.2 Damage at Tangalle Fishery Harbor

Located in the western part of Hambantota District, the Tangalle Fishery Harbor is one of the oldest harbors in Sri Lanka. This harbor was extended in 2001 with financial assistance from the Government of Japan. Table 8.2 shows the facilities of the harbor.

Table 8.2 Facilities of the Tangalle Fishery Harbor

Port Facilities		On-Land Facilities		Freezing and Ice Making Facilities		
Breakwater	221 m	Net mending	180 m ²	Flake ice	5 tons/day	Destroyed
Groin	27 m	Store	100 m ²	Block ice	10 tons/day	Private own
Quay wall	258 m	Workshop	120 m ²			
Depth	3 m	Office	450 m ²			
Slipway						

(1) Damage to the Harbor

- Some of the armor stones on the breakwater were shifted out of their original positions.
- The harbor became shallower.

(2) Damage to the On-land Facilities

- Two water pumps were damaged, although the locals have already repaired them.
- The canteen sustained damage to its doors, lighting system, roof, and catering equipment. No serious damage was found to the structure.
- An office building that accommodates the CFHC Office on the first floor, as well as the auction hall and the flake ice machine on the ground floor, sustained damage to its roof, doors, and electric system (including lighting). Ice storage panels were totally dismantled. No serious damage was found to the structure.
- An outside toilet sustained damage to its sewer pipe and septic tank. The discharge pump for the septic tank is undergoing repairs.
- The CFC Office was totally destroyed, with only concrete structures standing.
- The fuel supply pump was repaired at the initial stage, however, its office still lacks a roof.
- The workshop sustained damage to its doors and windows, with machinery undergoing repairs.
- While the truck crane is movable, the crane system was not functioning.
- Only a concrete structure remains for the winch hut, while the winch was removed from its position.
- The septic tank, sitting at the bottom of harbor, was pushed away.

(3) Current Situation of Usage

Although the ice supply is limited due to damage to the CFHC flake ice machine, privately-owned ice plants started to resupply ice, with the supply also augmented by a private plant in Matara. Fuel is supplied as it was before. The sewer treatment system was heavily damaged, except for that for the office toilet.

8.2 Strategy for Rehabilitation

Due to a variation in the actual tsunami approach to the fishery harbors, the scale and range of tsunami damage is smaller in the Tangalle Fishery Harbor than that in the Galle Fishery Harbor. The JICA Project Team conducted tsunami damage surveys in the initial stages of this Project to assess not only the aforementioned factors, but also related damage to fishery-related facilities around these harbors. The influence of the tsunami was also assessed upon nearby fishing communities, as well as on the composition and characteristics of recent fishery and fish marketing by local IBM fishing boats in the harbor.

A set of points has been formulated as basic strategies for the rehabilitation of the Galle and Tangalle Fishery Harbors (in order or priority). These points consider the following: (i) results of the tsunami damage surveys; (ii) results of field investigations on the restrictions and requirements of fishermen and fishery communities concerning the fishery harbors; (iii) discussions on rehabilitation requirements, their priorities, as well as self-reliance capability, etc. against tsunami damage with the Sri Lankan Government sectors concerned (i.e., MOFAR, CEY-NOR, CFC, and CFHC as a member of the Joint Coordinating Committee); and (iv) basic Japanese Grant Aid policy schemes.

1. To repair or replace facilities and equipment utilized by the majority of fishermen and related communities concerning the fishery harbors, which are suitable for Japanese Grant Aid scheme.

This is mandated by a requirement in the Japanese Grant Aid scheme such that results should benefit the maximum number of people involved. In the fishery harbors, various kinds of facilities operate. Some facilities, such as the auction hall, are utilized by fishermen, auctioneers, fishmongers, retailers, and occasionally consumers. Other facilities, such as the blast freezer, are utilized by a limited group of people involved in the fish processing industry. Fishermen are the largest impacted group from the tsunami and should serve as the key recovery point for the fishery sector by returning them to the sea to harvest fish. Fortunately, many IBM fishing boats, the main users of the fishery harbors, did not sustain damage from the tsunami, as they were out to sea during their fishing cycles (lasting two weeks each). However, these fishing boats cannot promote the fishery sector due to utilization restrictions placed on fishery harbors by the tsunami. Even when some facilities are utilized by the majority of the people, they are not suitable for Japanese Grant Aid components (for instance when such facilities are operated by the private commercial sector, are utilized for military activities, or operate infeasibly). Considering the

aforementioned aspects, facilities such as the net mending building, fish auction space, canteen, welfare shop, public toilet, ice plant, quay wall, as well as slipway are categorized into this task group due to their inherent characteristics as well as role in facilitating fishery harbor utilization.

2. To repair or replace facilities and equipment, whose utilization benefits the majority of fishermen and related communities within the fishery harbors.

This is based on a similar rationale to 1. above. Although the administration office is utilized by an operating body, its utilization benefits many people by facilitating sound operation of the fishery harbors. Furthermore, although the blast freezer and cold storage are utilized by a limited set of people, its utilization also benefits many people, particularly in the processing and marketing of products to local consumers. Even when fishery activities recover, the recovery of the sector may not be realized without influence from the fish marketing sector. However, serious damage to many fish marketing and administration facilities has obstructed smooth recovery of the fishery sector. Considering these aspects, facilities such as the workshop, administration office, facilities of the CFC Refrigeration Plant concerned with local marketing products, and equipment such as workshop working tools, are categorized into this task group, which considers that while such facilities and equipment are utilized by a limited group, their utilization benefits the majority of fisherman and concerned communities.

3. To repair certain facilities, damaged by the tsunami, which protected other important facilities.

This Non-project Grant Aid was conceived to repair damage from the tsunami. In Tangalle Fishery Harbor, relatively light on-shore and intra-harbor damage occurred, as the breakwater and groin, the first barricades to weaken the tsunami, took the brunt of its force. Even in the damaged building housing the CFHC Office and auction hall, the first floor was undamaged due to the height of the tsunami wave, with administrative functions taking place immediately after the tsunami, allowing fish dealing to restart in early January in Tangalle Fishery Harbor. Based on this, the quay wall, breakwater, groin, and other protective structures should be repaired and grouped into task group because of their inherent characteristics.

4. To improve facilities that will encourage the development process for utilizing fishery harbors affected by the tsunami.

This task recognizes that particular development activities are essential in revitalizing fishery communities in the Southern Region and thus should be given priority by concerned governmental entities for Non-project Grant Aid and this project. This task is the by-product of lessons learned in Japan, where recovery as well as redevelopment approaches, were effective in damage recovery caused by natural disasters. As such, the export functions of the CFC Refrigeration Plant in Galle Fishery Harbor have been categorized into this task group. As the Galle Fishery Harbor was constructed 35 years ago as an industrial fishery harbor, various fisheries-oriented activities have been extended there. However, cold storage facilities for frozen fish were seriously damaged by the tsunami. As such, the CFC plant is to be redeveloped to process and distribute frozen fish pieces to local consumers and to treat, freeze, and store various kinds of tuna for export marketing. Export operations at this plant will revitalize fishery communities by providing greater opportunities for local fishermen to sell fish, recruit labor, and utilize landed tuna in the Galle Commercial Harbor.

5. To repair or replace facilities suitable for applying Japanese engineering expertise.

This strategy is inherent within the concerned Non-project Grant Aid, which presents opportunities to utilize Japanese engineering skills, where appropriate. Marine civil engineering works on the breakwater/groin and the slipway are thus included within this task group. Some facilities and equipment in the Tangalle Fishery Harbor are also categorized in this group, as Japanese engineering skills were utilized in the original construction and procurement of these facilities and equipment in an improvement project under the Japanese Grant Aid scheme.

8.3 Rehabilitation Plan

8.3.1 Rehabilitation Program of Fishery Harbors

In addition to the large number of fishery households impacted by the tsunami, numerous fishery harbors were also damaged. In the Southern Region, seven fishery harbors (Hikkaduwa, Galle, Mirissa, Puranawella, Kudawella, Tangalle and Kirinda) were damaged. As shown in Table 8.3, fishery harbors are mainly utilized by IBM fishing boats, which are dominant throughout the Southern Region. As such, damage in these fishery harbors directly impacted fishery activities, making emergency recovery of functionality an immediate issue.

Table 8.3 Distribution of Fishing Boats by Type in the Southern Region in 2004

(unit: boat and %)

Fishery District	Total	IBM boat		OBM boat		Traditional	
	Number	Number	% of District Total	Number	% of District Total	Number	% of District Total
Country Total	30,567	3,074	10	12,233	40	15,260	50
Kalutara	1,035	268	26	227	22	540	52
Galle	1,181	263	22	598	51	320	27
Matara	1,553	625	40	408	27	520	33
Tangalle	1,787	251	14	806	45	730	41

Source: MOFAR

Prior to the tsunami in August 2004, the CFHC conducted a two-week survey on fish landings in the harbors. The survey estimated that annual fish landings (extrapolated from the average daily haul multiplied by 365 days/year) was: (i) 10,950 tons in Beruwalla Fishery Harbor; (ii) 1,460 tons in Hikkaduwa Fishery Harbor; (iii) 9,125 tons in Galle Fishery Harbor; (iv) 2,190 tons in Mirissa Fishery Harbor; (v) 6,000 tons in Puranawella Fishery Harbor; (vi) 4,380 tons in Kudawella Fishery Harbor; (vii) 3,650 tons in Tangalle Fishery Harbor; and (viii) 1,095 tons in Kirinda Fishery Harbor. Due to heavy siltation in the Hikkaduwa Fishery Harbor, fish landings at Galle Fishery Harbor have recovered remarkably in the later half of 2004.

Considering the important roles of fishery harbors in fisheries and of fish marketing in the Southern Region, even after the initial period after the tsunami, rehabilitation programs for fishery harbors have been promulgated by major donor countries. Based on consultations with the Government of Sri Lanka and its concerned entities such as MOFAR, CFHC, and CFC, the Government of Japan proposed a rehabilitation program for the Galle and Tangalle Fishery Harbors, recognizing the situation in other fishery harbors, and thereby concluding an agreement with the Government of Sri Lanka on this proposed scope. Rehabilitation of the two fishery harbors is to be conducted under a Japanese Non-project Grant Aid, related to the tsunami disaster. As shown in Table 8.4, the following eight fishery harbors are currently planned for rehabilitation by major donor countries.

Table 8.4 Program of Rehabilitation of Fishery Harbors in the Southern Region

District	Name of Fishery Harbor	Donor Country	Prospected Completion
Kalutara	Panadura	China	January 2006
Kalutara	Beruwala	China	January 2006
Galle	Hikkaduwa	USA	2007
Galle	Galle	Japan	March 2006
Matara	Mirissa	USA	January 2006
Matara	Puranawella	USA	January 2006
Matara	Kudawella	China	January 2006
Hambantota	Tangalle	Japan	March 2006

Source: CFHC

8.3.2 Priority of Rehabilitation of Galle and Tangalle Fishery Harbors

The rehabilitation priority of the two harbors was examined in the Joint Coordinating Committee according to the following aspects:

- Review of tsunami damage and appropriate Project Team study;
- Strategy for rehabilitation;
- Consensus of fishermen and related communities impacted by the tsunami; and
- Examination by the Sri Lankan Government sectors (MOFAR, CFHC, CFC, etc.) of rehabilitation priorities.

The following list of rehabilitation items was identified by the Joint Coordinating Committee for implementation, in connection with the Japanese Non-project Grant Aid for Galle and Tangalle Fishery Harbors, respectively.

(1) Galle Fishery Harbor

Table 8.5 shows a list of rehabilitation tasks in Galle Fishery Harbor connected with the Japanese Non-project Grant Aid. Considering emergency recovery of harbor functionality, Items 1, 2, 3, and 4 will be immediately implemented with financial resources of the Sri Lankan side. Considering the recovery of harbor functionality as well as fishery community revitalization from the introduction of a new fish marketing center, Items 5, 6, 7, 8, 9, and 10 will be implemented through the Japanese Non-project Grant Aid scheme.

Table 8.5 Rehabilitation Items for Galle Fishery Harbor, Related to Japanese Non-project Grant Aid

Item No.	Rehabilitation Item
Priority Order	
1.	Construction of the Open Area for Landing & Auction Space (800 m ²)
2.	Construction of the Canteen (200 m ²)
3.	Construction of the Welfare Shop (100 m ²)
4.	Demolition of Old Facilities Related to Items 1, 2, and 3.
5.	Repair of the Quay Wall (95m)
6.	Construction of the Slipway
7.	Construction of the CFHC Office (Two stories, 400 m ²)
8.	Demolition of Old Facilities Related to Item 7.
9.	Construction of the CFC Refrigeration Plant [Ice Plant (ice production: 50 tons/day, Ice storage: 100 tons), Cold Storage (total of 300 tons by four rooms), Air Blast Freezer (15 tons/day), Processing Room (200 m ² + 400 m ²)]
10.	Demolition of Old Facilities Related to Item 9.

Source: Project Team

It is highly recommended that the Sri Lankan side initiate necessary actions to realize implementation of Items 1, 2, 3, and 4 since the rehabilitation of these facilities is considered urgent to promote fishery related activities in the Galle Fishery Harbor.

(2) Tangalle Fishery Harbor

Table 8.6 lists rehabilitation items for Tangalle Fishery Harbor related to the Japanese Non-project Grant Aid. Considering the need to recovery harbor functionality and that most landside facilities were constructed under prior Japanese Grant Aid schemes, all items listed below are to be implemented through the Japanese Non-project Grant Aid scheme.

Table 8.6 Items of Rehabilitation for Tangalle Fishery Harbor, Related to Japanese Non-project Grant Aid

Item No.	Rehabilitation Item
Priority Order	
1.	Repair of the Exterior/Interior of the Building Donated by a Japanese Grant Aid Project (Canteen, Net Mending Building, Toilet, Septic Tank, Oil-lodge, Workshop, Winch Hut, Septic Tank, Oil Pump, and CFHC Office).
2.	Repair of the Ice Storage.
3.	Repair of the CFC Cold Rooms.
4.	Replacement of the Workshop Working Tools (see remark below).
5.	Repair of the Outdoor Lights.
6.	Repair of the Slipway (Replacement of the Cradle)
7.	Repair of the Radio Communication Office.
8.	Repair of the Security Office.
9.	Repair of the Breakwater/Groin.

Remark: Workshop working tools include an electric arc welder, stationary and handy tool, hand grinder, electric sawing machine, injection nozzle tester, battery charger, pipe wrenches, slide caliper, tap and dies, electric hand drill, micrometer, and cylinder bore gauge.

Source: Project Team

8.3.3 Medium-Term Development Program for Fishery Harbors

Compared to the short-term fishery harbor rehabilitation plans, medium-term development of fishery harbors in the Southern Region, consist of the construction of four fishery harbors (Ambalangoda and Dodanduwa Fishery Harbors in the Galle District, and Kalametiya and Hambantota Fishery Harbor in the Hambantota District). These facilities have already been under construction due to the following background:

- As a commercial center in the Southern Region, various activities have been extended, while potential for fisheries-oriented investment in the Galle District is expected;
- As a distribution center for both the local and overseas market, the position of the Galle District still maintains some advantages from the perspectives of physical transport, marketing, as well as economic infrastructure; and

- Due to the relatively low distribution of fishery harbors in the Hambantota District in the Southern Region, many requirements and constraints oppose construction of fishery harbors as basic infrastructure for promoting fisheries in this region.

The strategies and tendencies for fishery harbor development in the Southern Region are summarized by basic fisheries promotion in the Hambantota District as well as commercial revitalization in the Galle District. Following this line of thinking, the rehabilitation of the Galle and Tangalle Fishery Harbors is also akin to the medium-term development of fishery harbors witnessed throughout the Southern Region.

8.4 Facilities Rehabilitation Plan

8.4.1 Utilization Plan and Examination on the Scale of the Facilities to be Rehabilitated in Galle Fishery Harbor

(1) Background

As shown Table 8.7, within Galle District, approximately 20,000 - 25,000 tons of fish was harvested. Up to the end of the year, Galle Fishery Harbor served as the sole and primary fishery harbor in the district (until construction at the Hikkaduwa Fishery Harbor was completed), with the majority of harvest fish in the district landing here (20,000 tons).

Table 8.7 Fish Production in Galle Fishery District during the Last Decade

	(unit: ton/year)					
Year	1995	2000	2002	2003	2004	Average
Production	21,430	27,830	25,060	20,870	17,530	22,544

Source: MOFAR

Table 8.8 shows the estimated fish landing in the Galle Fishery Harbor. Though fish landings increased suddenly in 2001 and 2002, this was primarily due to utilization of this harbor by fishing boats from adjacent harbors, which were not operating. For instance:

- Hikkaduwa Fishery Harbor began new construction in early 2001, which was completed at the end of 2002;
- Mirissa Fishery Harbor began construction on its auction hall in early 2001, which was completed by the end of 2002;
- Kudawella Fishery Harbor continued on-going construction in 2002, which was completed in 2003; and
- Tangalle Fishery Harbor constructed land facilities starting in the middle of 2001, which were completed in early 2002.

On the other hand, fish landings at Galle Harbor suddenly decreased in 2003 and 2004, due to the following:

- Fishing boats registered in other fishery harbors returned due to the reopening of such harbors; and
- As one of the ice plants in Galle Fishery Harbor reduced production capacity from 30 tons/day to 5 tons/day due to mechanical problems in 2003, fishing boats registered in Galle Fishery Harbor started to utilize adjacent fishery harbors, since fishing boats usually load ice for fishing at the same fishery harbor that they land at - meaning boats will avoid harbors where availability of ice is poor.

Table 8.8 Estimated Fish Landing in Galle Fishery Harbor (2001 - 2004)

Year/Boat Size	(unit: ton/year)					
	18 ft	28 - 30 ft	31 - 35 ft	36 - 40 ft	41 - 45 ft	Total
2000	310	35	21,250	340	350	22,285
2001	120	110	26,660	390	550	27,830
2002	350	240	30,860	420	450	32,320
2003	20	70	2,400	100	20	2,610
2004	290	20	919	294	192	1,715

Source: CFHC

Table 8.9 lists the ice plants close to the Galle Fishery Harbor. Up to the year 2000 and the construction of the Hikkaduwa Fishery Harbor, the demand for fishing ice in the Galle Fishery Harbor was about 67 tons/day (20,000 tons/year ÷ 300 days/year x 1.0/1.0), which was supplied from two ice plants in Galle Fishery Harbor and one ice plant in Hikkaduwa, with a total capacity of 70 tons/day and a market ice demand of about 33 tons/day (20,000 tons/year ÷ 300 days/year x 0.5/1.0), which was transported from ice plants in Weligama partly. Fishing ice is normally used in a 1.0 to 1.0 ratio against fish weight, while marketing ice is normally used at a 0.5 to 1.0 ratio against fish weight.

Table 8.9 Ice Plants nearby to Galle Fishery Harbor, prior to the Tsunami

District / Town	Company Name	(capacity unit: ton/day)	
		Capacity	Distance
Galle / Galle Fishery Harbor	Lanka Ice Co., Ltd.	30	0 km
Galle / Galle Fishery Harbor	Harbor View Co., Ltd	30	0 km
Galle / Hikkaduwa	Incosyn Group Ltd.	10	15 km
Matara / Weligama	Incosyn Group Ltd.	40	20 km
Matara / Weligama	Lanka Ice Co., Ltd.	20	20 km
Matara / Mirissa	Ruhuru Thushari	10	25 km
Matara / Mirissa	Paradise Mirissa	30	25 km

Remark: ¹⁾ Distance is from Galle Fishery Harbor.

²⁾ The ice plant of Lanka Ice Co., Ltd. in Galle Fishery Harbor reduced its capacity to 5 tons/day in 2003 due to mechanical problems.

Source: Project Team

During 2001 and 2002, when construction works were ongoing at the Hikkaduwa and Mirissa Fishery Harbors, the demand for fishing ice in Galle Fishery Harbor (of between 93 to 107 tons/day (28,000 to 32,000 tons/year ÷ 300 days/year x 1.0/1.0)) was supplied from ice plants in the Galle Fishery Harbor, as well as Hikkaduwa and Weligama. This collectively amounted to a 130 tons/day capacity and a marketing ice demand of between 47 to 53 tons/day (28,000 to 32,000 tons/year ÷ 300 days/year x 0.5/1.0), which was transported from ice plants in Mirissa, totaling 40 tons/day capacity.

After 2003 when the Hikkaduwa and Mirissa Fishery Harbors restarted operations, ice plants in Hikkaduwa and Weligama began to supply ice to Hikkaduwa and Mirissa Fishery Harbors, respectively. Due to a decrease in ice production capacity at Galle Fishery Harbor in 2003, the capacity of ice supplied in the Galle Fishery Harbor fell to 35 tons/day, equivalent to about 7,000 tons annual fish landing (35 tons/day ÷ 1.5 ice use ratio x 300 days/year). This situation discouraged even registered fishing boats from utilizing the harbor, resulting in lower fish landings.

However, when the ice supply capacity recovers at Galle Fishery Harbor, registered fishing boats should return as fishermen have to pay additional berthing charges of Rs. 172.5 - 345.0 per single entry at non-registered fishery harbors, in place of the monthly berthing charge of Rs. 230 - 1,800 in registered fishery harbors. As such, fishermen basically want to utilize registered fishery harbors when convenient, especially when fuel, water, and ice are sufficiently availability.

Considering the aforementioned aspects, after rehabilitation of fishery harbor damage and recovery of fishing activities in the Southern Region, annual fish production at the Galle Fishery District will recover to levels of between 20,000 - 25,000 tons at the very least, with Galle and Hikkaduwa Fishery Harbors evenly sharing fishing landings of about 10,000 tons per year each, respectively.

Based on the above backgrounds, the JICA Project Team prepared a facilities rehabilitation plan for the Galle Fishery Harbor as follows.

(2) Repair of the Quay Wall

1) Objective and utilization

The existing quay area consists of a jetty (90 m long and 15 m wide), western quay areas (90 m + 35 m long) and an eastern quay area (approximately 120 m long). The jetty and

western quays are the main quay areas in the harbor, where essential and vital fishery activities have been provided for at nearby main fishery-related facilities (i.e., the auction hall, related offices, ice plants, and cold storage). Since no specially designated wharves for fishing preparations exists in the harbor, activities for both fish landing and preparation are conducted in the western quay areas, thus making congestion in the area significantly and a serious issue.

The eastern quay, which was seriously damaged by the tsunami along nearly its entire length, was mainly used for small to medium-size fishery boats, and/or as a rest quay for boats, due to its water depth (designed at -1.5 m MSL). It is, however, understood that the quay wall had been underutilized due to a recent and rapid increase in the number of larger sized fishing boats.

Under the noted circumstances, the CFHC therefore intends to rehabilitate/reconstruct this quay area for the following purposes from a perspective of more effective quay utilization to meet current needs:

- The quay can function as a preparing and resting wharf for registered boats, since no such designated area exists in the port at present;
- The quay wall can be improved to handle the largest size of fishing boats currently in use and/or planned in the very near future (to thus cope with recent trends towards increasing boat sizes); and
- Water depth of the quay wall should be at least -3.5m below MSL due to the proposed uses above.

2) Examination of the Scale

Table 8.10 indicates the distribution of registered boats at Galle Fishery Harbor in 1999 and 2004, respectively. The majority of boat sizes are in the 30 - 40 ft class range, with the largest size being less than 50 ft currently. It is, however, expected that 60 ft class boats will soon be introduced.

Table 8.10 Registered Fishery Boats at Galle Fishery Harbor

Year	No. of Engine(s)	OBM	18 ft	28 - 30	31 - 35	35 - 40	41 - 45	> 45ft	Total
1999	-	-	31	97	140	40	15	-	323
2004	0	0	33	53	90	123	21	0	320

Note: Technical Standards for Japanese Fishery Harbor Facilities are referred to.

The expected boat sizes to be considered in the design are as follows.

- 30 - 40 ft boats (LOA = 9.0 - 13.0 m; 5 - 10 GT); B = 2.5 - 3.5 m. Max. D = 1.8 - 2.0 m

- 60 ft class boat (LOA = 18 m: 20 - 25 GT); B = 4.8 - 5.0 m. Max. D = 2.2 - 2.5 m
- a. Total quay length to be rehabilitated/reconstructed

The existing quay wall length is approximately 120 m. The entire length will be subject to rehabilitation/reconstruction works to improve utilization efficiency in conjunction with an adjacent deeper quay (-5.0 m deep). Due to the necessity of relocating the slipway into this quay area, the total effective quay length will account for approximately 95 m after reconstruction. It is recommended that the easternmost 60 m (of the 95 m long quay) be allocated to the preparation wharf, such that three 50 - 60 ft class boats or five-six medium to small-size boats can be handled simultaneously (totaling at most 50 - 60 boats per day in eight hours). The remaining quay length of 35 m will be used as a boat resting wharf, or as an additional fish-landing wharf when needed to ease harbor congestion.

b. Water depth

As mentioned, CFHC intends to deepen this quay to meet the recent trends towards larger class vessels (60 ft class).

The minimum water depth required by this class of boat is about -3.3 m below MSL, based on the following estimate:

- W_{reqd.} = Maximum Draft (2.5 m) + Tidal Variation (0.3 m) + Safe Clearance (minimum of 0.5 m)

Considering this and also the fact that the harbor suffers from repeated sedimentation (with twice-yearly dredging maintenance), the design water depth of the reconstructed eastern quay should be at least -3.5 m MSL, as intended by CFHC.

(3) Construction of the slipway

1) Objective and utilization

Originally the Galle Fishery Harbor was provided with a slipway facility for repairing and regularly maintaining fishing boats. Due to weathering and daily use deterioration, as well as tsunami damage, the existing old slipway was nearly completely destroyed, leaving the harbor without a boat repair facility. Without an available and functioning slipway facility other than the one in Tangalle Harbor (which is also not functioning due to tsunami damage) in the Southern Region, it is essential, important, and urgent to provide such a boat repair facility in the harbor to revitalize the fishery activities in the region.

Due to the noted situation, CFHC has placed the highest priority on reconstruction of this slipway. It has, however, been noticed that the slipway should be relocated from its original location, as construction was extended over the fishery harbor boundary, which caused approach difficulties for boats due to accessibility constraints from the adjacent operations of the commercial port wharf. In addition, another constraint lies behind the existing slipway (and causes problems in half the width of this area). This constraint is from nearby Navy operations.

With due consideration of the above, the Project Team discussed several options for the reconstruction site and arrangement plan with CFHC. One option, to shift the slipway about 45 m west of its original location and removing a part (20 m) of the existing eastern quay wall, has been agreed upon with the CFHC.

The slipway will be arranged so that it is flush with the new quay wall face line and angled horizontally slightly, in order to minimize unnecessary interruption to quay operations and to reduce any approach difficulties to the slipway. Also, the slipway should be provided with a winch and a cradle system of a type well fit to the shape of local fishery boats.

2) Examination of the Scale

The slipway was planned for handling the largest size of registered or calling boats, which was expected to be a 60 ft class boat. Typical dimensions of this class of boat can be defined as follows (referring to the Technical Standards for Fishery Harbor Facilities, Japan):

- LOA = 18 m, B max = 5.0 m, Max. Draft (light load) = 2.1 m

Considering the above dimensions and the arrangement plan, the following slipway dimensions were recommended with its single slope inclination at 1:10.

- Front water depth: Max. draft (light) + cradle height + safe clearance
= 2.1 + 1.0 (assumed) + 0.3 - 0.5 = 3.40 - 3.60 m
Thus, -3.50 m MSL, the same elevation as that of the quay wall
- Width of slipway: W = 7.0 m is necessary. (B max + 1.0 m each side clearance)
- Total slipway length: L = 20 m for repair area + 40 m for slope (from -3.50 m to +0.50 m)
= 60.0 m

In addition, about 7.5 m for working space and a winch house area should be considered, producing a total overall slipway length of 67.5 m.

(4) Construction of the CFHC Office

1) Objective and utilization

The functions of the CFHC Office are to observe basic fishery harbor functions such as fish landing, fuel/ice/water supply for fishing boats, control and adjustment of hinterland facilities such as privately-leased ice plants, canteens, governmental organizations (such as the Ministry of Fisheries Statistics Bureau), as well as the CFC retail shop and CEY-NOR bending shop. In particular, since Galle Fishery Harbor's basin is located between the commercial port and the Navy base, channel and basin allocation is complicated for fishermen. Also, the Galle Fishery Harbor is a very important fishery harbor for CFHC, acting as a base port for maintenance dredgers for fishery ports in the Southern Region, while also hosting a large spare parts store (as well as for necessary materials) for CFHC dredging work. The expected function of the CFHC Office now is to receive warnings for tsunamis and to announce this to harbor users and fishing boats operating in shallow areas. As such, the CFHC Office needs a radio communications room near the office. Furthermore, structures should be comprised of reinforced concrete and have two stories, in order to properly resist the power and height of an expected tsunami.

2) Examination of the Scale

The Galle CFHC Office is composed of a coordinating section, a mechanical section, an operator, and security. For the purposes mentioned above, the coordinating office shall be considered for rehabilitation by Non-project Grant Aid scheme.

(5) Construction of the CFC Refrigeration Plant

1) Objective and utilization

As a state enterprise, CFC promotes both the domestic and overseas fish marketing. The Government of Sri Lanka intends to introduce a marketing center in the Galle Fishery Harbor to facilitate rehabilitation and recovery of harbor functionality and thereby encourage revitalization of the fisheries communities (vis-à-vis fish marketing promotion and improvement). The construction of the CFC Refrigeration Plant was planned in this regard. CFC intends to conduct the following services at the plant:

- Supply fishing and marketing ice supplies for fish landings of local fishing boats in the Galle Fishery Harbor;
- Supply fishing ice to industrial fishing boats that land fish (mainly various types of tuna for export) at Galle Commercial Harbor;
- Supply ice for pre-cooling fresh tuna for export, which are landed at the Galle Commercial Harbor;

- Provide freezing services for frozen fish for export, which are landed at the Galle Commercial Harbor;
- Conduct frozen processing of low-value fish landed at the Galle Commercial Harbor as well as of fish landed by local fishing boats at the Galle Fishery Harbor, which serve as CFC's regular domestic market products; and
- Provide cold storage for stocking the noted frozen products until shipping.

The operation of the CFC Refrigeration Plant is to be linked with a containerized cold storage and freezer truck provided by Japanese Non-project Grant Aid, in association with the tsunami disaster. This is especially pertinent for local sales of CFC frozen products.

Table 8.11 shows the existing levels of fish landing by product at the Galle Commercial Harbor. Fresh fish exports consist of various tunas, while frozen fish types include types of tuna, kingfish, etc. Prior to the tsunami, landed fish for fresh export were transported to CFC's refrigeration plant in Colombo and packed for fresh export. However, because of quality maintenance, it became necessary to conduct pre-cooling treatment at the minimum, then to pack it there, whenever possible. Some landed fish intended for frozen products were abnormally frozen in the cold storage (400 tons capacity), which was broken by the tsunami, in Galle Fishery Harbor and stored there. The remainder of the landed fish for frozen products was transported to CFC's refrigeration plant in Colombo, frozen there, and then stored there. Due to deterioration of the Colombo refrigeration plant constructed 13 years ago, it became necessary to freeze all landed fish in Galle.

Table 8.11 Fish Landings by Product Type in the Galle Commercial Harbor (2004 - 05)

(unit: ton)

	For Fresh Export	Frozen for Export	Frozen for Local Market	Frozen Sub-total	Total
May 2004	38	13	8	21	59
June 2004	106	47	82	129	235
July 2004	135	44	78	122	257
August 2004	146	43	26	69	215
September 2004	139	62	40	102	241
October 2004	212	61	89	150	362
November 2004	149	127	106	233	382
December 2004	162	61	35	96	258
January 2005	202	56	56	112	314
February 2005	132	37	51	88	220
March 2005	279	62	122	184	463
April 2005	155	31	47	78	233
Total	1,855	644	740	1,384	3,239

Source: CFC

2) Examination of the Scale

Ice Plant

The fishing and marketing ice supply necessary for fish landings by local fishing boats is as follows:

$$\text{Approx. } 50.0 \text{ tons/day} = 10,000 \text{ tons/year} \div 300 \text{ days/year} \times (1/1 + 0.5/1)$$

The fishing ice supply necessary for fishing landings by industrial fishing boats is as follows:

$$\text{Approx. } 10.7 \text{ tons/day} = 3,200 \text{ tons/year} \div 300 \text{ days/year} \times 1/1$$

The ice supply necessary for pre-cooling of fresh tuna for export is as follows:

$$\text{Approx. } 9.2 \text{ tons/day} = (212 + 202 + 279) \text{ tons} \div 3 \div 25 \text{ days/month} \times 1/1$$

(Due to quality maintenance, ice demand is based on the average in three peak months (October, January, and March))

Therefore, the total ice demand is 69.9 tons/day. However, as the existing ice plant was repaired and now has a capacity of 20 tons/day, the planned ice production capacity is to be 50 tons/day.

Blast Freezer

For freezing fish landed by industrial fishing boats at Galle Commercial Harbor, the total freezing demand is as follows:

$$\text{Approx. } 9.3 \text{ tons/day} = 233 \text{ tons} \div 25 \text{ days/month}$$

(Due to quality maintenance, planned freezing capacity is to satisfy peak demand in November)

For freezing fish landed for CFC local market products at the Galle Fishery Harbor, the total freezing demand is as follows:

$$\text{Approx. } 5.0 \text{ tons/day} = 1,500 \text{ tons/year} \div 300 \text{ days/year}$$

(As CFC intends to utilize more fish for frozen products, 15% of landed fish in the Galle Fishery Harbor are to be frozen for this purpose, considering that CFC's local fish marketing contribution is currently 10%)

Therefore, total freezing demand amounts to 14.3 tons/day. As such, planned freezing capacity is to be 15 tons/day.

Cold Storage

Assuming a normal shipping cycle of once per month and the typical result of cold storage, where the quality of products decreases slowly at -20°C for a period up to 30 days, the planned average storing period is to be one month.

For storing frozen fish landed by industrial fishing boats at Galle Commercial Harbor, the cold storage demand is as follows:

Approx. 178 tons = $(150 \times 0.5 + 233 + 96 \times 0.5)$ tons/month $\div 2$

(Although basic storing capacity is targeted towards the peak month of demand, the weighted average, including the months before/after the peak month, is adopted to evaluate capacity to account for the strong influence of “shoulder” months, prior to and after the peak month)

For storing frozen fish landed for CFC local market products at the Galle Fishery Harbor, the cold storage demand is as follows:

Approx. 125 tons = 5 tons/day \times 25 days/month

(This considers the monthly frozen processing cycle)

Therefore, a total of 303 tons is the cold storage demand. As such, the storing capacity is planned to be 300 tons. Considering fluctuations in storage demand and inherent storing differences in local market and export products, proposed cold storage is to be demarcated into several rooms (for instance two rooms for 100 tons of export products and two rooms for 50 tons of local marketing products).

Processing Room

- Processing Room for Treating Fish - This room is to be utilized for the following purposes:
 - Receiving all fresh-landed fish at the Galle Commercial Harbor and fresh-landed fish utilized by CFC for local market frozen products at the Galle Fishery Harbor;
 - Gutting the fish;
 - Demarcating the fish according to product types (i.e., fresh products for export, frozen products for export, and frozen products for local market), considering species type, fish size, fish grade, etc.;
 - Pre-cooling, packing, and shipping fresh products consigned for export after demarcation; and
 - Transferring fish intended for frozen export and local market products to the freezing section after demarcation.

For these procedures, a room is to be sectioned, but not be partitioned, considering flexible and effective use of floor space. Regarding hygienic conditions of the room, the concerned Sri Lankan standards for export processing will be referred to on all relevant practical points.

The fish received in the processing room is estimated at about 16 tons/day (3,239 tons/year ÷ 300 days/year + 1,500 tons/year ÷ 300 days/year). The detailed area scale and section allocation will be examined in consideration of the above processing procedures and purposes.

- Processing Room for Local Market Products - This room is to be utilized for the following purposes:
 - Receiving frozen fish for local markets from the cold storage facilities for raw materials;
 - Cutting frozen fish into smaller pieces;
 - Packing frozen fish pieces with the vacuum packing machine; and
 - Transferring the vacuum-packed products to the cold storage facilities.

For these procedures, a room is to be sectioned, but not be partitioned, in order to maintain flexible and effective use of the floor space. The fish received in this processing room is estimated at approximately 7.5 tons/day (740 tons/year ÷ 300 days/year + 1,500 tons/year ÷ 300 days/year). Details on the scale of the area and section allocations will be examined considering the processing procedures and purposes.

(6) Relationship to Other Equipment Procured by Japanese Non-project Grant Aid

In order to recover and maintain functionality as a fishery harbor until completion of rehabilitation works under the Japanese Non-project Grant Aid, two containerized block ice plant units (10 tons/day production capacity each) with ice storage, one containerized cold storage unit, and four insulated refrigerator truck units (freezer trucks) are to be distributed to the Galle Fishery Harbor and operated by CFC, under Japanese Non-project Grant Aid for the tsunami disaster. These will be distributed, in particular to fisheries and those businesses providing marketing support for fishery activities from local fishing boats.

After completion of the related rehabilitation work, one of the containerized block ice plants is to be relocated to the Mirissa Fishery Harbor, while another containerized block ice plant

and containerized cold storage unit are to be relocated to the Hikkaduwa Fishery Harbor to strengthen ice supply and fish storing capability at these fishery harbors. Even after completion of the related rehabilitation work, insulated refrigerator trucks will continue to be used at the Galle Fishery Harbor, which is the base for fish marketing equipment of the CFC in strengthening local fish marketing.

(7) Recommendations

Recommendations are summarized into the following three points:

- Regarding the ice plant for the CFC refrigeration plant, it is highly recommended that CFC should place high priority on the ice supply at landings for local fishing boats in Galle Fishery Harbor, as benefits to the majority of impacted persons are of importance within the Japanese Grant Aid scheme;
- It is recommended that CFC should analyze in detail the economic feasibility of operating the refrigeration plant as soon as possible, in order to ensure the appropriate operation of the plant without letting operating restrictions disturb effective supply of ice at landings for local fishing boats in Galle Fishery Harbor; and
- It is recommended that CFC prepare, as soon as possible, to recruit qualified operators for the refrigeration facilities, especially with the aim of hiring maintenance-oriented personnel with strong discipline (as in general, it is very difficult to find such operators).

8.4.2 Utilization Plan and Examination of the Scale of Facilities to be Rehabilitated in Tangalle Fishery Harbor

(1) Background

Land facilities (such as the canteen, net mending building, public toilets, oil-lodge, workshop, winch hut, CFHC Office with auction hall, ice plant, and slipway) were constructed, as well as equipment (such as the workshop working tools, crane vehicle, insulated fish boxes, and navigation lights) were procured under a Japanese Grant Aid project entitled, the “Project for Improvement of Fishery Harbor Facilities and Fisheries Training Center at Tangalle” (hereinafter referred to as “the Former Tangalle Project”). As the Basic Design Survey for the Project was conducted in the middle of 1999, construction of the facilities and procurement of equipment started in the middle of 2001, ultimately being completed in early 2002.

As shown in Table 8.12, fish production in the Tangalle Fishery District ranged from 22,500 to 27,500 tons/year from 1995 to 2004. Until 2002 when the Kudawella Fishery Harbor began operations, the majority of fish was landed in the Tangalle Fishery Harbor and in the Puranawella Fishery Harbor. Approximately 10,000 tons of fish was landed in Tangalle Fishery Harbor, including those by non-registered fishing boats.

Table 8.12 Fish Production in Tangalle Fishery District in the Last Ten Years

	(unit: ton/year)					
Year	1995	2000	2002	2003	2004	Average
Production	23,260	33,470	26,860	21,700	21,960	25,450

Source: MOFAR

In the noted Basic Design Survey, annual fish landings by registered boats were estimated at approximately 7,500 tons. During and after completion of construction works for the land facilities at the Tangalle Fishery Harbor, some other fishery harbors such as Kudawella Fishery Harbor and Hikkaduwa Fishery Harbor were constructed and began operation. Due to this situation, the annual fish landing in Tangalle Fishery Harbor has presently been estimated on the order of 4,000 tons. However, as one of the eastern fishery harbors in the Southern Region, its importance remains more or less connected to the development of fishery harbors such as Kalametiya and Hambantota.

Many facilities as well as a sizeable quantity of equipment were damaged by the tsunami. However, the main structures of some facilities were not seriously damaged, while the majority of facilities remained in usable conditions through the repair of interior/exterior fittings, furniture, etc. Since much of the equipment was soaked with or washed away by seawater from the tsunami, equipment housed in many electrical sections was out-of-order. CFHC capacity for engineering and maintenance allowed much of the equipment to be repaired, although some electrical tools remain out-of-order, while many hand tools have been lost. Furthermore, other locally constructed land facilities such as the security office, radio communication office, CFC cold rooms, and CFC & CEY-NOR Office, as well as the workers' office, were broken apart as the breakwater and groin were damaged by the tsunami when protective armor rocks were lost and the pavement was stripped away.

As mentioned in Section 8.3.2, many public land facilities were selected for repair, with some of the more important pieces of equipment selected for replacement under the rehabilitation of Tangalle Fishery Harbor by Japanese Non-project Grant Aid. The same goes for the repair of the breakwater and groin, as they are important parts of basic harbor facilities.

Based on the above backgrounds, the JICA Project Team examined a facilities rehabilitation plan for Tangalle Fishery Harbor as follows.

(2) Objective and Utilization of Facilities to be Repaired and Equipment to be Replaced

The facilities to be repaired and equipment to be replaced under the Japanese Non-Grant Aid are utilized and operated by CFHC, with the exception of the CFC cold rooms, which are operated by CFC. The objective and intended use of the facilities to be repaired and of the equipment to be replaced in Tangalle Fishery Harbor remain unchanged. Compared to those in the former Tangalle Project, the objectives, functions, and operating systems of the facilities and equipment in the Tangalle Fishery Harbor have not been and will not be altered upon completion of construction by the former Tangalle Project, even with regards to the direct operating system of the ice plant there by CFHC.

(3) Examination of the Scale

Considering the present fish landings (on the order of 4,000 tons/year), it is not necessary to review for expansion the scale of the facilities to be repaired and the equipment to be replaced. Therefore, the repair of the facilities is designed based on the existing scale of the facilities and the grades of the equipment are designed based on the equipment lost from the tsunami.

(4) Relationship to Other Equipment Procured by Japanese Non-project Grant Aid

In order to recover and maintain the functionality of the fishery harbor until the completion of the rehabilitation works under Japanese Non-project Grant Aid, one containerized cold storage unit and four insulated refrigerator truck units (freezer trucks) are to be distributed to the Tangalle Fishery Harbor. They will be operated by the CFC under Japanese Non-project Grant Aid related to the tsunami, and are intended especially for fisheries and marketing support to fishery activities by local fishing boats.

Even after completion of the related rehabilitation work, the containerized cold storage unit will be kept there, while the insulated refrigerator trucks should continue being utilized at the Tangalle Fishery Harbor as a base for CFC fish marketing equipment, to strengthen local fish marketing.

(5) Recommendations

Recommendations are summarized into the following two points:

- In light of the fact that the construction of two new fishery harbors will be completed in the Hambantota District soon, it is recommended that CFHC prepare to recruit qualified operators for harbor operation, especially with an aim towards hiring maintenance-oriented personnel with a strong discipline (noting that in general, it is difficult to find such operators). The operation of the Tangalle Fishery Harbor should not be disturbed by the shortage of qualified operators when new fishery harbors open; and
- It is also recommended that CFHC review the financial operating status of the Tangalle Fishery Harbor so as not to disrupt smooth operations, especially those involving maintenance, in light of future competition with new fishery harbors in Hambantota.

8.5 Natural Conditions Survey, Facilities Design, and Cost Estimates

The JICA Project Team conducted natural conditions survey and prepared draft facilities designs and preliminary cost estimates as a part of technical assistance. The details of these are shown in the below.

8.5.1 Design Policy

- Rehabilitation of existing facilities shall maintain the original design of the facilities.
- Design of newly constructed facilities shall be decided based on considerations of maintenance costs and/or facility lifespans, even though they may be rehabilitation projects.
- Project site shall be located in the seaside area, while also considering potential ramifications of damage from salty water/air.
- Disaster prevention plans shall be studied and considered within the basic design and specifications.

8.5.2 Basic Policies on Facilities Design and Cost Estimates

(1) Design Policy

- For rehabilitation of the existing facilities, the original design conditions/specifications shall be applied in the construction.

- For the construction of new facilities, design conditions/specifications shall be determined considering maintenance costs and/or facility lifespan, even though they may be categorized as rehabilitation projects.
- As the project site is located in seaside areas, due consideration to possible damage from salty water/air shall be made.
- In the basic design and specification formulation, effective disaster prevention plans, if assessed practical, will be considered.

(2) Policies on Construction Period and Cost Estimation

- Estimation of the construction period shall be discussed with Japanese-related organizations as well as the Sri Lankan side to formulate an appropriate duration for the Non-project Grant Aid project.
- In view of economic concerns and the ease of materials procurement, procurement from a third country may also be considered.
- Normal/typical construction methods should be applied as far as possible, considering the participation of local construction companies in tendering.

8.5.3 Examination of Design Conditions

(1) Building and Related Equipment

1) Basic Concept for Design

Galle and Tangalle are located in the southern region of Sri Lanka. The natural conditions of both sites are considered very similar. It is, therefore, intended to apply natural conditions found at Galle to the case of Tangalle. Soil investigations from borings have been carried out at the Galle site. The results of the investigation are to be considered in the structural design of facilities.

2) Regulation and Standards for Building and Related Equipment

For rehabilitation work, the regulations and standards used for damaged facilities design shall be applied. As for new construction, domestic standards (Sri Lankan standards) or Japanese standards shall be adopted. For electricity work, IEC (International Electrical Commission) guidelines and specifications, used worldwide, should be adopted.

3) Other Considerations for Design

Route No.2, located behind the Galle Fishery Harbor area, has a future expansion plan to widen to 15 ft from its existing borderline. This area shall be eliminated from the project site.

(2) Civil Engineering Facilities

1) Meteorological and Oceanographic Conditions

The data and information derived from the following reports, “The Study on the Urgent Rehabilitation Plan of Galle Port in the Democratic Socialist Republic of Sri Lanka; JICA in 2000” and “The Basic Design of the Project for the Construction of Tangalle Fishery Harbor Related Facilities; JICA in 2000”, were applied, respectively.

2) Topography and Bathymetric Conditions

At the Galle Fishery Harbor, a topographic survey was carried out by the JICA Project Team. Therefore, this survey result was used for the topography of the Galle Fishery Harbor, while the latest bathymetric data was obtained from CFHC and/or NARA (National Aquatic Research and Development Agency), since these organizations have carried out soundings recently.

As for topographic and bathymetric conditions in Tangalle Fishery Harbor, the available data/maps, which were taken mainly from the aforementioned JICA Study report, were used.

3) Soil Conditions

Soil investigation by six borings was carried out at Galle Fishery Harbor by the JICA Project Team. The results, attached in Annex 8-2, of the investigation have been used in the design at Galle Fishery Harbor. For designing facilities at Tangalle Fishery Harbor, the soil data contained in the noted Basic Design report has been referred to, where necessary.

4) Utilization Conditions

Based on the current utilization conditions of facilities and the requirements/plans derived through discussions with CFHC, the specific utilization conditions, such as objective boat sizes, etc., have been established in order to design optimum facilities.

5) Applied Regulations and Standards

In the case that the restoration/rehabilitation work is to be done according to the original conditions, the related regulations and standards in force in Sri Lanka shall basically apply, while internationally recognized standards may also be applied to new constructions, where deemed appropriate.

8.5.4 Study/Examination of the Size of Facilities

(1) Galle Fishery Harbor

- 1) Building and Related Equipment
 - Ice and refrigeration plant
 - Office building

The composition of the office building constructed by this project is composed of the CFHC administration office, the CFHC Harbor Manager’s Quarters, and the night-duty room. The administration office supplies the use of CFHC to 15 persons, as shown by the dotted line in the Galle Fishery Harbor organization chart shown in Figure 8.1.

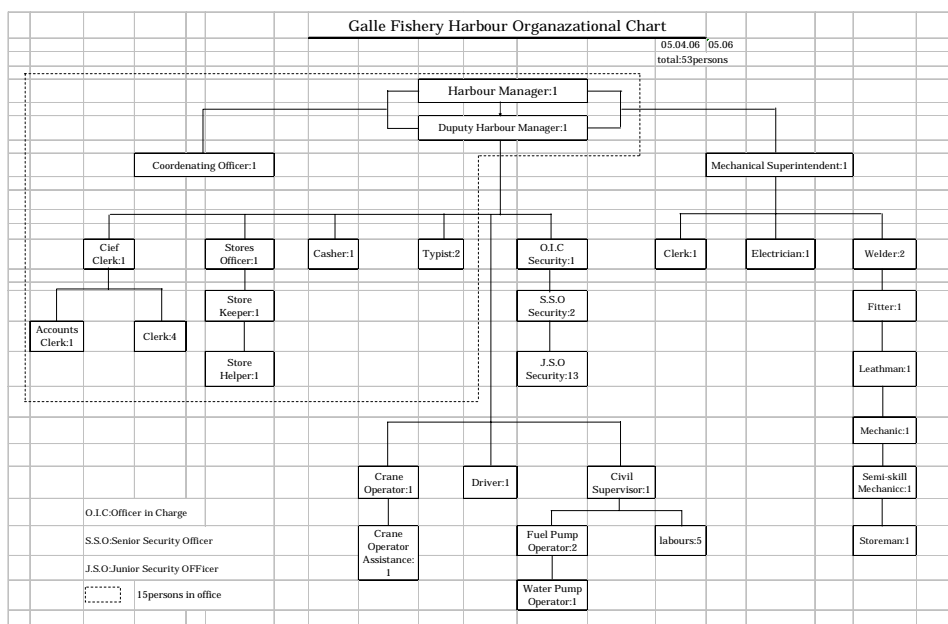


Figure 8.1 Galle Fishery Harbor Organization Chart

Regarding functionality, the administration office should be located on the ground floor. In order to oversee the inside of the harbor for management and disaster prevention purposes, the radio communication room and office room should be located on the 1st floor. Necessary areas in each room and the calculated occupied square areas are shown in Table 8.13. It is noted that these estimates assumed a per person area of 5 - 15 m²/person in the standard area (Architectural Standard Specification from the Architectural Institute of Japan). Some assumed values are as follows:

- Room for Harbor Manager: 10 m²/person;
- Rooms for accountants, offices, etc.: 6 m²/person; and
- Night-duty room: 3 m²/person.

Table 8.13 Square Area for Particular Rooms in the CFHC Office

Floor	Room	Area(m ²)	Area calculation
G.F	CFHC office	54.60	Personel on service 9:6.06m2×9=54.6 m ²
	Manager room	10.80	Office space:3m×3.6m=10.8 m ²
	PC room	10.80	Space:3m×3.6m=10.8 m ²
	Pantry	5.50	Sink:1,600×600,Range rack:600 × 600
	Toilets	Male:12.0 Female:12.0	Male toilets:stool 2, washhand basin 2 Female toilets:stool 2, washhand basin 2
	Entrance hall & Corridor	14.30	Entrance hall:3.3×3.5=11.55 Corridor:1.1×2.5=2.75
	(Terrace)	(33.75)	Outerside:1.5m × 22.5m=33.75 m ²
	(Outerstairs)	(15.00)	Outerside:6m × 2.5m=15 m ²
1 st	Raidio Communication & sea observation room	24.00	Personel on service 5:4.8 m ² × 5=24 m ²
	Night duty room & shower room	15.00	Personel on service:4:2.5m × 4.15m=10.38 m ² Shower space:2.5m × 1.85m=4.62 m ²
	Toilet	2.78	Stool:1 washhand basin:1
	Corridor	6.22	width:1.5m
	Manager quator	72.00	lobby:27.2 m ² , Bedroom:15.6 m ² , Bedroom:18 m ² , Toilet:stool:1, washhand basin:1, Shower space ,Pantry:5.4 m ²
	(Balcony)	(33.75)	Outerside:1.5m × 22.5m=33.75 m ²
	(Outerstairs)	(15.00)	Outerside:6m × 2.5m=15 m ²
	Total	240.00	

2) Civil Engineering Facilities

For the Galle Fishery Harbor, the slipway, as a boat repair facility, as well as the eastern quay wall, is to be rehabilitated/ reconstructed.

Slipway

The new slipway is to be constructed at the eastern end of the reconstructed quay area by removing/cutting a part of the existing quay wall and land area, as agreed upon by CFHC, in order to solve current issues of available area constraints and accessibility. The slipway will have the following dimensions, established based on design requirements and conditions that accept 60 ft class fishing boats.

- Total length of sloped slipway :60m (horizontal length), with an inclination of 1:10
- Width of slipway :7.0m
- Water depth at toe :-3.50MSL

The slipway should be provided with a cradle and winch system capable of handling the targeted boat size. As such, the winch should have at the least, a 10 ton pulling capacity.

Quay Wall

The existing quay wall must be reconstructed in light of the new requirements and the current conditions are as shown below:

- To accept berthing of 60 ft class boats to be used at the preparation/resting wharf;
- From the above, the front water depth should be a minimum of 3.5 m below MSL;
- The existing quay wall is a gabion wall-type construction with a design water depth -1.5 m MSL, which would not be able to handle the intended objectives; and
- The reconstructed quay wall is approximately 95 m long, due to the aforementioned relocated slipway facility, with the deck elevation set at +1.45 m MSL, to be the same with the other existing wharf elevation.

The structure selected from a preliminary study will be a steel sheet, piled-type construction that will be more advantageous than gravity types, due to the existence of soft soil layers from -5.4 m to -15.5 m MSL (N-value ranged from 0 - 5). Furthermore, with the recommended structural type, the shifting of the new quay wall towards the sea will be minimized (about 2.0 m from the original alignment). The reconstructed quay surface will be provided with a concrete apron that is 6.0 m wide.

(2) Tangalle Fishery Harbor

1) Building and Related Equipment

The Tangalle Fishery Harbor building and equipment shall be basically rehabilitated as originally specified. However, the following matters will be changed:

- Fuel supply dispenser (400 liter/min type)

There are two types of dispensers (100 liter/min and 400 liter/min) in the harbor. The CFHC side accepted a limited budget for other rehabilitation purposes, so the 400 liter/min type will be reduced to the 100 liter/min type.

- Ice storage in the office building

Ice storage is located on the lower side of the flake ice plant, fixed by steel frames. This was built using Japanese products. The CFHC side accepted the use of local product materials for repair work.

- CFC cold rooms (2)

The CFC cold rooms are CFHC property, but CFC is renting them from CFHC for storing the fish products from fishermen. The CFC fish distribution network is very important to

revitalizing fishery activities after the tsunami. As such, the damaged cold rooms must be rehabilitated as before.

- Security house

The security house retained only its floor after the tsunami. This facility is very important to control fishery harbor users and the narrow fishery harbor hinterland. As such, the roofing and fitting of this building must be rehabilitated.

- Radio communication house

The radio communication house was completely destroyed by the tsunami, with only the floor remaining. According to its requisite functions, it will maintain its 1st floor office building, but because there is no space in it, it will be reconstructed on the original site.

2) Civil Works

The main breakwater and groin damaged by the tsunami are the main facilities considered for rehabilitation in Tangalle Fishery Harbor. Both facilities are of a rubble-mound type construction and covered with armor stones. They also have asphalt concrete paving on their surfaces. The damage caused by the tsunami was mainly to the armor stones and the asphalt surfacing. It is, therefore, necessary to restore these damaged parts.

The restoration works for those facilities are, basically, carried out to restore the originally constructed shapes and functions. It should, however, be noted that the asphalt concrete surfacing may not last long, since this material is not so durable against seawater. As such if the budget allows, the installation of a concrete coping, instead of asphalt paving, onto the main breakwater, is recommended.

In addition to the above, the concrete foundation of the navigation light, placed on the groin head, should be rehabilitated/reinforced with additional concrete.

8.5.5 Management of Detail Design

(1) Building and Related Equipment

In order to shorten the overall implementation period and to maximize the bidders' practical knowledge of detailed designs and construction methods, it is recommended that a design-build, contract-based detailed design be adopted.

For building work, the design-build system is conducted according to the following procedures.

Step 1: Tendering documents show only a skeleton of the building, and detailed drawings for quotation (not showing details of steel structure columns and trusses, concrete structure bar arrangements and miscellaneous structures). Bidders cannot revise modules for the skeleton, nor the layout plans prepared by the consultants in the tender documents.

Step 2: The bidder submits bills of quantity for the steel structure, bar bending work, and other miscellaneous works for evaluation. The consultants evaluate the quantity of their work, as well as the detailed and unit prices, applying engineering perspectives as well as prior experience.

Some examples that include building portions of design-build projects are as follows:

- Steel structure details for columns, roofing trusses, rafters, etc.;
- Concrete structure bar arrangement designs and drawings; and
- Other related detail drawings.

During the design-build stage evaluation, consultants approve of construction materials and other important details for preliminary construction works to ensure a smooth start to construction.

(2) Civil Works

A Design & Build Contract will also be applied to civil works. The Standard Bidding Document for this type of contract, issued from the Institute for Construction Training and Development (ICTAD), shall apply to the works. The detailed design shall be carried out by the contractor, in accordance with the Sri Lankan Technical Standards and Specifications. Internationally recognized standards may, however, also be adopted in the detailed design, wherever evaluated appropriate. The detailed design will be reviewed/assessed by the JICA Project Team, when required.

8.5.6 Cost Estimates

(1) Cost Estimation Conditions

Exchange rate used: 1 USD= 107.00 JPY, 1 Rs= 1.0 JPY

(2) Procurement Method of Facilities

The Japanese side shall implement the components shown in Tables 8.14 and 8.15 using the Non-Project Grant Aid scheme.

For the Galle Fishery Harbor, as the cost of the refrigeration plant accounts for 70% of the component cost, a joint venture tendering of refrigeration plant engineering and construction companies is reasonable, which also makes it easier to control implementation. The main components of the refrigeration plant such as compressors, evaporators, and other devices shall be procured from DAC country products for durability and maintenance of the plant. The demolishing of existing building structures related to the refrigeration plant is not difficult to arrange.

Building and marine works are coupled to a single lot for construction, because the construction sites are very close to each other and warehouse demolition is included in both. Construction work shall not be complicated for local companies; hence a local qualified construction company is reasonable. Implementation of the Construction of Open Area for Landing & Auction Space, Canteen and Welfare Shop, using the Non-Project Grant Aid was discussed and decided by the working committee in early June 2005.

For the Tangalle Fishery Harbor, marine works are executed from the land area, so the main area of construction is on land. Lots 1 and 2 are combined into a single lot. Rehabilitation works are not considered complicated, thus local company procurement is acceptable. As Japanese products were procured through Japanese grant aid, Japanese products can be also applied this time to basic design concepts of the Japanese Grant Aid system.

Table 8.14 Galle Fishery Harbor Components

Lot	Item	Contents	Cost (tentative, Rs, JPY)
1	Refrigeration plant	50 tons/day block ice plant, 100 tons ice storage, clod storage (300 tons, four rooms), blast freezer (7.5 tons/day in two sets), export and domestic processing room, and a steel-structured building (3,000 m ²)	276.6 million
2	Demolition	Existing five-story building and concrete slab	4.0 million
3	Building	CFHC two-story building, RC structure, 240 m ²	15.0 million
	Demolition	CFHC office side ware house of CFHC	1.0 million
4	Marine work	Quay wall (-3.5 m, L=100 m), Slipway (L=70 m, W=7 m), cradle and winch system.	140.0 million
5	Demolition	Slipway side of warehouse of CFHC	2.0 million
Grand Total			438.6 million
6	Building work	Open Area for Landing & Auction Space, Canteen and Welfare Shop	47.0 million
7	Demolition	Existing steel structure floor	10.0 million
Total			57.0 million

Table 8.15 Tangalle Fishery Harbor Components

Lot	Item	Contents	Cost (tentative, Rs, JPY)
1	Repair of facilities	Repair of the facilities donated by the former Grant Aid Project (CFHC Office, canteen, net mending building, toilet, septic tanks, oil-lodge, workshop, winch hut, oil pump, ice storage and outdoor lights) and repair of facilities constructed locally (the two CFC cold rooms, radio communication office, and security office).	43.4 million
2	Marine work	Water tank tower, five-story building, and concrete slab	18.6 million
3	Equipment	Cradle of slipway and workshop tools	16.4 million
Total			78.4 million

(3) Conditions for Procurement of Construction Material

Cement, aggregate, and brick shall be purchased in local markets. Materials that are difficult to procure or are of high quality may be imported from Japan or a third country. Imported material shall be free of customs and internal tax.

(4) Method of Quotation

The JICA Project Team estimated quotations based on the Sri Lankan-style quotation system and surveyed material and labor costs at each construction site, then input data for unit rates of each working item. Costing of electricity and water treatment systems shall be based on the quoted prices of private companies or on the assumed prices from the Team's experience. Also, design-build work manpower shall be calculated, including quotations.¹

The ice making machine and refrigeration equipment comes as a single package, including electricity and water supply for the system. Calculating the cost of the plant shall be based on company quotations, based on consultant specifications.

(5) Ocean Freight from Japan

Ocean freight shall be based on JICS transportation standards. A 40-ft container costs US\$5,000, while overland transport from Colombo to Galle costs Rs20,000 for a 40-ft container, and Rs18,000 for a 20-ft container.

¹ Referenced Documents : Revision of the Building Schedule of Rates

(6) Indirect Construction Cost

The contractor shall submit monthly progress reports (including photographs, construction amounts, quality control records, safety procedures, etc.) to related organizations. The expenses of such a procedure, in terms of manpower, must be considered as well.

8.6 Design Work

8.6.1 Galle Fishery Harbor

The JICA Project Team prepared draft designs of the following facilities at the harbor site: (i) refrigeration ice plant; (ii) CFHC office building; (iii) auction hall and canteen/welfare shop; and (iv) quay wall, slipway, and winch hut. The site plan is described below.

(1) Refrigeration Ice Plant Building

It was described that the old ice plant and cold storage facilities built in the 1970s were to be taken down and removed. As a result, the refrigeration ice plant building will be constructed there, will be approximately 3,000 m², and will include the ice plant, cold storage facilities, a processing room for exports (will adopt the EU standard for hygienic and sanitary prospect), and a domestic processing room. When developing a plan for the building, it is necessary to consider the flow of workers, the fish from the landing area, the freight vehicles and parking space for waiting.

(2) CFHC Office Building

This two-story building, with an administration office on the ground floor and a radio communication room and an office room on the 1st floor (used to observe the inner harbor for management and disaster prevention purposes) is located in the southwest corner of the old store building and at the center of the harbor site.

(3) Fish Auction Hall and Canteen & Welfare Shop

The fish auction hall will be located on the site of the old auction hall. Meanwhile, the canteen and the welfare shop will both be located on the west side of the auction hall or new refrigeration ice plant building. As it is a public service facility, the surrounding environment and overall convenience should be taken into consideration.

(4) Quay Wall and Slipway

1) - 3.5 m Quay

The rehabilitated quay is approximately 95 m long, with a quay water depth of at least -3.5 m MSL. The quay will have an associated 6.0 m wide apron. The quay face elevation will be +1.45 m MSL, and will be designed to discharge surface water directly into the sea. The quay will mainly be used as a preparation/resting berth and will be designed to accommodate fishing boats up to 60 ft. The structure of the quay will be a steel sheet pile type, since conditions such as the subsoil profile have to be taken into consideration.

2) Slipway

The slipway is to be constructed for fishing boat repairs and maintenance, and accompanied by a cradle & winch system, rail tracks, etc. The slipway will be 7.0 m wide, with a 2.5 m clearance on each side, sloping at 1:10 from the ground level +2.50 to - 3.5 m MSL. The surface of the slipway shall be paved with pre-cast concrete blocks and in-situ concrete construction. The slipway shall be designed for cradle-mounted boats up to 60 ft long.

3) Retaining Wall Structure

A part of the west-side retaining wall, connected to the quay wall, will have a length of approximately 20 m from the quay face, be of a similar construction to the quay wall structure, and be respected as a part of the quay wall work. The remaining parts of the retaining wall may be designed with a gravity-type structure as shown in Annex 8-1.

4) Ancillary Facilities

Ancillary facilities for the quay such as fenders, bollards, and mooring rings are to be constructed as shown in Figure 8.9. All such facilities shall have enough capacity to withstand the intended utilization of the quay.

5) Pavement behind the Quay and Slipway

In order to enable smooth and effective operations of quay structures, the surrounding areas will have proper paving or surfacing. The pavement behind the slipway will be asphalt concrete paving and/or concrete paving. Behind the quay apron, areas that will be at least 4 m wide are to be leveled and surfaced with gravel.

6) Offshore Boring

Exploratory boring was conducted by the JICA Project Team in the rehabilitation area, where the soft layer of the onshore lies from -5.0 m to -11.5 m. Effects of the layer will be considered for developing a construction plan and for estimating costs. An offshore boring

exploration was also carried out to assess soil conditions at the planned rehabilitation plan in Galle Fishery Harbor. The summary of the offshore boring survey is found in Annex 8-2.

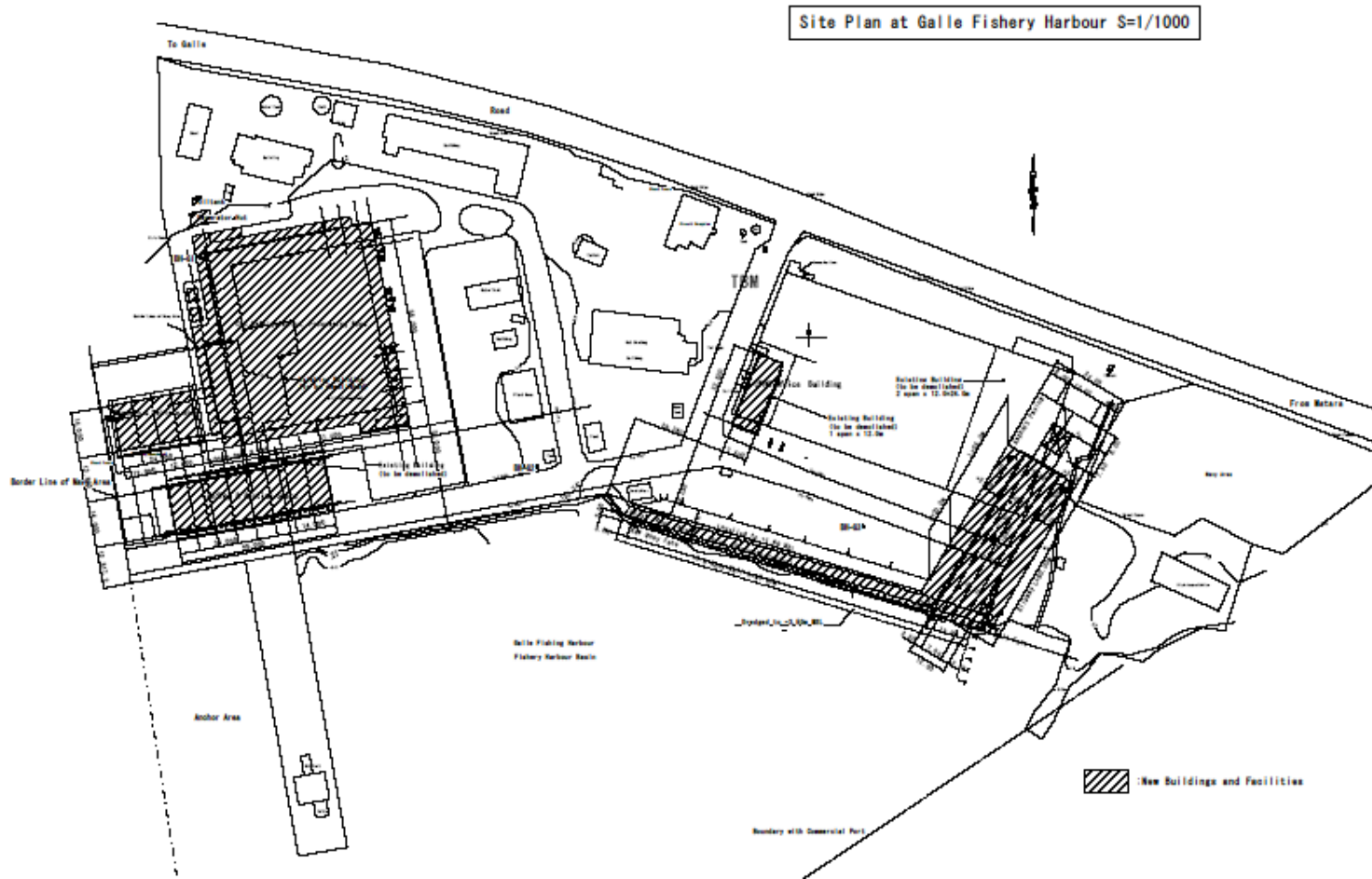


Figure 8.2 Galle Site Plan

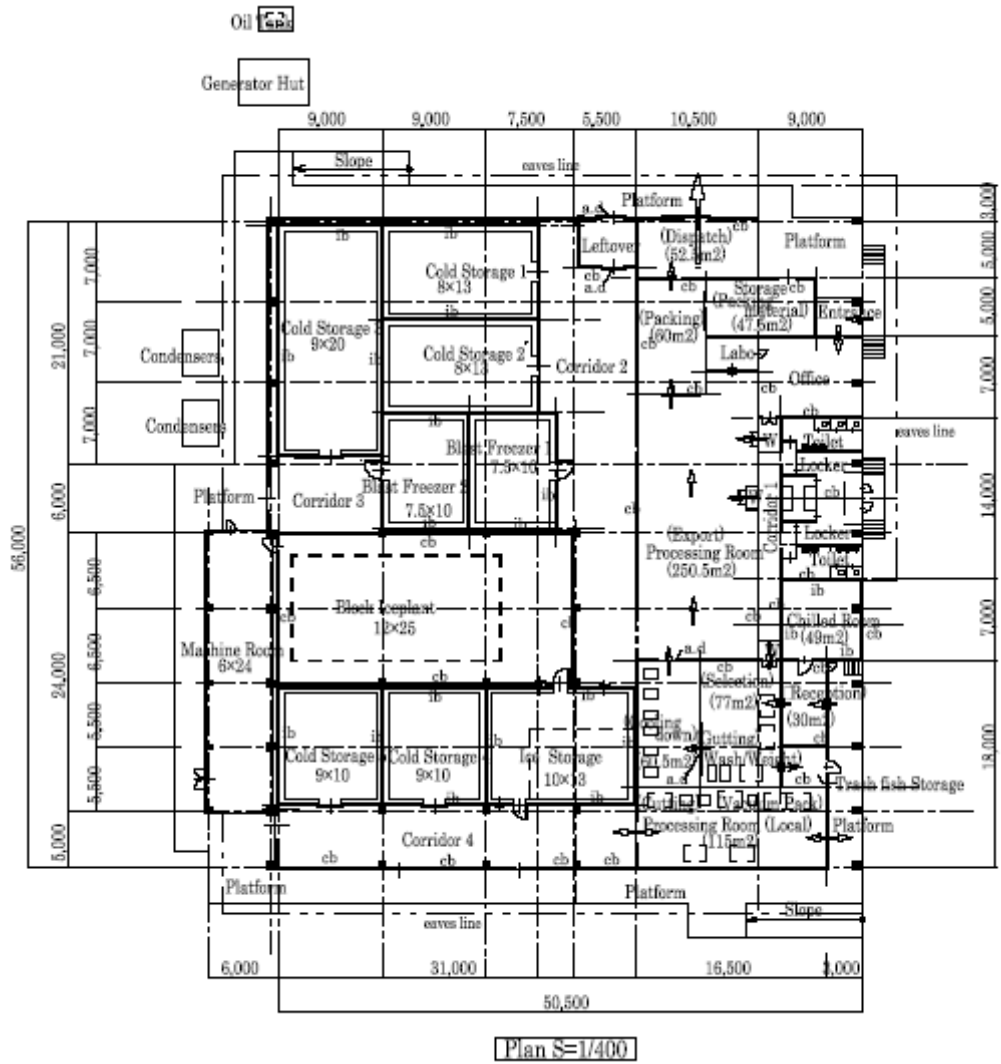
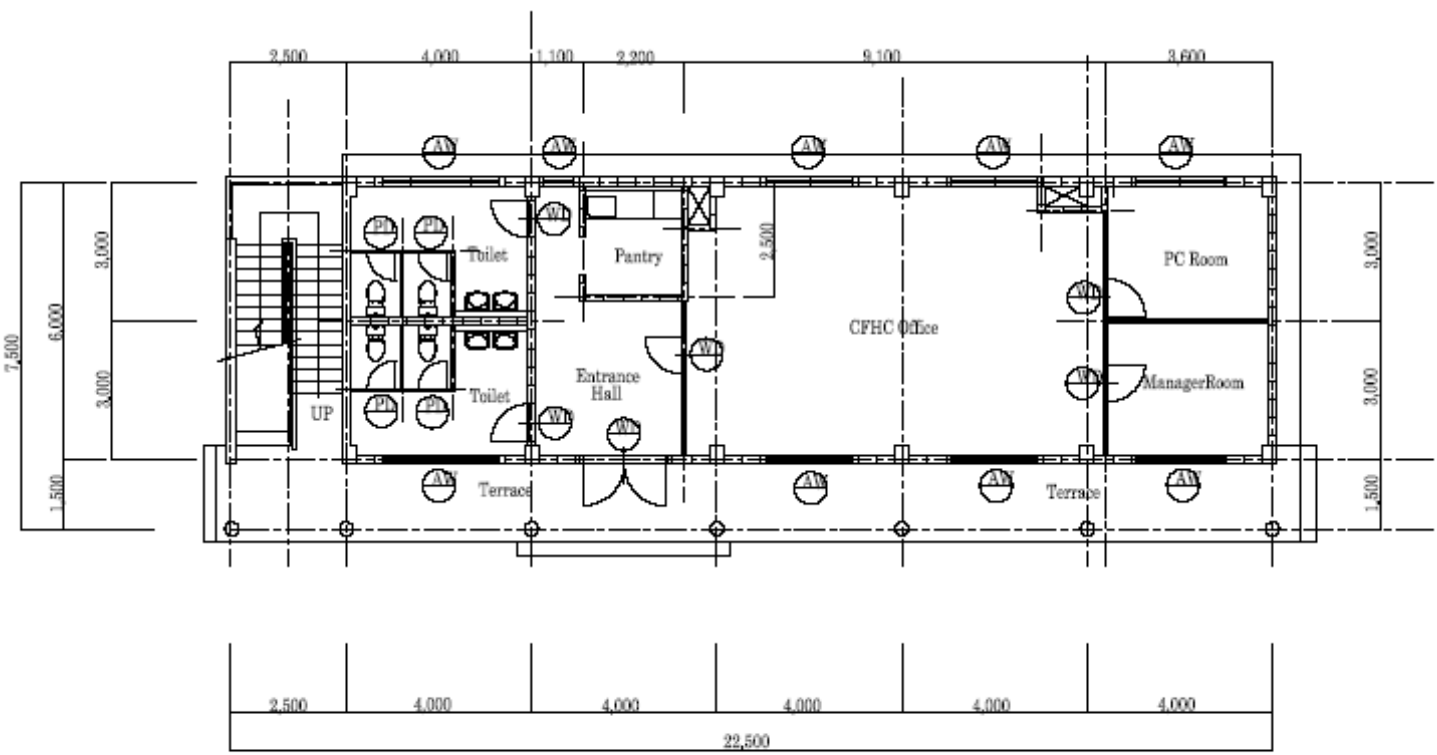


Figure 8.3 CFC Refrigeration Ice Plant Building



Ground Floor Plan S=1/100

Figure 8.4 CFHC Office Building (Ground Floor)

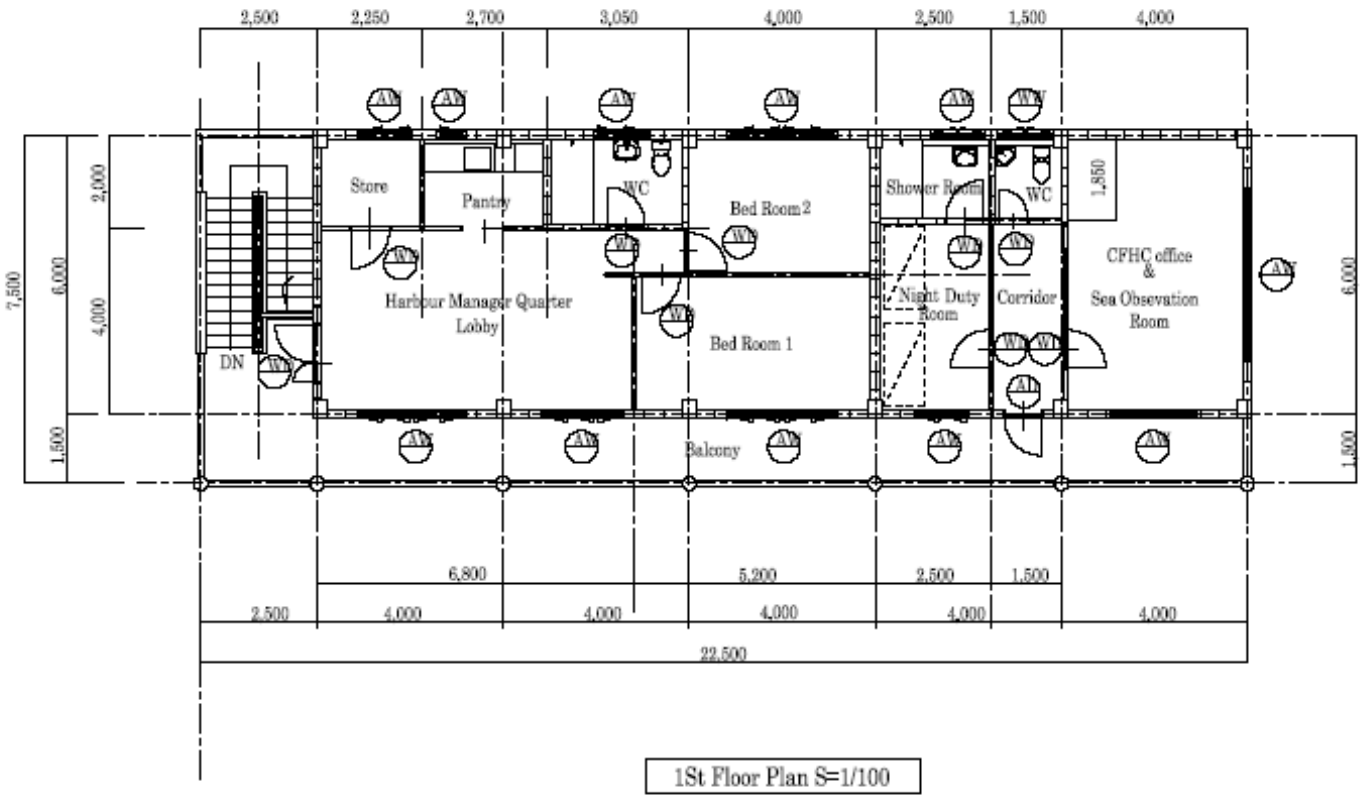
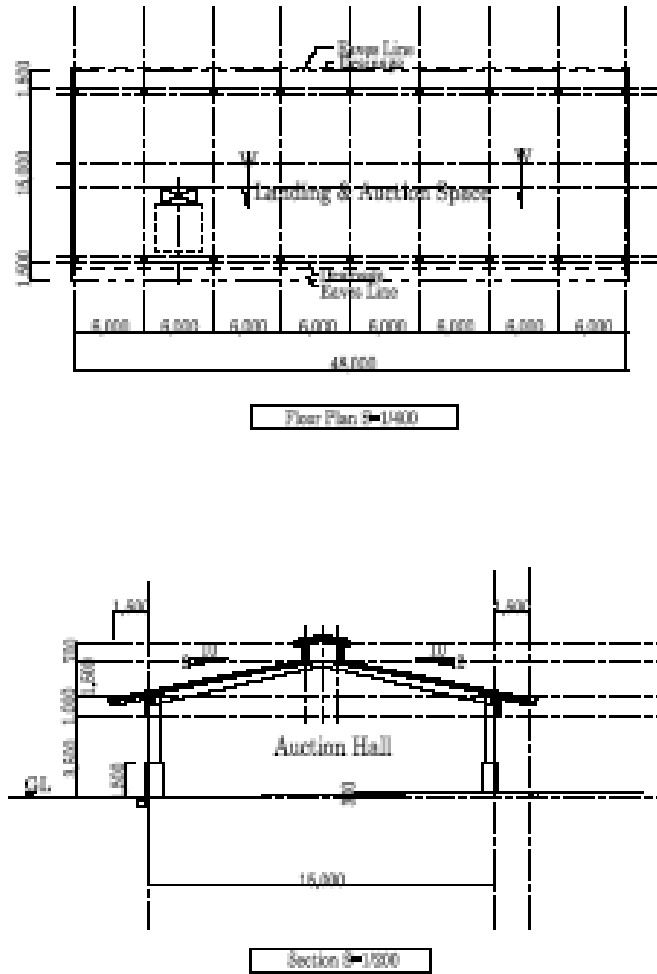


Figure 8.5 CFHC Office Building (1st Floor)



Structure

Steel Column, Beam

Finish Schedule of Exteriors

Roof: Zinc-aluminium alloy

Coated-color roof sheet

Thickness - 0.4 to 0.45 mm

Toplight, polycarbonate board,
aluminium louver

Column Beam Steel: MARINE Paint

with 200 micro-mm after sand blasting
concrete iron trowel up to 1.5 m

Wall: Cladding-type, colored with Zinc-Aluminium Alloy
coated steel

thickness 0.35 to 0.37

End wall: concrete block, mortar AEP

Finish Schedule of Interiors

Floor :concrete iron trowel finishing,
coated by hardener coating

Wall: concrete block, mortar trowel AEP
exterior wall steel panel

Figure 8.6 Auction Hall

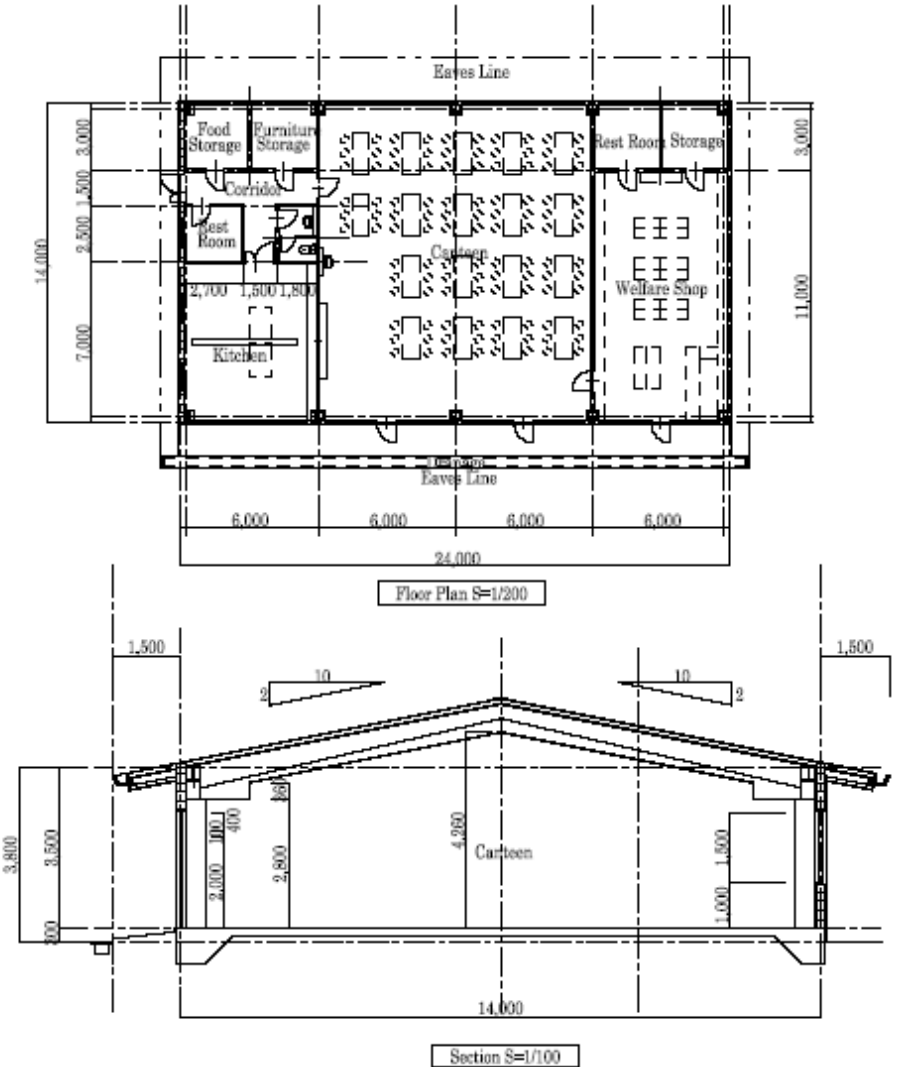


Figure 8.7 Canteen & Welfare Shop

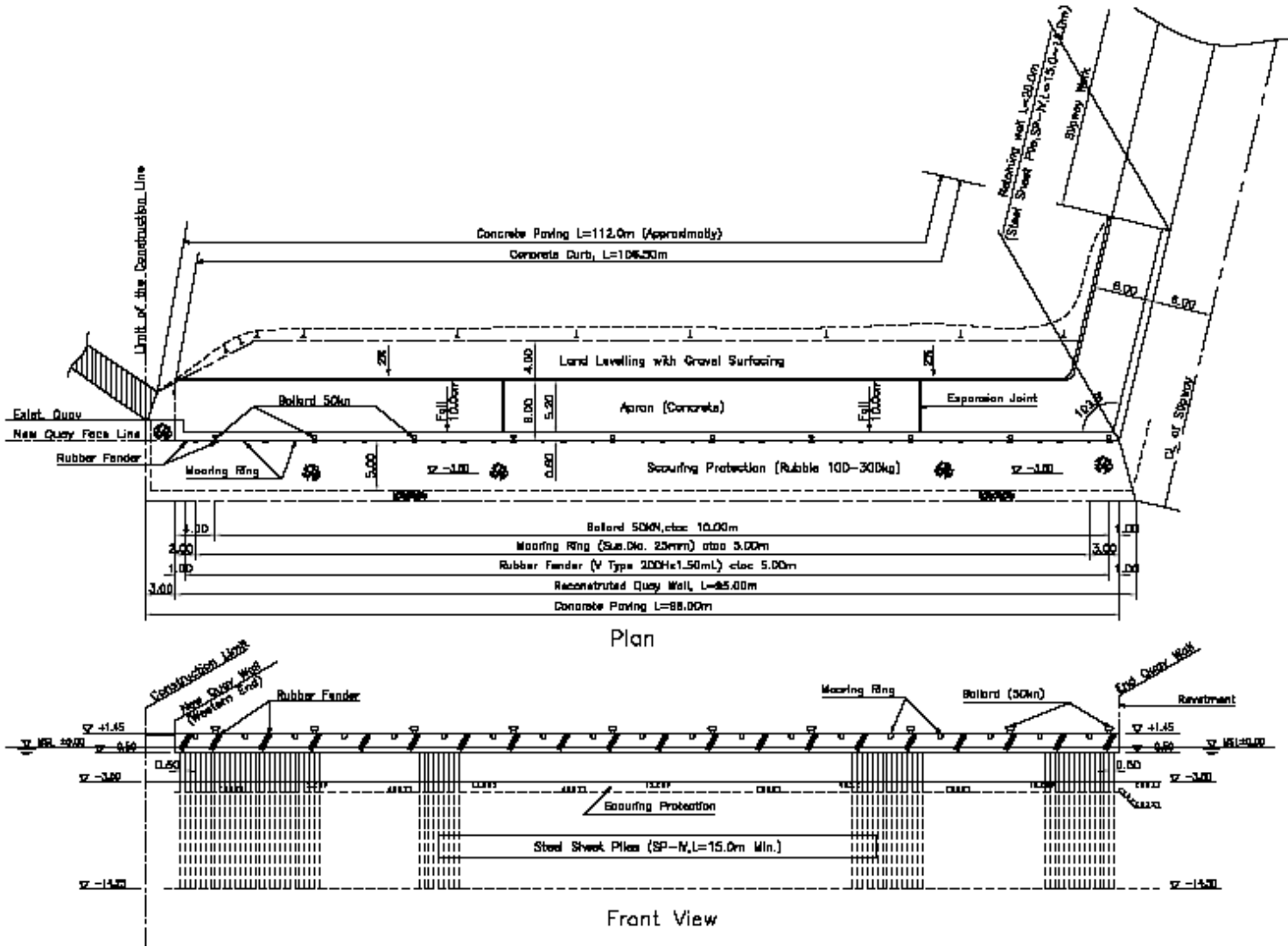


Figure 8.9 Quay Plan

8.6.2 Tangalle Fishery Harbor

The JICA Project Team also prepared draft design drawings of Tangalle Fishery Harbor. As described above, the buildings and facilities of the Tangalle Fishery Harbor will be restored. As such, restoration works will follow the original shape and function of the buildings.

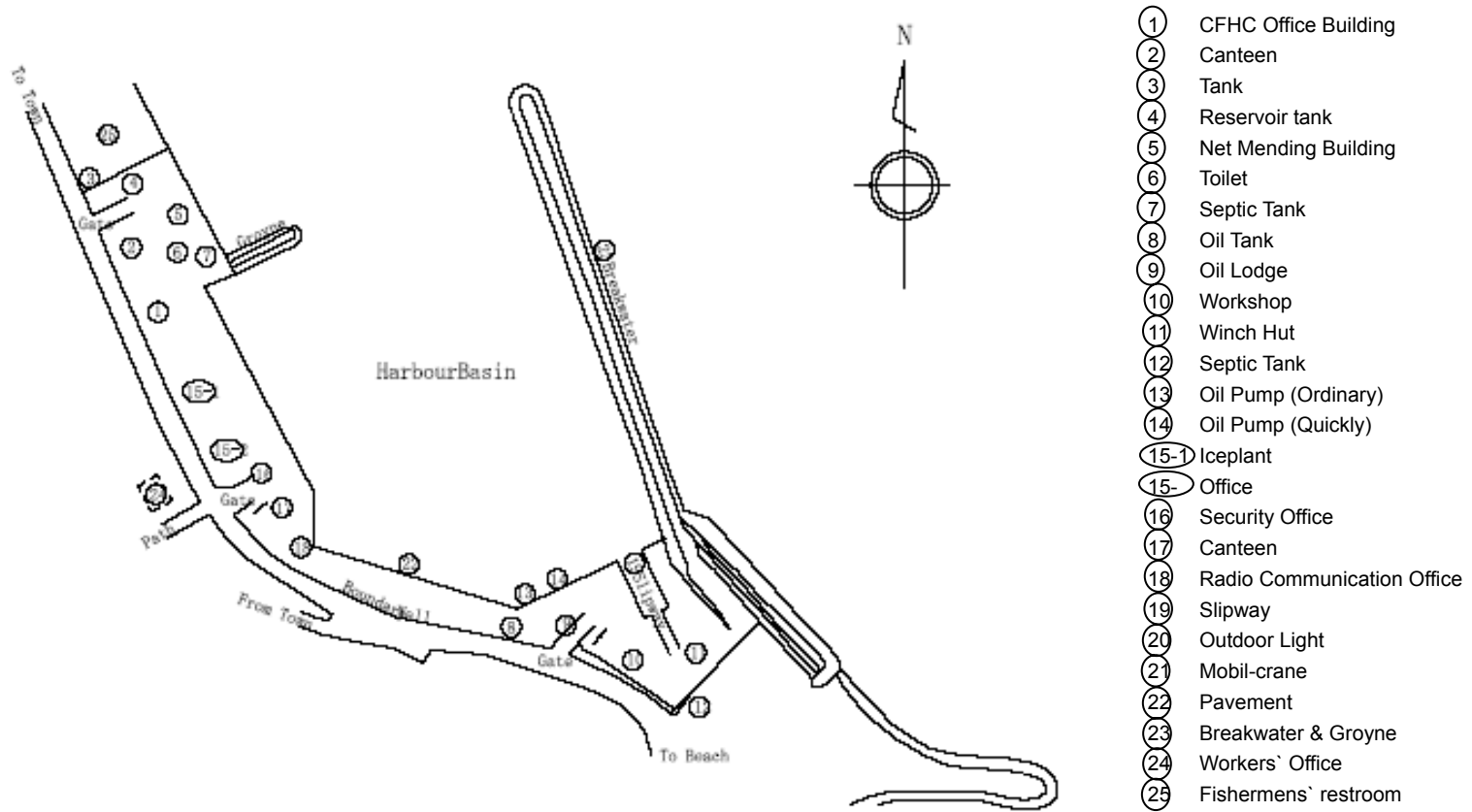
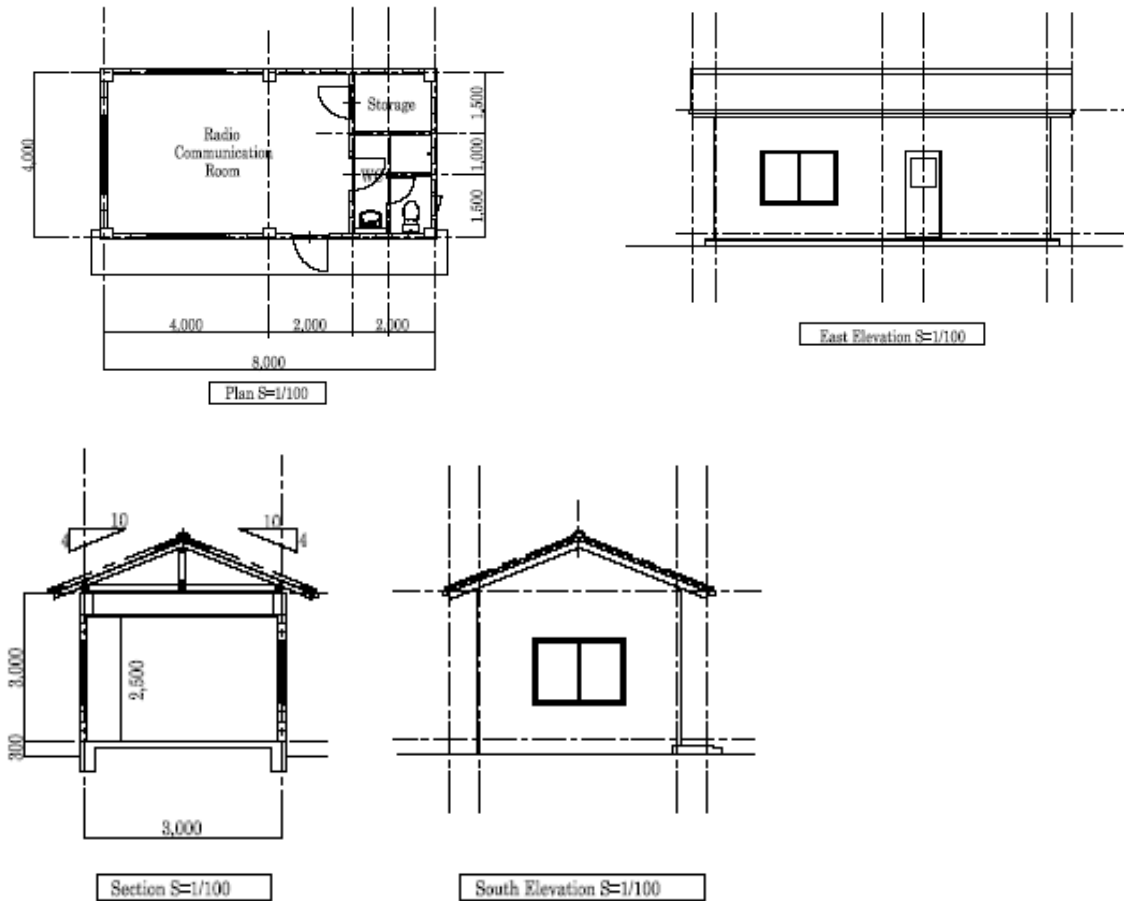


Figure 8.10 Tangalle Site Plan



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Structure

Column/Beam: Concrete
Wall: Concrete block

Exterior Finish Schedule

Roof: Truss wood frame, plywood 12t,
asfalt felt, clay tile roofing
External wall: Concrete block, mortar, AEP
Column, Beam: Concrete, AEP
Windows, doors: wood frame, aluminium window
Painting: anti-chloridisation for steel parts
Exterior floor: concrete trowel finishing coated
by hardener

Interior Finishing Schedule

Radio communication room
Floor: concrete trowel finishing coated by hardner
Wall: column/beam: AEP, block:mortar, AEP
Ceiling: woodframe: OS, plywood :OS

Toilet

Floor: concrete trowel finishing
Wall: column/beam: AEP, block: mortar AEP
Ceiling: woodframe: OS, cement board EP

Water Treatment System

Apply for local standards. (B.O.D. 30 ppm)

Figure 8.11 Radio Communication Office

8.7 Tender Procedure

8.7.1 Tender Specifications Preparation

(1) Basic Conditions

Basic conditions are based on Sri Lankan public specifications, with editing by the consultant leading to additions, supplements, and revision. In particular for this project, which is constructed by Non-project Grant Aid, the following matters are very important vis-à-vis tender documents.

1) Lump Sum with B/Q

Tender results shall be determined on a lump sum price from the bidders, although evaluation of the contents of the work and revision of the B/Q will occur during the construction stage, with the proposed B/Q attached as supplementary documents.

2) Evaluation of Site Manager and Engineer

For evaluating the capability of controlling and managing the construction schedule, quality, and safety of the work, an evaluation will be elicited from the Site Manager and Engineer.

3) Construction Period

Submit detailed and classified construction work, construction duration evaluations, arrangement, as well as construction material procurement schedules.

4) Construction Machinery for the Work

Submit machine classifications and operating schedules for construction work, evaluating the construction period and scheduling arrangement.

5) Construction Material

Submit the origin of the materials, as well as the transportation method and quantity, evaluating the quality and time schedule for each.

6) Other (Supervising System for the Work)

Formulate an organizational chart for the supervising system, indicating positions and functions. The JICA Project Team evaluated the tender documents in terms of adequacy of design-build process.

(2) Construction Management for the Work

1) Construction Progress Management

Submit preliminary construction schedules, indicating milestones for the work.

2) Quality Control Management

Quality control of concrete and steel structure manufacturing and erection is very important for the building. The JICA Project Team provided technical advice on quality control methods in detail in the tender documents.

3) Finishing Shape Control Management

After finishing each construction work, the resident engineer shall investigate the accuracy and quality of work, taking note of the work with photographs and a recording sheet.

(3) Completion of the Work

1) Documents for Completion

The resident engineer arranges with the contractor to submit a maintenance manual, information on the local agent for materials, and other operational information to the user.

2) As-built Drawings

The contractor shall submit as-built drawings to the user for his maintenance work.

8.7.2 Preparation of Draft Tender Documents

Based on the specifications described above, the JICA Project Team prepared draft tender documents and submitted to the Sri Lanka side. All repair work at the Galle and Tangalle Fishery Harbors was combined into a single lot and granted to a Japanese general contractor controlled by Japanese nationals. A tender notice was sent to eight tenderers by fax on July 15th, 2005.

8.7.3 Tendering Process

An invitation to tender was issued by JICS (an agent of the Sri Lanka Government) on July 15th, 2005 to eight general construction companies (all Japanese), registered with the Japanese Commerce and Industry Association. Several aspects were considered

when sending out the invitations - the contractor must:

- 1) Be a Japanese general contractor that is controlled by Japanese nationals;
- 2) Conducted at least five construction projects, with a contract price no less than 500 million Japanese Yen, over the last five years in Sri Lanka or around the world;
- 3) Submit a letter from Sri Lankan local contractors expressing their willingness to associate with the Japanese contractor;
- 4) Not incur three consecutive annual deficits in their P/L (Profit & Loss) statement over the last three years; and
- 5) Possess work experience on a design-build basis.

The tender documents were distributed to eight companies upon their request by July 22nd 2005. The tender documents were subsequently supplemented by Addendum No.1, issued to the noted companies on August 8th, 2005 to provide answers to questionnaires and to modify some sections of the tender documents.

8.7.4 Tender Opening

By the deadline and date for tender submission (14:00 on August 18th, 2005), the tenderer submitted its tender as follows.

No.	Name of Tenderer	Address of Tenderer	Authorized Representative
1.	PENTA-WAKACHIKU JOINT VENTURE.	Representative Office: P.O.BOX 383, COLOMBO 01, SRI LANKA	YOICHI KASAI Project Manager

The tenders were opened publicly immediately thereafter in the conference room of the Hilton Colombo Residences Building, in the presence of JICS (an agent of the Sri Lanka Government), the JICA Project Team, and the tenderers. In accordance with the procedures set forth in the tender documents, the original envelope of each tender was opened first and a preliminary examination was made to confirm whether the tender met the initial requirements for tender submission, that is:

- 1) The tender is expressed in a precise monetary figure;
- 2) The power of attorney for the tender signatory is provided and accompanied by a certificate of signature of the issuer;
- 3) All tender forms (T2 to T13) are duly filled and submitted with the tender; and
- 4) The tender price offered by each tenderer was read aloud and recorded.

8.7.5 Tender Price

The tenderer, PENTA-WAKACHIKU JOINT VENTURE, who offered the lowest tender, was designated as the prioritized negotiator for the contract award, subject to the results of a detailed technical and financial evaluation of the tender.

8.7.6 Tender Evaluation Procedure and Criteria

A detailed evaluation of the tender of the lowest tenderer, PENTA-WAKACHIKU JOINT VENTURE, was then conducted to ascertain its conformity to both procedural and technical requirements of the tender documents and the reasonability of the tender price.

The evaluation consisted of three steps, as detailed in the tender evaluation criteria prepared by the JICA Project Team and approved by the Sri Lanka side. These steps are summarized below.

Step 1: Preliminary Evaluation

This was to confirm, on a pass/fail basis, assessing the completeness and responsiveness of the tender and the financial status, work experience and personnel capability of the tenderer.

Step 2: Financial Evaluation

The financial evaluation will consist of the following sub-steps:

- 1) Correction of arithmetic errors;
- 2) Adjustment of differences, if any;
- 3) Calculation of evaluated tender price; and
- 4) Ranking of tenders in order of evaluated tender price and invitation of the lowest tenderer as the prioritized contract negotiator.

Step 3: Technical Evaluation by Scoring Method

Only the tender of the prioritized contract negotiator will be evaluated in this stage. The technical evaluation will examine five main criteria and allocated a total score of 100 points to them as follows.

- | | |
|---|------------|
| 1) Galle Fishery Harbor - Building Works | :15 points |
| 2) Galle Fishery Harbor - Refrigeration Plant and Equipment | :25 points |
| 3) Galle Fishery Harbor - Quay Wall and Slipway | :20 points |
| 4) Tangalle Fishery Harbor - Rehabilitation, etc. | :15 points |
| 5) Construction Schedule | :10 points |
| 6) Key Personnel | :15 points |

If the tender of the prioritized contract negotiator achieves a total score of 70 points or higher, with the scores of each of the noted five evaluation criteria equal to or above 50% of the total score of each criteria, the tenderer so designated will be considered to have a successful tender and invited to contract negotiation. Otherwise, the tender of the next lowest price tenderer will be evaluated and, in the case where it also fails to meet the required score, this procedure will be repeated until a qualified tenderer is selected.

The assessment and scoring of each of the main criteria will be based on the following evaluation levels as detailed below.

Level	% to Maximum Score
Very Good	> 80% - 100%
Good	> 60% - 80%
Average	> 50% - 60%
Not meeting the requirement	0%

8.7.7 Evaluation Result

The results of the tender evaluation for PENTA-WAKACHIKU JOINT VENTURE are described below. Each step was evaluated in accordance with the aforementioned criteria.

Step 1: Preliminary Evaluation by Pass/Fail Method

- 1) Checking completeness, validity, and responsiveness of tenders:
 - To be a Japanese general contractor controlled by Japanese nationals Yes
 - Tender submitted one original and one copy Yes
 - Letter of Authority with the proper signature of the representative by the tenderer Yes

- All specified tender forms correctly filled in and all required attachments provided Yes
- 2) Checking financial status of tenderers:
 - Not to have a loss in the P/L (Profit & Loss) category for the last three consecutive years Yes
- 3) Checking work experience of tenderers:
 - Having completed five or more construction works, with a contract price of no less than 500 million Japanese Yen during the last five years in Sri Lanka or around the world Yes
 - Having completed ≥ 1 project on Design-and-Build basis Yes
- 4) Checking personnel capability of tenderers:
 - Having a qualified staff of 300 or more licensed engineers of specified categories Yes

Step 2: Financial Evaluation

The evaluation in this step was essentially used to check the computation of the prices quoted in the tenderer's bill of quantities and breakdowns, and to compare the quantities and unit rates mentioned therein with those of the JICA Project Team's cost estimate to confirm whether the tender pricing is reasonable and balanced.

The conditions that were taken into consideration at the time of the above estimation are as follows:

- 1) The price estimation made by the JICA Project Team was based on quotations from local refrigeration manufacturers on the assumption that the tender would be called locally;
- 2) The tenderer offered its price under the conditions that they would subcontract with a Japanese refrigeration manufacturer, procure materials in Japan, and assure that the entire unit will be completed by Japanese engineers; and
- 3) The tender documents stipulate that, for the purpose of securing quality, major equipment should be procured from the DAC countries.

According to the estimate, it was found that the tenderer's price is higher than the JICA Project Team cost estimate. It is probable that the price difference was caused mainly by two elements: labor cost and purchase price, including the production cost of equipment and materials. These two elements are described below:

- 1) The labor cost becomes higher as the tenderer proposed dispatching a number of Japanese engineers for construction, including those specializing in welding, so that the period of construction is shorter;
- 2) The majority of equipment and materials for production would be procured in Japan for the sake of reliability, considering the importance of the intended usages, which also led to the higher cost; and
- 3) In addition, both with the initiation of major reconstruction works in Sri Lanka and with the rise of international oil prices, the market price for construction materials has soared dramatically, as shown by a report that indicates that prices have risen by 10% in only the last two months.

Hence, it was considered that the difference between the estimated price and offered price for this construction work was attributable to the procurement of Japanese products, the dispatch of a number of Japanese engineers, and the recent rise in price of construction materials.

Step 3: Technical Evaluation

1) Galle Fishery Harbor - Building Works

(maximum score: 15.0 points)

No.	Description	Max. Score	Evaluation Score	Remark
1.	Design Quality	5.0	4.5	
	1.1 CFC Refrigeration Ice Plant Building			
	1.2 CFHC Office Building			
2.	1.3 CFHC Landing & Auction Space and Others	5.0	5.0	
	Construction Method			
	2.1 CFC Refrigeration Ice Plant Building			
3.	2.2 CFHC Office Building	3.0	3.0	
	2.3 CFHC Landing & Auction Space and Others			
4.	Sufficient explanations on design criteria	2.0	1.5	
	Completeness of drawings	3.0	3.0	
Total		15.0	14.0	93%

2) Galle Fishery Harbor - Refrigeration Plant and Equipment

(maximum score: 25.0 points)

No.	Description	Max. Score	Evaluation Score	Remark
1.	Capability and guarantee of manufacturer	5.0	5.0	
2.	Capacity of plant and equipment	4.0	3.5	
3.	Guidance of system diagram	4.0	4.0	
4.	Age and workability of plant and equipment	4.0	4.0	
5.	Guidance of electric circuit of automatic running, interlocking and safety circuit	3.0	2.5	
6.	Qualification and experience of candidates	5.0	5.0	
Total		25.0	24.0	96%

3) Galle Fishery Harbor - Quay Wall and Slipway (maximum score: 20.0 points)

(maximum score: 20.0 points)

No.	Description	Max. Score	Evaluation Score	Remark
1.	Design Quality	5.0	4.0	
	1.1 Quay wall			
2.	1.2 Slipway and others	10.0	8.0	
	Construction Method			
2.	2.1 Quay wall	3.0	2.0	
	2.2 Slipway and others			
3.	Sufficient explanations on design criteria	2.0	1.5	
4.	Completeness of drawings	2.0	1.5	
Total		20.0	15.5	78%

4) Tangalle Fishery Harbor - Rehabilitation and Others

(maximum score: 15.0 points)

No.	Description	Max. Score	Evaluation Score	Remark
1.	Design quality	5.0	4.5	
2.	Construction method	5.0	4.0	
3.	Sufficient explanations on design criteria	3.0	2.5	
4.	Completeness of drawings	2.0	1.5	
Total		15.0	12.5	83%

5) Construction Schedule

(maximum score: 10.0 points)

No.	Description	Max. Score	Evaluation Score	Remark
1.	Appropriate and feasible schedule for completion of construction works is within 13 months	5.0	5.0	
2.	Suitability of construction method, equipment capability and technology	5.0	4.5	
Total		10.0	9.5	95%

6) Key Personnel

(maximum score: 15.0 points)

No.	Description	Max. Score	Evaluation Score	Remark
1.	Appropriate and sufficient assignment of project staff for key positions (Project Manager, Engineers etc.)	4.0	4.0	
2.	Qualification of candidates	4.0	4.0	
3.	Experience of candidates	4.0	4.0	
4.	Clear definition of duties and authority of each key position, and relationship between different sections	3.0	3.0	
Total		15.0	15.0	100%

Total Points

1) Galle Fishery Harbor - Building Works	14.0 Points
2) Galle Fishery Harbor - Refrigeration Plant and Equipment	24.0 Points
3) Galle Fishery Harbor - Quay Wall and Slipway	15.5 Points
4) Tangalle Fishery Harbor - Rehabilitation and Others	12.5 Points
5) Construction Schedule	9.5 Points
6) Key Personnel	15.0 Points
7) Grand Total	90.5 Points

8.7.8 Price Clarification and Negotiation

The Sri Lankan side held discussions on price with PENTA-WAKACHIKU JOINT VENTURE (the tenderer) from August 22nd to 29th, 2005. The JICA Project Team gave technical advice to them in terms of adequacy of the design-build process. The Sri Lankan side, with technical advice of the JICA Project Team, verified the conditions for price reduction and the contents of the revised bill of quantities proposed by the tenderer, and considered that they are reasonable and acceptable. The revised tender price is thus JPY 728,302,753.00.

The tenderer's letter No. JV/GEN/005, dated September 2nd, 2005, was accompanied by the revised priced Bill of Quantities.

8.7.9 Conclusion

After careful scrutiny of all aspects of the tender made by PENTA-WAKACHIKU JOINT VENTURE, by applying the three evaluation steps as detailed in the preceding sections, and after price clarification/negotiation with the tenderer, the following was concluded.

The tenderer, PENTA-WAKACHIKU JOINT VENTURE, has duly satisfied the following conditions:

- 1) Meeting requirements with regard to tender procedures, qualifications, financial status, work experience, and personnel capability;
- 2) Having sufficient technical capability to undertake the contract works; and
- 3) Offering an acceptable final tender price (the price difference between the estimated and offered price for the works was attributed to the procurement of Japanese products, dispatch of a number of Japanese engineers, and recent price rises for construction materials).

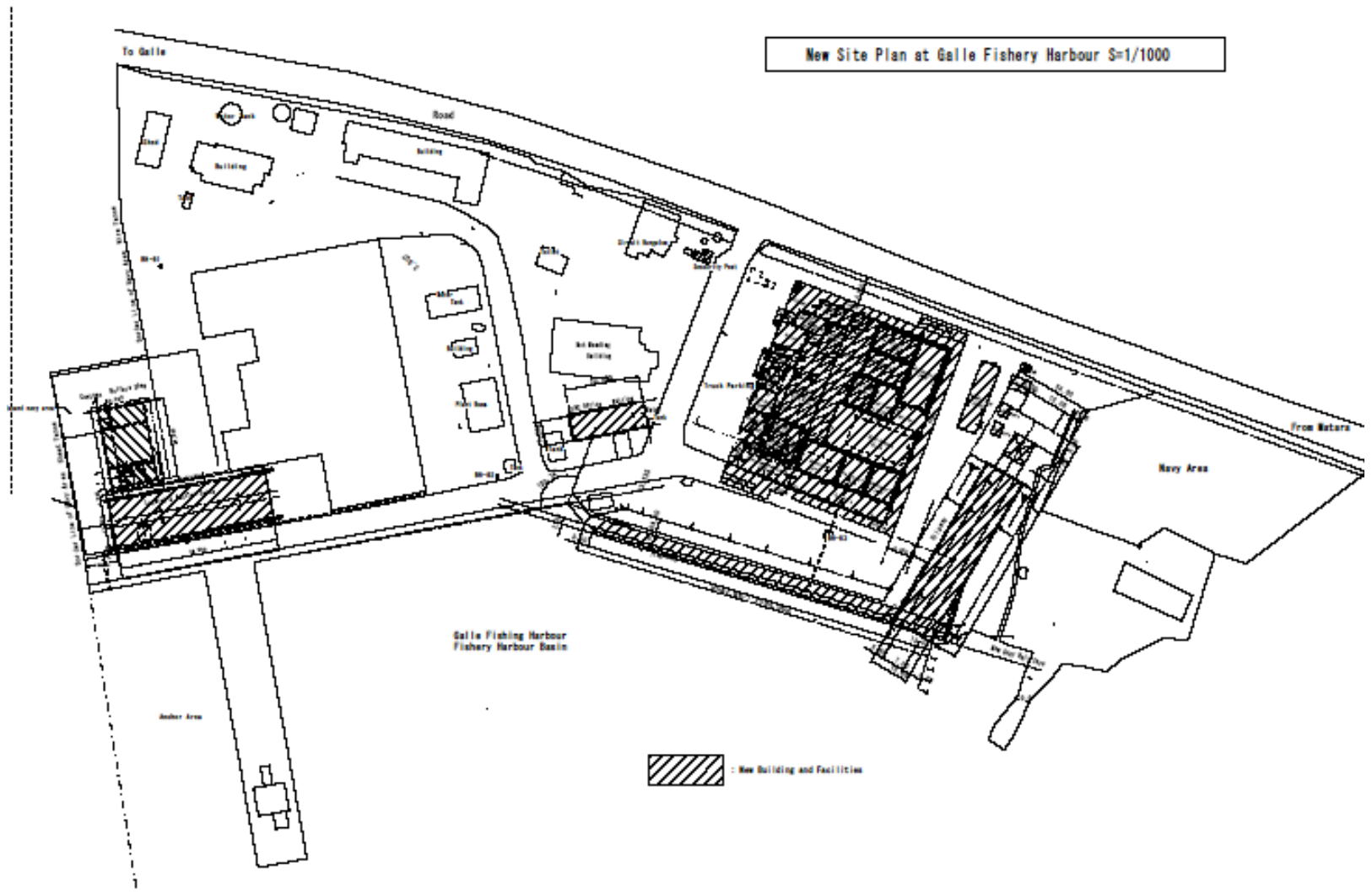
8.8 Monitoring of Rehabilitation Work

8.8.1 Monitoring of Design-Build Process

The JICA Project Team has technically monitored the design-build process between the Sri Lankan side and PENTA-WAKACHIKU JOINT VENTURE and evaluated the following technical points to ensure achievement of milestones for the design-build procedures.

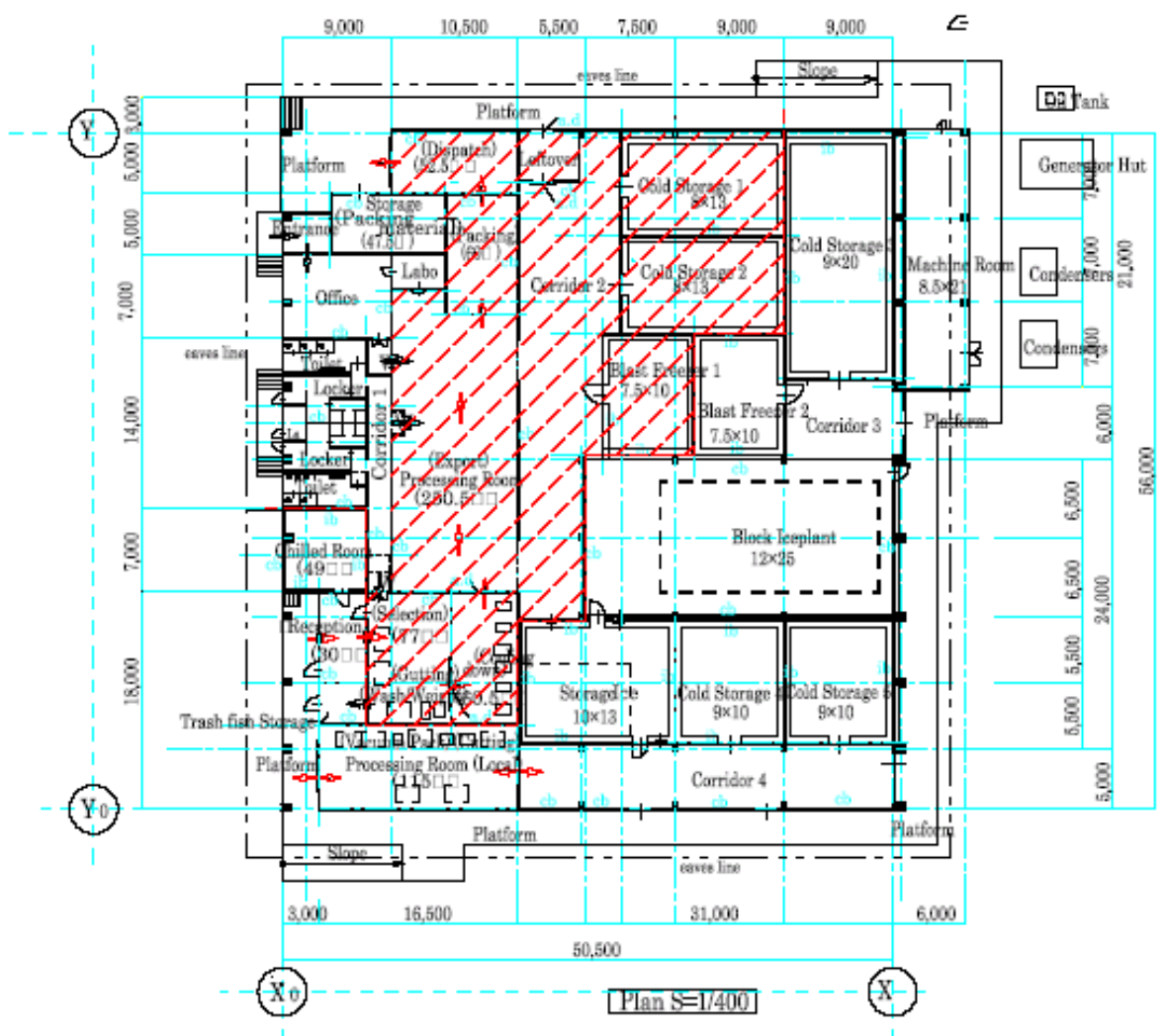
- Construction period (construction period and proportion);
- Supervising method and system (evaluation of system and method);
- Construction material (catalogue, procurement area, and duration);
- Project management and staff (qualification and experience); and
- Backup for the site.

It turned out that the new buildings at the Galle Fishery Harbor would have to be relocated, as leased buildings and facilities are to remain in their original places. A new site plan is shown in Figure 8.12. The CFC refrigeration ice plant building and CFHC office building will be turned around and replaced. The auction hall and canteen & welfare shop will be replaced as shown in Figures 8.13, 8.14, and 8.15.



Source: Project Team

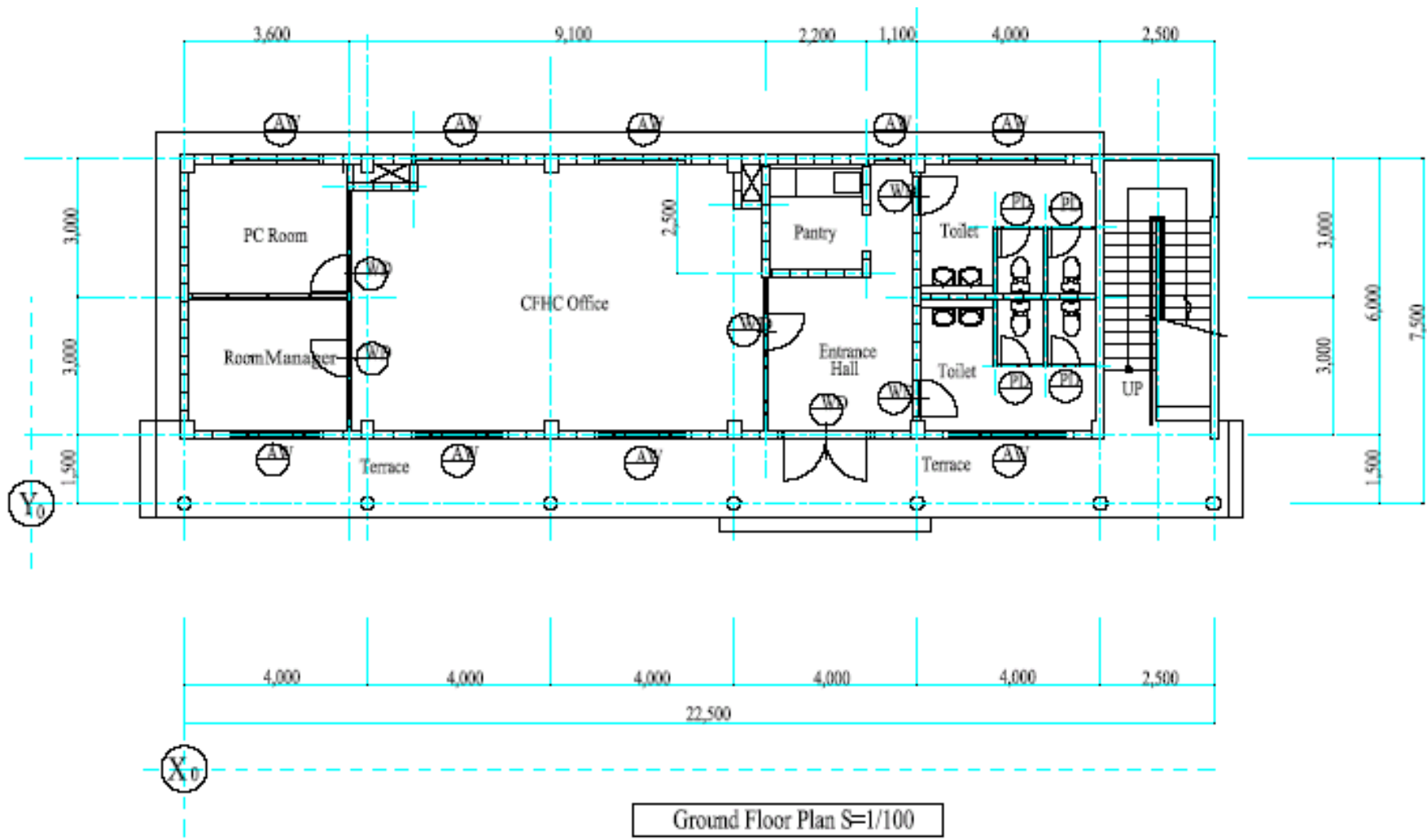
Figure 8.12 New Site Plan



Source: Project Team

Figure 8.13 New Ice Plant Plan

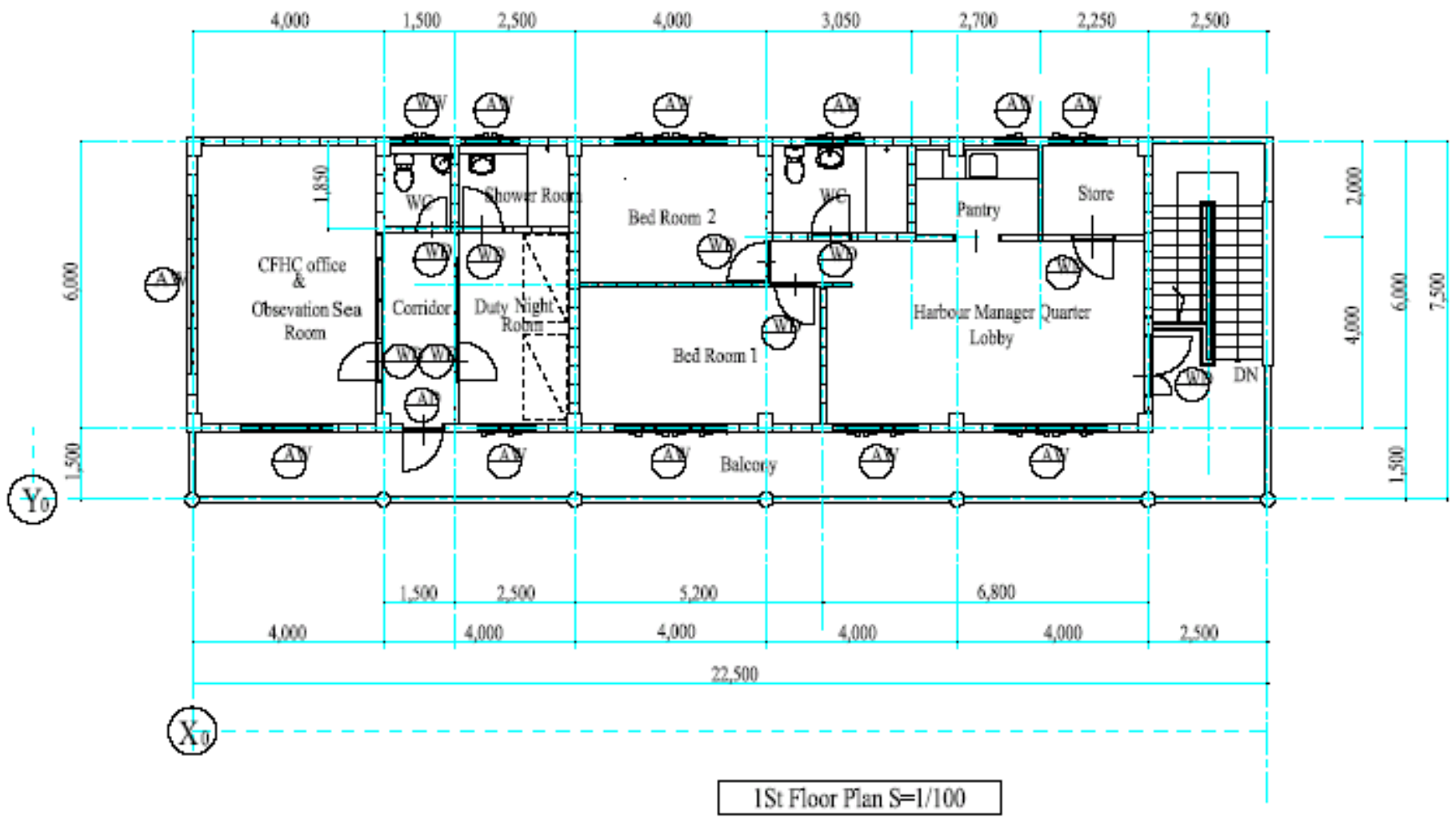
8-60



Source: Project Team

Figure 8.14 New CFHC Office Building (Ground Floor)

8-61

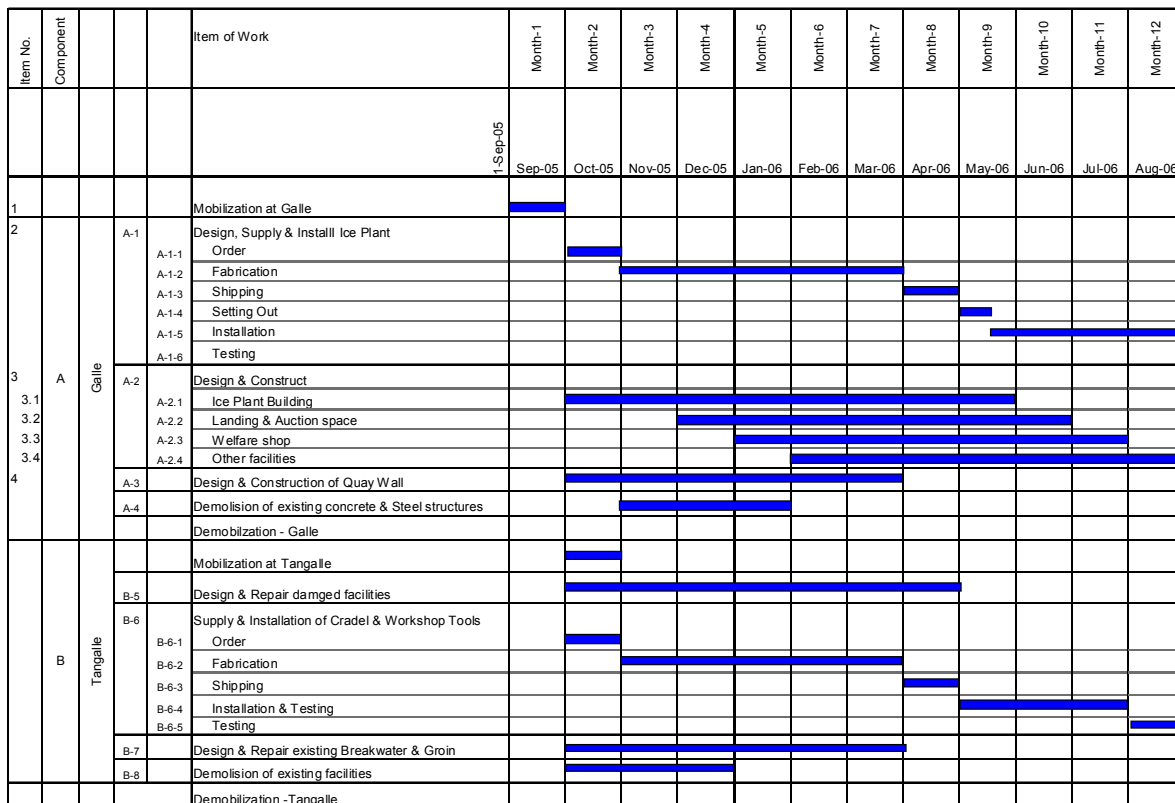


Source: Project Team

Figure 8.15 New CFHC Office Building (1st Floor)

8.8.2 Construction Schedule

The construction schedule submitted by the Contractor is shown in Figure 8.16.

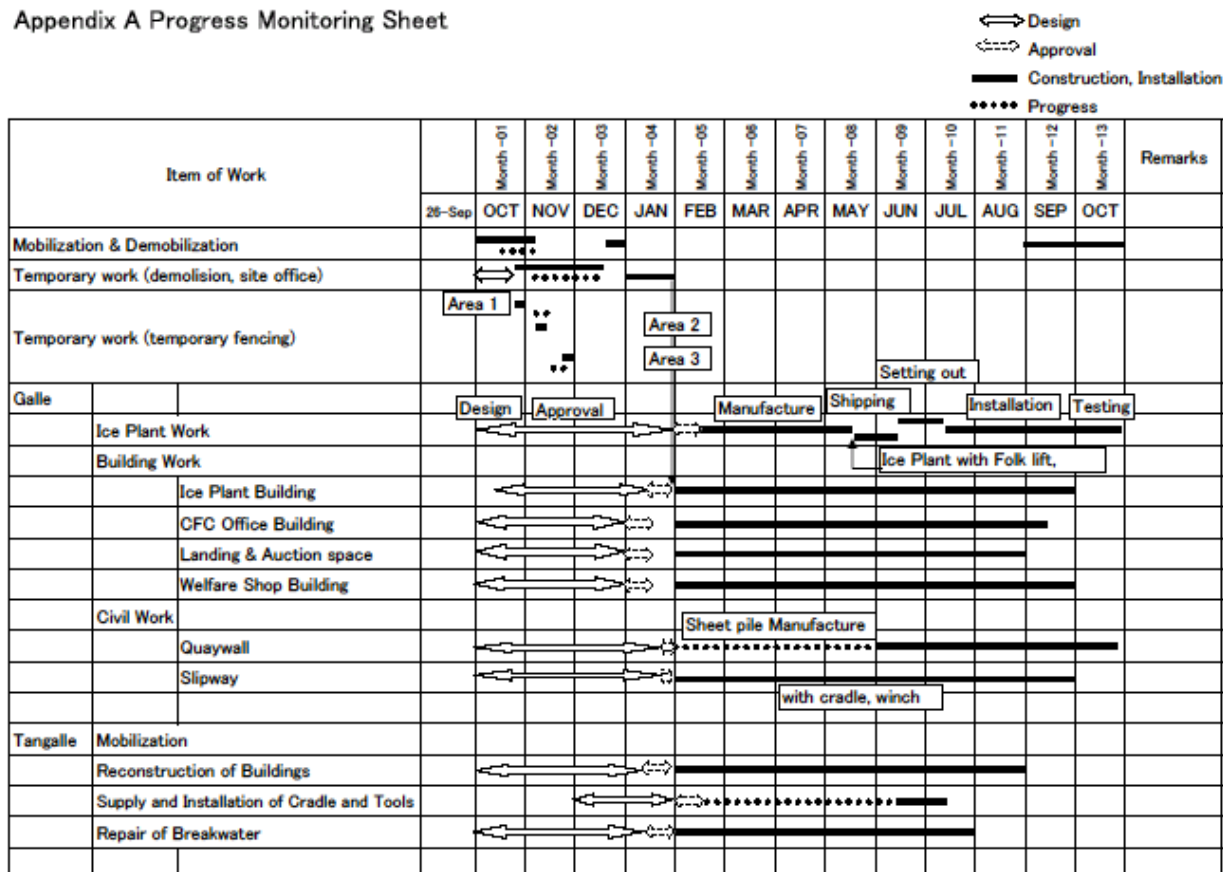


Source: Project Team

Figure 8.16 Construction Schedule

The construction schedule, however, should be revised by the Contractor, as shown in Figure 8.17.

Appendix A Progress Monitoring Sheet



Source: Project Team

Figure 8.17 Revised Construction Schedule

8.9 Rehabilitation Assistance for Kirinda Fishery Harbor

8.9.1 Background

The Kirinda Fishery Harbor is the easternmost one in the southern provinces of Sri Lanka. The Ceylon Fishery Harbor Corporation manages this fishery harbor. The tsunami hit the wharf and damaged facilities, equipment, and all buildings including the harbor office, the managers' residence, the canteen, the mechanical workshop, the auction hall, etc.

Even though the Sri Lankan Government did not develop an overall strategy on how to treat this harbor in the future, the auction hall was in active use for fish trading by the fishermen and brokers. The roof of the auction hall was torn away by the tsunami and only the concrete frame remained. The Ceylon Fishery Harbor Corporation (CFHC) and the JICA Project Team agreed to rehabilitate the auction hall roof to its original form.



Figure 8.18 Damaged Auction Hall of the Kirinda Fishery Harbor

Construction work includes repairing damaged concrete beams, setting wooden beams and rafters, and covering the roof with asbestos panels. This is a project put into effect by JICA. Construction by a local contractor started in June and work was completed by the end of September. The JICA Project conducted a completion check and found that the works exactly followed the tender documents. The handover ceremony was held in October.

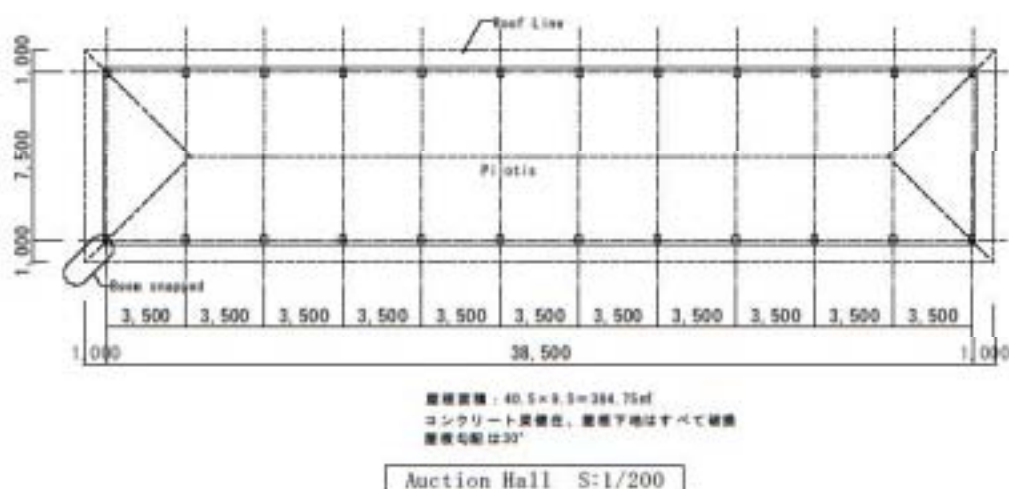


Figure 8.19 Plan of the Auction Hall Roof in Kirinda Fishery Harbor

8.9.2 Bathymetric and Topographic Survey for Kirinda Fishery Harbor

(1) Introduction

The Kirinda Fishery Harbor is located in the Hambantota district on the southeast coast of Sri Lanka (Figure 8.18). Since the construction of the Harbor in 1984, it has been suffering from excessive sand drifting. In general, the Harbor area suffers heavily from sand drifting and, in particular, the Harbor entrance is completely covered with sand. The JICA survey, "Follow-up on the Project for Rehabilitation of Kirinda Fishery Harbor in the Democratic

Socialist Republic of Sri Lanka”, has been carried out to review the seabed change in March 2005. The objective of this follow-up project is to research the Harbor sand drifting conditions after serious damages were caused by the Sumatran Tsunami on December 26, 2004. Because there are two monsoon seasons: SW monsoon (from May to September) and NE monsoon (from December to February) in Kirinda area, the bathymetric surveys have been carried out in the calm between the two monsoon seasons. The first Survey was carried out in November and December 2005, and the second Survey was carried out in February 2006. The results of the two surveys will be utilized for the future planning of the Kirinda Fishery Harbor.



Source: Arjuna's Atlas of Sri Lanka

Figure 8.20 Location of Kirinda

(2) Sea Conditions around the Kirinda

Following tables show sea conditions around the Kirinda Fishery Harbor. The tidal level fluctuates approximately 20 cm as indicated in the following table. The wave height is rather high during the monsoon seasons as shown in the table.

Tidal Level at Kirinda Fishery Harbor

	Observational ⁽¹⁾	Designed ⁽²⁾
HWL	+0.33m	+0.50m
MSL	+0.17m	+0.25m
LWL	+0.10m	+0.00m

Source: (1) Survey Department

(2) Basic design study on the project for rehabilitation of the Kirinda Fishery Harbour in the democratic socialist republic of Sri Lanka (hereinafter, JICA Study Report, 1991)

Design Wave Height and Period			
	Water Depth (m)	Wave Period (sec)	Wave Height (m)
Main Breakwater	5.0	10.0	4.0
	6.0	10.0	4.8
	6.5	10.0	5.0
New Sub-Breakwater	2.0	10.0	2.0
	3.0	10.0	2.8
	4.0	10.0	3.4
Groin	5.0	10.0	3.1
	5.0	10.0	3.7

Source: JICA Study Report, 1991

(3) Outline of Survey

The scope of the survey is shown in the following table and the survey area is located around the Kirinda Fishery Harbor. The topographic survey was not carried out in the second survey because there was no change in the land levels.

Contents of the Survey		
	1st Survey (Nov. to Dec. 2005)	2nd Survey (Feb. 2006)
Bathymetric Survey	30 ha approx.	15 ha approx.
Topographic Survey	30 ha approx.	-

(4) Details of Survey

The methods of the survey are the following:

- Echo sounder and GPS positioning system were used with continuous recording echo rolls and recordable digital devices;
- The survey was carried out along the survey line with an interval of twenty (20) meters. Obstructions in the survey area were described such as the location of revetment, wreck ships, wharf, and reef edges;
- Topographic survey was carried out in the shallow water area where the sounding boat cannot access;
- While sounding survey was in progress, the tide levels were recorded at an interval of every twenty (20) minutes by tide gauge or tide observation device for fifteen (15) days; and
- Three surveys charts (Feb/Mar 2005, Oct/Nov 2005 and Feb 2006) were compared and the sedimentation volumes were calculated.

(5) Results of the Survey

Figure 8.19 and Figure 8.20 show the results of bathymetric and topographic survey by the JICA Follow-up Study team in November 2004 and February/March 2005. Figure 8.21 and Figure 8.22 show the results of bathymetric and topographic survey by the JICA Project team in November/December 2005 and February 2006. The chart map of Nov. 2004 is before the Sumatran Tsunami, and the others are after the Tsunami.

In comparison with the four survey maps (Figure 8.19 to 8.22), the following observations can be made in regard to the sand drifting in and around the Kirinda Fishery Harbor.

a) Effect of Sumatran Tsunami

- Sand deposited at the harbor mouth was washed away by the Sumatran Tsunami. The seabed elevation there deepened from ± 0 to -2 m. (See Figure 8.19 and 8.20)
- After the Tsunami, the same area (harbor mouth) had suffered from accumulation, and in one year the seabed elevation has returned to the pre-Tsunami levels. (See Figure 8.20 and 8.22)

b) Seasonal Change from Feb/Mar 2005 to Nov/Dec 2005 (Effect of SW Monsoon)

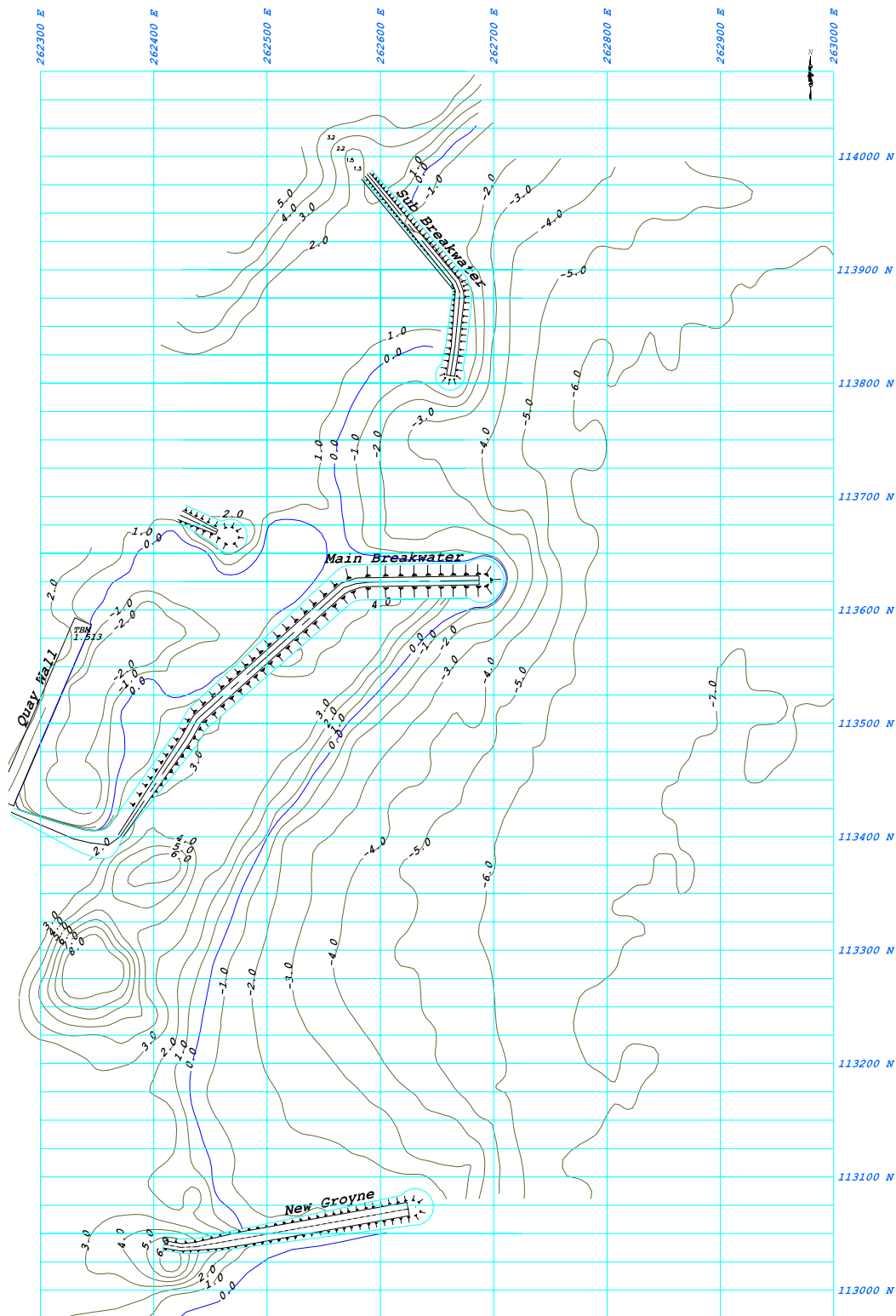
- The net accumulated volume at the Harbor (between the New Groin and the New Sub Breakwater) amounts to approximately $20,000 \text{ m}^3$.
- The area that suffered from heavy accumulation was along the Main Breakwater (in and out of the Harbor). (See Figure 8.20 and 8.21)

c) Seasonal Change from Nov/Dec 2005 to Feb 2006 (Effect of NE Monsoon)

- It can be deduced that the sand had drifted from the north to the south.
- The area that suffered from heavy erosion was the protruding part of the Main Breakwater. (See Figure 8.21 and 8.22)

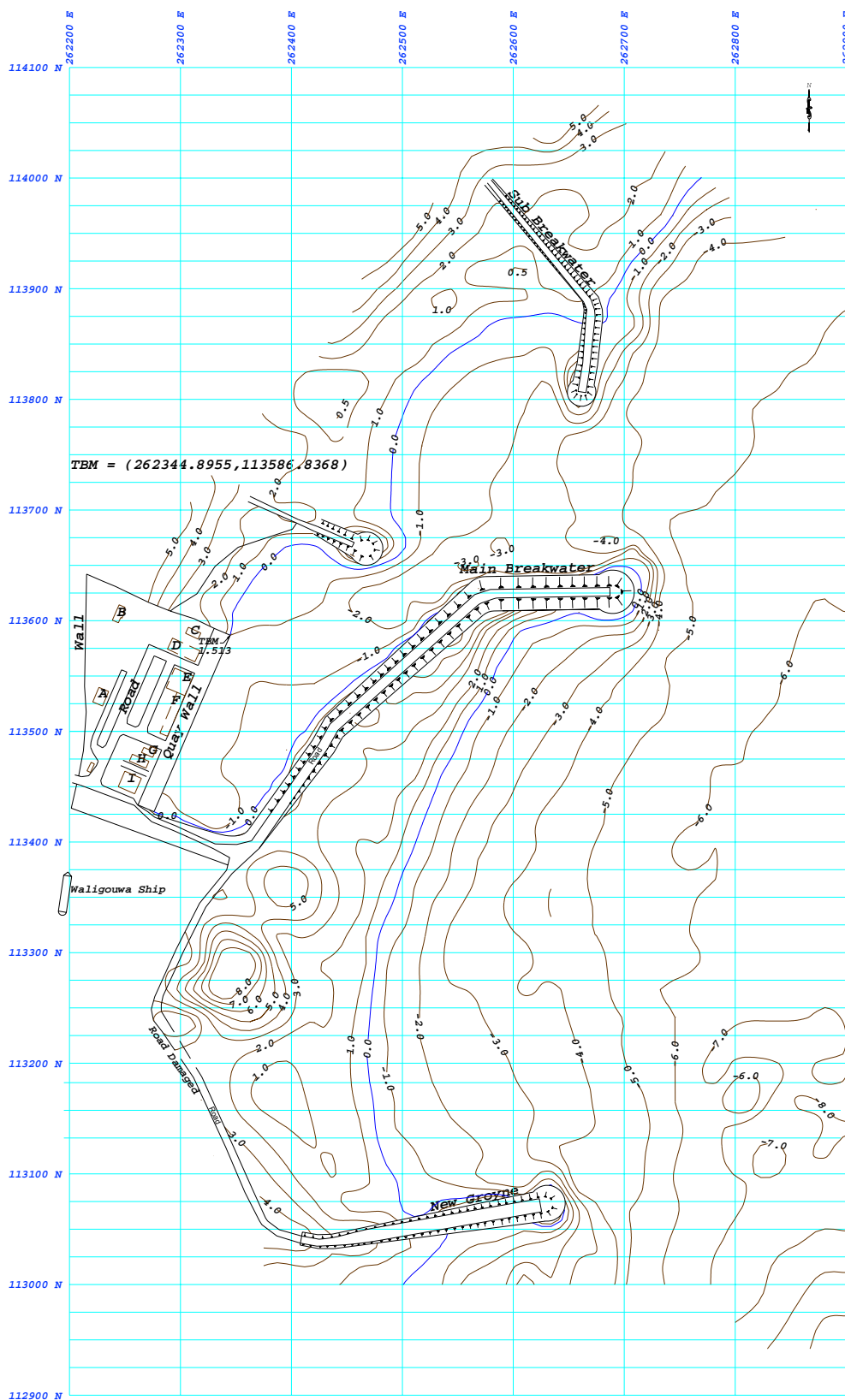
d) Conclusion of Sand Drifting Pattern at the Kirinda Fishery Harbor

- Seabed elevations of the same months: Figure 8.19 (Nov 2004) vs. Figure 8.21 (Nov 2005) and Figure 8.20 (Feb 2005) vs. Figure 8.22 (Feb 2006) indicate the similar patterns.
- It can be concluded that the dominant factor to cause the sand drifting is the seasonal monsoons: southward drift by NE Monsoon and northward drift by SW Monsoon.



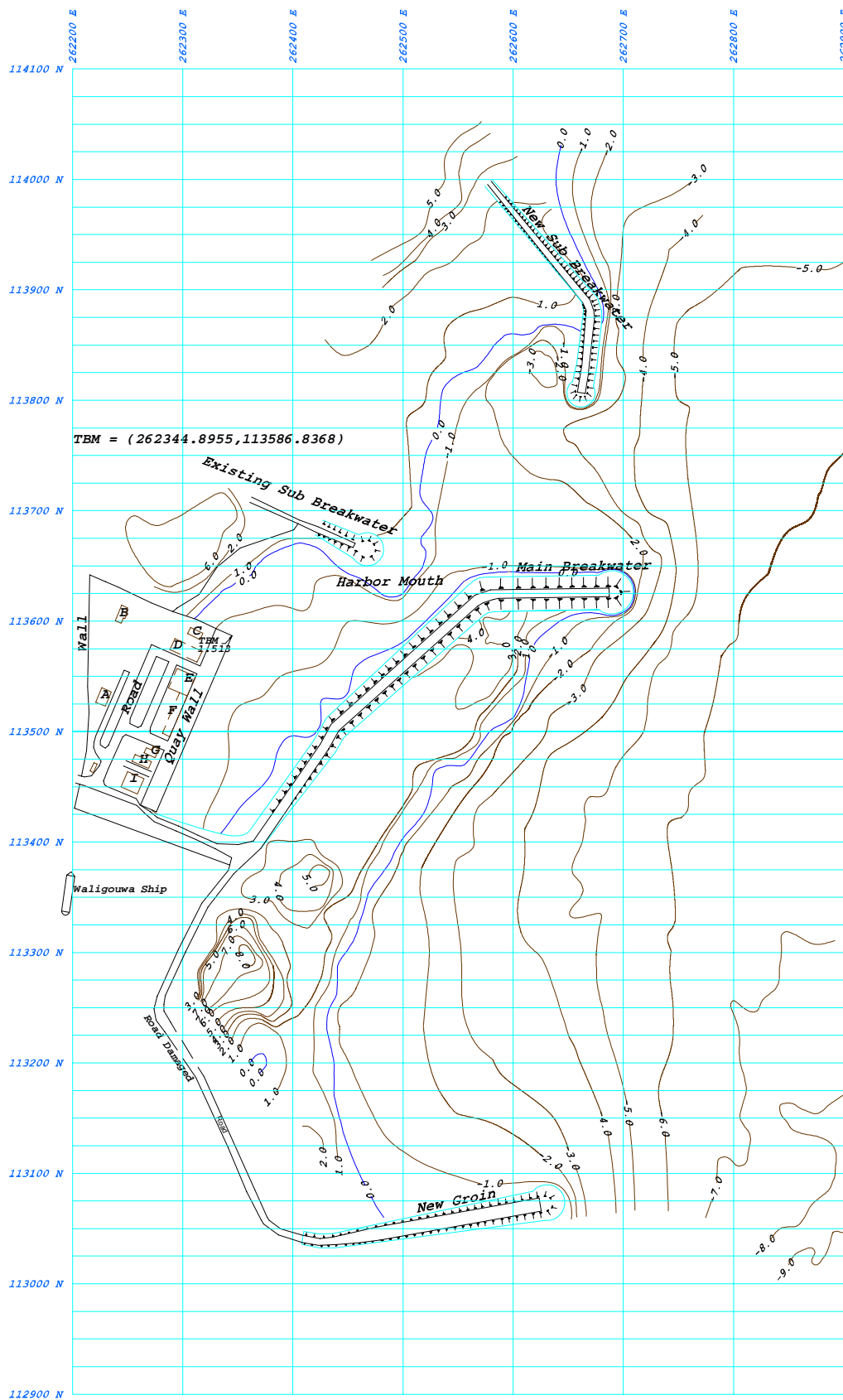
Source: JICA Follow-up Study

Figure 8.21 Bathymetric and Topographic Survey Result in Nov 2004 (Follow-up survey)



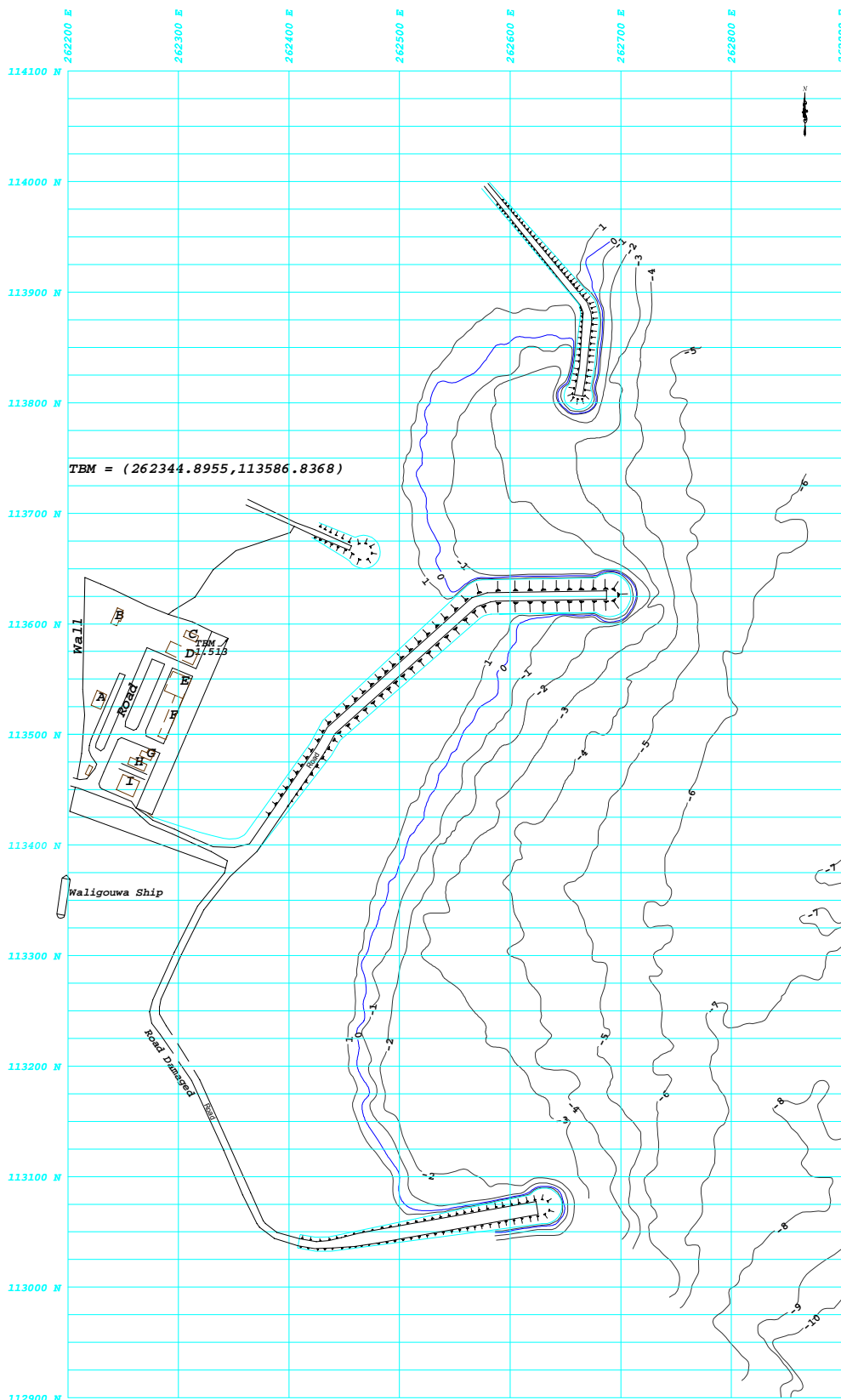
Source: JICA Follow-up Study

**Figure 8.22 Bathymetric and Topographic Survey Result in Feb/Mar 2005
(Follow-up survey)**



Source: JICA Project Team

Figure 8.23 Bathymetric and Topographic Survey Result in Nov/Dec 2005 (1st Survey)



Source: JICA Project Team

Figure 8.24 Bathymetric and Topographic Survey Result in Feb 2006 (2nd survey)