

Annex 11- Transport and Communication Sector

I. Introduction

1. Due to the archipelagic nature of its topography, the Maldivian transport sector is maritime and airborne based with few paved roads in Male (60km), on Laamu and Addu Atolls (14 km each) and the rest of unknown lengths of compacted coral village roads including of about 250 km of such roads under maintenance of the Ministry of Construction and Public Works. Aside from the main port in Male, the country has about 90 manmade harbors with quays, basins and breakwaters; several natural harbors; jetties and approach channels to access inner atolls to service the 200 inhabited islands. However, most of the islands are lacking proper facilities. Moreover more than half of the inhabited islands indicate not always being accessible. In most cases harbor related problems are cited as the reason, but also lack of jetties, difficulties with lagoons or entrance channels, as well as problems caused by adverse weather conditions are reported. The interisland shipping routes are marked by 86 nos. "12-miles light beacons", 209 nos. "2-miles reef markers" and 390 "harbor entrance markers". The airport sector consists of 2 international airports (Male and the former military airport in Gan for freight) and 3 regional airports in the southern and one in the northern atolls and a number of private airstrips.

II. Damage Assessment and the Government's Immediate Response

2. While the 26 December Tsunami inflicted severe physical damage to housing, power facilities, agriculture and fisheries, the damage to the transport infrastructure was less in comparison than originally feared. This can largely be attributed to the fact that the maritime facilities are generally located at the inner side of the atolls, away from the direct tsunami impact and the airports are located on islands where the tsunami had not much impact, like for example in Male and Gan islands where the most substantial port and airport infrastructure is located.

3. The telecom network broke down completely after the tsunami struck. Four network nodes failed largely because the network is serially connected without alternate routes. Because of the importance of a functioning communication network particularly in this calamity situation, Dhiraagu immediately established a network crisis management team that started restoration work. Limited services could be installed in the various atolls between 11 hours and 65 hours and as of 7 January 2005 all links including mobile service have been restored to previous capacities despite the damage to equipment buildings and power generators. The restoration is mostly temporary.

4. Immediately after the tsunami, the Post-Tsunami Task Force, the Ministry of Atolls Development and other related sector ministries have sent out questionnaires, followed by quick site visits to the most affected island to get immediate information on the damage. The data reported by the islands is often not fully conclusive and can therefore only be consolidated after some standardizing assumptions. As such, the data reported are subject to revisions as more detailed investigations have taken place, but should serve well as a first best estimate.

5. Based on the figures made available to the mission from 142 tsunami-affected islands that reported and after discussions with the relevant line ministries and MTCC, the largest Maldivian contractor, the damages for the transport sector are at present assessed as summarized in Table 1 based on the assumptions made as Appendix.

Table 1: Rapid Damage and Replacement Cost Assessment

Category	Grade/Item	Quantities	Unit	Replacement Cost Estimates US\$ million
Jetties	Destroyed/damaged	36	Nos	
		1,600	meter length	0.20
Harbor	Quay walls ¹⁾	4,200	meter length	4.30
	Sea Walls/Breakwater ¹⁾	15,000	meter length	11.50
			Harbor Subtotal:	15.80
Dredging	Basin Dredging	375,000	m ³	1.50
	Entrance Dredging	145,000	m ³	0.55
			Dredging Subtotal:	2.05
Nav aids (maritime)	12-Mile Light Beacons	25	Nos	0.34
	2-Mile Reef Markers	65	Nos	0.06
	Entrance Markers	120	Nos	0.10
			Nav aides Subtotal:	0.50
Causeway		300	meter length	1.70
Male Commercial Harbor²⁾	Electrical Equipment and Accessories, lighting	-		0.25
	Others (handling gears, office furniture)	-		0.02
			MCH Subtotal:	0.27
Male Int'l Airport²⁾	Runway, shoulders, taxiways, drainage, etc.	-		0.65
	See walls	-		0.77
	Nav aids/Communications system	-		1.90
	Others (building, etc.)	-		0.61
			MIA Subtotal:	3.93
			Total Cost:	24.45

1) Some damages to quay walls may be reported as damages to sea walls and breakwaters.

2) Damages to MCH and MIA will be covered under insurance. Though not all the insurance assessments have been undertaken as yet, one estimate is that in the final analysis maybe 50% of the physical damage will be covered by insurance (refer to para 7. Annex 8 Tourism Sector).

6. Only 36 jetties are reported to have some damage and a total of 19,200 m length of quay walls and sea walls/breakwater lengths need repair; a total dredging volume of 520,000 m³ caused by siltation of harbor basin and approach channels is estimated. In five cases have causeways partly been washed away. At this point in time, there are no confirmed reports on the actual damage on nav aids, but it has been assumed that about one-third of the lights have experienced some damage. There are minor damages to Male Commercial Harbor and Male International Airport, which will be partly covered by insurance. The total cost of the damages is estimated at US\$ 24.45 million. The unit prices assumed do not reflect possible inflationary impacts the forthcoming nationwide restoration works may develop.

7. There had been substantial amounts of coastal erosion reported, which could not be qualified in terms of environmental relevance and has therefore not been included here. It is expected that this will be considered by the Ministry of Environment and Construction and/or relevant ministries.

III. Needs Assessment

8. **Immediate Needs:** Except for the nav aids, none of the damages reported are of a nature that needs to be remedied on an immediate basis given the needs of the other sectors, but the facilities should be restored within the next 1-2 years. The above assessments have high margins of error, given that no detailed site inspections have taken place. It is therefore important that technical assistance be provided on an urgent basis to obtain a better picture of the damage and to better plan and cost the restoration works.

9. For safety considerations, the nav aids should be reinstated without delay to avoid any calamities and to provide security to fishermen and interisland traffic. A further immediate need would be, in the light of the forthcoming massive reconstruction works and the ensuing shortage of sufficient interisland transport capacity, to consider hiring on the international market a fleet of suitable motorized landing barges. In the absence of such transport capacity, construction cost would soar for the restoration works in all sectors, especially in the housing sector, as transport availability has been quoted as the single most important risk factor for potential contractors or suppliers of construction material.

10. The immediate actions the Government has taken after the tsunami for the transport and communication sector had all been financed out of the budget.

11. The cost of the immediate needs program for the transport sector would be around US\$2.0million (US\$0.5 million for the nav aids and US\$0.5 million for hiring shipping capacity) as summarized in Table 2.

Table 2: Needs Assessment

Activities	Phase I	Phase II		Total
	Immediate	Mid-term	Restoration	
	Public	Public	Insurance	
Maritime Nav aids	0.50			0.50
Hiring Landing Craft	0.50			0.50
Jetty Repair		0.20		0.20
Quay Walls/Sea Walls Repair		15.80		15.80
Dredging		2.05		2.05
Causeway Repair		1.70		1.70
Male Commercial Harbor ¹⁾		0.14	0.14	0.27
Male International Airport ¹⁾		1.00	1.00	2.00
Civ.Av.Nav aids (Satelite.based)		1.00		1.00
Total	1.00	21.89	1.14	23.03

1) Assuming insurance coverage of 50% for the physical damages

12. **Medium and Longer Term Needs:** All efforts should be undertaken to restore the damaged facilities to appropriate standards based on the recommendation and findings of the technical assistance mentioned in para. 8 within the next 1-2 years to avoid continued inefficiencies in the transport, which would result in higher transport cost to commodity prices. Such program is estimated to cost around US\$21.89 million (Table 2), including 50% of the damages to the Male Commercial Harbor and the Male

International Airport, assuming insurance will cover 50% of the physical damages. While it is unlikely that a similar disaster will strike the region in a foreseeable future again, all existing building standards should be reviewed and amended in the light of the recent experiences made, balancing incremental cost and risk as a disaster mitigation measure. As an immediate lesson, the Civil Aviation Department is considering as a disaster mitigation measure to change its navigational system from an earth based to a satellite based system and suggested this to be included into the mid-term restoration program.

IV. Donor Response and Financing Immediate and Restoration Needs

13. In response to the UN Flash Appeal, UNDP has received US\$4 million from the Government of Japan for the restoration of critical infrastructure. The ADB and JBIC have indicated interest in assistance for the immediate (6-12 months) and medium-term (1-3 years) restoration needs. There is a Domestic Maritime Transport Project (DMTP) in the ADB's pipeline, which will be formulated taking into account the new needs after the tsunami. Consultants that would be engaged by ADB in preparing DMTP should be mobilized immediately.

Assessed Needs and Commitments

Priority	Issue	Resource Needs	Commitments
<ul style="list-style-type: none"> • Restore the maritime navaid system • Hiring transport equipment like landing barges • Mobilize a technical assistance consultant immediately • Budgetary support 	<ul style="list-style-type: none"> • Essential for safe nighttime transport • Possible surging of prices in the construction sector • Assessment for the new needs in the transport sector due to tsunami by the TA consultant once the Government signed the TA letter • Possible restraint to the Government financing to on-going loans and tsunami-related activities 	<p>More reliable data and cost estimates are needed.</p>	<ul style="list-style-type: none"> • No commitment so far has been made to assist the Government specifically in the transport sector, neither for the restoration needs. • ADB and JBIC have indicated interest in assistance for both phases. • The Domestic Maritime Transport Project is in the ADB's pipeline, which will be formulated taking into account the new needs after the tsunami.

Assumptions for the Rapid Assessment of Damages

Jetty

- Apply a typical length of 100m to all islands
- Expressed as % of the typical jetty at the today's standard
 - If the length is not specified, assume 50% damage
 - If the damage is minor, assume 5%
- Unit price is Rf150,000 for a typical 100m jetty (Rf1,500 per m)

Harbor

- Typical harbor: 1200ft x 500ft (366m x 152m)
- Some of breakwater in harbors may be included in Item "Sea Wall", not in "Harbor"
- Physical: Expressed as meter damaged
 - If the length is not specified, assume the typical harbor length
 - If the damage specified is minor, assume 10% of the cost
 - Unit price is Rf4,000 per ft (or Rf13,123 per m) for quay wall, and Rf3,000 per ft (or Rf9,843 per m) for break water
- Dredging inside the harbor: expressed as cubic meter assuming (m³)
 - Assume to dredge 3m in depth
 - If the area is not specified, assume dredging of 10% area of the typical harbor
 - Unit price is Rf50 per m³

Entrance Channel

- Typical area dredged is estimated from those identified = about 2,000 square meter (m²)
- Assume 3m in depth
- Unit price is Rf50 per m³, same as dredging

Sea Wall

- If the length is not specified, assume the typical harbor length
- If the damage specified is minor, assume 10% of the cost
- Unit price is Rf3,000 per ft (or Rf9,843 per m)

Causeway

- Assume 4m high dredging and filling
- Unit price is Rf50 per m³, same as dredging
- For grading and compaction, assume Rf1,000 per m²