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EXPERIENCES AND LESSONS FROM THE CLEANER FISHING HARBOURS INITIATIVE IN INDIA

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EXPERIENCES AND LESSONS FROM THE CLEANER FISHING HARBOURS INITIATIVE IN INDIA

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PREPARATION OF THIS DOCUMENT

This document was prepared from mission reports of international and national consultants and back-to-office reports of FAO staff members backstopping the Technical Cooperation Project on Capacity Building in Support of Cleaner Fishing Harbours (TCP/IND/3102 A) implemented from March 2007 until December 2009. The international consultants who were involved in the project were: J.A. Sciortino (Harbour Design and Management; four missions) and Ivor Clucas (Fish Quality and Food Safety; one mission). The national consultants who were involved from the beginning until completion of the project were: B.N. Krishnamurthy (Harbour Management and Institution Building) and Venugopal Venkatesan (Community Participation in Fisheries). C.M. Muralidharan, national consultant, provided assistance on the awareness-raising activities and the planning and preparation of the printed materials. The FAO staff members who backstopped the project were: Francisco Blaha, formerly Fishery Industry Officer, and Susana V. Siar, Fishery Industry Officer (Lead Technical Unit Officer). Comments on the draft of the document were provided by Simon Diffey, Chief Technical Adviser of the project on the Restoration and Improvement of Fish Landing Centres with Stakeholder Participation in Management funded by the Canadian International Development Agency in Sri Lanka. This publication contributes to the achievement of the following organizational result: the operation of fisheries, including the use of vessels and fishing gear, is made safer, more technically and socio-economically efficient, environmentally-friendly and compliant with rules at all levels.

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ABSTRACT

India is one of the top ten producer countries of aquaculture as well as of marine and inland capture fisheries. Since 1964, the Government of India has been providing funds for the development of physical and infrastructure requirements for fishing harbours and fish landing, through the Department of Animal Husbandry and Dairying. Despite the investment made, most fishing harbours are not properly maintained due to lack of effective management and inadequate revenue collection.

To address this problem, a technical cooperation project was implemented to build the technical knowledge and institutional capacity to upgrade fishing harbours to internationally accepted standards necessary for fish quality assurance. The project was implemented from March 2007 to December 2009 in Dhamara fishing harbour in Orissa State and Mangrol fishing harbour in Gujarat State using a combination of infrastructure upgrading and stakeholder participation in management.

Stakeholder consultations were undertaken at the very start and during the course of project implementation to identify and analyze the various stakeholder groups, taking note of their needs and capacity for management. Assessment of existing facilities and services as well as the outcome of the stakeholder consultations became the basis for the recommendations for infrastructure upgrading and sanitation, including a review of existing frameworks and options to make way for the participation of stakeholders in management. Capacity building was undertaken to enable the stakeholders to participate fully in the management of the fishing harbour. This was executed through training and awareness-raising activities involving different groups of stakeholders. Training materials, leaflets, brochures, posters and signboards were developed in consultation with the stakeholders, and produced and translated into the local language.

This publication is intended to share the experiences and lessons from the project and provide an example of how fishing harbours may be upgraded to international standards of hygiene and fish quality assurance. It is intended for government officers in fisheries departments tasked with the supervision and management of fishing harbours and fish landing sites, as well as technical staff who are given the responsibility for designing and upgrading fishing harbours.

CONTENTS

Tables

Figures

Boxes

ABBREVIATIONS AND ACRONYMS

CICEF	Central Institute of Coastal Engineering for Fishery
EIA	Export Inspection Authority
EU	European Union
FAO	Food and Agriculture Organization of the United Nations
FARD	Fisheries and Animal Resources Development
FLC	fish landing centre
FRP	fibre-reinforced plastic
FTD	Fishery Terminal Division
GMB	Gujarat Maritime Board
GoI	Government of India
GoO	Government of Orissa
GPS	global positioning system
HACCP	Hazard Analysis and Critical Control Point
HDP	high density polyethylene
kVA	kilo volt-ampere
LOA	length overall
MFV	mechanized fishing vessel
MPEDA	Marine Products Export Development Authority
MSDFH	Management Society, Dhamara fishing harbour
NFDB	National Fisheries Development Board
OBM	outboard motor
PVC	polyvinyl chloride
QACs	quaternary ammonium compounds
TCDC	Technical Cooperation among Developing Countries
TCP	Technical Cooperation Project
UNDP	United Nations Development Programme
VHF	very high frequency
WUA	water users' association

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In Orissa, support and assistance to the TCP were facilitated by the following: Mr C.J. Venugopal, Dr Hrishikesh Panda and Ms Mathur Sarangi, Principal Secretaries, Fisheries and Animal Resources Department, Government of Orissa; Mr Bishnupada Sethi and Mr Gangadhar Singh, Director of Fisheries, Government of Orissa, who took necessary initiatives at various stages of the implementation; Mr N. K. Padhy, Executive Engineer, who was in charge of the construction of the harbour; and Mr Kuntia, Assistant Conservator of the Dhamara fishing harbour and his staff who extended necessary support in the implementation of the TCP. After the formation of the society, Mr J.B. Dash, Deputy Director of Fisheries, (Marine), Mr R.C. Sahu, Chief Executive Officer, and Mr Anup Sahu of the Management Society, Dhamara took active part in the implementation especially in conducting the training programmes and awareness-raising campaign. The members of Maa Dhamarai Fishermen Association, Dhamara especially, its President Mr A.K. Jena, Vice-President, Mr Abhimanu Raut, and Secretary Mr Profulla Jena, extended cooperation at all stages of implementation.

The officials who were involved in the implementation of the TCP from Gujarat were: Messrs. Arun S Sutaria and Rajiv Kumar Gupta, Secretaries Fisheries; Messrs Sanjay Nandan, A.M. Solanki and A.K Rakesh, Commissioners of Fisheries; Mr A.U. Buch, Deputy Commissioner of Fisheries; Dr H.B. Dave and Mr R.R. Pathak, Deputy Directors Fisheries; Chairman and Chief Engineer, Gujarat Maritime Board, and Presidents of Kharava Samaj and Mahavir Machimar Society, Mangrol.

1. INTRODUCTION

A fishing harbour is a place where many things come together – fish, people, and fishing technology. It is a meeting point for buyers, sellers, and service providers. It is a place of encounter between public and private institutions. Moreover, it is a point of convergence between production and trade. There is probably no other structure or facility in fisheries that matches the diversity of stakeholders and activities in a fishing harbour.

A fishing harbour offers enormous opportunity for the promotion of responsible fisheries, specifically the reduction of wastes and preservation of fish quality. The conditions prevailing in a fishing harbour may have consequences not only on human and environmental health, but also on fish price and exports. While having the right infrastructure at the right place is very important for the proper functioning of a fishing harbour, how it is managed and maintained are crucial considerations as well. Stakeholders are a vital link to the sustainability of a fishing harbour.

Section 8.9 of the FAO Code of Conduct for Responsible Fisheries[1] outlines the duties and obligations of States with respect to the design and construction of harbours and landing places, as well as the establishment of an institutional framework for the selection or improvement of sites for harbours. The guidance to States is elaborated in Annex VI of the FAO Technical Guidelines for Responsible Fisheries, No.1, Fishing Operations, which sets out the procedures for the development and management of harbours and landing places for fishing vessels.[2] Annex VI provides, among others, the standard procedures for management, environmental auditing, design criteria and education and training. The Code of Conduct for Responsible Fisheries is a voluntary instrument; however, some provisions in Annex VI may be or have already been given binding effect by means of legal instruments, such as the United Nations Convention on the Law of the Sea of 1982, the Montreal Protocol to the Vienna Convention on Substances that Deplete the Ozone Layer, and the International Convention for the Prevention of Pollution from Ships 1973, as modified by the Protocol of 1978 relating thereto (MARPOL 73/78).

In 1999, the Bay of Bengal Programme carried out a regional expert consultation that culminated with the adoption of the Chennai Declaration on Cleaner Fishery Harbours and Seafood Quality Assurance.[3] Participants included representatives from fishery harbours and fishery agencies of Bangladesh, India, Indonesia, Malaysia, Maldives, Sri Lanka and Thailand. The regional expert consultation strongly recommended "the development of one model fishery harbour and one fish landing site in each country to act as a working demonstration unit, assist in evaluation of methods/approaches/technologies and be used in the training of managers." Towards this end, there was also a strong recommendation for countries to seek the support of the Food and Agriculture Organization of the United Nations (FAO) and other countries for the development of model fishery harbours and landing sites through the Technical Cooperation Programme (TCP) and Technical Cooperation among Developing Countries (TCDC) arrangements. The TCP on Capacity Building in Support of Cleaner Fishing Harbours in India (TCP/IND/3102 A) was conceived following the recommendations of the Chennai Declaration.

This publication is intended to share the experiences and lessons from the project and provide an example of how fishing harbours may be upgraded to international standards of hygiene and fish quality assurance. It is intended for government officers in fisheries departments tasked with the

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[1] FAO. 1995. *Code of Conduct for Responsible Fisheries*. Rome. 41p. Also available at: www.fao.org/docrep/005/v9878e/v9878e00.htm

[2] FAO. 1996. *FAO Technical Guidelines for Responsible Fisheries* No. 1. Fishing Operations. Rome. 26p. Also available at: www.fao.org/docrep/003/w3591e/w3591e00.htm

[3] Bay of Bengal Programme. 2000. *Report of the Expert consultation on cleaner fishery harbours and fish quality assurance, 25–28 October 1999*. Chennai, Bay of Bengal Programme. 86p. Also available at: www.fao.org/docrep/007/ad916e/ad916e00.htm

supervision and management of fishing harbours and fish landing sites, as well as technical staff who are given the responsibility for designing and upgrading fishing harbours.

Those who find this publication useful for their work may want to consult the following related manuals:

Sciortino, J.A. 1995. *Construction and maintenance of artisanal fishing harbours and village landings*. FAO Training Series No. 25. Rome, FAO. 137p. Available at: www.fao.org/docrep/v5270e/v5270e00.htm

Sciortino, J.A. 2010. *Fishing harbour planning, construction and management*. FAO Fisheries and Aquaculture Technical Paper No. 539. Rome, FAO. 337p. Available at: www.fao.org/docrep/013/i1883e/i1883e00.htm

Verstralen, K.M., Lenselink, N.M., Ramirez, R., Wilkie, M. and Johnson, J.P. 2004. *Participatory landing site development for artisanal fisheries livelihoods: Users' manual*. FAO Fisheries Technical Paper No. 466. Rome, FAO. 128p. Available at: www.fao.org/docrep/007/y5552e/y5552e00.htm

2. BACKGROUND

India is one of the top ten producing countries of marine and inland capture fisheries in 2004, and ranks second to China in terms of both inland capture fisheries and aquaculture production (FAO, 2007).[4] There are 14 million people dependent on fishing and fishing-related activities, with the fisheries sector contributing 1.07 percent to the country's total Gross Domestic Product (Government of India, 2007). In 2005–2006, the total fish production amounted to 6.57 million tonnes, with export for the same period amounting to 551 thousand tonnes, valued at INR 7 018.68 crores[5] (Government of India, 2007).[6] A large percentage (83 percent) of the landed fish catch is marketed in fresh form (Government of India, 2007).

The Government of India (GoI) has been providing funds for the development of physical and infrastructure requirements for fishing harbours and fish landing centres since 1964, through the Department of Animal Husbandry and Dairying. Under a Centrally Sponsored Scheme, the GoI has provided financial assistance, ranging from 50–100 percent of total costs to implementing agencies such as maritime States, Union Territories (UTs) and Port Trusts for the development of fishing harbour and fish landing centre facilities. Responsibility for the construction, management and maintenance of the facilities is however held by the respective State Governments, Union Territories and Port Trusts. The scheme has provisions for providing financial assistance for repair/renovation of the existing fishing harbours and fish landing centres to improve the hygienic and sanitation conditions. Through another arm of the GoI – the National Fisheries Development Board – 100 percent financial assistance is extended for modification/repair/renovation of the existing fishing harbours and fish landing centres to improve the hygienic and sanitation conditions.

Despite the investment made by the GoI to provide for the physical and infrastructural requirements at fishing harbours, most are not properly maintained due to (1) lack of effective management and (2) inadequate revenue collection. This tends to result in unsanitary conditions at the harbours and poor working conditions for those involved in the sector. As noted, once harbours are commissioned, the responsibility of maintenance and management is vested with the State Governments, UTs and the Port authorities. Studies reveal however, that sufficient revenue is being collected regularly in only a few fishing harbours. In some, the revenue collected is too small for proper management and maintenance.

As a consequence, the hygiene and sanitation conditions in most of the harbours and fish landing centres fall below internationally accepted standards and fish contamination levels are often high. It is believed that these problems are partly due to inadequacies in the design and construction of the facilities, more so due to lack of use of appropriate materials and implementation of standards and specifications, and partly due to poor management and maintenance.

GoI recognized the urgent need to upgrade fishing harbours to international standards necessary for fish quality assurance, and realized the lack of requisite management and technical skills as well as capacity and knowledge, to undertake the changes. It was within this context that GoI requested technical assistance from the Food and Agriculture Organization of the United Nations (FAO) to build the technical knowledge and institutional capacity, through the Technical Cooperation Project (TCP) on Capacity Building in Support of Cleaner Fishing Harbours (TCP/IND/3102 A). This TCP recognized that one of the major weak links in the present production chain in India is at the primary landing point. The hygiene and sanitation conditions in many harbours require immediate attention if

[4] FAO. 2007. *The state of world fisheries and aquaculture 2006.* Rome, Food and Agriculture Organization of the United Nations. 162p.

[5] A unit of value equal to ten million rupees or 100 lakhs. The conversion rate for 3 March 2006 was: US$1 = INR44.2.

[6] Government of India. 2007. *Handbook on fisheries statistics 2006.* New Delhi, Ministry of Agriculture, Department of Animal Husbandry, Dairying and Fisheries. 182p.

the export industry is not to be threatened. Moreover, the supply of wholesome, safe and good quality fish has to be assured to domestic consumers.

The overall objective of the project was to build the technical knowledge and institutional capacity to upgrade fishing harbours to meet the international standards necessary for fish quality assurance, develop self-sustainable management capacities, and raise the income earning opportunities from fishing, in particular, for poor households. The project aimed to: (1) establish self-financing management structures for the maintenance and operation of two fishing harbours; (2) implement cleaning and sanitation programmes and schedules that meet modern safety standards in the two fishing harbours; and (3) reduce pollution from waste products from fisheries activities.

Two fishing harbours, Dhamara fishing harbour in Orissa State on the east coast, and Mangrol fishing harbour in Gujarat State on the west coast, were identified for upgrading. Project implementation started in March 2007 and was completed in December 2009.

3. PROJECT APPROACH

Dhamara and Mangrol were designed as model fishing harbours for India through a combination of "hardware" (upgrading of infrastructure) and "software" (stakeholder training in hygiene and sanitation and participation in management) approach. Pilot activities involving all key stakeholders were conducted and extensive technical inputs from international experts were provided, including technical support and follow-up by two national experts in each fishing harbour to facilitate the implementation of project activities. Boat owners and crew, ice and transport suppliers, and women traders, processors and exporters participated in stakeholder consultations, training and awareness-raising activities, and the establishment of harbour management body to upgrade the two fishing harbours to meet international standards of hygiene and fish quality.

To enable the project team to assess the existing situation, a profile of each fishing harbour was developed which served as baseline information against which progress may be measured. Each fishing harbour profile described the location, facilities, primary and secondary stakeholders, harbour condition, maintenance and management, user charges, fishing and processing activities, landings, handling of catch, handling of ice, and availability of services in each fishing harbour prior to the interventions under the project.

Stakeholder consultations were undertaken at the very start and during the course of project implementation to identify and analyze the various stakeholder groups specific to each fishing harbour, taking note of their needs and capacity for management (Figure 1). This process also involved looking at how the stakeholders were organized and the functions and roles of existing associations, including their concerns and interests. The project team ensured that women stakeholders were identified and involved in all stages of project implementation.

Figure 1. Stakeholder consultations during the start of project implementation in Dhamara (left) and Mangrol (middle and right).

The assessment of the existing situation and outcome of the stakeholder consultations became the basis of the recommendations for upgrading each fishing harbour into international standards of hygiene and fish quality. These recommendations were used to prepare and issue the tender for the construction of civil works funded by the national and respective state governments. The upgraded infrastructure was furnished with appropriate equipment necessary to support the maintenance of hygienic conditions, such as wall-mountable cold water pressure washer, light duty mobile pressure washers, and waste receptacles. In addition, equipment and furniture that would be useful for training purposes were also identified and provided.

Parallel activities involved a review by the national experts of existing frameworks and options for the establishment of a management body in each fishing harbour, to make way for the participation of stakeholders in management. The recommendations for each management body were founded on what can be organized in each state based on existing legal frameworks and previous experience. The recommended composition was based on the stakeholder identification and analysis.

Capacity development was an essential component of the project design to enable the stakeholders to participate fully in the management of the fishing harbour. This was executed through training and awareness-raising activities involving different groups of stakeholders, as well as a study tour of two participants to the General Santos Fish Port Complex in southern Philippines. Training on seafood handling was directed towards representatives of primary stakeholder groups and conducted with practical exercises. Members of the society as well as representatives from user groups participated in a training course aimed at giving a comprehensive view of how the fishing harbour management can offer safe, reliable and quality services to all users, especially in assuring fish quality and food safety, and in reducing environmental pollution caused by various activities in the harbour. Training materials, leaflets, brochures, posters and signboards were developed, produced and translated into the local languages to support training and awareness-raising activities

The findings, lessons and experiences from the project were discussed and shared in a national workshop, where recommendations were also put forward to ensure their dissemination and sustainability. The national workshop was highlighted by a working group session where the participants discussed and formulated recommendations relating to these three aspects: (1) effective participation of stakeholders in the management of the fishing harbour; (2) achieving financial sustainability in the management of fishing harbours; and (3) maintenance of hygiene and cleanliness and prevention of pollution in the fishing harbour. Training guides, one each for Dhamara and Mangrol, for maintaining hygiene and cleanliness, were prepared and furnished to the project authorities.

4. FISHING HARBOUR PROFILES

A profile of each fishing harbour was prepared in March 2007 prior to the project implementation based on interviews and information provided by ports and fisheries officers, fishing harbour users and stakeholders. Appendix 1 presents a photographic documentation of how Dhamara and Mangrol fishing harbours looked like in March 2007.

4.1 Dhamara fishing harbour

4.1.1 Background

The selection of the site at Dhamara, engineering and economic field investigations, design of harbour structures and preparation of techno-economic feasibility were done under a United Nations Development Programme (UNDP)-assisted and FAO-executed project during the period 1971–1974. The national consultant on harbour management and institution building for the TCP was the Government of India (GoI) counterpart team leader of the 1971 investigation and techno-economic report. The harbour structures were built according to the designs provided in the project report.

The harbour was constructed from 1976 to 1978 and commissioned in March 1978. The harbour has a total land area of 47 acres (approximately 190 203 square meters), which includes a fishermen colony of 5 acres (approximately 20 234 square meters). The entire area of 47 acres falls under the jurisdiction of the Department of Commerce (now transferred to the Department of Fisheries), Government of Orissa.

4.1.2 Location

Dhamara fishing harbour is located 83 kilometres from Bhadrak, the district headquarters and 215 kilometres from Bhubaneshwar, the capital of Orissa State on the east coast of India. The condition of the road up to the fishing harbour is in good motorable condition. The fishing harbour is in the northern bank of Dhamara River, seven kilometres from the point where the Dhamara River meets the Bay of Bengal.

4.1.3 Harbour facilities

The harbour consists of a landing wharf of 200 metre length; auction hall of 1 000 square metres; gear shed of 325 square metres; slipway and repair track; workshop of 320 square metres, and hard surface and paved area of 10 600 square metres. The harbour is provided with proper internal roads, electricity and water. The capacity of the water tank is 50 000 gallons (250 tonnes). There are three generators having a capacity of 100 kVA (1 unit), 15 kVA (1 unit) and 3.5 kVA (1 unit) to take care of any power breakdown. The 100 kVA-unit was not functioning at the time of reporting. There is a 7.5 horsepower pump for lifting water to the water tank. There is another water pump of 5 horsepower for supplying water for washing the harbour area. A concrete road links the main district and the harbour. The entire harbour area of 47 acres is only partially (50 percent) protected by a compound wall.

There is a petrol and diesel bunk within the harbour premises operated by the Orissa State Pisciculture Development Corporation. Other facilities include a launch used for survey and investigation in the river and a tractor used for transporting goods within the harbour area.

Due to the increase in fishing activity, the Government of Orissa (GoO) has taken up the expansion of the harbour in Phase II which was nearly completed. The facilities consist of: extension of the wharf by 205 metres (the total now is 405 metres); 750 square metres of auction and packing hall; 800 square metres gear shed; 1 238 square metres workshop; extension of repair tracks of the slipway

from the existing 12 to 24; and 22 766 square metres of hard surface, along with the internal harbour roads.

The cross-section of the wharf of Phase I consists of pre-cast driven piles with a concrete slab on top and revetment of the slope under the slab. The cross-section of Phase II consists of cast *in situ* board piles with concrete slab and revetment under the slab. The width of the slab is 8 metres in Phase I and 12 metres in Phase II.

In addition to the ongoing construction of Phase II, there is also an ongoing construction under another Government of India (GoI)–scheme called "Assistance to States for Infrastructural Development for Exports" (ASIDE), administered by the Ministry of Commerce of GoI. The facilities proposed under this scheme are: modification of auction hall, construction of fishermen retail market complex (300 square metres), construction of net mending yard (2 560 square metres), fishermen rest shed and canteen (200 square metres), community toilet (60 square metres), construction of effluent treatment unit (1), lateral drainage and wheel wash (370 metres), gardening and plantation, provision of waste basin (15), improvement to parking area, and harbour lighting and electrical installations.

The harbour authorities have expressed the need for the following: (1) dredging of the channel in the river, (2) providing facilities for night navigation, (3) lack of quality power supply and (4) lack of transportation facilities from Dhamara to marketing centers in Orissa and West Bengal.

The fisheries authorities at the harbour site, on the other hand, expressed the following concerns: (1) draft near the wharf is not sufficient and needed dredging; (2) the wet dock has to be improved and expanded for the use of vessels during cyclonic weather; and (3) need for a health care center for the harbour workers.

4.1.4 Harbour condition

The wharf is in good condition but the fenders are missing. The fishing vessels tie old truck tires to protect from damages to the trawler during berthing.

The concrete surface on the wharf is in good condition except at some spots where water collects and stagnates due to damages to the top portion of the hard surface. The superstructure of the auction hall is fully rusted. It is advisable to test the strength of the steel structure before undertaking any maintenance and repair. The floor of the auction hall is damaged at places. There are four diesel-operated, cast iron-made ice crushers installed in four partitions in the auction hall which emit black smoke while crushing the ice.

The drains of the auction hall are very shallow and not functioning. The water going to the drain gets stagnated and the same situation is observed in other drains in the harbour area.

There are taps in the auction hall and around the harbour area providing potable water.

There are five rooms in the auction hall measuring 10 x 10 metres for the use of the exporters/processors and traders/transporters. Some of the rooms are used for the removal of shrimp head and storing for a short period. The other rooms are used for stocking crates used for transporting fish. These rooms also serve as office for merchants and processors. The space in the steel truss is used for storing nets, baskets and other materials.

The whole area between the wharf and the road is fully concreted, with some unevenness at places.

There are no toilet facilities for the harbour users in the periphery of the harbour area. There is no designated point for collection of wastes for further disposal. Because the entire harbour area is

partially enclosed by a fence, cattle and dogs enter the harbour premises and cattle dung can be seen in some places around the harbour.

Sufficient depths are available in the main river and at the entrance near the sea for the navigation of fishing vessels. The harbour management is providing a draft of 2 metres at the wharf side. The management has the capability of undertaking maintenance dredging alongside the wharf. The Director of Ports has a crawler mounted 20-tonne capacity crane with a grab attachment.

There is also a hurricane basin used by fishing vessels at times of cyclonic weather for shelter. This dock is partially silted.

4.1.5 Fishing harbour development

In Orissa, proposals for the development of a fishing harbour are made by the Department of Fisheries of the State Government and put up to the Ministry of Agriculture, GoI. After approval of the project, GoI releases the grant to the Fisheries Department of the State Government. Because the Fisheries Department in Orissa does not have the engineering capability for taking up the construction of the fishing harbour, it proposes to the Director of Ports under the Department of Commerce to take up the construction. The Director of Ports has the engineering capability and also manages the commercial activities at the minor ports. With the Director of Ports there is a separate fishing harbour engineering division for fishery engineering works headed by an Executive Engineer. The funds for the construction of the fishing harbour are then placed by the Fisheries Department with the Director of Ports.

After completion of Phase I of Dhamara fishing harbour, the management and maintenance was handed over to the Commerce Department.

The expenditure for the construction of Phases I and II was borne by the GoI under the centrally-sponsored scheme, where GoI meets 50 percent of the expenditure as grants-in-aid to the state. The cost of construction of Phase I is understood to be INR 75 lakhs (INR 7.5 million). The current estimate of total cost of construction of Phase II is INR 10.94 crores (INR 109.4 million).

4.1.6 Harbour management and maintenance

The management and maintenance of the Dhamara fishing harbour is under the Director of Ports (DoP), Department of Commerce, GoO, whose headquarters is at Bhubaneshwar. DoP has appointed an Assistant Conservator (AC) for the management and maintenance of Dhamara fishing harbour, who reports directly to the DoP. The AC has an office within the harbour premises and is supported by personnel at the office and field level. There are 12 staff at the office consisting of an accountant, head clerk and other ministerial and group D staff. The field staff consists of a total of 46 personnel, including two junior engineers and 24 regular staff. The remaining 20 persons are employed on NMR (nominal muster roll) basis. Some of the supporting staff is employed to collect the user charges.

The AC has the responsibility to manage and maintain the fishing harbour and collect charges. He has to provide services like water, electricity, cleaning of the harbour area, servicing and operation of slipway and security of the harbour premises.

4.1.7 User charges

A proposal for levy of various charges originates from the AC and put up to the DoP. After due scrutiny, the DoP forwards the proposal to the Commissioner-cum-Secretary, Department of Commerce and Transport, GoO. At this stage, the Commissioner-cum-Secretary publishes and invites objections from the users and the general public within a one-month notice. After the notice period

and discussions with the users, the user charges are finalized and published in the Orissa State Official Gazette. The order provides for automatic escalation of user charges annually. The AC implements the approved user charges.

User charges are collected for landing and berthing of fishing vessels and the entry of commodities, vehicles and persons within the harbour premises. The level of user charges in 2007 is shown in Table 1.

Table 1. User charges at Dhamara fishing harbour, 2007.

Categories of charges	Rate
Commodity	
Fish (prawns)	INR 500 per tonne
Fish (others)	INR 80 per tonne
Petrol, diesel, lubricants	INR 25 per tonne
All other articles not specified	INR 25 per tonne
Ice	INR 0.30 per 50 kilogram block
Vehicles	
Car, taxi, jeep, etc.	INR 5 per entry
Other vehicles (trucks and tractors)	INR 12 per entry
Three-	INR 5 per entry
Persons	INR 1 per person per entry
	INR 25 per person per month
	INR 100 per person per year
Fishing vessels per landing	
Fishing trawler and inland vessels (other than country crafts) having length of 50 feet (approximately 15 metres) and above	INR 25 per day or part of a day subject to a maximum of INR 500 per month
Fishing trawler (other than country craft) having length less than 50 feet	INR 13 per day or part of a day subject to a maximum of INR 300 per month
Country crafts	INR 5 per day or part of a day subject to a maximum of INR 50 per month
Charges for using battery charger	12 volts, INR 20
	24 volts, INR 25
	6 volts, INR 15
Drawing of fresh water	All fishing trawlers shall pay a rate of INR 0.40 for every 20 litres of freshwater drawn
Stacking of bags on landing quay	INR 0.50 per bag for every 24 hours or part thereof
Use of covered space in the port area	INR 100 per 10 square metres of area per month or part thereof
Use of uncovered space	INR 40 per 10 square metres per month or part thereof

Categories of charges	Rate
Stacking of nets	INR 2 per day
Stacking (berthing) fishing trawlers and other vessels at the landing quay and adjacent area	INR 350 per day or part thereof
Hiring of slipway	INR 250 for the first 24 hours and INR 50 per day for the subsequent days for length of 40 feet (approximately 12 metres) or less and INR 75 per day for length above 40 feet.
Hiring of slipway cradle	INR 250 per hauling and launching
Labour charges for hauling and launching	INR 1 450
Drilling charge	INR 7 each hole
Welding charges	INR 10 per item of work

The total revenue collected for the year 2005–2006 was INR 31.1 lakhs (INR 3.11 million) and INR 37 lakhs (INR 3.7 million) for 2006–2007. The annual expenditure incurred by the AC office for the year 2005–2006 was INR 57 lakhs (INR 5.7 million).

4.1.8 Fishing activities

The fishing season starts from June and goes up to mid-April. Fishing is banned from 15 April–31 May. Shrimp is mainly landed from June to November, with peaks in August and September. Fish is landed throughout the fishing season, with peak landings in November and December.

There are 446 fishing vessels in four categories operating from the harbour:

- Trawlers – 100
- gillnetters – 78
- motorized country crafts – 165
- non-motorized country boats – 103

In addition, 200 boats from different areas land their fish catch occasionally at the fishing harbour. During the peak fishing season, the vessels are berthed in a minimum of four rows, with 12 fishing vessels in a row.

The length of the trawlers ranges from 32 to 53 feet (approximately 10 to 16 metres) and the gillnetters from 25 to 45 feet (approximately 8 to 14 metres). The length of the motorized country crafts ranges from 25 to 35 feet (approximately 8 to 11 metres) and the non-motorized craft from 20 to 25 feet (approximately 6 to 8 metres). Some fishing vessels do a combination fishing of trawling and gill netting. About five fishing vessels are fitted with global positioning system (GPS) and 75 vessels are fitted with radio communication system.

According to figures provided by the local fishery officer for 2005–2006, there are 3 483 fishermen households in two blocks, namely, Chandbali and Tihidi. The total population is 31 126, consisting of 9 187 adult males, 7 951 adult females and the rest are children. Among the males, more than 5 000 are active fishermen. The number of persons employed on each fishing vessel is as follows:

- trawlers – 10
- gillnetters – 10
- motorized country craft – 6
- non-motorized country craft – 3

Trawler voyages normally range from six to seven days with a maximum of 10 days. Gillnetter voyages range from two to eight days depending on the catch and availability of supplies. Motorized country crafts usually stay for two to four days at sea. Non-motorized country crafts are day boats.

The women in the fishing households are generally homemakers, except for the females of families who work as labourers for exporters in the removal of shrimp head.

An owner of a motorized craft using gillnet earns an average of INR 10 000–15 000 per boat per year. He fishes 10 kilometres from the river and lays the net in the sea for two to three days. His catch varies from 20 to 300 kilograms per fishing trip. Together with three or four other fishermen, he hires a truck to transport the catch to the adjoining state of West Bengal.

A 52-year old fishermen living near the river mouth of Dhamara River who was interviewed is part-owner of a 21 feet (approximately 6 metres) non-motorized country craft. He has three children and seven persons are living in his house. He is fishing with two other fishermen and each of them earns an average of INR 100 per day. He is fishing for nine months in a year and works as a labourer during the off-fishing season. His wife sometimes works as a labourer too. He has two years of primary schooling (Class 2) and can sign his name but cannot read.

According to district fisheries officers, GoI provides assistance through the savings-cum-relief scheme to members of fishermen societies. During the period from August to March, each member-beneficiary deposits INR 75 per month, with a total of INR 600 for the entire period. In the following fishing season, GoI gives an equal amount to each member-beneficiary in three equal instalments. This scheme does not cover non-members of fishermen societies. Of 800 members of male societies, 500 are covered under the scheme.

During the fishing ban period from 15 April–31 May, no financial assistance is extended to fishermen.

4.1.9 Landings

The total annual landings of fish based on 2005–2006 data are 6 500 tonnes. The landings consist of 5 percent prawn, 10 percent pomfret, hilsa and other A grade fish; 5 percent ribbonfish and other B grade fish; 30 percent catfish; 5 percent Bombay duck; and 45 percent other fish, all of C grade. The 45 percent C grade fish consists of skates, rays, croakers, crabs, squids, eels, flatfishes, etc.

In addition to the landings of capture fisheries, 5 500 tonnes of farmed shrimp are brought into the fishing harbour for removal of shrimp head and packing. The shrimps come from the farms in the districts of Bhadrak and Kendrapara.

4.1.10 Handling of the catch

Fish caught are preserved in insulated fish holds with ice. When the fishing vessel returns to the wharf, the fish are lifted from the holds and emptied on the wharf surface. The catch is sorted, species-wise and quality-wise on the floor. The sorted fish is put into the crates and packed with ice. The crates are then transported to markets located at Digha and Howrah, in the neighbouring state of West Bengal. During the process of handling fish in the wharf, the wastewater drains into the river. Fish is not washed with freshwater before packing in the crates. Till the fish is segregated, the fish is

exposed to the hot sun. Once the fish are packed in the crates with ice, they are loaded into trucks which are brought into the wharf area.

There is no system of auction as there are no merchants who visit the harbour.
Some of the catch of dried fish variety is put for sun drying when the vessel is fishing at sea. Fishes like Bombay duck are dried in the scaffolds fixed on board the vessel. Those that are lower than the dried fish grade are thrown back to the sea. As the vessel stays at sea for six to seven days, the fish (dried fish variety) is spread on the upper deck for sun drying.

4.1.11 Handling of ice

Blocks of ice are brought into the harbour from the nearby private and government-run ice plants. The water used for making ice appears to be not of potable quality. In the auction hall, ice is crushed by diesel-operated crushers emitting black smoke; the crushers are mostly rusted. The crushed ice falls on the floor and is transported by wooden barrows.

4.1.12 Handling of shrimp

In the exporter's room, the shrimp heads are removed, washed, packed with ice and transported to processing factories. These rooms do not have any basic facilities for hygienic handling of shrimp.

4.1.13 Involvement of women from Dhamara village

There are 150 women from Dhamara village working for exporters in the harbour premises. They are involved in the removal of shrimp head before it is packed and transported to processing facilities in other parts of Orissa. The women are divided into groups of 20–22 members, with one to two groups working for each exporter. Their age ranges from 18 to 60 years; the number of children per woman ranges from four to five. For each woman, there are 2–3 children who are in school. The maximum level of education attained by the women is five years of primary schooling (Class 5).

The women work for six months from August to January, with working hours from six in the morning to seven in the evening. Each woman is paid INR 1.50 per kilogram of shrimp beheaded and earns between INR 80 to INR 100 per day. In Orissa, the daily wage for an unskilled worker is INR 69 per day. According to a woman who was interviewed, she spends her earnings on food, clothing and the education of her children.

In the village of Dhamara where the women reside, there are 130 households with a total population of 2 000. There are 14 trawler-owners and 30 country-craft owners residing in the village. The village is located about 300 metres away from the fishing harbour.

4.1.14 Stakeholders

The primary stakeholders identified are:

- vessel owners – trawlers, gillnetters, motorized and non-motorized boat owners;
- vessel crew – all those involved in fishing on board the boats;
- input suppliers;
- export processors;
- transporters;
- harbour management personnel (officers and staff);
- people handling three-wheelers; and
- women workers.

The secondary stakeholders identified are:

- fisheries staff;
- supervising staff (e.g., construction engineers and staff); and
- boat builders and repair workers.

There are no trade union activities seen around the harbour area. There is only one association existing in the fishing harbour, the Ma Dhamarai Fishermen Association.

4.1.15 Ma Dhamarai Fishermen Association

The members of the association are boat owners, exporters and fishermen. The members belong to four panchayats – Dhamara, Jagula, Dofinga, and Kaitkola. These four panchayats have 60 villages. About 50 percent of the population in these villages are fishermen.

The association is the only association in the whole Dhamara area representing the interest of all the users of the harbour and other fishermen in the area. It is headed by Mr Ananth Kumar Jena, President, with Mr Abhimanyu Raut, Vice President and Mr Profulla Jena, Secretary.

The total membership is 4 000. The association collects the following fees from its members:

- INR 3 per member per month.
- INR 500 per trawl per year.
- INR 300 per gillnetter per year.
- INR 15 per motorized boat per year.
- INR 5 per non-motorized boat per year.

The annual revenue of the association is about INR 2.25 lakhs (INR 225 000).

The functions of the association are as follows:

- advise the boat owners to comply with the rules of the government with regards to fishing restrictions;
- place the demands of the association with the state government with regards to subsidy benefits, user charges for the fishing harbour, etc.
- help the coast guard by passing information on the movement of foreign vessels into Indian waters;
- negotiate jointly with other fishermen associations for fixing the price of the catch;
- collect details of international prices of shrimp and fish from their apex organization and use the same for negotiating the price with the buyers;
- hold discussions with the harbour authorities regarding day-to-day problems; and
- extend personal help to their members.

The association maintains a very high frequency (VHF) system for providing communication from shore to vessels with a range of 20 kilometres.

While interacting with the association, the Vice-President and the Secretary brought up the following needs and concerns:

- formation of coordination committee of users for implementation of new schemes in the harbour;
- improvement of the auction hall;
- improvement of drainage and wastewater disposal system;

- improvement of the condition of the surface of the harbour area;
- improvement of drinking water supply;
- provision of adequate number of toilet facilities for men and women;
- setting-up of wholesale and retail markets.

4.1.16 Concerns/issues in the implementation of the TCP

- The timing for the upgrading and improvement of infrastructure facilities which will be borne by GoI and the State government may not coincide within the duration of the TCP.
- The speed of communication flow from the Union Ministry of Agriculture headquarters to the officers coordinating the project at the field level has to be accelerated to ensure that all information regarding the project and its implementation (e.g. logistics, travel of consultants, interaction with user groups, assistance to be extended to consultants in collecting requisite data, etc) reach all parties concerned in time.
- Roles and responsibilities of the agencies at the state level regarding the implementation of the project should be specified and each agency concerned informed.
- The needs, requirements and details for each mission of the consultants have to be communicated in advance to all concerned particularly the field staff.

4.2 Mangrol fishing harbour

4.2.1 Background

Mangrol fishing harbour was completed in 1984 at a cost of INR 3.64 crores (INR 36.40 million) with financial assistance from the World Bank.

4.2.2 Location

Mangrol fishing harbour is located 40 kilometres north of Veraval and 85 kilometres south of Porbandar in the State of Gujarat on the west coast of India. The State of Gujarat has the longest coastline among the Indian states, extending to 1 663 kilometres. The fishing harbour is located in Junagadh District, about 3 km away from Mangrol town. Mangrol consists of one panchayat (administrative group of villages) and one municipality.

4.2.3 Harbour facilities and condition

The fishing harbour was designed to accommodate 110 mechanized fishing vessels (MFV). The facilities developed consist of: 633 metres length eastern and western breakwater; 375 metres landing quay; 1 950 square metres auction hall, a port office building, connecting roads and concrete harbour surfaces. The area of the harbour basin is 12 000 square metres. The draft of the harbour is -2.3 metres.

Due to the expansion in fishing activities, the harbour became overcrowded and the Government of Gujarat (GoG) took up expansion of the harbour. Stage II was completed in 1998 under the GoI centrally sponsored scheme. The cost of Stage II was INR 9.55 crores (INR 95.50 million). The facilities under Stage II are: extension of the breakwater by 90 metres; construction of 147 metres protection arm; 400 metres of landing quay; and 10 860 square metres of harbour surface area. Stages I and II together were designed to accommodate 400 fishing vessels. GoG is already planning for Stage III for which engineering investigations are under way.

There are three open entrances to the harbour, which allow unrestricted entry. There is no compound wall surrounding the harbour area. The hard surface of the harbour area and the connecting roads are dusty, unclean and damaged with pot holes at many places.

The breakwaters are constructed with rubble stones with dolos and tetrapod concrete blocks. The conditions of the breakwaters are good, providing safe entrance and protection to the harbour basin. The quay is constructed by using concrete block work. The top level of the quay is +3.3 metres. The mean high water spring is +2.21 metres and the mean low water spring is +1.26 metres. The harbour basin is in the form of a rectangular dock and is in good condition. The concrete of the apron of quay is extensively damaged making water to collect and stagnate.

The superstructure of the auction hall consists of steel trusses which appears in good condition, but do not seem to be maintained with regular painting. The flooring is made of kota stone slabs; its condition does not look satisfactory. In many places, the slabs are damaged or missing. These spots have become a source for water stagnation. The drains are constructed with concrete and stagnation of water was also observed. Except in patches, the drains are not covered with grills.

The auction hall has provision for 23 booths (each booth area is 4 x 5 metres) for merchants. The booths are used for storing crates and weighing machines and for temporary storage of fish packed in crates. The condition of the wall and the flooring is not satisfactory. Loading of the packed fish is done behind the booths separating the vehicular traffic with the auction hall area.

Due to the inadequacy of the auction hall area, temporary sheds with thatched roof and concrete flooring have been erected outside the auction hall. There are no drains and water facilities in these sheds. These sheds are removed during the off-season and the space is utilized for repair of fishing vessels.

The booths inside the auction hall are allocated to the merchants every year on a first-come first-served basis. In the case of the temporary sheds, land is allotted and the lessee constructs the shed. The lease of land is auctioned on an annual basis.

Near the auction hall area but in a separate building, toilet and bath facilities are constructed. These are run by a foundation on a pay-and-use basis, with the fees collected used for routine maintenance. The toilet facilities were constructed by the government and turned over to the foundation for maintenance and operation on a 15-year contract. The government provides water and electricity free of charge. The condition of the toilets is not satisfactory.

There is no slipway facility at Mangrol. A crane is used for lifting the fishing vessel from the dock for storing ashore in a hardstanding, where the repairs for the fishing vessels are carried out. The fishermen community maintains and manages the operation of the crane.

For supply of potable water, there is an overhead tank of 130 tonnes capacity that has been built. The harbour water supply meets only part of the demand, with the remaining demand met by private suppliers. Electricity is available at the harbour. There is a standby generator, which is currently not in operation. A building has been built for running a canteen in the harbour but it is not in operation. It is now used as a workshop and training center for self-help groups.

Diesel is supplied to the fishing vessels by two diesel bunks, one operated by Mahavir Fishermen Cooperative Society and the other by the Gujarat Fisheries Central Cooperative Association. The state of the refuelling infrastructure is cause for concern.

Near the harbour entrance, there is a temporary shed (200 x 50 metres) serving as a retail fish market. The fishermen community runs this market. A few steps away from the harbour entrance is located the local fish market where women fish traders hold auctions and retail marketing. This local market was constructed and managed by the local community (Mangrol Kharava Samaj or fishermen community association).

4.2.4 Harbour management and maintenance

The Fisheries Terminal Division (FTD) manages the harbour. The concept of FTD was provided by an earlier UNDP-assisted and FAO-executed fisheries development project in India in the 1970s. The GoG through a government Resolution has set up the FTD.

The Superintendent of Fisheries (SF) heads the FTD at Mangrol. The office and field units assist the SF. The office unit consists of a head clerk (1); senior clerk (1); accountant (1); junior clerks (3); peon (1); watchman (1) and sweeper (1). The field unit consists of Assistant Superintendent of Fisheries (1); Fisheries Officer (1); hose gang (1); patrol sergeant (1) and patrol man (1). The FTD has a vehicle with a driver.

The FTD has responsibility for the management and maintenance of the fishing harbour. For engineering (civil, mechanical, electrical) maintenance, FTD seeks the help of the engineering division of the Gujarat Maritime Board (GMB).

The FTD has an annual contract of work given to a private agency for providing security, collection of user charges, cleaning the auction hall and supplying water to the boats when they go fishing. The annual contract is for cleaning the auction hall daily and the harbour premises periodically. The contractor has to provide 10 persons for all the works mentioned. Two persons each are assigned for security, collection of user charges and supply of water; four persons are assigned for cleaning.

4.2.5 User charges

User charges are collected by the FTD and GMB. GMB collects user charges for landing and berthing of fishing vessels and FTD collects the rest of the user charges (Table 2).

The level of berthing charges as of 2007 was:

- INR300 per month per boat collected for eight months of the fishing season.
- INR120 per month per boat collected for four months of the off-season.

The revenues collected by FTD and GMB for 2004–2005 and 2005–2006 are shown in Table 3.

Table 2. User charges levied by the Fisheries Terminal Division.

Items	Monthly (INR)	Daily (INR)	Half year (INR)	Seasonal (9 months fishing season) (INR)
Merchant booth	825	none	3300	5000
Floor area (6 x 5 ft)	165	20	none	825
Motor vehicles				
Heavy duty	165	18	none	825
Medium vehicle	83	11	none	413
Non-mechanical (trolley, bullock and camel cart)	17	2	none	110
Water supply charges	83	28	none	none
Mechanized fishing vessels	18	none	none	none
Canoes				

Table 3. Revenues collected by Fisheries Terminal Division and Gujarat Maritime Board.

Period	Revenue collected by FTD	Revenue collected by GMB
2004 – 2005	INR 6.73 lakhs	INR 39.45 lakhs
2005 – 2006	INR 6.56 lakhs	INR 15.13 lakhs

Ten lakhs = one million

4.2.6 Fishing Activities

In Gujarat, fishing is banned from 10 June to 15 August every year.

Until 2003, there were 935 fishing vessels (trawlers and gillnetters) operating from Mangrol fishing harbour. In 2003, 50 percent of the fishing vessels were encouraged to operate from Okha fishing harbour, 238 km northwest of Mangrol fishing harbour.

In addition to the trawlers and gillnetters, there are 535 FRP (fibre-reinforced plastic) boats fitted with OBM (outboard motors) operating in the beach area within the harbour premises, but outside the quay. These boats land their catch outside the harbour.

The trawlers and gillnetters are of wooden or FRP-make with size ranging from 36 to 55 feet (approximately 11 to 17 metres). Most of the boats are fitted with either 88 horsepower or 118 horsepower engines. The size of the FRP boats fitted with OBMs ranges from 25 to 36 feet (approximately 8 to 11 metres). They use one or two OBMs of 8 horsepower capacity.

There are boat owners who own more than one boat and up to a maximum of 15 vessels. Most of the owners normally do not go on the boat for fishing. They employ a tandal (skipper) and crew of 6–7 members for operating the vessel. The voyage period of the bigger trawlers ranges from 8–10 days. Each vessel carries about 1 000 litres of diesel. They operate the nets at a depth ranging from 18 to 70 fathoms and carry different trawls for catching different types of fish and shrimps. The tandal is paid a salary of INR 10 000–12 000 per month and the crew gets a salary of INR 2 000–4 000 per month. Specially trained skippers receive INR 13 000–14 000 per month. The duration of each haul is 2–3 hours. On average, three hauls are taken during daytime. If the catch is good, one or more hauls are taken during the night.

The boats have a fish hold capacity of 5–7 tonnes and they carry 4–6 tonnes of ice for each voyage. In several of the vessels, the fish holds have been improved by providing puff insulation. Most of the vessels are equipped with GPS, VHF and fish finder. A few small trawlers of 36–40 feet (approximately 11 to 12 metres) LOA fitted with 38–40 horsepower engines are also operated. They are mostly day boats operating between five in the morning and five in the evening. The small trawlers take about three hauls of 2–3 hours each.

A big trawler lands about 2.5–3 tonnes per voyage. The day boats approximately land 400 kilograms per day.

The FRP boats operate gillnets only. They employ 40–50 lengths of gill nets, each measuring 40 feet (12 metres). Nets are made of monofilament or HDP. The FRP boats travel a distance of 20–25 kilometres and the total voyage lasts about three days. Each gillnetter employs 4–5 persons. Some of the vessels operate hook-and-line and squid jiggers. They carry insulated boxes with 300 kilograms of ice (equivalent to 3 blocks of 100 kilograms each ice). The gillnet owner does not pay wages to the crew. Instead he allots gillnet lengths as follows:

- owner – 20 lengths
- crew – 4 lengths each
- tandal – 6 lengths

The catch obtained by each allotted length belongs to the particular group and not commonly shared by all.

4.2.7 Disposal of the catch

Having taken cash advances, majority of the trawl owners are tied up with the traders for disposal of the catch. Except for 15–20 kilograms of the total landings, all the remaining catch is handed over to the traders. Other trawler owners who possess more than one vessel and are financially sound do not have any tie-up with the traders. They supply to any trader who offers a better price and pay some cash for immediate expenses. In this case also, 20–25 kilograms of the catch is given to the wife for disposal at the local market. The FRP boats also have tie-up with traders and hand over their catch to them for disposal.

The major catch of the trawlers consists of shrimp, pomfrets, ribbonfish, threadfin bream, sharks, squids, jawfishes, seerfish, eels, soles, snappers, catfishes, Bombay duck, etc. The FRP boats land seerfish, tuna, catfishes, pomfrets, mackerels, crabs, etc.

4.2.8 Handling of the catch

At sea, the catch is stored in fish holds with ice in loose form. All catch of export quality are segregated on board. Trawlers land their catch at the quay. The catch of good quality and export variety is landed at the quay near the auction hall. The rest of the catch is landed at the berthing quay.

At the landing quay, the fish is collected in crates from the fish holds, transported to the auction hall and emptied on the floor for sorting by size, species and quality. The auction hall is not used for any auctioning purpose and it is mostly used for segregation and packing by shed owners and traders. The floor of the auction hall is not in good condition and the water stagnates in many places and patches. The persons in the auction hall walk all around the wet floor area while the fish is being segregated on the same floor. Partly-spoiled fish and shrimp are also brought into the auction hall and spread on the floor. The same process is followed in the temporary sheds.

After the fish are sorted and segregated, they are washed with water and packed with ice on crates. Due to the inadequacy of water supply, the washing is not thorough and complete.

The fish of export quality and variety are transported to the processing centers in Mangrol, Veraval and Mumbai by traders. The rest of the catch is transported to the retail markets at Mangrol, Ahmedabad and South Gujarat.

The basin water is used for washing the floor of the auction hall and the water from the drains of the auction is let into the basin.

In the temporary sheds outside of the auction hall (61 units), the catch is spread on the floor and segregated. The handling of the catch is similar to that of the auction hall but the temporary sheds use underground hand pump water for washing the fish and the floor of the shed. Because the temporary sheds have no drains, the wastewater percolates into the neighbouring surface area.

Unlike in other fishing harbours in India, fish is not dried inside the harbour premises.

The FRP canoes land their catch on a small stretch of beach area, the surface of which is not finished with concrete. There are no gear sheds for repair of nets. The fishermen community have erected temporary sheds located around the beach area within the harbour.

In the local market outside the harbour premises, some auctioning is taking place in addition to retailing. The fish carried by the women of the trawler and canoe owners is auctioned. Of the total fish brought into the local market, about 70 percent comes from FRP boats. The women retail traders buy the fish in auction and segregate the catch for retailing in the same market, as well as to sell to other retailers, who will sell the fish in nearby villages.

The retail market hall is open on all sides and the surroundings are very unhygienic. Water accumulates in several places and patches on the surface of the market hall. Fish is handled in the market in a very unhygienic manner, similar to that in the auction hall inside the harbour. There is no proper drainage system for the local market. The existing drains are fully choked and the waste remains and stagnates close to the retailing area.

4.2.9 Stakeholders

The primary stakeholders identified are:

- trawler and gillnetter owners;
- FRP boat owners;
- crew and fishermen working on board the vessels;
- shed owners/traders/suppliers and their employees;
- fisherwomen/wives of boat owners and independent women traders;
- men and women employed for segregating, sorting and packing;
- administrative personnel including officials, office staff and their contract persons;
- toilet operator; and
- Gujarat Maritime Board officials.

The secondary stakeholders identified are:

- tri-wheeler and four-wheeler operators;
- crane operator;
- boat repair and service workers;
- cooperative society;
- Samaj community leaders;
- ice plant owners;
- private freshwater suppliers;
- environment protection group (a non-government organization); and
- market retailers.

4.2.10 Mangrol community

The Mangrol community has a population of 65 000 from 14 500 households. Of these, 1 500 households are engaged in fishing, with a total fishing population of 12 000. The fishing community has formed the community association called Mangrol Kharava Samaj (fishermen community association). The president of the association is elected annually and he has the final authority in deciding all matters relating to the community, including fishing activity. There are about 100 board members headed by the President in the executive body. Decisions of the president are generally accepted and implemented by the community members in matters relating to fishing and fishing activities. Conflicts and other issues within the community are settled by the body. By and large the members of the community are well educated. They run a school up to higher secondary level for the benefit of their children.

The local retail market was constructed by the Samaj and is managed and maintained by them. The temporary market shed inside the harbour premises is also maintained by the Samaj.

4.2.11 Role of women in fish marketing

A total of 600 women from the community are engaged in fish marketing, out of which 200 use the local retail market. The women are also involved in pre-processing, loading and unloading of the

catch, fish drying and fish cutting and salting. There is no separate organization for women. Among the women involved in marketing, only few have completed elementary education and the rest are not literate. However, they are now sending their children to school. Their average family size is six.

The women do not have bank accounts and they get credit for two days from the wives of the boat owners. Under the GoG scheme, the women have received insulated fish boxes and crates at subsidized rates. Some of the women have received training from a self-help group in preparing value-added products such as fish pickles.

Out of 600 women, about 100 are widows and the sole breadwinners of their family. The income of the women ranges from INR 30 to 100 per day. The money they earn is used on food for the family. In the case of wives of trawler owners, the money goes to the family common fund used for fishing supplies and operation. For them, a day's income is about INR 3 000–4 000 per day. During the off season (fishing ban period) these women are involved in dried fish production and marketing by utilizing the raw materials rejected by export processing plants.
For the local retail market, the women expressed the need for hygienic conditions, drinking water, lighting, ice crushing machine, good drainage and expansion of the market space. The women do not pay any user charges. However, the Samaj collects INR 1 per day per person from outsiders for using the market.

4.2.12 Mahavir Cooperative Society

There are three existing cooperative societies in Mangrol, but the most active one is the Mahavir Cooperative Society. It has a membership of 3 000 including about 500 women-members. It has been in existence since 1954. Trawler and FRP owners and their crews are members of the society. The functions of the society are:

- To interact with the State government regarding the schemes available for extending financial and technical assistance to the fishermen.
- To facilitate the implementation of the programs of the government.
- To supply inputs such as diesel and nets to the fishermen at an economical price. The association also supplies fishing aids such as GPS, VHF, and fish finders.
- To implement the prediction of potential fishing zones with the use of satellite technology.
- To act as a nodal agency for implementing group insurance scheme for their members.
- To operate a diesel bunk for supplying diesel to boat owners. They avail of the diesel subsidy scheme of the GoI through the petrol bunk.

4.2.13 Concerns/issues in the implementation of the TCP

- The timing for the upgrading and improvement of infrastructure facilities which will be borne by GoI and the State government may not coincide within the duration of the TCP.
- The incumbent Superintendent of Fisheries is on leave since February 2007 and the SF of Porbandar is holding additional charge of Mangrol FTD. This means that there is no officer who is currently in charge full-time in the management of the harbour.
- The cleaning of the auction hall and occasionally of the harbour premises is put to tender annually. It maybe likely that those who would be trained under the TCP may not be the same persons who would be getting the contract in the following year.

5. UPGRADING INFRASTRUCTURE AND SANITATION

5.1 Norms and legislations

The current trend in some of the major fish importing countries is the so-called net to plate concept whereby fish sold in these countries is traceable not only to its country of origin but also the waters it was fished-in and the entire post-harvest infrastructure which handled the exported product. To comply with HACCP (Hazard Analysis and Critical Control Point) requirements, seafood exporting countries like India will have to invest substantially in upgrading and improving the overall hygienic and sanitary conditions of its fishing harbours. This concept not only calls for organizational modifications to the existing post-harvest system, but also dramatic innovations and drastic changes in the long term**.** In particular, these will involve:

- minimizing and eventually eliminating harbour and coastal pollution from point and non-point sources;
- improving overall sanitation and hygiene throughout the fish exporting process (from onboard fishing vessels right up to the packaging of fish for export); and
- maintaining port and harbour infrastructure in good working order.

In tropical waters, fish is a highly perishable commodity, requiring well-developed and efficient landing and handling facilities and distribution channels to move the catch to the processing and packaging factory in the shortest possible time. Moreover, the longer the time required for this operation, the greater the post-harvest care required to land the same netted catch in as good a condition.

This degree of post-harvest care has to be maintained all the way down the chain of events, right up to the processing establishment, whether the end product is destined for export or the local market. Hence, it is no use landing good quality fish in a harbour that cannot handle the product properly and fast enough, leading to spoilage; vice-versa, it is no use running a good clean harbour if the fish landed is already contaminated through poor housekeeping onboard the fishing vessels themselves.

Understandably the governments of the countries that import seafood from India and elsewhere have a duty to ensure that the imported products are safe to eat and do not threaten the health of the consumers. With this in mind they have produced production standards which apply not only to the foodstuffs produced domestically but also to those imported from other countries.

Although it is recognized that the European Union (EU) is not the only country or group of countries importing Indian seafood, it is generally recognized that EU norms can form a benchmark for judging food safety systems. For this reason the EU regulations concerning food safety are used to illustrate the tasks faced by the Indian seafood exporting.

It is also recognized that in many cases only a small proportion of the landed catch is destined for export, however, it can be disproportionately valuable in terms of income to the fishing industry. Moreover, it can be argued that Indian consumers deserve clean and safe seafood just as much as those in countries which import Indian products.

Foremost among the European Union legislation are the regulations “laying down specific hygiene rules for food of animal origin” (regulation 853/2004 of 29 April 2004[7]) and “on the hygiene of

[7] REGULATION (EC) No 853/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific hygiene rules for food of animal origin. *Official Journal of the European Union* L226/22 - 25/6/2004.

foodstuffs" (regulation 852/2004 of 29 April 2004[8]). The latter is primarily concerned with the management and implementation of quality and food safety assurance regimes in food production including the application of HACCP principles. These regulations are designed to ensure that food is produced in hygienic manner and ensure the safety of the consumer. They apply to foodstuffs produced within the European Union as well as to imported food products. Section VIII of the directive "laying down specific hygiene rules for food of animal origin" (regulation 853/2004) is concerned particularly with fishery products.

The other EU regulation that has relevance is regulation No 854/2004 "laying down specific rules for the organization of official controls on products of animal origin intended for human consumption" (regulation 854/2004[9]). Of particular interest is the first part of the annex which is shown in Box 1. It can be seen that inspection procedures are expected to include landing sites, auctions, fishing vessels, transport facilities and the staff involved in these operations.

BOX 1

Extract from REGULATION (EC) No 854/2004
Annex III **FISHERY PRODUCTS**

CHAPTER I: OFFICIAL CONTROLS OF PRODUCTION AND PLACING ON THE MARKET

1. Official controls on the production and placing on the market of fishery products are to include, in particular:

(a) a regular check on the hygiene conditions of landing and first sale;

(b) inspections at regular intervals of vessels and establishments on land, including fish auctions and wholesale markets, to check, in particular:

- (i) where appropriate, whether the conditions for approval are still fulfilled;
- (ii) whether the fishery products are handled correctly;
- (iii) or compliance with hygiene and temperature requirements; and
- (iv) the cleanliness of establishments, including vessels, and their facilities and equipment, and staff hygiene; and

(c) checks on storage and transport conditions.

Three basic underlying factors link the fisheries process:

- The work environment – the fishing vessel itself, the fishing harbour, the sorting hall, the chill rooms, the road transport and the processing hall.
- The working medium – sanitary grade water (fresh or seawater) is required at every single step in the chain of events; water is required for ice, rinsing of fish and hosing down of the work environment and the working surfaces that come into contact with the fish.
- The surrounding environment - the focal point of the fishing effort is the harbour installation and hence pollution control and abatement, public hygiene, waste disposal, etc. govern the type of environment that the harbour sits in.

The work environment – As already mentioned, Regulation (EC) No 853/2004 of the European Union lays down the specific hygiene rules for food of animal origin and outlines the conditions required during and after landing of fish and should apply, where appropriate, to all work

[8] REGULATION (EC) No 852/2004 of The European Parliament and of The Council of 29 April 2004 on the hygiene of foodstuffs. *Official Journal of the European Union* L226/3 - 25/6/2004.

[9] REGULATION (EC) No 854/2004 of the European Parliament and of the Council of 29 April 2004 laying down specific rules for the organization of official controls on products of animal origin intended for human consumption. *Official Journal of the European Union* L226/83 - 25/6/2004.

environments, whether they be onboard the vessel, inside a sorting hall or at a processing hall. In other words, the standards of personal hygiene, sanitary facilities, disinfection, the placing of fish without unnecessary delay in a protected environment etc., should be the same throughout.

The working medium – The suggested water quality standards for drinking water (World Health Organization and the equivalent Indian National Standard) give the water quality requirements for potable water. Again, these conditions should apply to all the water used in the chain of events mentioned above, whether it is used on board the vessel, for making ice, for rinsing fish or for cleaning down premises. Clean sea water may be used in some instances and the quality of seawater is again influenced by environmental conditions.

The surrounding environment – Council Directive 76/464/ EEC (Dangerous Substance Discharges) established two lists of substances classified as hazardous. List I identified 129 substances to be eliminated from the environment because of their toxicity and their bio-accumulation. List II contained those which have a detrimental impact on the environment but which may be contained within a given area depending on the characteristics and location of the area. The suggested water quality standards for estuary and harbour basins outline the seawater quality inside a typical fishing harbour or estuary. Polluted harbour water is one of the major concerns of the fisheries industry and the EU guidelines ensure a comprehensive coverage of likely pollutants. Typically, harbour pollution may arise from three major sources:

- Municipal waste (town's sewage outfall diverted to the port).
- Fisheries operations (oil, diesel, onboard sewage, wet waste and solid waste, anti-fouling, etc.).
- Industry (tanneries, paper mills, galvanisers etc. discharging into a waterway).

Whereas municipal and industrial pollution of the harbour environment should be tackled by the competent authorities through the appropriate channels, fisheries-related pollution, mainly shipboard, may be tackled through the International Maritime Organization's International Convention for the Prevention of Pollution from Ships 1973, commonly known as MARPOL 73/78. The overall aim is to make fishing port operators aware of the Convention and the Annexes likely to have an impact on fishing operations.

The Convention itself is composed of:

Articles	(20 in number)
Protocol I	Provisions concerning Reports of incidents involving harmful substances (5 articles)
Protocol II	Arbitration (10 articles)
Annex I	Regulations for the Prevention of Pollution by Oil
Annex II	Regulations for the Control of Pollution by Noxious Liquids
Annex III	Regulations for the Prevention of Pollution by Harmful Substances carried by sea in packaged forms
Annex IV	Regulations for the Prevention of Pollution by Sewage from Ships
Annex V	Regulations for the Prevention of Pollution by Garbage from Ships

Many of the articles of MARPOL 73/78 set down definite requirements. These are in addition to the regulations of the annexes. Countries which ratified MARPOL 73/78 undertake to give effect to its provisions, including those annexes to which they are bound. Annexes I, IV and V apply to fishing vessels and the fishing industry as a whole.

5.2 Upgrading infrastructure at Dhamara and Mangrol

5.2.1 Port security

Port security at both ports needs upgrading. At Dhamara, ongoing civil works will partly take care of this but gaps in the existing port boundary need to be plugged. It would be advisable to install a cattle grid at the main entrance and in front of the new market stalls to prevent animals from wandering inside. The path leading to the ferry terminal should be fenced-in from the main gate to prevent passengers from mingling with the fishermen.

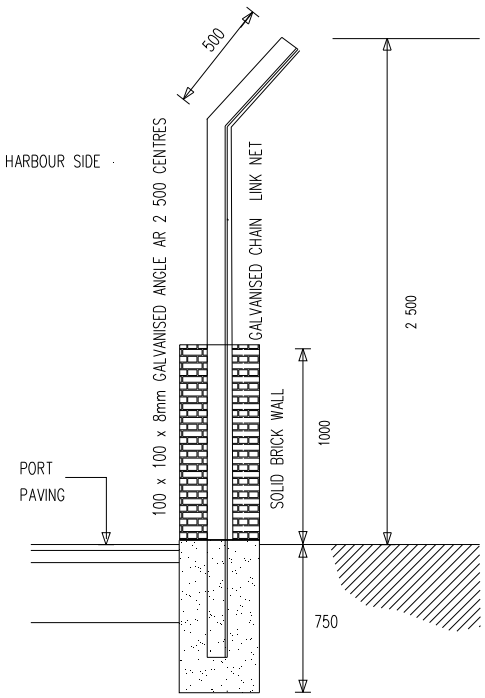
Mangrol needs to re-build its perimeter from scratch. Figure 2 illustrates the port's consolidated perimeter (green) and the three gates (red) required at Mangrol. These are:

1. The main gate for transport vehicles and pedestrians and a rear gate for pedestrians only (beach landing area), both manned at all times.
2. Two boat entry gates to be kept closed at all times except for vessel movements.

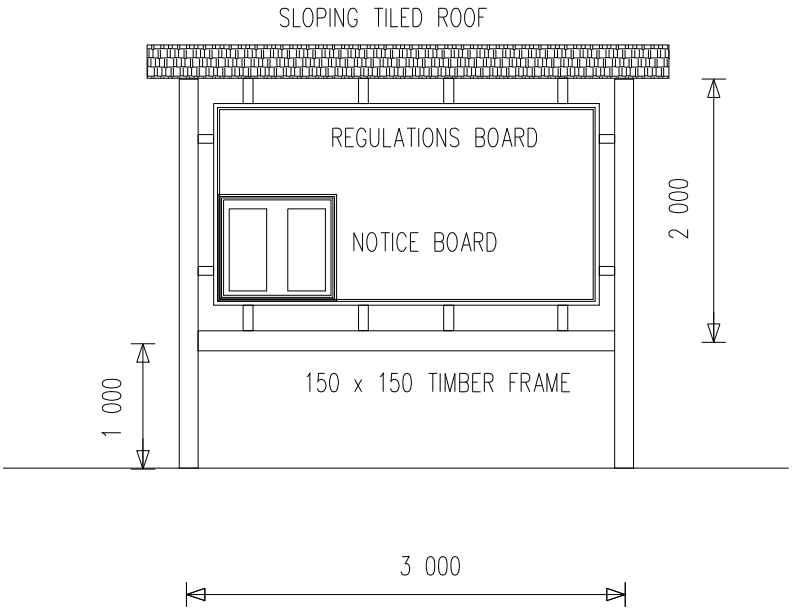
Typically, the port boundary fence should consist of a solid brick wall up to a height of around 1 metre and topped with a chain-link fence up to a height of 2.50 metres (Figure 3). These proportions may be changed to suit local conditions.

The main gate should consist of two pedestrian entry exit points and a vehicle access point as illustrated in the same figure. The gate should be manned at all hours and kept closed after working hours. The rear gate should be a pedestrian only gate and manned at all times. As part of the hardware for the port management organization, entry to the port should be restricted to vessel crews and port workers only. All other entries (including vehicles) should be against payment of an entry fee. Port regulations have to be established and fines for contravention agreed. All this information (entry fees, regulations and fines) must be displayed on an information board (Figure 3) which should be placed on the left hand side of the main entry gate. Unless gates are kept shut, cattle grids should be installed to keep animals out.

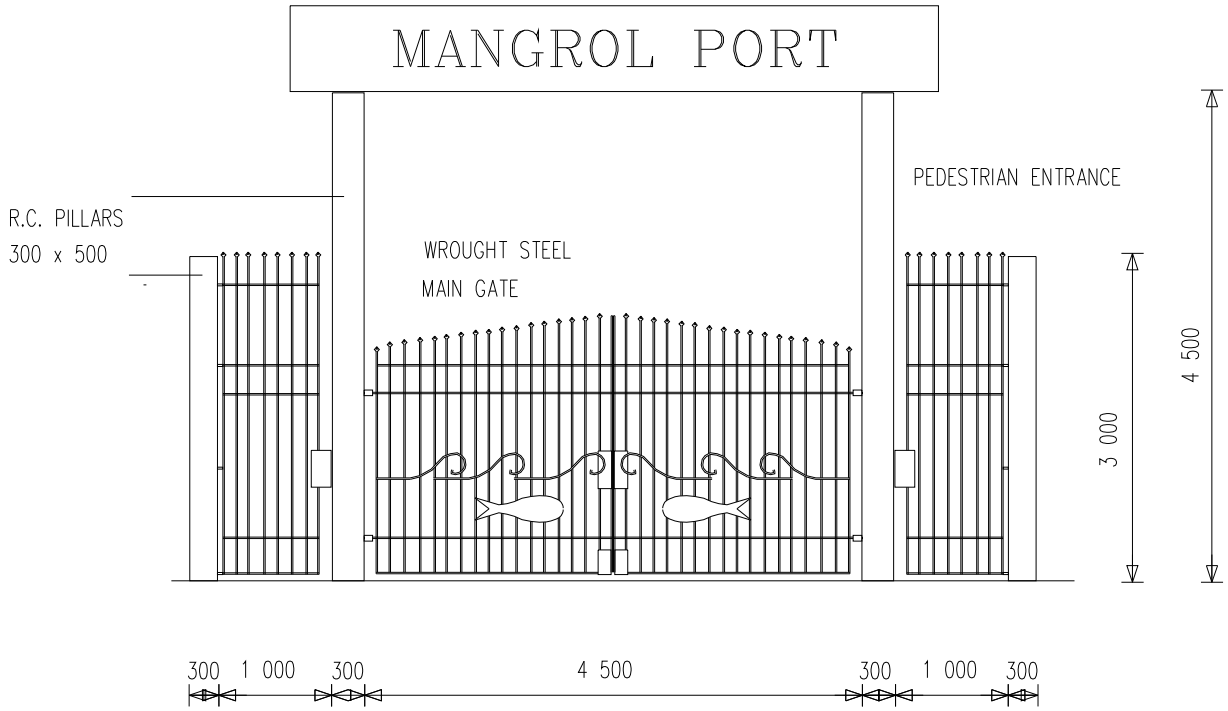
Figure 2. Aerial photo showing the port's consolidated perimeter (green) and three gates (red) required at Mangrol fishing harbour.



Typical Perimeter fence



Typical Notice & Regulations board



Potential main port gate for pedestrians and vehicular traffic

Figure 3. Typical port security infrastructure

5.2.2 Sanitary water supply

The port of Dhamara does not suffer from potable water shortages at the moment and the port's borewell appears to satisfy the needs adequately, albeit the supply is not chlorinated. However, as chlorination of a port's water supply is a mandatory requirement for international standards to apply, regular and frequent bacteriological testing should be undertaken by a suitably qualified laboratory as part of the management's duties.

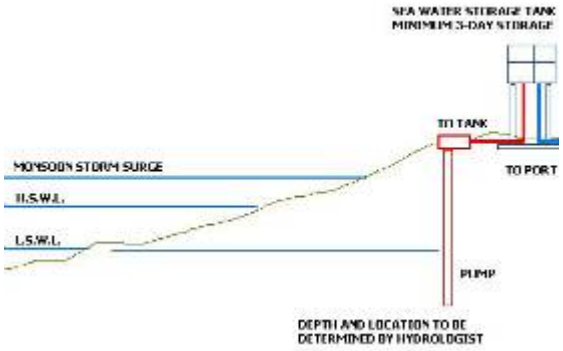
The port of Mangrol's water supply, on the other hand, is in dire need of an upgrade and the safest and most economical way to achieve this is to separate the port's requirements between the strictly potable (drinking water taps, hygiene block) and the potential seawater services (fish washing, fish box washing, floor hosing, vessel deck hosing and quay hosing). EU Directive 91/493/EEC, Chapter II, General Conditions for Establishments on Land, Item 7, tabulates the potential volumes of seawater that may be used to replace potable water in the day-to-day activities at the port. Good, clean seawater may be sourced some distance away from the port and human habitation by drilling into the foreshore and extracting seawater filtered through the sea bed. This water may be pumped up into an overhead tank and conveyed back to the port via a seawater main. Figure 4 illustrates how a permanent borewell may be installed on the foreshore, some distance inland to protect the borewell head from wave damage during strong monsoon storms that may occur at high tide.

The borewell head should be fenced off by an adequate fence and capped and locked to protect the equipment that constitutes the permanent borewell, i.e. the pump, level indicator, non-return valve, pressure sensor, gate valve and flow meter. All the materials used should be suitable for operation in a seawater environment, with all metal components in AISI 316 stainless steel and concrete Grade M40. Particular attention should be paid against installing dissimilar metals in contact with one another due to the potential for galvanic corrosion.

5.2.3 Jetties and port paving

At Dhamara, the jetty, apron and port paving in general are in good repair and the current civil works will further improve the situation in and around the Phase II area.

Whereas the jetty sub-structure at Mangrol is still in good condition, the concrete paving along the superstructure should be removed. In practice, this is the area of the port's perimeter minus the port basin and the shed and hygiene block. It is recommended that the top 300 mm of paving be demolished and replaced with a 300 mm thick Grade M40 concrete laid to a gradient of 200 to drain away surface water. Sub-surface drainage should be installed to drain water away from the rear of the auction/sorting shed. During this reconstruction, a new PVC seawater main should be laid behind the cope line to feed the new seawater hydrants built in to the cope line at 5 metre centres (Figure 5). Each hydrant should consist of a quick-release coupling on a 25 mm stainless steel ball valve embedded in the concrete cope through a steel sleeve.



Distant coastal seawater borewell and overhead storage *(no scale)*

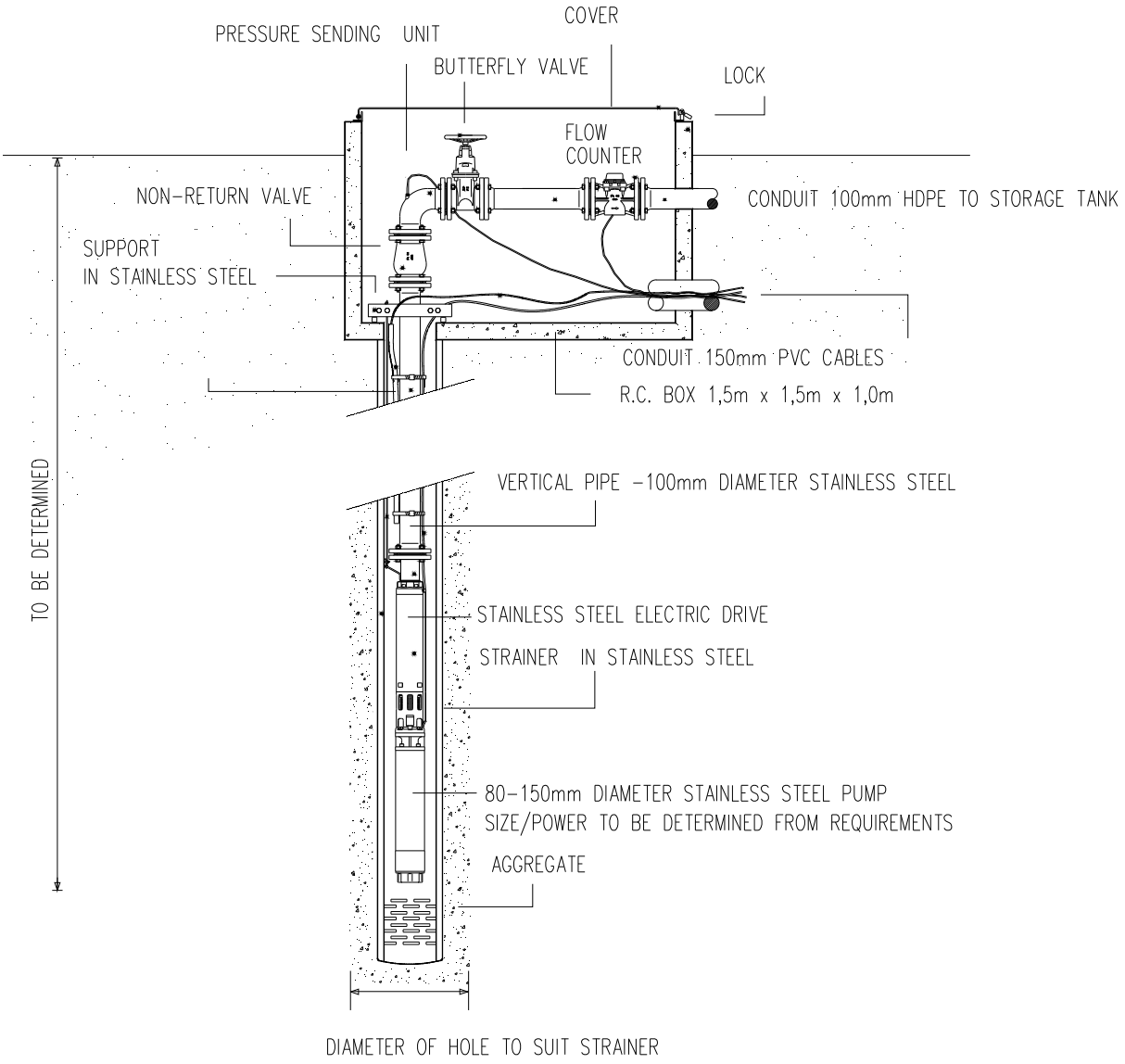
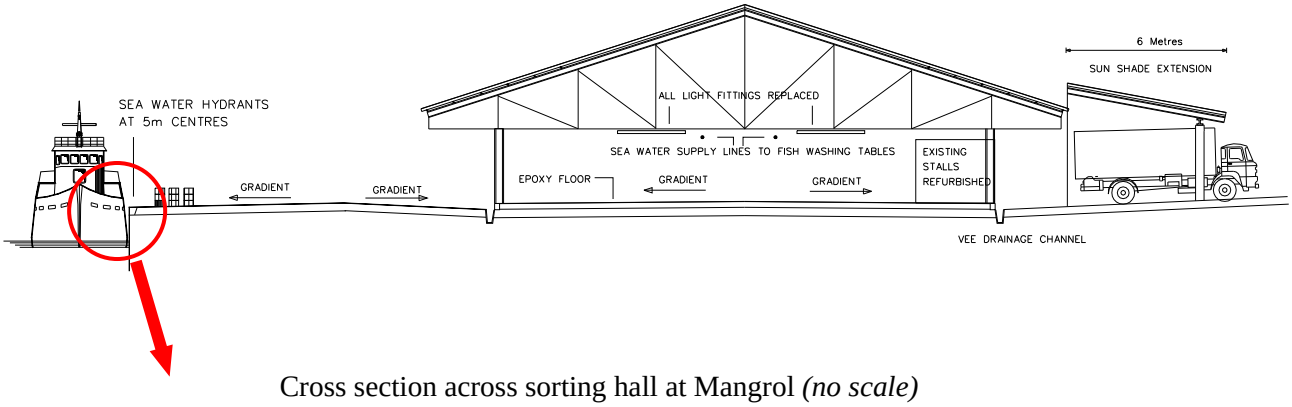
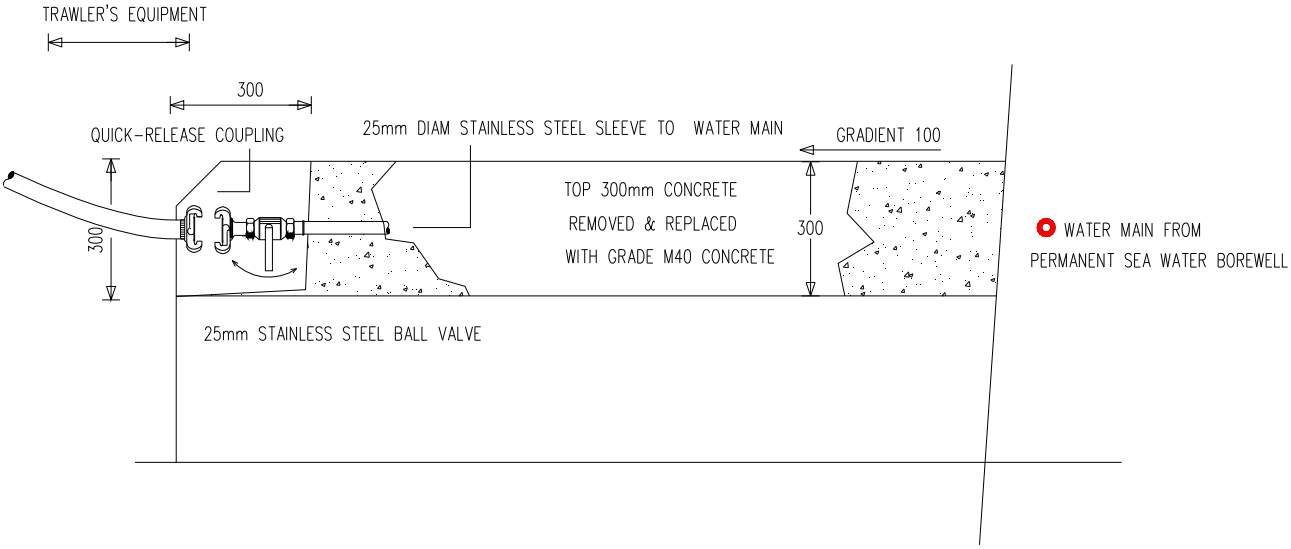


Figure 4. Details for a permanent seawater borewell



Cross section across sorting hall at Mangrol *(no scale)*



Details of fresh seawater hydrants at Mangrol *(no scale)*

Figure 5. Typical cross-section across Mangrol sorting hall

5.2.4 Auction halls

The auction/sorting hall being constructed under Dhamara Phase II should be modified slightly to enable a higher standard of handling to be achieved. These modifications should consist of:

- Construction of a 6 metre wide sun shade to the rear of the existing structure for trucks waiting to load fish.
- Installation of low fish sorting platforms inside every sorting bay.
- Provision of fish rinsing shower heads over the sorting platforms.
- Provision of power washing attachments (water and electricity outlet) inside each bay.
- Adequate lighting to enable night-time work.

Figure 6 illustrates the work to be carried out. In addition to the 6 metre overhang to protect trucks waiting for fish from the elements, hardened sorting platforms should be constructed in each of the 6 metre bays to enable sorting to be carried out in a hygienic manner with the least disruption to the flow of fish from vessel to truck. Hardened surfaces, sloping towards a drain, should be installed as illustrated in the figure, and consist of one 750 mm wide surface against the far office wall and one 1 500 mm wide surface in the middle, Figure 6, Plan. One side of the passage, 2 250 mm wide, should be left clear for ready-boxed fish to be loaded directly from the moored vessel to the waiting trucks, Figure 6, Section A-A. Each platform should consist of a concrete base laid to a fall towards a sieved drain and topped with a local granite or marble surface (not dark coloured). A 50 mm thick granite or marble edge should be glued to the edge to prevent water from spilling over on to the passage ways. The average height of the hardened platform should not exceed 150 mm. Each 6 metre long hardened platform should be equipped with an overhead potable water main in UV stabilised PVC or HDPE with three flexible (food-industry standard) fish rinsing heads complete with grip faucets. The entire volume of rinse water should be drained away to a soakaway via a stainless steel strainer and the solids recovered every day for proper disposal at sea. Each sorting bay should be equipped with a suitable waterproof power outlet (IP55) for the power washer together with a quick-release coupling for freshwater, as illustrated in Figure 7. Adequate minimum lighting (220 lux) should be installed.

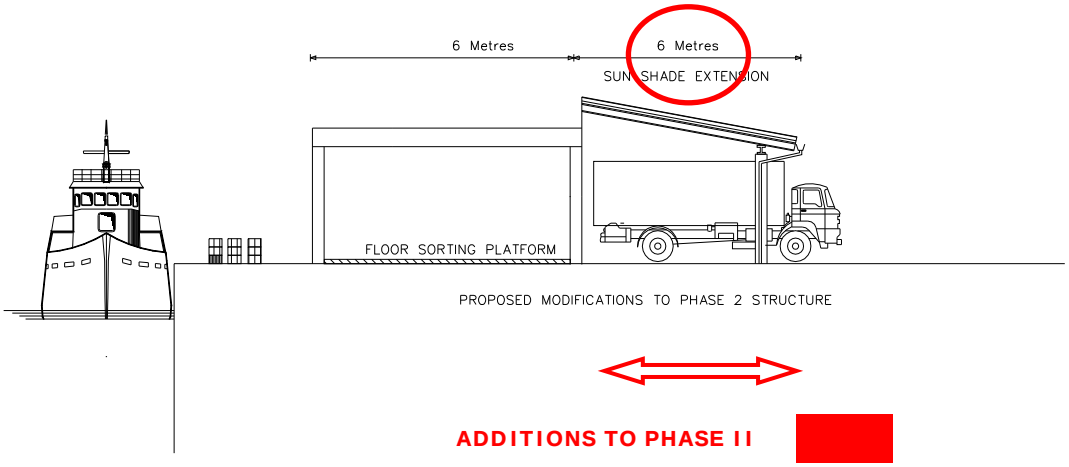
The Phase I re-construction at Dhamara should include the complete demolition of the existing shed and rooms and disposal of the waste. The new sorting hall should be along the same lines as those in Phase II but with further modifications, see Figure 8. In addition to the modifications already mentioned above, the sorting bays should be constructed wider (10 metres instead of the current 6 metres) to spread the sorting load.

The current shrimp processing rooms should also be replaced with a small modern state-of-the-art processing hall to encourage more exporters to use Dhamara. Figure 10 illustrates the standard design of a typical fish processing hall.

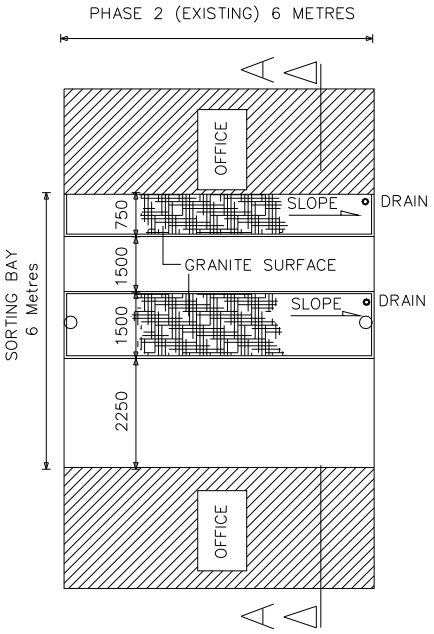
The net mending area should be equipped with at least one set of vertical columns or posts, in concrete or timber, to enable a flexible sun screen to be erected over the repair area to shade workers from the elements, Figure 10.

The Mangrol auction shed should be refurbished as follows (Figure 6):

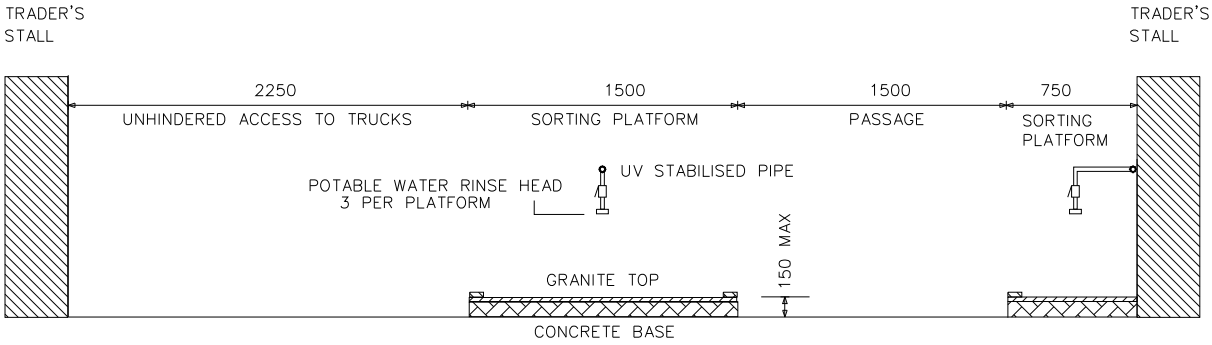
- The existing hall floor should be removed and the concrete base scabbed to formation level. The concrete base should be re-laid to the required levels (gradient of 200) and sealed with a seamless epoxy floor topping, Figure 11. The existing lighting system, all timber doors and fittings, glazing and old pipe work should be replaced and brought up to standard as described in EU Directive 91/493/EEC, Chapter III, General Conditions for Establishments on Land, Item 7. All brick structures (trader’s stalls and offices) should be scabbed, re-plastered with polymer-modified cement and coated with a waterproof white gloss paint.
- VEE drainage channels, between the edge of the sorting hall and the new port apron, should be installed to capture all surface water runoff and connected to an underground drain via a solids strainer.
- The rear side of the shed should be extended by a 6 metre overhang to provide shade for the loading trucks.
- The entire under side of the shed roof should be rendered bird-proof by the application of an appropriate polymer netting and defective roofing material replaced.
- An overhead 25 mm diameter pipe network in PVC or HDPE should be installed via pipe hangers anchored to the trusses to provide for seawater rinsing facilities over the sorting platforms.
- The assorted weighing and carting equipment should be replaced with stainless steel scales and trolleys.



Cross-section across Phase II sorting bay *(under construction – no scale)*



Plan on Phase II sorting bay *(under construction – no scale)*



Section A-A across sorting bay *(under construction – no scale)*

Figure 6. Typical cross-section across Dhamara Phase II sorting hall

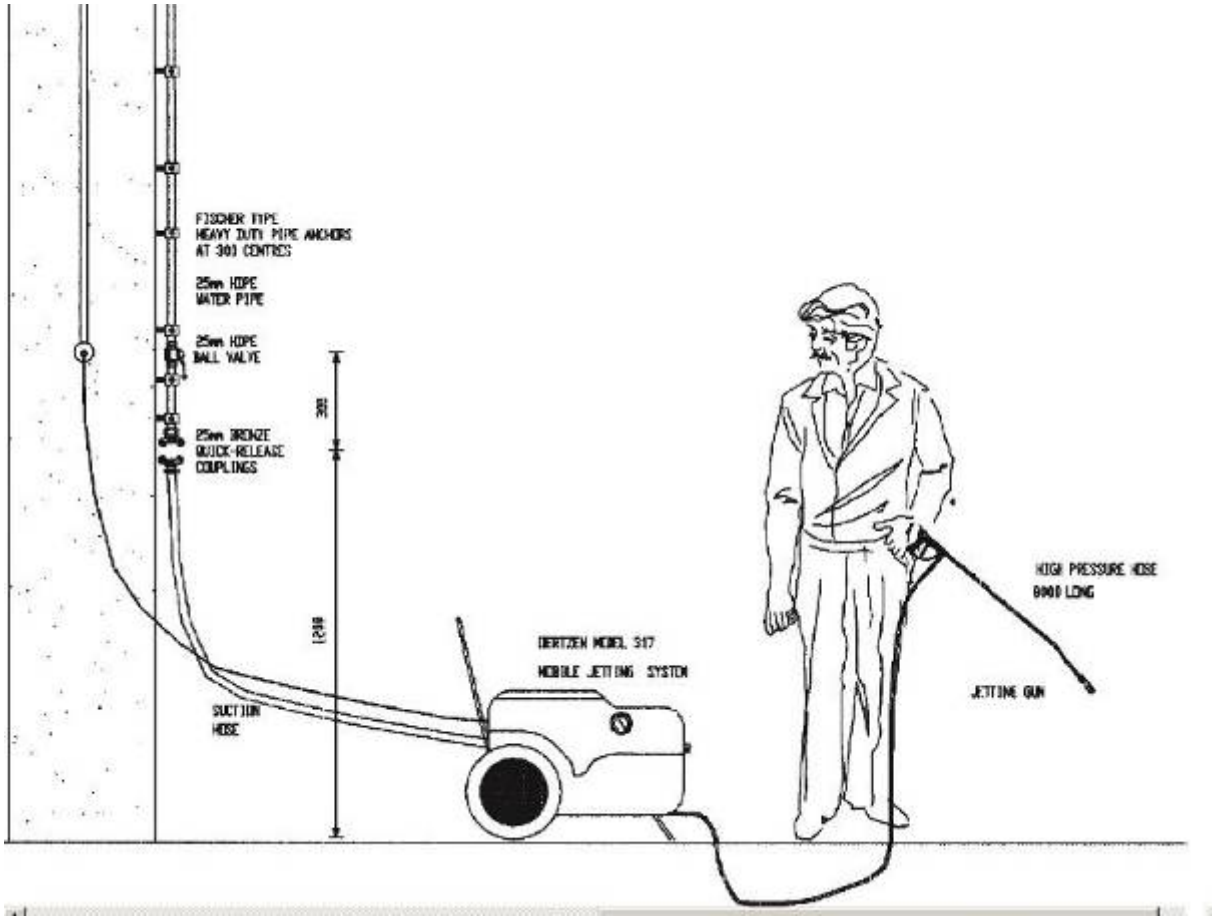
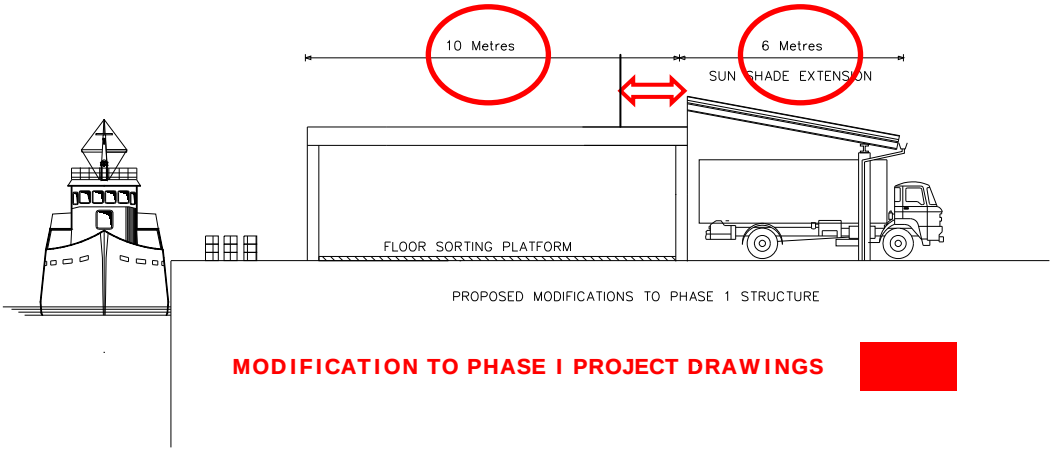
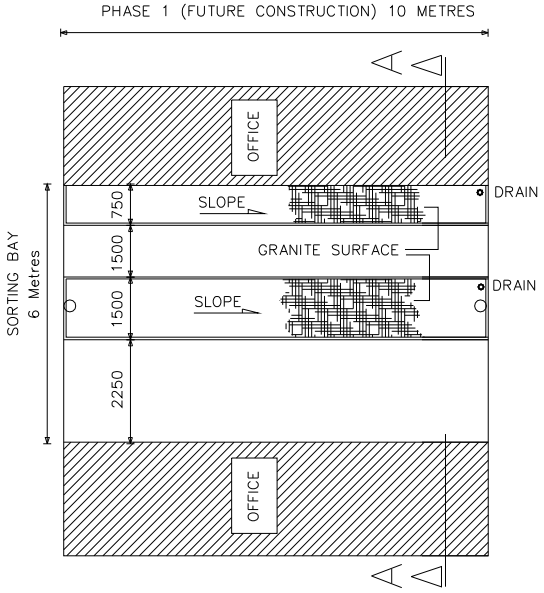


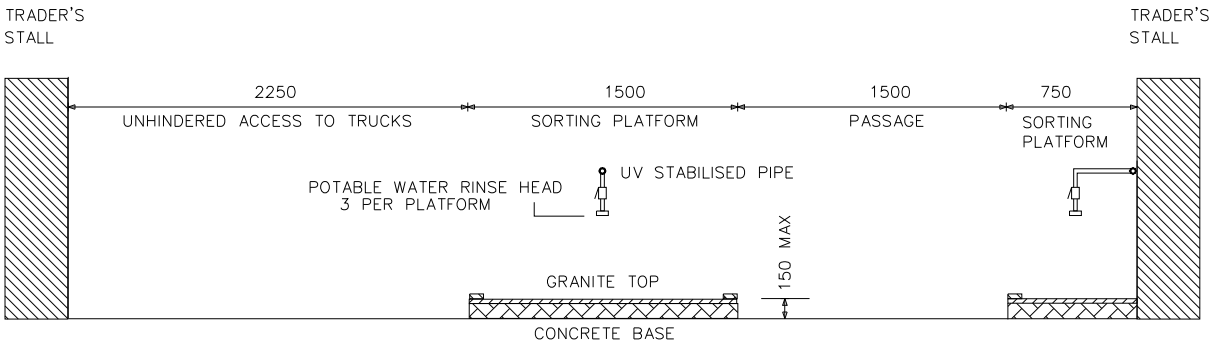
Figure 7. Details of mobile power washer fittings at each platform



Cross-section across Phase I sorting bay *(future re-construction – no scale)*



Plan on Phase I sorting bay *(future re-construction – no scale)*



Section A-A across sorting bay *(under construction – no scale)*

Figure 8. Typical cross-section across Dhamara Phase I sorting hall

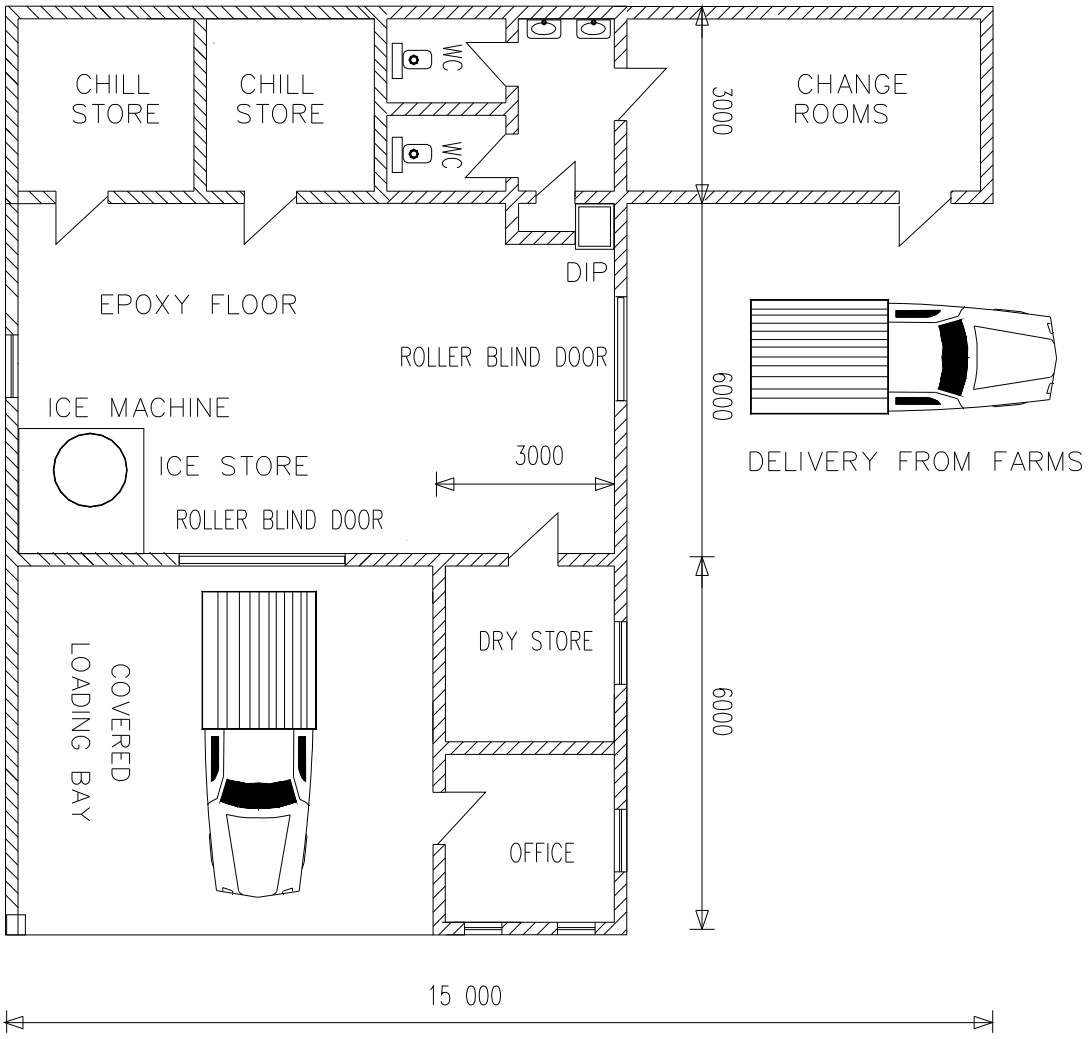


Figure 9. Typical layout for a modern processing hall for Dhamara fishing port to replace existing facilities

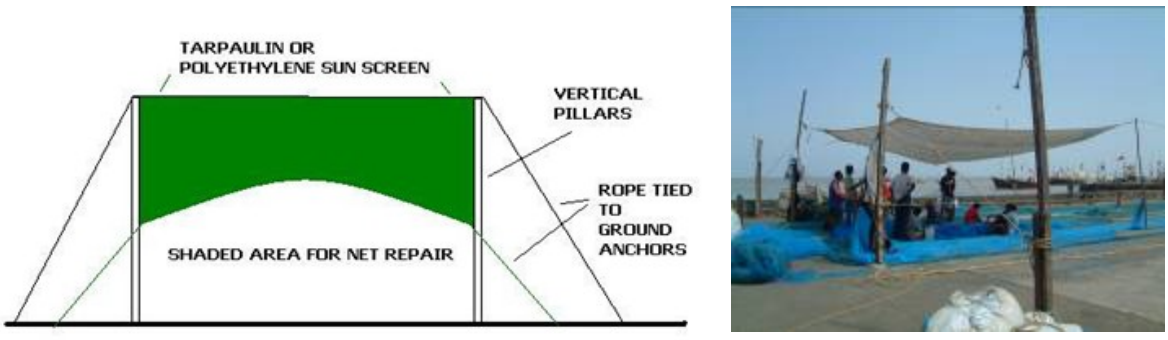
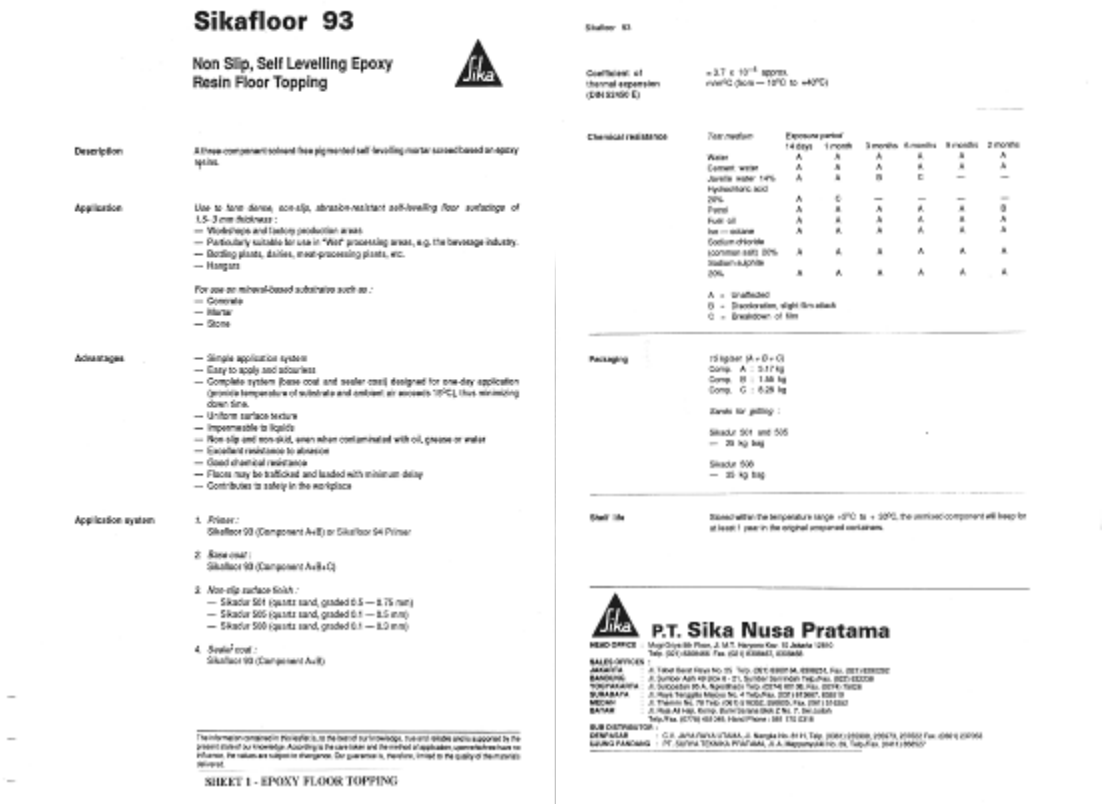


Figure 10. Upgrading (shading) of net repair



Sikafloor 93

Non Slip, Self Levelling Epoxy Resin Floor Topping

SHEET 1 - EPOXY FLOOR TOPPING

P.T. Sika Nusa Pratama

Figure 11. Sikafloor 93 seamless resin floor topping

The sorting platforms in the newly refurbished sorting shed should consist of: either low level (150 mm high) hardened platforms or waist-level processing tables in food grade material.

The exact extent of the epoxy floor may then be determined prior to the tendering out of the civil works, as this will influence the method of construction and surface area.

It is recommended that a trial be conducted immediately for a period of two to three months with a suitably modified table to determine the working level most favoured by the sorters.

5.2.5 Hygiene facilities

The hygiene block (toilets and showers) currently under construction at Dhamara should be finished to the highest possible standards to prevent malfunctions. In particular:

- The floor should be paved in granite or other local hard mineral slabs with the least number of joints.
- All faucets should be food-industry grade.
- All surface water should drain towards a central linear drain away from the walls.
- The linear drain should be easy to clean and unblock.
- All doors should be in waterproof materials (not timber).
- The facility should be manned and charge for services.
- Reminder notices (hand washing) must be displayed internally.

The hygiene block at Mangrol needs complete refurbishment to the above standards and the outflow from the septic tank diverted to the intermediate settling tank for discharge through the outfall, Figure 2.

5.2.6 Fish box wash station

The fish box wash station should consist of a rigid canopy in reinforced concrete or steel, approximately 5 metres wide by 10 metres long with two or four supporting columns, Figure 12. The area below the canopy should be considerably larger (say 10 metres wide by 15 metres long) paved in Grade M40 concrete and laid to a gradient to drain away the hose down water (which includes fish scales and other organic debris) to a VEE channel running along the perimeter of the station. A one metre high reinforced concrete perimeter wall should be constructed over three sides of the station. One column of the supporting structure should be equipped with a suitable waterproof power outlet (IP55) and a water coupling as shown in Figure 12, to enable a wall-mounted power washer to be installed at eye level.

At Dhamara, the fish box washing and sterilisation station may be located mid way between the Phase II and Phase I jetties. The entire volume of washing water should be drained away to a soakaway via a stainless steel strainer and the solids recovered for proper disposal at sea.

At Mangrol, the fish box washing and sterilisation station may be located near the existing elevated water tank (Figure 2) and the entire volume of washing water drained away to the intermediate settling tank via a stainless steel strainer and the solids recovered for proper disposal at sea.

5.2.7 Port wastes reception

At both ports, the wastes stream consists of:

- Wet fish wastes from the sorting platforms and strainers and trash fish.
- Spent engine oil.
- Oily bilge water.
- Starter and other batteries.
- Toxic wastes (engine spares, oil filters, oil and paint cans, etc.).
- Non-toxic wastes (dunnage, nets, ropes, etc.).
- Hose down water from sorting hall, outflow from septic tank.

Wet fish wastes generated by the port should be collected in airtight PVC barrels placed in strategic places around the port. Wet wastes like trash fish, brought back by trawlers for sale as fertiliser, should be placed inside airtight PVC barrels aboard the trawlers themselves before being put ashore.

Spent engine oil should be collected in special double-walled containers, Figure 13, placed inside a reception shelter and located in a strategic position within the port area.

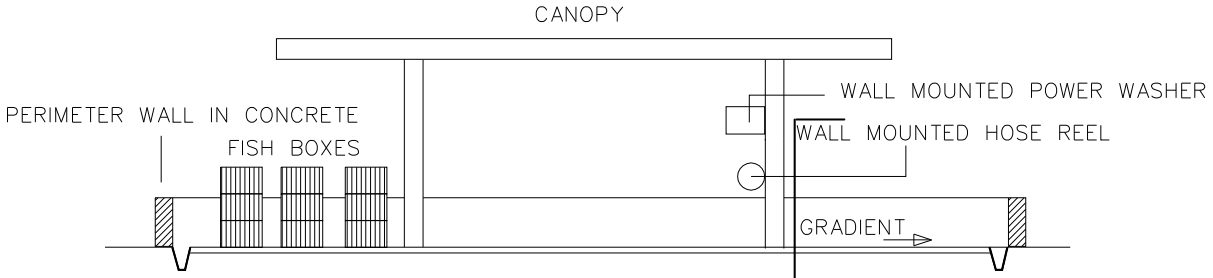
Bilge water should be pumped ashore into a bilge water separator and the oil so collected returned to the spent oil containers, Figure 13, bottom figure.

Starter batteries, unless returned to the supplier in return for a new one, should be stored on site inside a protective (shaded from sun and rain) shelter until they can be collected for recycling, Figure 13.

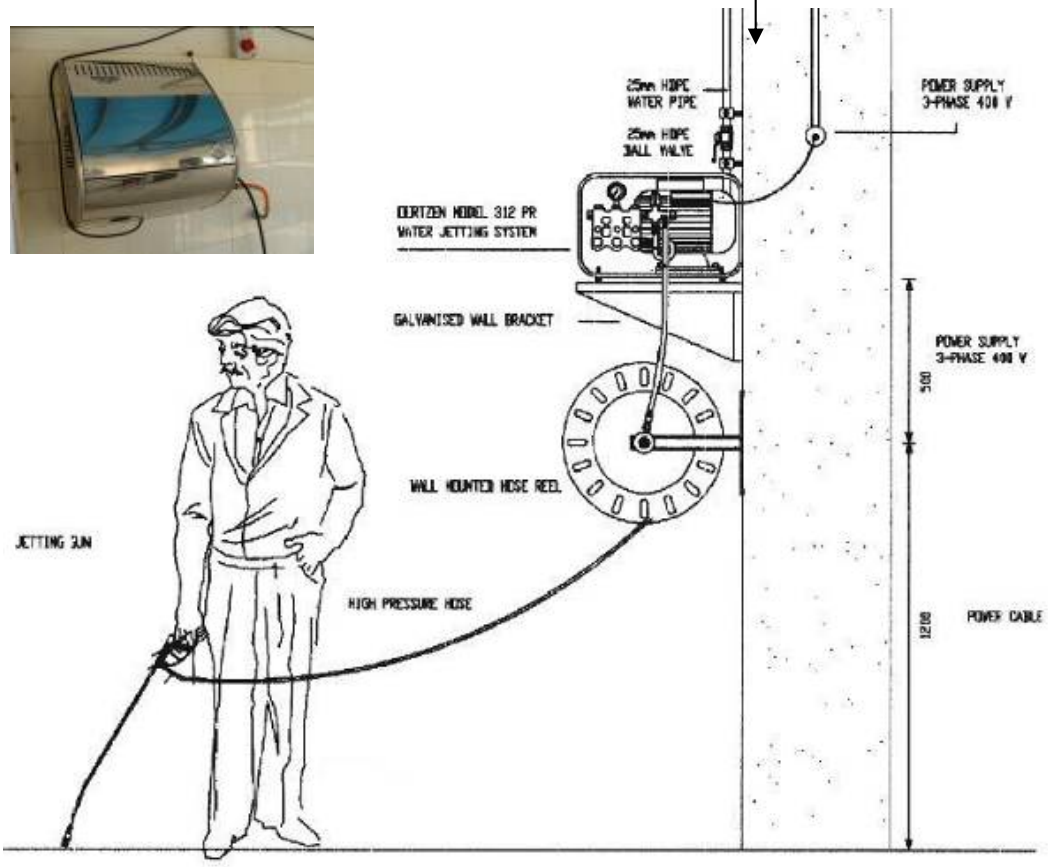
Similarly, rechargeable batteries and toxic wastes should be stored in a water-tight container until they can be collected for proper disposal.

Non-toxic wastes should be collected in large plastic wheelie bins with drop-down lids for eventual disposal. The port in Mangrol should also make an effort to collect floating debris (polystyrene foam, plastic and other vegetable matter) from inside the basin.

The hose down water from the sorting hall and fish box wash station will first pass through the solids strainer before being conveyed to a drain. This water will contain fish blood, fish oils and squid ink, all solids having been removed at the point of origin. This water, together with the septic tank outflow, should be conveyed to a large settling tank to separate the fish oils from other organic but water soluble substances, Figure 14.



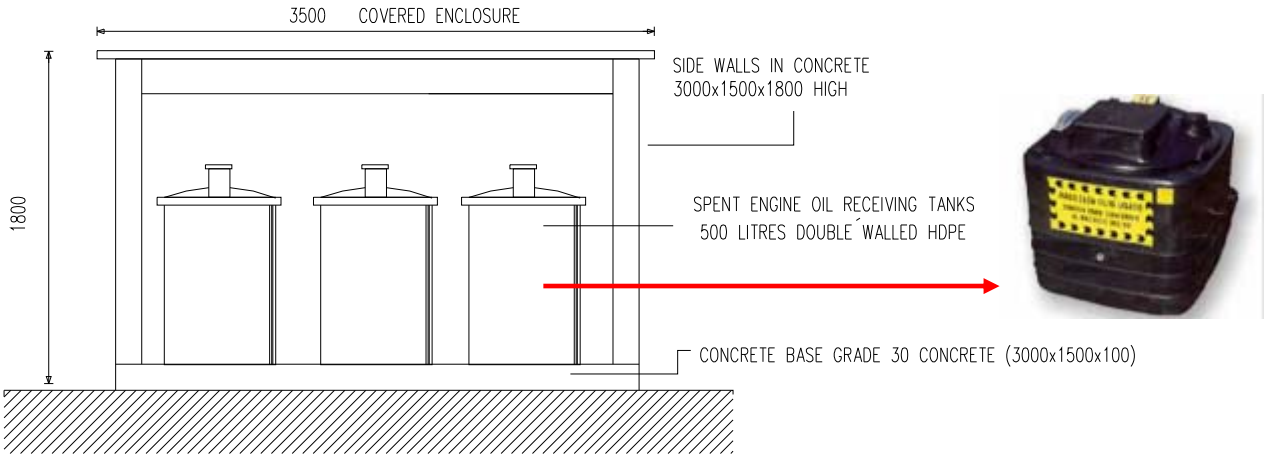
Fish box washing and sterilization station *(Side view - no scale)*



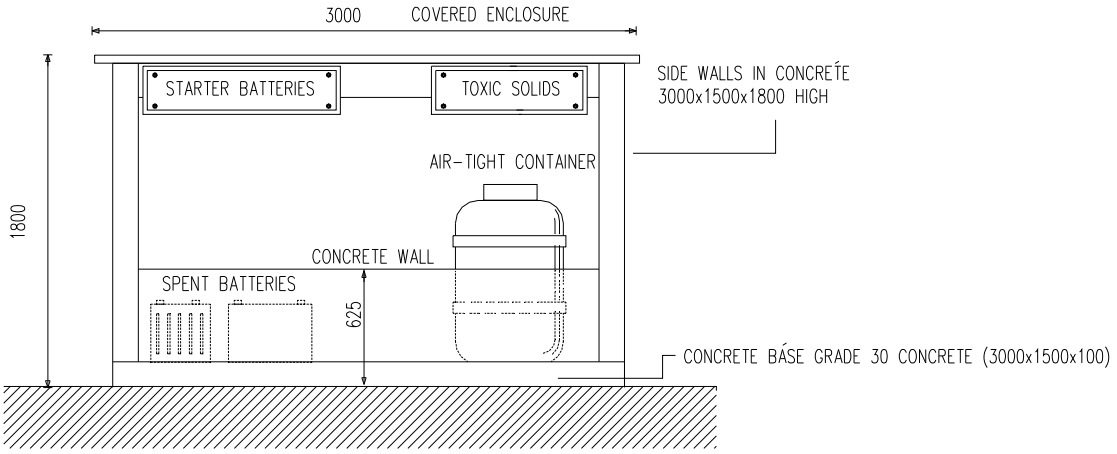
Details of wall mounted power washer fittings *(no scale)*

***** All pipe brackets, supports, hose reel drum, etc. to be suitable for operating in a sea water environment

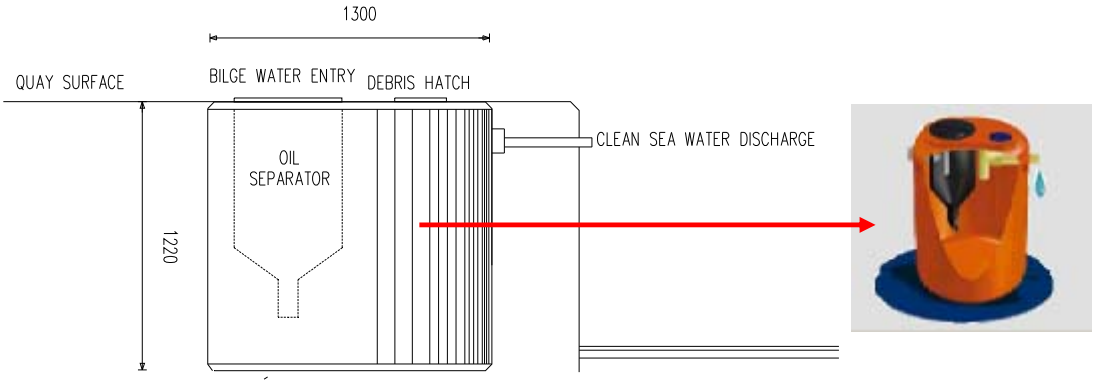
Figure 12. Details of fish box washing and sterilization station



Details for spent engine oil reception shelter *(no scale)*

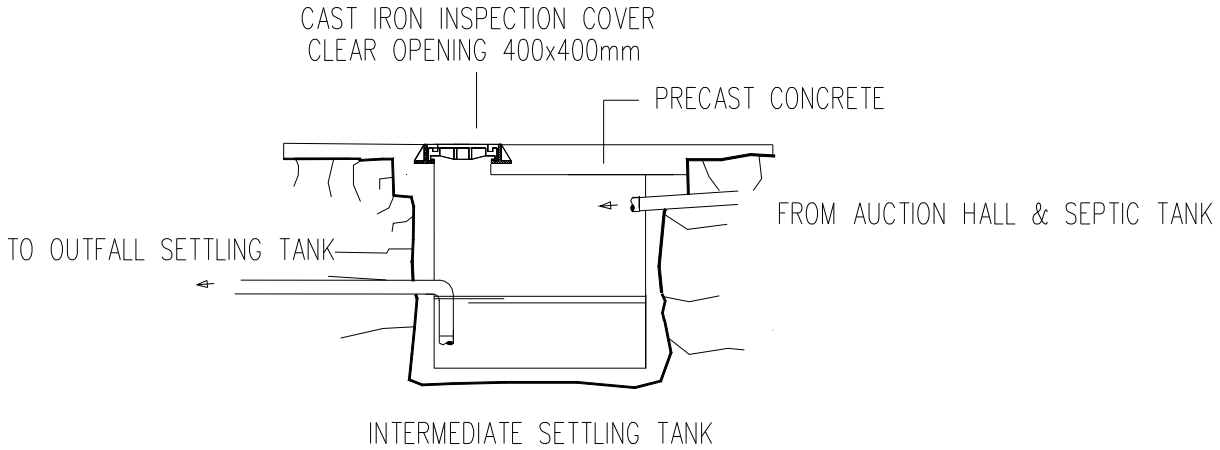


Details for spent batteries and toxic waste shelter *(no scale)*



Details for a bilge water oil separator *(no scale)*

Figure 13. Details of toxic wastes reception equipment *(MARPOL)*



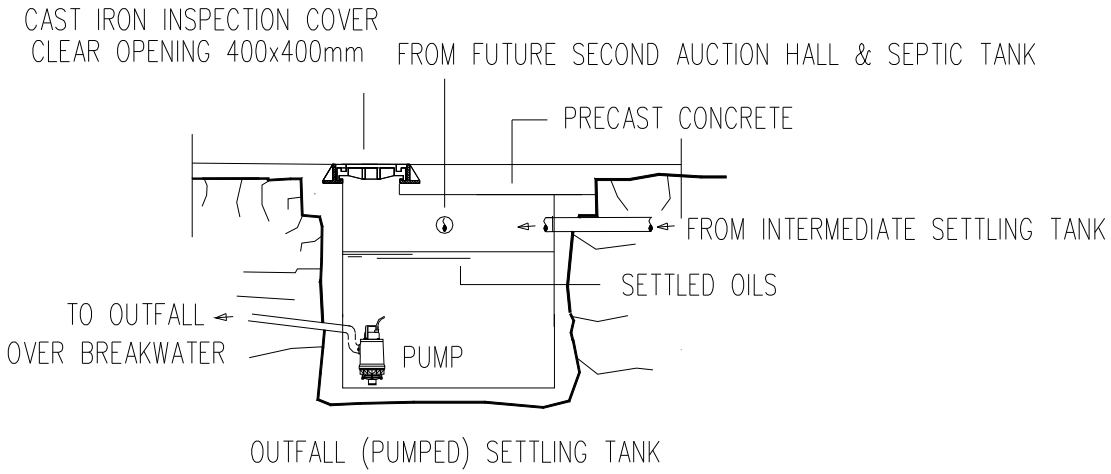


Figure 14. Details for settling basins at Mangrol

5.2.8 Port waste disposal

Small to moderate quantities of wet wastes unless used as fertiliser or animal feed, should be returned to the open sea, as these provide food for other fish.

The port management bodies at Dhamara and Mangrol should enter into an agreement with an oil refiner for the delivery of the collected spent engine oil for recycling. Some oil is already being collected in Dhamara for recycling but the effort needs to be expanded to the whole fleet. The port management bodies should also try to introduce simple log books aboard the trawlers detailing the oil changes carried out and the port where the oil was collected.

Lead-acid starter batteries are already collected in some places but the effort must be extended to the entire fleets.

Toxic wastes, especially those that cannot be recycled, should be sent to an approved landfill for disposal. The port management bodies at both ports should consult with local municipal authorities for such areas to be identified if they do not already exist.

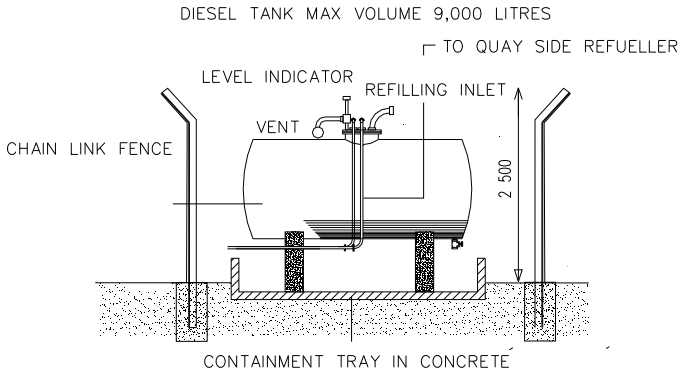
Non-toxic wastes should be sent to an approved municipal landfill and not dumped haphazardly around the village.

The hose down water containing only soluble organic matter, mainly fish blood and squid ink, should be conveyed to an outfall for discharge into the open sea behind the lee breakwater, Figure 3. National legislation must be adhered to regarding the effluent standard from point sources. It should be emphasized that the more fish is pre-sorted and boxed on board, the cleaner the hose down water.

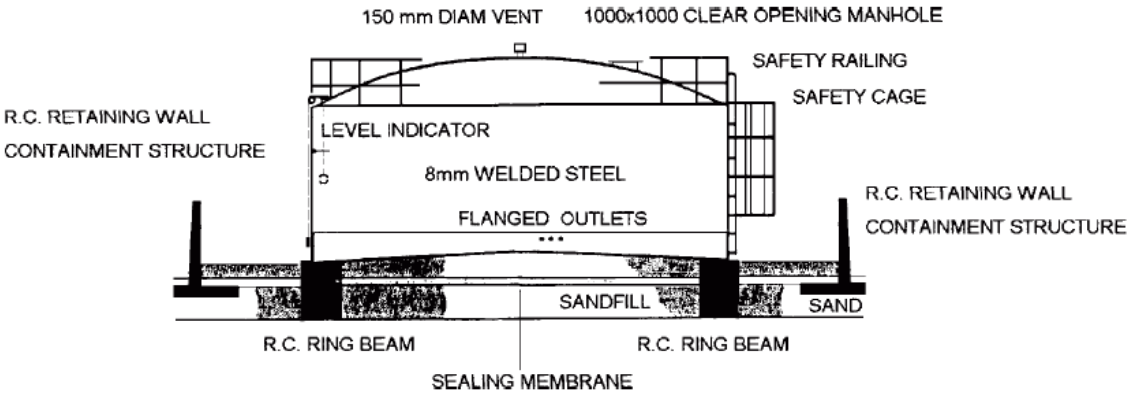
5.2.9 Refuelling

Depending on the amount of fuel sold at each port, the bunkering facilities should be upgraded to conform to current environmental standards. Fuel tanks should not be buried close to sea level for fear of corrosion and the current methods of refuelling (roadside pumps and jerry cans) are not suitable for a sustainable environment.

Figure 15 illustrates the internationally approved methods for storing fuel in medium and large quantities in fishing ports. The fuel dispensing unit should also be upgraded to cater for the larger trawlers that require 1 000 litres or more of fuel.



Details of a refuelling bunker for a small fleet – 10 Tons maximum *(no scale)*



Details of a refuelling bunker for a large fleet – 100 Tonnes minimum *(no scale)*

A typical quayside refueler for fishing boats capable of dispensing
Up to 400 litres/minute of diesel

Figure 15. Details for refuelling bunkers

Figure 16. Examples in other countries: Standard of workmanship and cleanliness (small and large refuelling bunkers). Fishing port development – Cape Verde *(left)* – Albania *(right)*

Figure 16 illustrates the standard of workmanship and cleanliness of refuelling centres required in modern day fishing ports.

5.2.10 Tie-up

The function of tie-up areas is grossly underestimated in both ports, resulting in overcrowded conditions at the main jetties (trawlers remain moored in the same place after unloading) and a drastic drop in throughput efficiency of the port.

The port of Dhamara should dredge the cyclone shelter to enable trawlers to move off the jetty as soon as they finish offloading, freeing up jetty space for late comers.

In this respect, the situation in Mangrol is very desperate and only the much anticipated Stage III construction of an outer basin may ease the overcrowded conditions inside the inner basin.

5.2.11 Other equipment and buildings

Selected items of obsolete equipment should also be replaced.

At Dhamara, these include timber platforms on rickshaws carrying ice to the port (to be replaced with stainless steel) and diesel-powered ice crushers, to be replaced with electrical models.

A training centre should also be constructed at Dhamara to assist in the dissemination of model fishing port technologies and practices. The centre should consist of a two-storey building with a footprint of about 20 metres by 20 metres with a large classroom to accommodate up to 30 people on the ground floor and up to five lodging rooms on the first floor for visiting instructors.

5.3 Sanitation programme[10]

Dhamara and Mangrol fishing harbours act as transit points rather than auction or sales points. Most of the fish is sold directly to traders who may own the boats themselves or have prior arrangements with owners. In Dhamara there are reckoned to be just five transport companies who operate out of the harbour taking fish to markets in West Bengal. These companies have multiple interests in the fishing industry and can own fishing vessels, ice plants, transport vehicles and probably make loans to boat owners in exchange for first refusal on fish caught. It is essential therefore that these transporters are involved in and kept informed of the changes that are taking place at the harbour.
The landings are used for the transhipments of fish from the catching vessels to the vehicles which transport the fish to other markets. Although auctions do not take place the landings are used for sorting, grading, re-icing and boxing of the catch for onward transport. The amount of handling that occurs at the landing point depends on a number of factors. In Dhamara for instance, it is estimated that about 40 percent of the trawlers landing at the harbour box their catch with ice at sea and that some of the catch is sorted and graded by species and size during this operation. Catch thus handled at sea can be unloaded directly from the vessels and need not be repacked at the landing point. This can cut down on the steps in the food chain and thus reduce the risk of the food becoming contaminated. It appeared that boxing at sea is not practiced on any of the boats in Mangrol. The trawlers do have separate pounds in the holds which are used to separate catches and species but most of the sorting and grading is done at the landing.

The threats to the safety of the fish passing over the market come from a number of sources and the management of the harbours and the cleaning and sanitation controls need to take these into account. Contamination of the product can come from the following:

- Contact with surfaces already contaminated with bacteria from previous batches of fish.
- Contact with surface contaminated by extraneous materials such as diesel, engine oil detergents etc.
- Contact with sources of pathogenic organisms such as faeces, animals (insects, rodents. dogs etc).
- Contact with human carriers of harmful organisms.
- Contact with contaminated water or ice during the cleaning or preservation process.

It must be emphasized that a fully functioning and acceptable sanitation programme can only be implemented once the structural and infrastructural changes have been completed. The existing facilities, because of their design and lack of maintenance, are impossible to keep clean to an acceptable level.

5.3.1 Sanitation and cleaning regimes

The sanitation and cleaning regimes recommended here require minimum levels of trained staff. The management of the harbours will include a sanitation manager responsible for the overall cleanliness of the harbour. In addition, staff will be needed for the physical tasks involved. Initially the staff required is limited to those envisaged for the first stage of improvements at each of the harbours. In the case of Dhamara limited to the completion of the new (Phase II) sorting/auction area and the rationalization of bunkering and servicing of vessels; in the case of Mangrol limited to the landward development of the old auction hall and quay. These are set out in Table 4.

[10] Taken from the mission report of Ivor Clucas, *International Expert on Fish Quality and Food Safety, 13–28 April 2007*.

Table 4. Staffing at the harbours.

	Staff Duties	Dhamara	Mangrol
		Number of staff	Number of staff
1	Manager/Supervisor	1	1
2	Box washing	1 (per shift)	1 (per shift)
3	Cleaning surfaces	1 (per shift)	1-2 (per shift)
4	Colleting rubbish/checking drains	1	1
5	Manning toilet block	1 (per shift)	1 (per shift)

The duties for the members of staff 2 – 4 in Table 4 would be interchangeable. It is probable the number of staff would need increasing during the main fishing season particularly at Mangrol where congestion and overcrowding on the quay will make cleaning and sanitation particularly difficult. When operating around the clock, for instance, there will be a need to have someone on duty both day and night to undertake manning of the toilet block, surface cleaning and box washing. During the closed season in Mangrol when no fish is landed into the harbour, the staff number could be reduced to just the manager/supervisor and one labourer to take care of the facilities which may still be used by traders buying fish from the gillnet beach landing adjacent to the main harbour. At Dhamara there are times of the year when some nearby fishing grounds are closed (April/May) but fish caught elsewhere is still landed at the harbour, therefore there may be a minimum staffing requirement during the low season. The situation will need to be reviewed once the sanitation and cleaning regimes are operational.

5.3.2 Cleaning procedures

Table 5 shows the recommended processes of cleaning and sanitation that apply to both Dhamara and Mangrol harbours.

For the cleanliness of floor surfaces and those that come into contact with fish, staged cleaning regime needs to be adopted at least once a day. This consists of the following three steps:

1. Large debris will be removed using brushes, scrubbers or by hand.
2. The area will be washed down using the high pressure washers with a food grade non-perfumed detergent.
3. The area will then be drenched or rinsed with chlorinated water (50 ppm) – this can be allowed to evaporate and dry naturally.

Should they be available cheaply and reliably, Quaternary Ammonium Compounds (QACs) may be used instead of a detergent and chlorine. QACs act as both detergents and sanitizers; however they are generally more expensive than standard detergents. Guidance from the Marine Products Export Development Authority (MPEDA) on what is used in the seafood export factories in India should be obtained so that the costs and availability of suitable materials can be ascertained.

The above cleaning regime should be used for surfaces in contact with fish. In addition the following actions are required:

- The platforms and surfaces constructed for fish sorting will be washed down with clean water after every sorting operation using the overhead trigger taps provided.
- Between the use by one operator/transporter and the next, the surfaces and surrounding floor will be washed with high pressure water.
- The filters through which wash down water from the sorting platforms or tables flows, will be emptied and cleaned between each sorting operation or more frequently should they become blocked.

- At the end of the working day and at least once a day during the fishing season the fish sorting area will be cleaned in a three-stage process.

Table 5. Cleaning and sanitation scheduling.

Frequency	Items
Daily	1. Floors and sorting area cleaning and sanitation 2. Inspection of quay and lorry parking areas – clean if necessary 3. Inspection and cleaning filters on all drainage systems 4. Inspection of waste bins – empty if necessary 5. Clean down the box wash area 6. Toilet block to be cleaned and disinfected 7. Inspection of canteen facilities for waste food disposal and clear up if necessary
Weekly	1. Three stage cleaning of quay 2. Three stage cleaning of lorry park area 3. Thorough cleaning of drainage system 4. Empty all waste bins 5. Manager to walk whole site to inspect for problems
Monthly	1. Manager to sample and test water and ice supplies
Ad hoc	1. Cleaning of fish boxes – at least every use 2. Users to clean as they use the sorting and auction areas 3. Boat owners to dispose of oil, grease, batteries etc as directed 4. Toilet to be kept clean and manned throughout the working day

5.3.3 Recommendations

The following recommendations provide guidance on other actions necessary under the sanitation programme:

- Cleanliness of boxes used for storing and transporting fish must be ensured as they come into contact with the fish. These must be thoroughly cleaned between each use. This will be undertaken in a specially designed facility using high pressure washer and sanitizers.
- By implementing a regime which restricts entrance to the harbour of animals and humans without business in the port, the amount of cleaning necessary to areas other than those where fish is directly being handled can be reduced. However it will be necessary to clean down periodically the quay over which boxes and baskets of fish pass on a regular basis. This area must be inspected on a daily basis and any spillages or contamination dealt with immediately. It is recommended that the area be given a three-stage clean at least once a week or more frequently should the need arise. It is probable that during the high season more frequent cleaning will be required. Cleaning will be using the three-stage cleaning regime.
- The lorry/truck loading area adjacent to the sorting area must be inspected on a daily basis and any spillages or contamination dealt with immediately. It is recommended that the area be given a thorough three stage clean at least once a week.
- Drains which take wash down water from the harbour activities must be inspected for debris which hinders the flow of water on a daily basis. Debris must be removed and disposed of appropriately. The basket filter and other filters installed in the waste stream will collect any macro particles suspended in the water such as fish scales etc. These must be emptied and cleaned once a day to ensure water flow. The wet and semi-solid wastes from the filters will be placed in airtight waste bins for eventual disposal.
- All drains should be washed through at least once a week and observations made of the water flow (this is a two-person operation) to ensure that there are no blockages at constriction

points such as corners. If lack of flow is observed it must be reported to the management and remedial action initiated.

- The physical operation of the chlorination system for the main water supply must be checked everyday. Weekly checks on the residual chlorine at the outlet taps on the harbour should be made to ensure they are at acceptable levels (5 ppm). Adjustments to chlorination systems or remedial action must be taken as necessary.
- Ice is used as the main preservative for fish on the vessels, market and for onward transport. It is essential that the ice used conforms to Indian standards for drinking so that it does not contaminate the fish or the working environment. The management should insist that the ice plant operators produce documentary evidence from the local health authority that the ice they produce conform to these standards.
- Human excrement represents a potential threat to the cleanliness and sanitation regime on the harbour. Disease vectors such as flies and rodents have the potential to carry pathogenic organisms from human waste to fish through physical transfer. In order to reduce this risk properly designed toilet facilities are to be provided on the harbours. These are to be manned while the harbour is operational. Users of the facilities must be made aware of their responsibilities in keeping them clean and clear signage to this effect must be shown in the local language and in pictorial form. In addition poor personal hygiene, such as not washing hands after using the toilets, can lead to contamination of the fish. With this in mind a public awareness campaign on the need to maintain clean toilet practices will be needed. This will include appropriate signage.
- The toilets will be designed so that the human waste is flushed to a sceptic tank thus reducing health hazards associated with open latrines. The toilet stalls and urinals will be cleaned thoroughly on a daily basis. In addition the door handles, taps and sinks should receive particular attention as it has been shown that they are a major means of transmittal of bacteria from one user to another. Phenolic disinfectants may be used in the toilet cleaning operation; however these must NOT be used for cleaning the fishing harbour generally as they are toxic and will taint the fish. Any maintenance needs will be reported immediately to the management.
- At least once a week the manager responsible for hygiene and sanitation must walk the whole site with the purpose of ensuring there has been no unauthorized dumping of waste material which can harbour rodents, flies etc. Should unauthorized waste material dumping be found, the culprits should (where possible) be identified and charged for the removal of the wastes.
- The airtight containers used for the reception of wet and semi-solid fish materials must be emptied at least twice a week and more often if they become full. They need to be checked for contents on a daily basis and emptied if they become full.
- The wheelie bins for the reception of dry and solid wastes must be emptied at least once a week or more often if necessary. They must be checked for content on a daily basis and emptied if necessary.
- The fishing industry at both Dhamara and Mangrol are based in part around motorized fishing vessels. The servicing and maintenance of these vessels produce materials which are potential contaminants of fish. These include waste engine oil and other lubricants and lead acid batteries. In Dhamara there already exists a system whereby waste engine oil is collected and taken to the local engine oil supplier for recycling. This system should be formalized through the new management regime on the harbour and a system for the recycling and safe disposal of worn-out lead acid batteries also initiated. Similar schemes should be initiated for Mangrol harbour.
- By ensuring at Dhamara harbour that refuelling of vessels takes place from only one point rather than on an ad hoc basis, diesel spillage onto the quay with the potential to contaminate fish and ice will be reduced. However the management will need to ensure that there is no contravention of the bunkering arrangements and appropriate action taken against those who abuse the system.

- With the installation of hydrants for delivery of clean seawater to the quay side at Mangrol, there will be no need for fishing vessels to use harbour water for cleaning their decks and holds. It will be the responsibility of the harbour management to ensure that the skippers and crews of the vessels use the water hydrants correctly and inspect and check for their correct operation on a daily basis.

6. UPGRADING MANAGEMENT

6.1 Port management

No matter how small or busy a fishing port is, proper port management is required to ensure:

- Compliance with the laws, regulations and other legal rules governing the use of the facility (landing fees, bulk handling charges, sale of potable water, etc.).
- Compliance with environmental conservation and monitoring measures adopted by the planning authorities (waste recycling, spent-oil recovery, wet wastes disposal, etc.).
- Integration with other users as in the case of a non-exclusive facility for fishing vessels (landing jetty may double as a passenger landing stage for coastal taxi boats).
- Transparency in the decision-making process.

In order for the port management body to be able to carry out its duties, it must:

- Be commensurate with the size of the facility and the responsibilities expected of it (one person could be enough for a small village jetty but a group of persons would be necessary inside a harbour with a large fleet of canoes, plank boats and other types of vessels).
- Adequately funded to function as intended (landing fees and handling charges should reflect current maintenance and running costs).
- Represent the whole spectrum of users of the facility (if the jetty doubles as a passenger landing then the interests of the passengers must also be taken into account).
- Allow for consultation between the various users (if one of a multitude of user subjects the jetty to abnormal stresses then this should be reflected in the maintenance charges).

The port management body should include a full-time hygiene officer. The hygiene officer may also be seconded to the port management body from another government agency. The hygiene officer should ensure that:

- Only potable standard water is used within the port area to wash fish;
- Fish or fish products are not tainted while being handled;
- The port area and its immediate surroundings are kept in pristine condition.

Assuming that the port infrastructure has been upgraded to the required standard, the hygiene officer would check that:

- All water supplies inside the port comply with national drinking water standards.
- All ice brought in from outside suppliers conforms to the national drinking water standards.
- If chlorination equipment is used on site, it should be functional and adequate supplies of the chlorination agent are held in stock.
- If water supply is safe but not chlorinated, a rigid and frequent water quality testing regime is set up and scrupulously adhered to.
- All sampling and testing carried out inside the port is carried out by an approved or certified laboratory.
- All drainage systems (indoor and outdoor) and their filters are kept in perfect working order and checked at the close of business everyday.
- Disinfection of required areas is carried out on a regular basis and enough detergents and/or sterilizers are kept in stock.
- No excessive quantities of trash fish and wet waste accumulate in work areas.
- No rodent harbourage exists in and around the port area (tall weeds, junk piles, vessel hulks, old netting and municipal rubbish).

- No birds are nesting inside the open areas of halls and fish handling sheds.
- No animals or animal droppings are inside the port area.
- The entire fish handling area is hosed down at the close of business.
- Toilet facilities equipped with “HAVE YOU WASHED YOUR HANDS?” signs at all exits.
- Awareness programmes on personal hygiene are carried out on a frequent basis (either organized by the port itself or by local non-government organizations (NGOs).
- Awareness programmes on proper housekeeping on board vessels are carried out on a frequent basis (either organized by the port itself or by local NGOs).
- Toilet facilities are kept scrupulously clean and in perfect working order (corrosion of fittings, soap, toilet paper supplies, drainage filters, and lights).
- Toilet facilities are manned at all times.
- Toilet facilities are used by crews during layover periods inside the port.
- Port perimeter fences are properly maintained and breaches repaired immediately.
- Appropriate signs are displayed at the entrance and within the port boundaries listing the port hygiene regulations (dumping, spillage, use of seawater, spitting, etc.).
- Appropriate signs are displayed at the entrance to the port area listing the fines for contravention of port hygiene regulations.
- Only electrically powered or manual machinery is allowed inside the sorting sheds to prevent cross contamination of large fish which is often stockpiled on the floor.
- All sorters follow personal hygiene guidelines when handling fish.
- That all sorting platforms and fish boxes are washed properly and that no harbour water is used on surfaces that come into contact with fish.
- That moving mechanical parts are not oiled but greased with non-toxic grease.

6.2 Fishing harbour management in India

The classification of fishing harbours in India follows the pattern of classification of commercial ports. The commercial ports are classified as major ports and minor ports. Major ports are under the control of GoI and are regulated under the major ports trust act. Port Trusts are responsible for management and maintenance of respective major port. Minor ports are for commercial activities of the maritime states and are under the control of the respective state Government. Development and management of minor ports is done by the state through their state port department who have engineering wing under them.

Following a similar pattern there are three categories of harbour facilities in India for fishing vessels.

a. Major fishing harbours
b. Minor fishing harbours
c. Fish landing centres

6.2.1 Major fishing harbours

Major fishing harbours are those developed within the jurisdiction of major (commercial) ports of India. The objective of development of such harbours is to create fishing harbour for use by fishing vessels going on deep sea (distance waters) fishing. The location of major fishing harbours will be in the land belonging to a Port Trust normally adjoining the commercial port. Consequently the Port Trusts who will have a full-fledged engineering department under it will undertake their design and construction. The inputs regarding fishing such as the fleet of vessels would be provided by the state fisheries department of the state Government within which state the major fishing harbour is located. The GoI provides 100 percent financial assistance to the Port Trust for the development of major fishing harbours. The control of the assets created with the funds of Ministry of Agriculture, GoI, vests with the Port Trust. The fisheries department regulates the fishing activity in the harbour. GoI expects that the Port Trusts are in a better financial position to take up the maintenance of major

fishing harbours including capital-intensive work of dredging. However, whenever expansion of harbour facilities is required, Port Trust would make the proposals after consulting state fisheries department. On that basis GoI approves the proposal and provides funds. Under the category of major fishing harbours there are five harbours as follows:

a. Chennai (Madras) in Tamil Nadu
b. Kochi (Cochin) in Kerala
c. Vishakapatanam in Andra Pradesh
d. Paradeep in Orissa
e. Sassoon in Mumbai in Maharashtra

There is no single model of management of major fishing harbours. Generally, the management and control of major fishing harbours is by the Port Trusts, which are autonomous bodies. As the major fishing harbours fall with in the estate of major ports, the Port Trusts would not accept any outside agency to manage the fishing harbour.

While all the major fishing harbours are managed by the Port Trusts, in the case of Chennai fishing harbour a management committee has been constituted to oversee the operation of the fishing harbour. This became necessary at Chennai due to the presence of many groups of fishermen associated with different political formations.

The management committee is headed by the Chairman of Chennai Port Trust and is represented by a wide spectrum of interests like fishermen associations, fishery industry, city police, city corporation, Ministry of Agriculture and state fisheries department. The committee is empowered to take decisions regarding the management of the fishing harbour including the fixation and levy of user charges.

The user charges are decided by the Port Trust in consultation with the state fisheries department, who in turn, get inputs from the fishing community using the harbour. The Port Trust levies on that basis and collects the user charges.

6.2.2 Minor fishing harbours

These are the harbours located on the coast of each maritime state other than the premises of Port Trusts. The harbour offers facility to medium and small size fishing vessels with draft less than 2.5 metres. The harbours will have proper protected harbour entrance from the sea, a protected harbour basin, breakwater wherever required, a landing quay, and all other facilities like auction or sorting hall. There are in all 44 minor fishing harbours in India. The state governments have many more proposals for increasing the number of minor fishing harbours. It is to be understood here that the number of new harbours and the fleet of vessels to use the harbour would be consistent with the maximum sustainable yield.

Development of minor fishing harbours is undertaken by respective states under a GoI-sponsored scheme. Under this scheme the expenditure on the construction of fishing harbours is shared equally by GoI and state Government. The fund provided by GoI is in the form of grants-in-aid to the state. The state port department, which will have under it an engineering wing, develops the minor fishing harbours.

There are different models practiced by different States for the management of minor fishing harbours.

a. Fishery Terminal Division (FTD) model
b. State port department model
c. State fisheries department model

Fishery Terminal Division model

This concept was introduced under an earlier UNDP assistance on fishing harbours during the 1970s. UNDP project prepared techno-economic feasibility reports for several sites in India based on both engineering and socio-economic investigations for development of modern fishing harbours. The respective state Governments approached GoI with those and obtained funds from GoI. Dhamara fishing harbour is one of the sites for which feasibility report was prepared under the UNDP project. It was the UNDP who introduced the concept of FTD and gave brief details of the system in each of the feasibility reports then prepared.

The responsibility of the FTD envisaged the following:

- Day-to-day cleanliness in the harbour.
- Organizing auction system in the harbour.
- Providing services and supplies to fishing vessels and other users of the harbour.
- Fixing levy and collection of user charges.
- Security of the harbour.
- Collection of fisheries statistics.

FTD has been established at some ports like Mangrol and Veraval in Gujarat. In this model, FTD is a governmental set-up established by an executive order of the state government. The head of FTD and supporting staff are employees of the state government. At present FTD is headed by different levels of fisheries officers. For the engineering maintenance of the harbour, FTD seeks the help of engineering wing of the state port department.

In the current assessment, FTDs are unable to exercise full control on the harbour, especially about limiting the size of the fishing fleet to the designed capacity of the harbour. Overcrowding and consequent effects on quality of harbour and catch are prevalent. The reasons are mainly that the voice of the fishing community, trawler operators and others in association with political and social groups prevails over the FTD. The FTDs are not also adequately funded.

Port department model

In this model, management and control of the ports are given by the state government to the port department under it. The head of the unit at the harbour will be from the same department. The unit would consist of other supporting staff like accountant, clerks, field men and watchmen. The unit would maintain the harbour and also collect the user charges as fixed by the state government. The fishery department would provide fishing input like collecting fishery statistics, licensing of boats, and also attend to other programmes of the state government to assist fisherman community, like providing subsidy on diesel, group insurance coverage, housing etc.

This model is not all inclusive. The other stakeholders of the harbour are not participating in the management. This model also expects highest cooperation between the two departments, viz., department of ports and department of fisheries of the state government. Dhamara is a typical case adopting this model.

There is an advantage to this model in that the process of seeking approval and execution of civil works, their maintenance, expansion works, dredging and similar works become smoother and faster, as all these are handled in the same department. However, there are also disadvantages. One is that the fishery participation and the participation of the community using the harbour are absent. This results in improper and inadequate maintenance of quality of fish. The fishery officials also feel that they are outside the ambit of the system and hence lack positive reinforcement to take interest and feel the ownership of the facilities. Another disadvantage is that the port department lacks authority to control the population of fishing vessels using the harbour. As a result, the trawler owners enjoy uncontrolled

use of the harbour by their vessels. In view of good profits from fishing activity, the fishing community goes on adding numbers to the already congested fleet.

Fisheries Department model

This model is similar to the port department model, except that the roles of the two departments get interchanged. In this model, the fishing aspects of the harbour get proper attention, the head of the management unit being an officer from the fisheries department. The head and the supporting staff for the state fisheries department provide the management unit. For engineering maintenance and repairs including dredging, the fishery department seeks assistance from the port department. The advantage in this set-up is that the fishery aspects, like control on operation of fishing vessels, regulation of mesh sizes, fishing ban period, and collection of fisheries statistics, fall nicely under the model. However, the disadvantage is that the engineering repairs and maintenance have to be done through the state port department. Hence, this could result in delays in the execution due to the time required in processing the proposals separately by two departments.

A typical example of this model exists at the fishing ports of Malpe, Honaver, Mangalore and Gagolli, in Karnataka. The Fisheries Department of the Government of Karnataka has appointed a Joint Director of fisheries to manage the fishing harbours with other supporting staff.

There are also other models where fishing harbours are managed by autonomous bodies like state fisheries corporation. One example is the case in West Bengal where West Bengal Fisheries Corporation is managing the fishing harbour.

6.2.3 Fish landing centres

The development of fish landing centres (FLCs) is distinguished from the minor fishing harbours in terms of type of civil structures to be built and the category of fishing vessels operating at the centre. Otherwise the funding pattern is similar to that of minor fishing harbours and the jurisdiction comes under the State Government. GoI has a policy to develop an FLC to cater to traditional craft, motorized and non-motorized, and small mechanized fishing vessels. An FLC can be developed with or without a wharf or jetty. But essentially the FLC will have the facilities for clean landing of the catch in addition to provision of utilities like roads, water and electricity. Generally the FLCs are small budget facilities compared to the minor fishing harbours. There are about 175 such FLCs (2009) operating along the Indian Coast.

At the time of reporting there was nothing existing as a management body for any FLC. The control and ownership of the facility lies with either fishery or port department of a state government. The facilities are used by the traditional fishermen and no user charges are collected. Any engineering maintenance is done by the state government. However there are proposals to provide a management structure to either an individual FLC or a group of them. In another system there is a proposal to bring the management of FLCs in the neighbourhood of a minor fishing harbour under the management of that minor fishing harbour. The Government of Tamil Nadu has published a “Manual on Fishery Harbour and Fish Landing Centres” which proposes a two-tier management system. Such a system will have one body directly at the facility to take care of the management and another apex type at the district level to oversee the management and provide adequate funds, equity to all users and security. This concept of a two-tier system, one at the facility and the other either at district or state level was also discussed and proposed at the national workshop in December 2009.

6.2.4 User charges

A proposal for levy of various charges originates from the field office at harbour level and put up to the concerned director of state government. After due scrutiny at the directorate, the proposal is put up to the Commissioner or Secretary in the government. At this stage, the Commissioner or Secretary invites opinions from the users and the general public. In most of the cases the users track such proposals and submit representations, generally for reducing the scale of user charges. After interactions with the users, the user charges are finalized and published in the State Official Gazette. This empowers the head of management at each harbour to levy and collect user charges.

The funds collected by the harbour have to be remitted to the state government treasury and are not available to the local harbour management body. The funds required to manage the harbour and maintenance of structures are provided by the state government under a separate budget head. As the financial position of state governments is generally tight, the allocation of funds to the harbour management body would also be tight.

The procedure described above is followed generally for fixing user charges for fishing harbours in India. The fishing harbours are treated as instruments for improving the socio-economic condition of the fishermen and GoI is put under enormous pressure from the user groups to moderate the quantum and level of the user charges consistent with their demands. As a result, the level of the user charges is low and does not match to meet the day-to-day running and maintenance of fishing harbours.

In the current environment where public-private participation is the mantra for progress, the governmental system cannot provide a solution for the management and maintenance of the harbour to meet the stringent norms for cleanliness and sanitation as stipulated by EU.

6.2.5 Observations on the current models of management of fishing harbours

Based on the above review of existing models of management, the following observations can be made:

- The management has remained exclusive, either to the port department or to the fishery department. The fishery harbour has several stakeholders. In the present system, the needs of such stakeholders have remained inadequately addressed. This is not any criticism of the present functioning of either port or fishery department which are doing their best in the given situation and circumstance. This is only to point out that the model is inadequate to consider the needs of all the stakeholders.
- Attention to the control of fishing fleet using the harbour is inadequate. The fleet has increased more than double the designed capacity, beyond the control of the management of the present system of model.
- Collection of statistics regarding fishery, vessels, and catch composition could be affected.
- There is weak control on the proper use of harbour premises by the users.
- Sanitation within the harbour like proper drainage of waste from sorting sheds, other surface wash downs has become unmanageable.
- Maintenance of structures needs better attention.
- Waste disposal has become unmanageable resulting in the possibility of contamination of the fish in addition to spreading unacceptable smells in the harbour environs.
- Security of the harbour is inadequate.
- The reasons for most of the constraints or drawback as listed above are attributed by local officials to lack of funds (support from state government budget) and staff.

6.2.6 Fishing Harbour Authority

There have been attempts by GoI and the state governments to enact legislation for the management of fishing harbours. The GoI had circulated a model bill for the benefit of state governments for enacting a suitable legislation for the management of fishing harbours under the control of state governments. Some states like Karnataka and Gujarat have enacted the bill. The legislation provides setting up of a fishing harbour Authority to work like a corporate body both for development and maintenance of fishing harbours. The authority has the following functions, among other things:

a. Hygienic handling and disposal of fish
b. Keep fishery harbour area clean and free from pollution
c. Levy and collect user charges

The act has not been put into practice although the enactment was done many years ago.

6.3 Dhamara fishing harbour

6.3.1 Management and maintenance

At the time of implementation of the TCP, the management and maintenance of the Dhamara fishing harbour Phase I was under the Director of Ports (DoP), Department of Commerce, GoO with headquarters at Bhubaneswar. DoP has appointed one Assistant Conservator (AC) for the management and maintenance of the harbour, who reported directly to the DoP. The AC had an office within the harbour premises and was supported by personnel at the office and field level. There are 12 staff at the office consisting of three senior clerks and two junior clerks to look after the accounts and administration and other group D staff. The field staffs consist of a total 27 personnel, including two junior engineers and 24 other regular staff. Another 16 persons are also employed on NMR (Nominal Muster Roll) basis.

The AC had the responsibility to manage and maintain the harbour. He had to provide services like water, electricity, cleaning of harbour area, servicing and operation of slipway, and security of the harbour premises. He had also the responsibility of collecting user charges from the various groups using the harbour and services provided.

The total revenue (user charges) collected for the year 2005–2006 was INR 31.1 lakhs (INR 3.11 million) and INR 37.78 lakhs (INR 3.778 million) for the year 2006–2007. The major sources of revenue during 2006–2007 were house rent, fish landing/handling charges, supply of water, higher charges for slipway etc. as shown in Table 6.

The annual expenditure for the management and maintenance of the harbour for the year 2005–2006 was INR 57.0 lakhs (INR 5.7million) and INR 62.0 lakhs (INR 6.2 million) for the year 2006–2007. The major items of expenditure are shown in Table 7.

Table 6. Main sources of revenue for Dhamara fishing harbour during 2006–2007.

Item of revenue	Amount (INR Lakhs)	% of the total revenue
House rent	9.67	25.6
Landing/handling charges for fish& prawn	9.61	25.4
Supply of water	3.47	9.2
Hire charges for slipway	3.22	8.5
Cover area charges	2.49	6.6
Vessels berthing charges	2.26	6.0
Supply of energy	2.13	5.6
Entry charges for persons	1.38	3.6
Entry charges for ice	1.32	3.5
Entry charges for the vehicles	1.27	3.4
Other charges	0.96	2.6
Total	37.78	100.0

Table 7. Major items of expenditure for Dhamara fishing harbour during 2006–2007.

Item of expenditure	Amount in INR lakhs	% of the total expenditure
Salary for regular staff	36.50	58.9
Wages for NMR workers	8.00	12.9
Maintenance of the harbour	11.00	17.7
Electricity charges	6.50	10.5
Total	62.00	100.0

The Department of Commerce and Transport, GoO is meeting the excess expenditure over income of INR 24.22 lakhs (INR 2.422 million in 2006–2007) through annual budgetary allocation.

6.3.2 Strengths and weaknesses of the management system

The harbour was by and large managed and maintained well. The main users of the harbour have expressed their satisfaction about the overall management and maintenance of the facilities in the harbour. The financial performance of the harbour showed that it collected considerable amount of user charges annually. Thus, compared to most of the harbours in the country, Dhamara fishing harbour stood out in the overall management and financial performance.

The harbour was lacking facilities for hygienic handling of fish. Even though the fishing vessels landed the catch in prime condition, practices followed for unloading, sorting etc. were not carried out hygienically.

The financial performance revealed that staff salary and wages alone accounted for about 72 percent of the total annual revenue of the harbour. Out of this, only a paltry sum (wages for a few NMR persons) was spent for daily cleaning of the harbour. The expenditure for the management and maintenance of the harbour was bound to increase in the future due to increasing cost of living and the consequent need to increase the salary and wages of the staff over and above the normal annual increments in salary. The maintenance and energy costs were also likely to increase. Expenditure for maintaining the cleanliness of the harbour to international standards will also increase in the coming years. Including this expenditure, the annual expenditure in the coming years is likely to increase at a rate of 12 to 15 percent per year.

While expenditure on management and maintenance was expected to increase at 12–15 percent per year, the scope for increasing the income was not that bright. In the latest order of the state government fixing the fees for the users of the harbour, there was a provision for enhancement of user

fee at 3 percent every year. This small annual increase in income was not going to help reduce the gap between expenditure and income. As the fishing industry in India is passing through a tough time due to increasing fuel prices and dwindling catches in the traditional fishing grounds, there is very little scope for increasing user charges from the vessel operators. There may be scope to increase the income of the harbour through novel methods (developing facilities for tourism, adding certain infrastructure for revenue earning etc) which are yet to be explored. One definite way of improving the financial health of the harbour is to reduce the expenditure on salary and wages. Outsourcing of services has been recognized as a measure to reduce such expenditure. Unless some drastic measures were undertaken in this matter, the gap between expenditure and income cannot be bridged.

There was no involvement of the stakeholders in the day-to-day management and maintenance of the harbour.

6.3.3 Options for managing Dhamara fishing harbour

Based on existing practices in other fishing harbours and consultations with the stakeholders, the following options for managing Dhamara fishing harbour were formulated. The main consideration was how to involve stakeholders in the management of the fishing harbour and maintain sanitary and hygienic conditions so that the fishery products passing through the harbour are of good quality and safe to eat.

Option 1: Formation of a society[11] for management

The Kerala state government in southern India has already established a society for managing one of its fishing harbours namely Munambam (see Box 2), near Cochin. Financial self-sustenance was the main objective for the formation of the society and the user charges collected during the last two years indicated that the management of the society was progressing satisfactorily to achieve the objective of self-sustenance in finance. Expenditure on management, especially on salary of staff, has been brought down considerably by outsourcing of services.

The Tamil Nadu government is also likely to introduce Munambam-type management structure for the fishing harbours in Tamil Nadu with adequate representation from the stakeholders in the management.

Based on the Munambam harbour management model, the Department of Fisheries, GoO has prepared a model by-law for the management of Bahabalpur fishing harbour in Balassore district. It was also contemplating to follow the same management model for Dhamara and other fishing harbours in the state.

[11] A society is a body registered under the “Societies Registration Act”. Each state government has passed such an Act based on a Central Act. Any seven persons associated for any literary, scientific or charitable purpose or for any such purpose as described in Section 20 of the Act, may, by subscribing their names to a memorandum of Association, and filing the same with Registrar of Joint-Stock companies, form themselves into a society under this Act. A society so registered can function as an independent body and pursue the objectives for which it was created. The societies initiated by government are administered by nominating suitable members for governing body of the society as well as appointing suitable persons to the key posts such as President, Vice-President, and Chief Executive etc.

Box 2
Composition of management at Munambam fishing harbour

Name of society:
Date of registration of the society: 23 March 2005

Area of operation: Revenue limits of Munambam estuary and the contiguous water areas.

GOVERNING BODY:

• District Collector	Chairman
• Superintendent Engineer (HED)	Vice-Chairman
• Deputy Director of Fisheries	Member
• Representative of MPEDA	Member
• Representative of Matsyafed	Member
• Executive Engineer (HED)	Member
• Port Officer, Alapuzha	Member
• Representative of Exporters	Member
• Representative of Fishermen (3)	Member
• Representative of Boat owners	Member
• Representative of GOI	Member
• Joint Director of Fisheries	Member

EXECUTIVE COMMITTEE:

• Joint Director of Fisheries	Chairman
• Executive Engineer	Member
• Representative of MPEDA	Member
• Representative of MATSYAFED	Member
• Port Officer	Member
• Deputy Director of Fisheries	Member

REVENUE GENERATED: INR 2 711 285 (through auction of toll collection, rent of locker hall, rent from canteen, telephone booth, pan shop, ice crusher) during 2005 and 2006.

HED	Harbour Engineering Department
MPEDA	Marine Products Export Development Authority
Matsyafed	Kerala State Cooperative Federation for Fisheries Development

Option 2: Continuing the existing management by the Department of Commerce with the involvement of stakeholders in the maintenance of harbour until the GoO decides on the policy for the management of the fishing harbours

The prerequisite for implementing the above option is placing Phase II of the harbour, which is now under the control of the Fisheries Department, under the control of the Director of Ports, Department of Commerce.

Option 3: Forming "Fisher-Users Society "along the lines of "Water Users Associations" of Orissa State and handing over the operation and management of the fishing harbour to the "Fisher-Users Society"

Decades ago, while the operation and maintenance of the irrigation canals were the responsibility of the Department of Water Resources, the Department of Revenue was responsible for the collection of

water tax. It was found that the collection was poor; as well there was no or negligible maintenance of the canal system. Operation of the canal was also influenced by rich farmers.

A water users association (WUA) was formed by the beneficiaries of a particular canal system running through a group of villages. The beneficiaries using the water from the irrigation canal system usually elected an eleven-member body namely, executive committee, which is given the responsibility of collecting the water tax from the irrigated area. The body elected a president, secretary, and treasurer among themselves typically in the format of president or secretary from the tail end of the irrigation system to ensure proper distribution of water up to the tail end. A part of the tax collected was retained by the WUA and the rest was deposited in the government treasury as return on investment. The amount retained by the WUA was utilized for the operation and maintenance of the canal system. The estimates of maintenance work were prepared by the WUA with the help of Department of Water Resources and the work was carried out under the supervision of the Executive Committee. This model has helped to collect the water tax fully, ensured supply of water to all the farmers and maintained the canal system properly.

A similar system was proposed for the management and maintenance of the Dhamara fishing harbour. Instead of forming an association[12], a society on the lines proposed under Option 1 was recommended. The society will have a governing body, executive committee, etc as in other societies. But the difference was that the members of the user groups (say 60 percent of the members) will constitute a majority in the two bodies. There will be proper representation for the weaker sections among the user groups. There will be nominees from the government bodies too. However, the chief executive will be deputed from the government for managing the society until the stakeholders gain enough experience in the management of the society.

The society will enter into an agreement with the government for taking over the harbour management and maintenance including collection of user charges. Apart from meeting the expenses for the management and maintenance of the harbour, the society is also bound to pay a portion of the income to the government as a return on investment. While the government plays the role of a facilitator allowing the society to manage and maintain the harbour, it will act as a watchdog of the society by constituting necessary committees to verify the maintenance of the harbour and to audit the accounts of the society on a regular basis. As a society registered under the “Societies Registration Act”, it will be a legally constituted body and function as per “Rules and Regulations” framed for the management of the society.

Formation of such a society is possible only if the state government takes a policy decision to hand over the management of the harbour to the user groups.

6.3.4 Establishment of management body

In December 2007, the Fisheries and Animal Resources Development (FARD) Department of the Government of Orissa issued Resolution No.7 FY-Sch-126/07/4550/FARD constituting a management society, namely, Management Society, Dhamara fishing harbour (MSDFH), for managing Dhamara fishing harbour. The management society is comprised of the following members:

- Secretary, FARD Department — Chairman
- Director of Fisheries, Orissa, Cuttack — Member
- District Collector, Bhadrak — Member
- Superintendent of Police, Bhadrak — Member

[12] An “association” is a body of members joining together for a certain purpose. It can be a legal entity if it is registered under the “Societies Registration Act”. Like a society it can have the office bearers such as President, Member Secretary, etc. Depending upon the purpose and objectives, any association of members can register under a society or an association. An example would be an Apartment Owners Association.

- Deputy Director of Fisheries, (Member-Secretary) Member
- Representative of MPEDA, Bhubaneswar Member
- Representative of FISHFED[13], Bhubaneswar Member
- Executive Engineer, Fisheries Engineering
- Division, Bhubaneswar Member
- District Fisheries Officer–cum–Chief Executive Officer, Fish Farmers Development Authority, Bhadrak Member
- Representative of Director of Ports & Inland Water Transport, Bhubaneswar Member
- Thasildar, Basudevpur Member
- One representative of Trawlers and Fishermen's Association, Dhamara Member
- One representative of Transporters Member
- One representative of Traditional Fishermen Member

The powers and functions of the management society are:

- To be responsible for management of Dhamara fishing harbour.
- Receive grants, collect fees, and incur expenditure as per the decisions taken by the society.
- Prescribe technical procedures for execution of various decisions.
- Appoint the Secretary of the Management Committee who shall look after day-to-day management of the fishing harbour as per the powers delegated to him by the Management Society.
- Meet at least twice in a year.

MSDFH was registered under the Society Act, 1860, bearing registration number 1953/01/BDK/08. The Society has three committees, namely: Governing Body, Executive Committee, and General Body. The Governing Body is comprised of stakeholder representatives, with the Principal Secretary of the Fisheries and Animal Resources Development as the Chairperson. The Executive Committee (EC) is comprised of three members, namely, the Secretary of MSDFH, Assistant Engineer of the Fisheries Engineering Division, and Sub-Collector of Bhadrak District. The Sub-Collector is the Chairperson of the Executive Committee and the EC is empowered to approve expenditure up to INR 15 lakhs. The General Body is comprised of all members of the Governing Body and the EC, where grassroots-level suggestions are discussed and action taken up.

Subsequently, to increase the representation of the stakeholders in the governing body of the society, one representative each of trawler owners association, gillnetters association, country boat owners association and exporters association were co-opted as members of the governing body.

6.4 Mangrol fishing harbour

The stakeholders at Mangrol fishing harbour were pleased with the prospect of participating in the management of the fishing harbour. Discussions were conducted with them regarding the appropriate structure and composition. Consultations were also held with the Gujarat Maritime Board, Assistant Charitable Commissioner in Junagad District, Office of the Commissioner of Fisheries, and the Department of Law. From these discussions and consultations arose the following recommendations regarding the management set-up for Mangrol:

- For bestowing autonomy and making it participatory, it would be desirable to set up a management body represented by the majority of the users, replacing the present Fisheries Terminal Division.

[13] FISHFED is an apex body of all Primary Fishermen Cooperative Societies in the State of Orissa.

- Such body could be formulated and registered as a Society under the Government of Gujarat (GoG) Act of Registration of Societies. The registration has to be done at the Junagad office.
- All the procedures prescribed for the registration has to be fulfilled.
- The structure of the body could be as suggested in Box 3.
- The body will have a Memorandum of Association (MOA), Articles of Association, indicating therein aims and objectives, a Governing Council, terms and all other aspects.
- The body may have an administrative set-up as in Box 4.
- The chief of office would be the member-secretary for the board.
- The management of different activities may be outsourced with the minimum regular staff maintaining records, handling of funds.
- The body may set up one or more committees involving users for managing each of the activity and such committee/s may have powers to tender and allocate the work after approval by the board.
- The committee may have responsibility for implementing the contract and supervising the work of the contracted party.
- The body may appoint a hygiene officer from either seeking secondment from the Health Department of GoG or by direct recruitment. The body may realize that the position of health officer is an important one whose efficiency and professionalism would be crucial to the maintenance of international standards in hygiene.

A big challenge in managing Mangrol fishing harbour is the problem of overcrowding of fishing vessels in the harbour. The fishing harbour was originally designed to accommodate 400 fishing vessels. By 2003, there were 935 fishing vessels operating from the harbour. Half of these were encouraged to operate from another fishing harbour 238 kilometres northwest of Mangrol but the option was never taken up. In addition, there were 535 FRP boats fitted with outboard motors operating from the beach area within the harbour premises. A fishing harbour should not exceed the number of fishing vessels it was designed for. If the number of fishing vessels continues to increase then harbour congestion is there to stay and no amount of management will resolve the problems at Mangrol.

At the time of completion of the technical cooperation project, no action was taken regarding the recommendation on the composition of the management body and the fishing harbour continued to be managed by the Fisheries Terminal Division.

Box 3
Proposed structure of the management body

Board of Management

Chairperson: Secretary Fisheries
Vice Chairperson: to be decided
Members: GMB, Fisheries Department, MPEDA, representative of big vessel owners, representative of small vessel owners, representative of women's group, representative of boat association, representative of the Samaj, representative of society, representative of traders, EIA (Export Inspection Authority, Veraval), Local Revenue Authority (Mamlatdar)

Member Secretary: CEO of Administration

Type: Register as a Society under Society Registration and Public Trust Act to function as an autonomous body.

Title: Mangrol Fishing Harbour Management Board

Box 4
Proposed administrative set-up of the management body

Administrative Office

Chief Executive Officer: AD/DD Fisheries deputed by Fisheries Department or Professional Manager recruited by the management

Supported by

Administrative Superintendent, Accountant, Hygiene Officer, Fisheries Statistician/ Inspector/Adviser
Clerks-2, Helper/fieldman-2

All transactions to be computerized

Vehicles and office equipment
Uniform for staff
Use existing Fisheries Terminal Division and canteen building with modifications for Administrative Office.

7. CAPACITY BUILDING

The different stakeholder groups were keen to take part and get involved in the management of the fishing harbour. For them to be able to do so in a meaningful way, they need information on the operations of the fishing harbour and the management skills to run the harbour. All users must be aware of the proper behaviour inside the harbour, which starts with the maintenance of personal hygiene particularly for those who are handling fish. The following activities were conducted to develop the capacity of the stakeholders to participate in management: (a) training course on seafood handling; (b) awareness-building on cleaner fishing harbours; (c) training course on managing the fishing harbour; and d) study tour to the General Santos Fish Port Complex in southern Philippines. The training courses and awareness-raising activities were supported by printed materials that were translated into the local languages, i.e. Oriya and Gujarati. A national workshop was conducted at the end of the project to share the experiences and lessons learned to the stakeholders of Dhamara and Mangrol and those from other fishing harbours and projects.

7.1 Training course on seafood handling[14]

This training course was intended to give representatives of stakeholder groups a basic understanding of the causes of spoilage, contamination and sickness and how these problems can be addressed through personal hygiene, cleaning and sanitizing and management of food safety. The training course was first delivered in Dhamara fishing harbour and included a practical session that demonstrated the proper way of cleaning and sanitizing the sorting hall.

There were 20 participants in the training course representing trawler owners, gillnet boat owners, country boat owners, ice plant owners, transporters, exporters, crew members, fishermen's associations and shrimp processors. There were also fishery officers, civil engineers assigned to fisheries and a representative each from the state federation of fishermen's associations and the government office in charge of export development. Except for the two shrimp processors, the other 18 participants were all males.

The training course was conducted with many visual aids which enabled those without a professional background to understand the theoretical aspects with ease. The interactive method of teaching delivery achieved total involvement on the part of the participants.

7.2 Awareness-building on cleaner fishing harbours

The awareness building activity was intended for the men and women using the fishing harbour to assist them in developing a culture of cleanliness and hygienic practices. The programme was developed in consultation with the trainees who completed the training course on seafood handling as well as members of the fishermen society in Dhamara fishing harbour. A brainstorming session in small groups was conducted where they discussed the following question: *What are the best practices you would like to be conveyed to your peers so that the harbour facilities will be put to best use?*

With some facilitation, the small groups decided on the important messages that needed to be conveyed with respect to the following stages: onboard handling, in the harbour, while transporting fish, as well as aspects of personal hygiene. They recognized that good fish handling should start on board the boat and should be carried on with good practices in the fishing harbour. The stakeholder representatives also agreed that pictorial pamphlets or booklets, posters and signboards would be useful to convey the messages, in addition to a one-day awareness creation event for as many participants as possible. Thus, two one-day events were arranged and held, one each for groups of

[14] The training manual on seafood handling was reproduced in Fisheries and Aquaculture Technical Paper 539, Fishing harbour planning, construction and management available at: www.fao.org/docrep/013/i1883e/i1883e00.htm

50 men and women. Boxes 5 to 7 show the key messages that were agreed by the stakeholder representatives. Figures 17 to 19 show samples of the printed materials developed to support the awareness-raising activities.

In Mangrol, a combined training on seafood handling and awareness-raising campaign was conducted during a period of four days. Three days were devoted to male stakeholders with a total participation of 107, and the last day for female stakeholders, with a total participation of 157. The male stakeholders were trawl and gillnet operators, fish merchants, exporters, ice plant owners, officials of the fishermen society and samaj, fishermen and deck hands, and fisheries officials. Except for one boat owner, all female stakeholders were involved in fish marketing.

Box 5
Good fish, good price start from good fish handling on the boat

1. Keep the boat and deck clean.
2. Clean the deck with clean seawater before hauling in fish.
3. Keep the fish hold clean and store sufficient good quality ice.
4. Do not spill oil or diesel on the deck.
5. Use only grease in exposed moving parts, not waste oil.
6. Keep the fishing gear/net clean.
7. Clean fish with clean seawater on hauling.
8. BE FAST BUT GENTLE to sort the fish by variety and store in crates with ice in layers.
9. Crates should be cleaned before storing fish.
10. Remove head, gills and offal of selected big fishes or larger fishes for drying.
11. Do not step on the fish.
12. Do not drag fish or throw fish around.
13. Use clean gumboots and gloves.
14. Use crates to transport fish from boat to clean sorting platform in the harbour.

Personal hygiene messages
Do not spit on the deck.
Use clean clothes.
Wash hands with soap each time after going to toilet and before and after cleaning or sorting fish.
Do not step on fish.
Avoid hair falling on the fish.

Box 6
Handling fish, ice and transport in the fishing harbour

1. Fish from the boats should be taken to the cleaned sorting platform in crates.
2. Fish should not be put on the floor of the quay or of the sorting area or dragged on floor.
3. The sorting platforms must be cleaned first with detergent water and then with chlorinated water before the fish is brought in, and after sorting and disposing of the fish each day.
4. Fish need to be washed only if it is dirty and if not washed on board
5. Water for cleaning must be potable water or clean seawater pumped in from some distance away from the harbour through a sand bed filter where it is not polluted.
6. Sort out the different varieties of fish into different crates with ice.
7. Discard spoiled fish. Dispose spoiled fish separately in containers meant for it and arrange for composting.
8. Do not put waste fish or any other waste back into the water in the harbour area.
9. Battery, dry cells or other chemicals should be disposed of separately.
10. Fuel for the boats should be handled without spilling on the quay, water or boat.
11. Waste oil should be disposed of carefully.
12. Solid wastes should not be put in drains.
13. Harbour area should be fenced/walled and cattle and dogs should be kept away.

Personal hygiene messages
Do not spit on the floor or sorting platform.
Use clean clothes/protective clothes.
Wash hands with soap each time after using toilet and before and after cleaning or sorting fish.
Do not step on fish.
Avoid hair falling on the fish.

Transport
1. Transport fish preferably in insulated vehicles.
2. Keep the fish storage area of the vehicle clean.
3. Transport fish only in clean crates with ice.
4. Use good quality ice.
5. Weighing platforms and containers should be washed before using.

Preparation of clean ice
1. Use potable water from public supply or tube well water for ice.
2. Ice can should be of aluminium sheet.
3. The ice can in the ice plant should be washed with detergent each time.
4. Transport ice in clean and hygienic trolley before fish preservation.
5. Crushing of ice should be done preferably by an electrically-operated crusher.
6. Use appropriate amount of ice for fish preservation.
7. Ice should be kept in clean and hygienic container.

Box 7
Maintain personal hygiene to keep fish clean and safe to eat

Wash hands before handling fish and after using toilet.
Role sleeves up to elbow.
Rinse up to elbow.
Apply soap carefully.
Brush hands and nails.
Rinse with clean water to eliminate soap.
Dry hands with a personal towel or better still with a paper towel.
If not (picture of unclean hands spoiling fish).
Avoid stepping on fish or kicking fish.
Do not spit or sneeze around.
Avoid hair fall.
Avoid handling fish when sick.

Figure 17. English version of leaflet developed for awareness-raising activity.

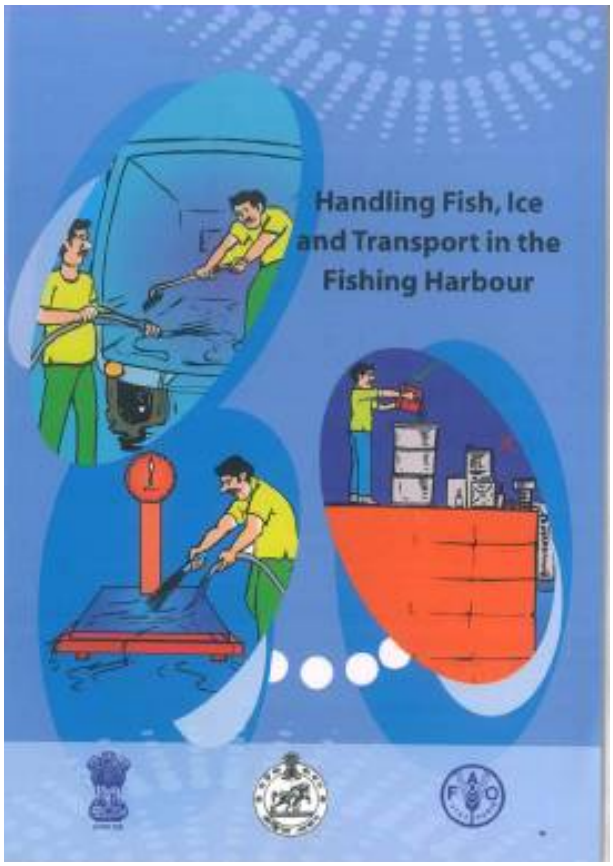


Figure 18. English version of booklet developed for the awareness-raising activity.

Figure 19. Signboard in Oriya language produced to support the awareness-raising activity.

7.3 Study tour to General Santos Fish Port Complex

The study tour was intended for two participants, one from each fishing harbour, in order for them to learn first-hand how a fishing harbour in another Asian country is being operated so that they would be able to pick up good practices for implementation in their own fishing harbour. In this regard, the criteria used for selecting the participant from each harbour were the following:

- The person must be directly involved in the management of the fishing harbour for at least two years, and would be involved in direct management for the next five years.
- The person must be in a position to recommend and implement changes in the management of the fishing harbour.
- The person must be willing to prepare a write-up and presentation of the study tour and present it upon return to relevant state officials and stakeholders. The write-up and presentation must include recommendations on how the practices and lessons from the visited fishing harbour would be applied to their own situation, or modified as necessary.

The objectives of the study tour were:

- To observe the operations of a fishing harbour, learn lessons from the experiences of the management authority, and explore how the best practices in the visited fishing harbour could be applied in their own situation.
- To analyse the structure and composition of the harbour management group and operations pertaining to cleanliness and maintenance of sanitation and hygiene.
- To learn how stakeholders are involved in the management of a fishing harbour, determine the costs of running and maintaining the fishing harbour and look at who is paying for what services.

The study tour was conducted over a period of five days and covered all aspects of fishing harbour operations. The programme is shown in Appendix 2. The General Santos Fish Port Complex (GSFPC) covers an area of 36 hectares. It is located in General Santos City in South Cotabato on the island of Mindanao in southern Philippines. GSFPC is the main center for landing marine fish in the area and local fishing boats as well as foreign vessels are allowed to unload their catches. The port activities include the following:

- unloading and marketing of marine products both for local and foreign market;
- harbour operation which include maintenance and repair of fishing vessels; and
- processing and refrigeration activities.

Following the study tour, the participant from Dhamara fishing harbour proposed recommendations for the management of fishing harbours in India:[15]

Managerial

- The fishing harbour should be managed by an independent body under the control of the government.
- The independent body may be registered under the society Act or any other similar Act prevailing in the state.
- The society should form a governing body for making decisions.
- Representative from government departments as well as from all the stakeholders should be taken as the governing body members.

[15] Recommendations by J. B. Dash, Deputy Director of Fisheries, Cuttack, Orissa, following the study tour to the General Santos Fish Port Complex, 9-16 November 2008.

- One executive body may be formed to take decisions on day-to-day management of the fishing harbour and to work out as per the power conferred to them by the governing body.
- The society may post its own staff as and when required by obtaining the governing body approval.
- The society may have an executive committee for the implementation and decision on day-to-day activities.
- The secretary/harbour manager may be posted as head of the management of the fishing harbour, who will act as the head of all the sections.
- For proper implementation of the international standard of food safety, a separate unit may be set up, which may also look to the market operation.
- For engineering and harbour operation one unit may be set up.
- For financial activities one unit under direct supervision of secretary/harbour manager may be set up.

Financial

- The society should have independence in financial activities.
- The fees and other income should be deposited in the society accounts.
- The expenditure can be made obtaining the approval of governing body.
- The society may have its own engineering consultant or a government engineer as decided by the governing body.
- The secretary may have some financial power to implement at the time of need.
- All funds from government for development of the fishing harbour may be provided to the society for implementation.
- The society may have its own financial system to be decided by the governing body.
- The fee structure may be made by the finance section under supervision of the secretary/harbour manager and get approved in the governing body before implementation. This may be revised from time to time as required.

Technical

- All the technical activities may be under the secretary/harbour manager.
- As required the technical staff may be posted for proper implementation of the International Food Safety Standards.
- The engineering activities may be managed through a consultant or under the supervision of government engineering personnel, under the supervision of the secretary/harbour manager.
- The food standard compliance unit, finance unit and the engineering unit should have adequate staff to implement the Food Safety Standard.
- Norms for market operation to be made by the society to implement.
- Norms for the food safety as required in International market/EU norms may be made and implemented. The infrastructure may also be developed accordingly
- Waste management to be done effectively.
- All necessary measures for the control of environmental pollution to be taken.
- The harbour should have its own laboratory for tests.
- There should be a training center for training of the fishing harbour users on the code of conduct, food safety measures, SSOP, etc.

Others

- The safety of the fishing harbour may be outsourced and security staff as required may be engaged.
- The entry should be controlled and ID cards for harbour users may be issued.

- Adequate security personnel may be engaged for proper implementation of all the harbour activities like food safety standards, cleanliness of harbour, restriction in harbour area etc.
- For all other activities separate norms/system need to be developed.

7.4 Training on managing Dhamara fishing harbour

The training course was aimed at giving a comprehensive view of the management of the harbour in offering safe, reliable and quality services to all harbour users, especially in assuring fish quality and food safety and in reducing pollution of environment caused by various activities in the harbour. Practical procedures and guidelines were given on a variety of issues pertinent to the administration, financial management, operation and maintenance, hygiene and cleanliness of the harbour, environmental management, quality assurance and community development. A three-day training course was conducted during 28–30 December 2009 at Dhamara fishing harbour. A training guide was prepared and formed the basic training material. Eight officials of the management society were able to participate in the training course including three representatives from the user groups.

A training guide for managing Mangrol fishing harbour was also prepared but the training course was not conducted because no action was taken regarding the establishment of the management society.

8. ISSUES, CONSTRAINTS, AND LESSONS LEARNED

8.1 Duration and timing

At the very start of the project during the initial consultations, the stakeholders already brought up the concern that the timing for the upgrading and improvement of infrastructure facilities which will be borne by GoI and the state governments may not coincide within the duration of the TCP. This was a constraint that the project faced from the very beginning. The project was originally scheduled to run for 18 months and was extended to 33 months.

As discussed in Section 6.2.1, funds for the construction of the recommended civil works are shared equally, 50–50, by the Government of India (GoI) and the respective state government. To release funds, GoI requires a proposal from the state government containing the details of works and the cost estimates. The following steps illustrate the approval process of the civil works and the approximate time that it can take:

- The state government prepares a proposal containing the technical and financial components and then submit to the GoI (one month).
- On the basis of such reports, GoI examines and sanctions the funds. The sanction and the realisation of funds are then communicated to the state government (one month).
- The concerned department of the state government then prepares the tender documents, seeks technical sanction from the concerned engineering head, and puts the works to tender (three months).
- Notice of tender, receipt, analysis, selection and approval of the tender by the state Government (four months).
- Issue of the work order for the commencement of construction.

It needs a minimum of nine months before the work order could be issued for the commencement of works. The period of construction for the completion of the work would be a year and half after the issuance of the work order, taking into the consideration the monsoon period. While the works would be in progress it would be difficult to stop the fishing activity at the two harbours. At Mangrol during the monsoon period, all the trawlers are lifted from the harbour basin by a crane and some of them are parked in the onshore area for safety. In Orissa, the monsoon rains limit the period within which civil works could be undertaken to six months in a year. This posed additional constraints for the execution of civil works.

At the end of the project in December 2009, only Dhamara fishing harbour managed to complete most of the civil works in Phase II, as well as the establishment of the management body. The tendering procedure plagued construction works at Mangrol, where the successful bidder sub-let the construction works to a local contractor who was unable to perform the work required with the equipment at his disposal. During a supervision mission undertaken in May 2009, the international and national experts declared that the construction management, schedule and standard of workmanship at Mangrol were unacceptable. The project was awarded in October 2008 and was expected to be completed by April 2009; however, by May 2009 only 15 percent of the work in Mangrol had been completed. The construction work also suffered from lack of supervision. Table 8 shows the approximate completion rates at the two harbours by December 2009.

Table 8. Approximate completion rates for the projected infrastructure at Dhamara and Mangrol in December 2009.

ITEM	Dhamara fishing harbour Phase 2	Mangrol fishing harbour
Port security (fences & gate)	80% complete	30% complete
Sorting hall & platforms	95%	80%
Truck sun shade	100%	0%
Fish box wash station	100%	0%
Hygiene blocks	100%	0%
Fresh water system	100%	0%
Seawater system	*Not envisaged*	0%
Outfall and drains	*Not envisaged*	0%
Port paving	*Not envisaged*	80%
Net mending facility	100%	*Not envisaged*
Supply power washers	100%	50%
Supply stainless steel ice crushers	50%	0%
Supply waste receptacles	0%	0%

8.2 Dhamara fishing harbour

Several issues and constraints were observed during implementation, among the significant ones were:

- During the implementation phase, Dhamara fishing harbour was under the management of the Director of Ports. However, expansion of the harbour (Phase II) was carried out by the Department of Fisheries. Such dual control caused several problems in upgrading of the infrastructure and formation of the management body. Decision on the unification of the two phases of the harbour and bringing them under the control of one body had to cross many official hurdles. Because of the delay in unifying the two phases and placing under a single management body, implementation of several activities had to be postponed and finally could be taken up hurriedly just before the end of the project. This eleventh hour implementation of certain activities left no time to test and improve the programmes further. For example, the training module for future use, the training guide on management of Dhamara fishing harbour, could not be improved. Testing the efficiency of the management in implementing the programme of hygiene and cleanliness could not also be done before the project closed. These works will be taken up in the future jointly by the Department of Fisheries and the National Consultant on Community Participation in Fisheries.
- A technical cooperation project is time bound. However, a state like Orissa, which receives rain for over five months in a year, could take up civil works only for six months in a year. Thus the limited period available for civil construction was also the reason for the protracted period of construction and upgrading.
- On some occasions, the recommendations of the consultants especially with regard to civil works were ignored and material unsuitable or inferior in quality was used for construction (e.g. use of ceramic tiles instead of epoxy covering the sorting platform).
- The recommendations of the consultants were usually forwarded by the FAO to the Ministry of Agriculture, which in turn communicates the same to the State Coordinators of the TCP. Often it was found that such recommendations did not reach the field officials in-charge of the construction and implementation on time. Consequently, the recommendations could not be carried out on time.
- Upgrading the existing infrastructure to meet the prescribed standards causes problems in achieving desired standards. This problem is more pronounced when a recently created

facility has to be upgraded with little disturbance (without much demolition) to existing structure (e.g. improvements to auction hall at Dhamara Phase II).

- Lack of sound knowledge in the maintenance of hygiene and cleanliness among the officials managing the harbour was a concern. There is a further need to train the existing officials on a regular basis in the emerging quality standards. Furthermore, there is need to train an adequate number of officials of the Fisheries Department, so that a trained cadre of officials would be available for manning other harbours and also to replace any of the existing official of the Management Society, Dhamara fishing harbour, if required.
- There is not much information available on the economics of operation of the mechanized fishing vessels in India. Often, it is seen that rich vessel operators are becoming richer (acquiring more and more vessels, involving in the supply of inputs and virtually monopolizing the activities in the harbours) due to scale of operation which yields better revenues to them. Compared to this, a large number of small mechanized boat owners seem to be not making any profit but just achieving breakeven. Under such circumstances, fixing of user fee collected for services provided to the users can be made rational as followed in the Philippines (i.e. increasing the user fee to operators of large number of vessels).
- A major concern of the users of the harbour is that they may have to pay more user fee for the upgraded facilities without any immediate tangible financial benefit accruing to them for observing hygiene and cleanliness. Even though they are convinced of the necessity for meeting international standards of hygiene and cleanliness for export of fish, they expect that the quality assured fish going out of their landing centre should be recognized in one way or another, so that they can realize a better price in the domestic market.

8.3 Mangrol fishing harbour

The following issues and constraints were encountered during the course of the implementation at Mangrol fishing harbour:

- The harbour is overcrowded because twice that of the designed fleet is using the harbour. Demand for space for landing and berthing of vessels causes serious concern. Against a designed capacity of less than 300 vessels, more than 800 vessels are using the harbour. Even after upgrading, the harbour will be overcrowded and there is every possibility of breakdown of many services and also deterioration of hygiene and cleanliness. The upgrading of structures as recommended under the project would not completely solve the hygiene and sanitation issues.
- Though the fishermen are progressive, they have not been aware of the threat to their very livelihoods both by overfishing and unacceptable sanitary and hygienic conditions at the harbour.
- Building of new boats is banned by GoG. However, due to the lucrative nature of business the fishermen continued to build new boats on the pretext of replacing their old boats.
- Supervision and control by field office of Fisheries at Mangrol was too weak and inadequate.
- The GMB, though a huge organization, did not post adequate personnel for execution of civil works under the TCP.
- The declaration of holding of general elections in the country after the commencement of the project delayed the tender process due to the mandatory adherence to the model election code by the GoG. A severe flooding of the area during the TCP period also contributed to delays.
- The contractor who actually was executing the works did not have experience of doing similar works, let alone the aspect of quality and workmanship. While the administrative procedures of the GoG contributed to the delay in starting construction works, the inexperience of the contractor delivered a serious blow to the progress, quality and workmanship.
- The GoG was not able to set up a management body. Because of this and the non-completion of the civil construction, the training and awareness campaign for the stakeholders of Mangrol

had to be rushed through in the eleventh hour. As there was no management body, no training on management could be taken up.

- The GoG was reputed to introduce change from governmental controls to public-private participation in developmental works, but in the case of Mangrol the GoG somehow did not live up to the expectations.
- The project experienced some matters beyond its control, like transfer of important, decision-making and key government officials during the implementation period, who had understood the importance of the project, set up clear directions, priorities, implementation schedules and policies at the beginning. The explanation of bureaucracy would be that (theoretically) such change of guard, a common and normal policy of the government, should not affect the progress of the project. But practically it did.
- In the huge socio-economic developmental scenario of a state government, projects in the fishery sector like the TCP lose priority and receive low attention from the persons who matter at the government level. However, initially at the launch of the project there was keenness, appreciation, necessity and willingness at all levels.
- Initially the idea of an autonomous society for the management of Mangrol fishing harbour on the lines proposed by the project was considered appropriate at the highest level of GoG. Then in the middle of project, the GoG changed the idea to managing the harbour by invoking an existing act which had provision to set up a government-controlled authority. To make it participative, GoG explained that some of the user groups could be inducted into the authority. Then again the idea of society was mentioned in the interactions. But till the end of the project it was not known which model the GoG would follow to set up a body to manage the harbour. As recommended by the project, an all inclusive autonomous society so willingly accepted by the user groups would be the best model to give a try.

8.4 Lessons learned

8.4.1 Timing and duration – Risk assessment exercise

In deciding the duration of a TCP, it would be desirable to take into consideration events like the calendar of constitutional events, annual weather events, working periods and others. For future TCPs, once a TCP is ready, an independent assessment, with the consent of the implementing agency, must be done of the preparedness of the implementing agency. This risk assessment study would take into consideration the national events, weather, construction and supervisory capacity, availability of land and other aspects which have to be as realistically factored as assessable into the duration of the project.

8.4.2 Implementation arrangements

In cases where implementation is the responsibility of the state government, a state-level coordination committee consisting of all relevant agencies of the state must be constituted. Such committee would be in addition to the Central Coordination Committee under the purview of the Union Government. The State-level committee should meet at least once in three months with provision to invite national consultants to the meeting. This arrangement would ensure that the activities receive their proper attention in the vast calendar of programmes of the state governments.

8.4.3 Designing fishing harbours and fish landing centres

The Central Institute of Coastal Engineering for Fishery (CICEF), Bangalore is the main organization involved in the design of the fishing harbours and fish landing centres in India. Services of experienced engineers from the Indian Institute of Technology or similar organizations are availed for designing certain important works such as breakwater, navigational channel, protection wall, wharf,

etc. In addition, several private agencies are also involved in the design and construction of fishing harbours and landing centres.

What is often overlooked in the design stage is that the fishing harbour is not only a facility for providing safe berthing and landing of catch for fishing vessels, but also a place where fish quality and food safety have to be ensured and environmental pollution has to be minimized. The changing demands for fish quality assurance starting from catching of fish till it reaches the consumer, have to be kept in mind while designing the harbour infrastructure meant for maintenance of hygiene and cleanliness. Often there is communication gap between the fish quality assurance personnel of the Department of Fisheries concerned, and the engineers who are entrusted with the design. Consequently, in designing the facility, hitherto, not much attention has been paid to include necessary infrastructure of international standards for hygienic handling of fish. This lacuna in design specifications has been addressed in FAO's latest publication, Fisheries and Aquaculture Technical Paper No. 539, Fishing harbour planning, construction and management.

Similarly, before designing the infrastructure required for landing and handling of fish, stakeholders have not been consulted properly. Even if there was some consultation, the importance of fish quality and food safety and the need to meet international standards of hygiene and cleanliness in the fishing harbours was never explained to them before seeking their views. This situation has to be changed.

There should be proper consultation between the engineers designing the fishing harbour and the quality assurance personnel of the Department of Fisheries to decide upon the infrastructure requirement for maintaining hygiene and cleanliness in the harbour. Deciding the design features regarding specific facility meant for maintaining hygiene and cleanliness should be the prerogative of the quality control personnel (e.g. size of the auction/sorting facility; auction/sorting platform; other facilities in the hall; location of such facilities, finishing material for the floors, etc). The fisheries department of each maritime state should have a "fishing harbour quality assurance cell" with trained and experienced officers in fish quality assurance to work with the engineers.

Similarly, informed stakeholders have to be consulted on the infrastructure required for hygienic handling, auctioning and packing of fish (e.g. dimensions of sorting platform or table; auction platform, facilities for packing etc).

8.4.4 Construction standards

Millions of rupees are earmarked in the budgets of the MoA and the National Fisheries Development Board (NFDB) for the construction of new fishing harbours and landing centres and also for the renovation of existing infrastructure. Several agencies are likely to be involved in the design and construction of the harbours. It is worthwhile to give specific information to the engineers on the construction of infrastructure meant for the maintenance of hygiene and cleanliness.

8.4.5 Management structure

Most of the state governments have not so far taken a policy decision on the structure for the management of the fishing harbours. They have also not thought of the need for a proper management structure for the harbours which can develop them into financially self-sustainable establishments meeting international standards of hygiene and cleanliness.

The Port Trusts which administer the six major fishing harbours in the country are very much preoccupied with their main work of cargo handling and simply do not find time to look into the needs of the fishing harbour. They are also indifferent to the international requirement of hygiene and cleanliness in the fishing harbours.

The state governments have to take a policy decision immediately to frame a suitable management structure for the management and maintenance of the fishing harbours and fish landing centres in their state. While framing the management structure, they should see that the management body is adequately represented by stakeholders. Small landing centres can even be handed over to the stakeholders for management.

An effective way of inducing the State Governments to quickly act on the formation of a management structure for a particular harbour/landing centre is to link the funding with the formation of the management structure. As funding and guiding agencies, the MoA and NFDB should lay down clear-cut conditions for releasing funds that would bind the state fisheries departments and Port Trusts to have a management structure for the fishing harbour well before the completion of construction/renovation of the harbour. Release of the last instalment of funds could be directly linked to this condition. The MoA and NFDB should even have a body to check the functioning of the management of the harbour with regard to proper maintenance of hygiene and cleanliness. Only well-maintained harbours should be made eligible for funding for future developments. If such conditions are not imposed and the working of the harbours is not checked, funds provided for upgrading may go to waste. Achieving international standards of hygiene and cleanliness in the fishing harbours/landing centres would remain only a dream.

The Export Inspection Council (EIC) which has laid down regulations for the proper maintenance of hygiene and cleanliness for handling fish for export on board vessel and in the landing centres has so far not taken any steps to inspect the fishing harbours on a regular basis nor taken any action against harbours not meeting the prescribed standards. It is high time that the EIC inspect all the major fishing harbours and important minor fishing harbours and landing centres, and take necessary punitive action against harbours not meeting the standards.

Decision on the development of a fishing harbour in India is mostly taken based on technical viability and probably on social benefits accruing to the users. Cost-benefit ratio is often not looked into. Consequently, heavy investments are being made to develop/renovate infrastructure which can meet the international standards. Maintenance of such infrastructure is a costly affair and every state government would like the harbour management earn sufficient income at least to maintain the infrastructure for a considerable period of time. Without an efficient management system and a management body, the maintenance of the infrastructure created at a large investment would not be possible.

8.4.6 Improvements to fishing vessel infrastructure

The state department of fisheries has to take necessary steps to improve the fishing vessel infrastructure for hygienic handling of fish. With stakeholders' cooperation and regular awareness programme on hygiene and cleanliness on board the vessel, this can be achieved. Funds may be required for improving the fish holds and to purchase crates. One-time funding for these purposes may be considered.

8.4.7 Gender concerns

The stakeholder identification conducted at the beginning of the project showed that both men and women have important roles in each fishing harbour and that the project would have an impact on their activities and livelihoods. In Dhamara, women are involved in the pre-processing of shrimp whereas in Mangrol, women are involved as fish vendors and fish traders. In both fishing harbours, women stakeholders have shown great interest in participating in consultations, training and awareness-raising activities. In this regard, their participation as members of the management committee has been strongly recommended and advocated.

9. NATIONAL WORKSHOP

The national workshop was held on 9–10 December 2009 in Bhubaneshwar, Orissa to disseminate experiences and learning from the TCP (Appendix 3). The objectives of the workshop were: (1) present the findings from the TCP; (2) share lessons and experiences that may be useful to other fishing harbours in India and elsewhere; and (3) formulate recommendations to ensure further dissemination and impact from the project. Key stakeholder groups from Dhamara and Mangrol fishing harbours, management officials of the Management Society, Dhamara fishing harbour, fisheries officers involved in the management of fishing harbours in Orissa, Gujarat and other maritime states of India, officers from government agencies vested with the responsibility for development of fishing harbours and their supervision, and officers from other government agencies responsible for fish quality and food safety were invited to participate in the workshop. Over forty persons attended, including two representatives from an FAO-executed project on improvement and restoration of fish landing centres in Sri Lanka.

9.1 Field visit to Dhamara fishing harbour

The workshop was preceded by a day's visit by the participants to Dhamara fishing harbour on 8 December 2009. On reaching the fishing harbour, the participants were received by the President, Secretary and other office bearers of the Maa Dhamarai Fishermen Association and taken to their office located next to the main security gate of the harbour. After a brief introduction, the participants were taken around Phase II of the fishing harbour which was upgraded to international standards under the TCP. The newly-developed facilities included the sorting platform, pressure washer, stainless steel ice crushers, shade for trucks in the loading area, fish box wash station, toilet facilities and net mending area (Appendix 4). The practices followed by the vessel operators such as segregation of fish on board vessels, preservation with ice in the fish hold, modifications carried out to the fish hold of the vessels for holding the crates properly, and the proper maintenance of the deck and fish hold of the vessels without any contamination, were very much appreciated by all the participants. After lunch break, the participants were taken around Phase I, the improvement works of which were yet to be taken up.

9.2 Workshop proceedings – Day 1

9.2.1 Inauguration session

The inaugural session of the workshop was presided by Mr G. Mohan Kumar, Principal Secretary, Fisheries and Animal Resources Development Department, Government of Orissa. He also inaugurated the workshop. After briefly explaining the objectives of the project, Mr Gangadhar Singh, Director of Fisheries, Orissa, extended a warm welcome to all participants.

In his opening address, Mr Gavin Wall, FAO Representative for India and Bhutan, drew the attention of the participants to the food security issues currently discussed all over the world. He explained that like any other, the two fishing harbours involved in the project provided an interface between harvesting and consumption. Unless the fish are handled properly in the harbours, fish quality and food safety could not be ensured. The capacity building now accomplished in the two harbours should continue, so that the harbours would become a showcase to other fishing harbours in the country. Before concluding his address, he emphasized the need for involving the women stakeholders in the management of the society and in implementing programmes for improving their livelihoods.

Expressing his happiness to participate in the workshop, Mr Mohan Kumar said that improving fishing harbours in India had been a challenging job for the fishery administrators. The marine fishing industry not only supported livelihoods of thousands of the coastal population, but also helped to earn foreign exchange through exports. As more than 40 percent of the marine catch are processed and exported from India, he emphasized that unless the quality requirements of the importing countries

were met, exports from India would suffer, which in turn would affect the livelihoods of persons employed in the fishing and processing industries. While the country could improve the processing factories to required standards, improvements to fish handling on board vessels and in harbours had been elusive.

He pointed out that one of the main problems in achieving international standards of hygiene and cleanliness in the fishing harbours was the failure to set up a proper structure for the management and maintenance of the fishing harbours. Even a harbour with all infrastructure facilities would not be able to ensure food safety unless the same was managed and maintained properly. He further informed that the fishing harbours were short of revenue due to certain policies of the governments. To overcome various problems of the management of harbours, an autonomous system of management was thought of as early as 1998, but such a system failed to take off at that time. However, an autonomous management system was recently introduced successfully in one of the harbours in the state of Kerala. He was happy that the two fishing harbours with improved infrastructure and proper management would go a long way to serve as models for the improvement of the fishing harbours in the country.

Following the inauguration, Mr Abhimanu Raut and Mr Profulla Jena, President and Secretary, respectively, of the Maa Dhamarai Fishermen Association, Dhamara, and Mr Ranchod Khorava, stakeholder from Mangrol, Gujarat, offered felicitations and assured the gathering that their members would carry out the programmes to its logical end.

The inauguration session came to an end with the vote of thanks offered by Mr J.B. Dash, Deputy Director, Marine, Department of Fisheries, Government of Orissa.

9.2.2 Presentations

The session was chaired by Mr Mohan Kumar. The first presentation was delivered by Dr Susana V. Siar, Fishery Industry Officer, on the background of the project and objectives of the workshop. While explaining the background and objectives of the TCP, she touched upon the reasons for which the technical cooperation from FAO was sought by the Ministry of Agriculture, Government of India. She was happy that the partners in the programme – FAO, Ministry of Agriculture, Government of India, Governments of Gujarat and Orissa – had worked together with better understanding and cooperation to achieve the objectives of the TCP. The approach for the implementation of the TCP revolved around (1) activities involving all key stakeholders of the two fishing harbours; (2) extensive technical inputs from international experts; and (3) follow-up and technical support from two national experts. She pointed out the various constraints encountered in project implementation such as the following:

- Time: This was already foreseen by the stakeholders in the two fishing harbours during the initial stakeholder consultations. In the case of Mangrol fishing harbour, the tendering process for the infrastructure upgrading took time, thus the start of the construction of civil works fell behind schedule. By the end of the project, the auction hall is scheduled to be finished during the first quarter of 2010.

- Administrative: Phases I and II of Dhamara fishing harbour were under two different jurisdictions, with Phase I under the Director of Ports of the Department of Commerce and Phase II under the Department of Fisheries. Unification of the two fishing harbours under only one jurisdiction was recommended during the early days of the project but this was not realized until December 2009, when the management of Phase 1 was handed over to the Department of Fisheries. In this regard, the Management Society of Dhamara fishing harbour started functioning fully only on 1 December 2009.

- Implementation: Recommendations regarding the design and materials were not always followed and there were problems with the poor quality of civil works.

- Logistics and communication: The two fishing harbours are located on the western and eastern coasts of the country, requiring substantial resources for travel by the national as well as international consultants in order to deliver the required outputs and follow up on the implementation.

- Excess fleet capacity: Mangrol fishing harbour was originally designed for 400 boats, but is being used by more than 1 000 boats. There is evidence of continued construction of boats around the fishing harbour, which are meant to be replacement for the already existing fleet. However, the fishing fleet continues to increase because the boats to be replaced are still being used for fishing and are not taken out from the fishery. This puts the fishery resources under more stress and no amount of upgrading can solve the problem in an already overcrowded fishing harbour.

She also explained the objectives of the workshop, the flow of the two-day programme and the formation of the working groups to recommend the future courses of action.

The second presentation was given by Mr Joseph Alan Sciortino, International Expert on Harbour Design and Management, on upgrading fishing harbours to international standards. After briefly tracing the various components of a fishing harbour and the sources of their contamination, he explained the various infrastructural improvements suggested for the two harbours and the works completed so far. He suggested that after completion of the remaining works in the two harbours, the government should set up a training centre exclusively for fishing harbours for training key staff in design, management and public health. With the help of these trained personnel, selection of new sites for development of fishing harbours could be made and modification of the existing ones could also be done.

He suggested that the upcoming FAO Fisheries and Aquaculture Technical Paper 539 on fishing harbour planning, construction and management, the EU publication on design for sanitary standards for landing sites, and other training manuals could serve as tools for selecting new sites for the development of the fishing harbours and for improving the existing ones. The three steps involved in the identification and selection of a suitable site – characteristics of a landing site; potential sources of pollution; and assessment of standards of services, utilities, etc. were also explained with examples.

The next presentation was delivered by Mr N.K. Padhi, Executive Engineer, FED, Bhubaneswar, on the status of upgrading of infrastructure at Dhamara fishing harbour. After explaining the existing infrastructure, including the infrastructure developed under the TCP, he gave a detailed picture of the works proposed for Phase 1 of the harbour and other general improvements costing Rs.131.0 million. He informed that the project was awaiting clearance from the Government of India. While discussing the infrastructure for the harbour, Mr Padhi expressed his difficulties in selecting the right material (epoxy or other) for covering the fish sorting platform, the size of the platforms etc. He also wanted to know whether the sorting/auction hall should be a closed or open one.

Considerable discussions were held on the above points. Mr Sciortino explained that the prescribed quality epoxy floor covering would meet the requirements fully. Mr Simon Diffey, Chief Technical Adviser of the FAO project in Sri Lanka, suggested that more information was needed with regard to the cost of the various materials that could be used for covering the floors. With regard to closed or open auction hall, Mr Betgeri of CICEF insisted that as per EU norms the hall should be a closed one. Mr Venkatesan emphasized the need for a dialogue at national level to decide on the various issues including the design of the auction hall.

During the post-lunch session, the first presentation was delivered by Mr P.C. Malli, Assistant Director of Fisheries, Gujarat, on the status of upgrading Mangrol fishing harbour. He explained the works completed so far and expressed hope that the remaining works would be completed within a few months.

The next presentation was given by Mr B. N. Krishnamurthy, National Consultant on Harbour Management and Institution Building, on the recommendations regarding stakeholder participation in the management of Mangrol fishing harbour. After presenting briefly on the areas of management in a fishing harbour, he gave a picture of the various management models followed in different fishing harbours in the country and their deficiencies. Thereafter, he focused mainly on the management structure recommended for Mangrol. The various structures of the management body include the composition of the society, organs of the society, office bearers, Governing Council, and managing committee. He also explained the proposed administrative structure for the society and the anticipated income and expenditure. He pointed out that the user charges were proposed with the consent of the stakeholders. Before concluding his presentation, he remarked that the Department of Fisheries, Government of Gujarat, was yet to take a decision on the formation of the management structure.

The next presentation was delivered by Mr V. Venkatesan, National Consultant on Community Participation in Fisheries, on environmental management and maintenance of hygiene and cleanliness in Dhamara fishing harbour. He explained how the improved infrastructure in Dhamara would be helpful for the maintenance of hygiene and cleanliness in the harbour. With the management society in position and completion of the capacity building activities, he hoped that the plan suggested by FAO for the waste management and maintenance of hygiene and cleanliness in the harbour could be easily carried out. The best environment management practices laid down for dealing with waste collection and disposal, cleaning and sanitation schedules, monitoring methods of the hygiene and cleanliness, and personal hygiene were also explained. He drew the attention of the participants on the practices followed by the fishing vessel operators such as segregation of the catch on board, using crates for packing fish with adequate quantity of ice and storing in fish hold, and modifications carried out on the fish hold to store more crates. He expressed confidence that these practices would set an example not only to the fishing crew in the other harbours of Orissa but also to the crews elsewhere in the country. With the improved infrastructure and management personnel in position for implementation of the best management practices, he further emphasized that the harbour would become a model in the next few months.

At the request of the participants, Mr Simon Diffey, Chief Technical Adviser, in-charge of the FAO project on the restoration and improvement of fish landing centres with stakeholder participation in management in Sri Lanka, made a brief presentation about the project. This is a three-year post-tsunami project funded by the Canadian International Development Agency (CIDA). The expected impact of the project is the improvement of livelihoods of fishers and fishing communities in the tsunami-affected areas. The expected project outcome is rehabilitated landing sites functioning and managed in a self-sustaining manner through active stakeholder participation. There are three specific project outputs, namely: (1) Capacity of Ceylon Fishery Harbours Corporation (CFHC) strengthened to coordinate landing site rehabilitation and management; (2) Fisheries landing sites rehabilitated in 15 districts; and (3) Institutional frameworks for community participation in fisheries landing site management developed and implemented.

9.3 Workshop proceedings – Day 2

9.3.1 Sharing of experiences

The session was presided by Mr Gangadhar Singh, Director of Fisheries, Government of Orissa. Mr Abhimanyu Raut and Mr Profulla Jena, stakeholders from Dhamara fishing harbour, jointly shared their experiences on the training course on fish quality and food safety and awareness-raising on the maintenance of hygienic standards. They expressed that the training conducted by

Mr Francisco Blaha on fish quality and food safety was very interesting and useful to them. Similarly, the awareness campaign gave the opportunity to a large number of the stakeholders to learn more on the importance of personal hygiene during handling of fish in the harbour.

The Chief Executive of the Management Society, Dhamara fishing harbour, Mr Rama Chandra Sahu, in his presentation on the Management Society of Dhamara fishing harbour, provided the details of the composition of the society, its Governing Council and the recently positioned administrative structure.

The next speaker, Mr Janaki Ballav Dash, Deputy Director of Fisheries, Marine, shared his experiences on the study tour to General Santos Fish Port Complex in the Philippines. He gave a detailed picture of the harbour infrastructure and administrative and management structure. He further explained how the management was ensuring hygiene and cleanliness in the harbour by adopting HACCP and waste handling following MARPOL. For him, the most interesting part of the management was the penalties inflicted on the defaulters/violators of the port regulations which he considered were helpful to ensure proper management of the harbour.

Mr L. Shankar, Deputy Commissioner, Fishing Harbours, Ministry of Agriculture, Government of India, delivered a presentation on the prospects for cleaner fishing harbours in India. He gave an overview of the Indian marine fishing industry and the fishing harbours and fish landing centres in India, the policy of the Government of India for development of fishing harbours, financial assistance extended for improvement/construction of fishing harbours of international standards, and the present status of the harbours. He explained the different management structures existing in India and their deficiencies. He also emphasized the need for setting up autonomous institutions like a National Fishery Harbour Authority and State Fishery Harbour Authority for development and management of the fishing harbours. Before concluding his presentation, he also shared his experiences on his study visit to General Santos Fish Port Complex in the Philippines.

Following the presentations, the participants interacted on various issues relating to fishing harbours in India. On a query on the penalties levied by the General Santos port, Mr Shankar replied that the Port Regulations enacted by the Philippine Government empowered the port authorities to levy such a penalty. He further explained that there was no such regulation in India. Mr Naseem Ansari of Karnataka Fisheries enquired about the source of funds for running the management society of Dhamara. Mr Dash informed that the Department of Fisheries is meeting the salary expenses. However, once adequate funds are collected through user fees and leasing of facilities, the society would have adequate income to meet its expenditure. Mr Venkatesan pointed out that unlike in the current year, the income in the coming years would be around Rs 3.5 to 4.0 million only and the society should either restrict its expenditure within this limit, or increase its income from sources other than the present ones.

Mr Simon Diffey emphasized that each harbour should have a business plan, look at the cost and income regularly and make necessary financial decisions. The Chairman indicated that the Governing Body of Dhamara would be approving a financial plan well before the commencement of the financial year. Mr Venkatesan cautioned that as the fishing industry is passing through a tough time, levying more fees on the direct services and supplies would become counterproductive. Mr Krishnamurthy emphasized the importance of providing initial seed money for the management of the harbour.

On a query on the role of government of India in the case of BOT by private builders, Mr Shankar informed that the government would assist the private developers financially to meet the viability gap, but the government has yet to decide on its role in the management of such harbours. Mr Venkatesan emphasized that many beach landing and fish landing centres might be catering to domestic markets. These must be identified and made to follow a national standard which would help the consumers in India to get good quality fish. As far as major and minor fishing harbours are concerned, he further

emphasized that the Export Inspection Council of India should take necessary penal action against harbours not meeting the prescribed standards.

Mr Sciortino suggested that the trained team of staff should be allowed to continue in the concerned harbour for a couple of years to bring it to requisite standards. Any transfer of trained staff from the harbour would delay in achieving the objectives.

9.3.2 Working group session

The participants were divided into three working groups to discuss an assigned topic, as follows:

- Working group 1 – Effective participation of stakeholders in the management of fishing harbours
- Working group 2 – Achieving financial sustainability in the management of fishing harbours
- Working group 3 – Maintenance of hygiene and cleanliness and prevention of pollution in the fishing harbours

Each group was asked to select a chair and a rapporteur and prepare a powerpoint for presentation during the plenary.

9.3.3 Plenary

The plenary session was chaired by Mr G. Mohan Kumar. The detailed output of each working group is presented in Appendix 5.

Recommendations of Group 1: The recommendations of Group 1 on effective participation of stakeholders in the management of fishing harbour were presented by Mr Simon Diffey. In addition to stakeholder analysis, the team recommended the methods of the classification of stakeholders, ways and means of ensuring their participation in the management, the needs for their participation, as well as importance of informing them properly on the need to pay user fees, among others. They had also indicated items of management responsibilities which had to be taken care of by Government or its authorized bodies.

Recommendations of Group 2: The recommendations of the second group on achieving financial sustainability in the management of the fishing harbours were presented by Mr L. Shankar. The group emphasized the need for institutions with autonomy for managing the harbour, including fixing and collecting of user fee. The other important recommendations include: (1) providing seed money by the state government to the management body to meet the expenditure during the initial period; (2) optimization of human resources and outsourcing for major services and (3) judicious expenditure. After the discussion, the recommendation on the supply of water and power at concessional rates was modified to actual cost. This means that the user charge for water has to be worked out to a level which would meet all the costs of production by the water supplying agency, in this case the state government, without adding profits.

Recommendations of Group 3: Mr Betgeri, Director, CICEF, presented the recommendations of the third group on maintenance of hygiene and cleanliness and prevention of pollution in the fishing harbour. The important recommendations of the group include the need for: (1) an approved quality assurance programme for each harbour and appointment of a health/hygiene officer; (2) cleaning and sanitation schedule; (3) ensuring supply of quality ice including hygienic crushing and transporting; (4) approved items of detergent and sanitizer; (5) an approved waste disposal programme; (6) approved monitoring programme, checklist for effective monitoring and follow-up action; and (7) approved pest and animal control . The recommendations also emphasized the need for allocation of sufficient funds in the budget for maintenance of hygiene and cleanliness and waste disposal and for conducting the awareness campaign on a regular and continuing basis.

Discussions followed the presentation of working group outputs. With regards to standards of water for ice making, it was recommended to use the ISI standard for potable water or the standards prescribed by EIC for fish processing and exporting establishments. The participants suggested that segregating fish on board and using of crates for storing fish in fish hold should be popularized among fishing vessel operators.

As regards the management of fishing harbours, the participants recommended that there should be a two-tier system. Tier one would be at the state level to take up decisions on major expansion works, dredging, policy issues and general direction and guidance. Tier two would be an autonomous body, preferably a Society registered under the Registration of Societies Act. Each harbour or a landing centre should have an autonomous body to manage the day-to-day operations, collection of revenue, maintenance, and implementation of approved hygienic standards. The body should be financially self-sufficient and would be an all inclusive entity.

The participants approved the recommendations of the three groups. Mr Mohan Kumar recommended that the considerable information from the TCP should be adopted by all the maritime states and put into use for the benefit of the fishing industry. Before concluding the session, he thanked FAO and the Ministry of Agriculture for selecting the two fishing harbours for upgrading into international standards and serve as models.

9.3.4 Closing

Dr Susana Siar thanked Mr Mohan Kumar for his support and cooperation in conducting the workshop and expressed hope that under his guidance the fishing harbours in the state would be upgraded to international standards quickly. She also thanked the Ministry of Agriculture for all the cooperation in the implementation of the TCP. She appreciated very much the tireless work done by the team of officers of the Department of Fisheries led by its Director, Deputy Director, Marine and other officials and also the officials of the management society. She also thanked the officials of the Department of Fisheries, Gujarat and the stakeholders of Mangrol and Dhamara for the cooperation they extended to the project.

APPENDIX 1

Photo documentation
Status of the two fishing harbours in March 2007

Dhamara fishing harbour

Entrance to the harbour (left) and office of the Assistant Conservator (right)

Dhamara fishing harbour Phase 1

Dhamara fishing harbour Phase 2


Auction/sorting hall


Inside a processing room (left) and ice crushing inside the auction hall (right)


Sorting and packing of the catch on the quay


Fishers' living areas (left) and slipway (right)

Mangrol fishing harbour


Fishing boats berthed inside the basin


Sorting hall (left) and hygiene block (right)


Temporary shed used inside the harbour (left) and fish market outside the harbour (right)


Crane lifting boat (left) and women fish vendors (right)

APPENDIX 2

Study tour at General Santos Fish Port Complex
(under the TCP/IND/3102)

Programme of activities

Date	Time	Activity	Responsibility
Arrival	Morning	• Pick-up participants at airport • Courtesy call to the PM • Quick tour to port premises • Fetch participants to hotel	• Office of the Port Manager(OPM)
	Afternoon	• Rest at the hotel	
Day 1	Morning	• Pick-up participants at hotel to fish port • Orientation on Procedures of Port Operations o Administrative Matters o Food Safety o Information Technology o ID System o International Ship & Port Security	• Administrative Division • Port Manager o Admin o OPM – Food Safety o OPM – IT o OPM – PIDS o OPM - OSAS
	Afternoon	o Harbour Operations o Market Operations o Engineering, Maintenance & Refrigeration Operations (Including Waste Water Treatment) o Finance Operations	o Harbour Division o Market Division o EMR Division o Finance Division
Day 2	Morning	• Observation: Harbor & Market Operations o Process Flow o System Implementations	• Harbour Division • Market Division
	Afternoon	❖ *Continuation: Harbour & Market Operations* o Process Flow o System Implementations • Debriefing o Harbour Operations o Market Operations	• Harbour Division • Market Division

Day 3	Morning	• Observation: Engineering, Maintenance & Refrigeration Operations (Including Waste Water Treatment) o Process Flow o System Implementations • Debriefing	• Engineering, Maintenance & Refrigeration Division
	Afternoon	• Orientation/Observation on Food Safety (GMP-SSOP) o Guidelines on Adherence o System Implementations ➢ Monitoring Procedures ➢ NUOCA ➢ Saturation Drives ➢ Janitorial (Sanitation)	• OPM – Food Safety Compliance Unit
Day 4	Morning	• Observation: Seminar-Orientation On GMP-SSOP • Debriefing	• OPM – Food Safety Compliance Unit
	Afternoon	• Orientation on Finance and Corresponding Fees o Process Flow o System Implementations	• Finance Division
Day 5	Morning	• Orientation on stakeholders' role to the Fishing Industry and its Commitment to Food Safety	• Socsargen Federation of Fishing & Allied Industries, Inc. (SFFAII)
	Afternoon	• Feedback with the PM • Closing	• Port Manager
Departure	Morning	• Pick-up at the hotel and fetch to airport	• Office of the Port Manager

APPENDIX 3

Workshop programme
National workshop on the TCP on capacity building
in support of cleaner fishing harbours

Date and Time	Activity
Day 1 – 9 December 2009 (Wednesday)	
08.30	Registration
	Inaugural session
09.00 – 09.05	Invocation
09.05 – 09.15	**Welcome address** Mr Gangadhar Singh Director of Fisheries, Cuttack
09.15 – 09.30	**Opening address** Mr Gavin Wall FAO Representative in India and Bhutan
09.30 – 10.00	**Presidential address and inauguration of the workshop** Mr Mohan Kumar, IAS Principal Secretary, Fisheries & ARD, Orissa
10.00 – 10.15	Felicitations from Representative of Stakeholder Groups
10.15 – 10.20	**Vote of Thanks** Mr J. B. Dash Deputy Director of Fisheries, Directorate of Fisheries, Cuttack
10.20 – 10.35	Break
	Chairperson: Mr Mohan Kumar
10.35 – 10.50	**Background of the project and objectives of the workshop** Susana V. Siar, Fishery Industry Officer (Rural Development) Food and Agriculture Organization of the United Nations, Rome
10.50 – 11.50	**Upgrading fishing harbours to international standards** Joseph Alan Sciortino International Expert on Harbour Design and Management
11.50 – 12.20	**Discussion**
12.20 – 12.50	**Status of Upgrading of Infrastructure at Dhamara fishing harbour** Representative from Orissa State
12.50 – 13.05	**Discussion**
13.05 – 14.30	**Lunch**
14.30 – 15.00	**Status of upgrading of infrastructure at Mangrol fishing harbour** Representative from Gujarat State
15.00 – 15.15	**Discussion**
15.15 – 15.45	**Stakeholder participation in fishing harbour management: options and recommendations for Mangrol fishing harbour** B.N. Krishnamurthy Expert on Harbour Management and Institution Building
15.45 – 16.00	**Discussion**
16.00 – 16.15	**Break**
16.15 – 16.45	**Environmental management and maintenance of hygiene and cleanliness in Dhamara fishing harbour** V. Venkatesan Expert on Community Participation in Fisheries
16.45 – 17.00	**Discussion**

17.00 – 17.30	**Sharing of experience on training course on fish quality and food safety and awareness raising on the maintenance of hygienic standards in Dhamara fishing harbour** Representative from Dhamara fishing harbour
17.30 – 18.00	**Discussion**
Day 2 – 10 December 2009 (Thursday)	
	Chairperson: Mr Gangadhar Singh
09.00 – 09.30	**Management Society of Dhamara fishing harbour** Chief Executive Officer of the Society
09.30 – 09.45	Discussion
09.45 – 10.15	**Sharing of experience on study tour to General Santos Fish Port Complex, Philippines** Mr J. B. Dash Deputy Director of Fisheries, Directorate of Fisheries, Cuttack
10.15 – 10.30	Discussion
10.30 – 10.45	Break
10.45 – 11.15	**Prospects for cleaner fishing harbours in India: existing and future harbours** Mr L. Shankar Deputy Commissioner, Fishing Harbours Ministry of Agriculture, Government of India
11.15 – 11.30	Discussion
11.30 – 13.30	**Working group sessions** Participants will be divided into three working groups to discuss an assigned topic. Each group will choose a chair who will facilitate the discussion, and a rapporteur who will record the discussion and prepare a powerpoint presentation. The group will also choose among themselves a presenter during the plenary. Working group 1 – Effective participation of stakeholders in the management of fishing harbours Working group 2 – Achieving financial sustainability in the management of fishing harbours Working group 3 – Maintenance of hygiene and cleanliness and prevention of pollution in the fishing harbours
13.30 – 14.30	Lunch
14.30 – 15.30	**Continuation of working group sessions and preparation of group presentations**
	Chairperson: Mr Mohan Kumar
15.30 – 16.30	**Plenary: Presentation of working group outputs**
16.30 – 17.30	**Discussion and adoption of recommendations**
17.30 – 17.45	**Vote of Thanks**

APPENDIX 4

Dhamara fishing harbour Phase II in December 2009


Sorting hall (left) and signboard to raise awareness on proper handling of catch in Oriya language (right)


Fish box washing station (left) and fishery training center and extension office (right)


Wall of toilet block with signboard to raise awareness on personal hygiene in Oriya language (left) and shaded truck loading area where orientation to the fishing harbour was held (right)

APPENDIX 5

Recommendations of the working groups

Working group 1

Effective participation of stakeholders in the management of the fishing harbour

Primary stakeholders in a fishing harbour

- Fishermen/crew members
- Middlemen
- Processors
- Boat owners
- Women's groups
- Transporters
- Exporters
- Ice, fuel and fishing gear suppliers

Secondary stakeholders

- Co-op Society
- Boat builders
- Government (Federal/State)
- Municipality
- Financial institutions
- Environment agency and coastguard
- Marine Police/Navy
- National security agencies etc etc

Informing stakeholders

- Communication strategy – website (where appropriate), newsletter, monthly meetings

Ensuring participation of stakeholders

- Get the confidence of the people – sense of ownership
- Recognised membership
- Use of working groups
- Setting of responsibilities
- Legal recognition
- Democratically elected membership and representation

Needs for effective participation

- Changes in the law as required
- Be honest with our skills – use SWOT analysis
- Training of stakeholders (formal and on-the-job and exposure) – awareness raising
- Training of government officials to relinquish (give back) some control
- Remuneration (incentives) for staff
- Mechanisms for conflict resolution

- Need for a business/operational plan – bottom up planning! MONITOR THE PLAN

Issues of funding

- Be realistic about how much funding is required in the 'early days'
- Need to understand 'user pays' in order to cover FH costs
- Large capital costs to be covered by GoI
- Disaster management

Government's sole responsibility

- Licensing and registration of vessels
- Identity cards for skipper/crew
- Coastal protection/national security
- National hygiene standards (Competent Authority)
- Enforcement of regulations (stakeholders however have a role in voluntary compliance).

Two-tier system of management will help effective participation

- Tier one would be at state level to take decisions on major expansion works, dredging, policy issues and general direction and guidance.
- Tier two would be an autonomous body, preferably a Society registered under the registration of societies act. Each harbour or a landing centre should have an autonomous body having adequate representation from stakeholders to manage the day-to-day operations, collection of revenue, maintenance, and implementation of approved hygienic standards. The body should be self-sufficient financially. It should be an all-inclusive entity.

Working group 2

Achieving financial sustainability in the management of fishing harbours

- The management Body should be provided with seed money to meet the expenditure during the initial period of one year. Thereafter the Body should take all necessary initiatives to become financially self sufficient.
- Optimize the human resources and outsource the major services. An institutional system with autonomy should be in place for the management, maintenance and operation of the fishing harbour.
- The Body should have the autonomy in formulation, levy and collection of user charges.
- The formulation of user charges should be in consultation and consent of the user groups.
- The body should consider the economic and social state of the users while deciding the user charges.
- The system of collection of user charges should be made mandatory and based on the quantity and grade of fish and supplies made.
- The value added facilities should be provided to boost the revenue of the harbour, e. g. fish retail market, ice plant, cold storage (freezing unit), chilled storage, processing unit, canteen, stores for gear and fishing in puts, crates.
- Adequate personnel for collection of user charges.
- Easy way of collection of user charges should be established.
- Expenditure on capital works like expansion, upgrading, dredging etc. should come from government funding.
- Best management practices should be followed to optimize the expenditure.
- The Body should follow proper procedures for incurring expenditure judiciously.

- Boost the revenue by encouraging eco-tourism in the harbour premises especially during the off season.
- System of fines for violation of harbour rules and regulations should be put in place.
- The harbour authority should be provided with water and power at cost price or cost price plus.
- The list of user charges should be displayed at the main gate.
- The revenue has to balance the expenditure.
- At the beginning of the financial year, the estimate of expenditure should be made and on that basis the user charges to be formulated.

Working group 3

Maintenance of hygiene and cleanliness and prevention of pollution in the fishing harbour

- The fishing harbour should have all necessary standard infrastructural facilities for hygienic handling of fish and prevention of environmental pollution.
- Each fishing harbour should have its own approved quality assurance programme with regard to hygiene and cleanliness and prevention of pollution.
- Each harbour should have a well-trained hygiene officer and staff to implement the quality assurance programme.
- As it is difficult to get qualified hygiene officer, the government should have a training centre specifically for training personnel in the above subjects.
- Under the Quality Assurance Programme, the harbour should have a 'Cleaning and Sanitation Schedule' for all fish contact surfaces, other surfaces in the harbour complex, drainages, and equipments and machinery used for fish weighing, ice crushing etc.
- Especially, the quality of water used for drinking by harbour users, washing fish, making ice should meet ISI standards for potable water. Ice should be produced in approved plants meeting standards fixed by the harbour.
- Fish as well as ice transporting vehicles should meet the standards prescribed by the harbour.
- The harbour should procure approved food quality detergents and sanitizers for cleaning and sanitizing.
- There should be an approved waste disposal (solid, liquid and hazardous) programme.
- Each harbour should have an approved monitoring programme to ensure maintenance of hygiene and cleanliness and prevention of pollution.
- The harbour should conduct awareness programme on a regular basis for the stakeholders. NGO services can be utilized for this purpose. The hygiene officer or his staff should have standard checklists for periodic check-up of the implementation of the programme.
- The observations made by hygiene officials should be entered into records and follow-up action taken promptly (action taken to be noted).
- Giving incentives to the vessel owners who maintain the vessel hygienically may be considered.
- The hygiene officer should ensure that the standards for personnel hygiene and health are implemented.
- The harbour should have a standard pest and animal control.
- For proper maintenance of toilets and waste disposal, the harbour should decide the best of agency to carry out the job.
- The harbour management should allocate necessary funds on a priority basis for the maintenance of hygiene and cleanliness and prevention of pollution.

This publication is intended to share the experiences and lessons from a technical cooperation project on capacity building in support of cleaner fishing harbours in India. The project was implemented between March 2007 and December 2009. The objective in preparing this publication is to provide an example of how fishing harbours may be upgraded to international standards of hygiene and fish quality assurance. It is intended for government officers in fisheries departments tasked with the supervision and management of fishing harbours and fish landing sites, as well as technical staff who are given the responsibility for designing and upgrading fishing harbours.