



**REPUBLIC OF THE MALDIVES**

# **TSUNAMI: IMPACT AND RECOVERY**

**JOINT NEEDS ASSESSMENT  
WORLD BANK-ASIAN DEVELOPMENT BANK–UN  
SYSTEM**



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**ABBREVIATIONS**

ADB	Asian Development Bank
DRMS	Disaster Risk Management Strategy
GDP	Gross Domestic Product
GoM	The Government of Maldives
IDP	Internally displaced people
IFC	The International Finance Corporation
IFRC	International Federation of Red Cross
IMF	The International Monetary Fund
JBIC	Japan Bank for International Cooperation
MEC	Ministry of Environment and Construction
MFAMR	Ministry of Fisheries, Agriculture, and Marine Resources
MOH	Ministry of Health
NDMC	National Disaster Management Center
NGO	Non-Governmental Organization
PCB	Polychlorinated biphenyls
Rf.	Maldivian Rufiyaa
SME	Small and Medium Enterprises
STELCO	State Electricity Company Limited
TRRF	Tsunami Relief and Reconstruction Fund
UN	United Nations
UNFPA	The United Nations Population Fund
UNICEF	The United Nations Children's Fund
WFP	World Food Program

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## SUMMARY

The tsunami which hit Maldives on 26 December, 2004 was a nation-wide disaster which caused severe damage to the physical infrastructure of many islands. The tsunami has set back the high levels of social progress and prosperity achieved in recent years. Total damages are estimated to be US\$470 million, 62% of Gross Domestic Product (GDP). Of these losses, direct losses are \$298 million, or about 8% of the replacement cost of the national capital stock. Severe damage was caused to houses, tourist resorts, boats and other fishing equipment, schools, health facilities, transport and communication equipment, water and sanitation, and electricity infrastructure. There has also been substantial damage to agricultural crops and perennial trees. Farms, homestead plots, and aquifers have been salinized. The physical damage has led to severe human suffering inasmuch as large segments of the population have lost their dwellings, lifetime assets, savings, and sources of livelihood. About 7% of the population is now living in temporary shelters or with relatives.

The total damage estimate of US\$470 million does not, however, include a very real and critical cost that would demand additional financing, namely the cost of environmental damage and substantial soil erosion on many affected islands that to a great extent rely for their livelihoods on agriculture and home based market gardening; these costs could not yet be quantified as detailed surveys are still under way.

The transmission of the physical damage into an economic shock occurred to a large extent via contraction of the tourism and fisheries sectors, which sustained the largest losses. Lost tourism and fisheries income will cause GDP growth, employment, and government revenues to contract this year. The revival of the Maldivian economy depends critically on how fast the two leading sectors, tourism and fisheries, recover. Public financing for the reconstruction of lost or damaged assets and infrastructure, and for providing temporary income support to the affected, will be critical.

In terms of impacts on the Government's long-term development strategy, the tsunami has reinforced the established policy of encouraging voluntary population movements to less vulnerable islands, which has now assumed even greater urgency than in the past. This policy aims to mitigate the risks of future tsunamis and rising sea levels, help realize economies of scale in the provision of public and private services in the atolls, strengthen service quality in the atolls, improve welfare, and help retain the population in the atolls.

The government has made a commendable effort to provide swift relief to the affected and is now engaged in planning and executing a reconstruction program. Reconstruction of public assets and restoring lost government revenue will require financing of \$364 million, most of which will need to come from external sources in grants and highly concessional loans. This document spells out in some detail the physical damage and human suffering caused by the tsunami, the recovery strategy, and financing needs. A set of accompanying annexes discuss impacts of the tsunami on individual sectors in greater detail.

## INTRODUCTION

### Location and Risk Factors

1. *Geography.* The Maldives is a chain of Indian Ocean islands spread over a distance of 900 kilometers, located between northern latitude 4 to slightly south of the equator. The land area, which covers about 26 geographic atolls, is grouped into 20 administrative atolls. The population of the Maldives is about 300,000. The country faces two main geographic challenges: (a) the presence of a highly dispersed land mass of very small size, resulting in a highly dispersed population, and (b) the low altitude of the islands. The country has 1,190 islands, of which 198 were inhabited prior to the tsunami. Of these islands, only 28 have a land area greater than one square kilometer. One-third of the inhabited islands have a population of less than 500 and 70% of the inhabited islands have a population of less than 1,000. This extremely low population density makes the Maldives unique, even among small island archipelagic states. It also raises the cost of delivering social services and of public administration, as there is hardly any scope to generate economies of scale. Because of the low altitude of most of the islands, rising sea levels may cause many islands to disappear, render some inhabited islands ecologically vulnerable, and other islands to become too densely populated to sustain their population. The greater Malé area—already home to 70,000 people or almost one quarter of the population—is of specific concern because of increasing strain on social and public services caused by continuing immigration from other parts of the archipelago.

2. *Risks.* The main risk factor stems from the extremely low elevation of all Maldivian islands: the average elevation is 1.5 meters above sea level. This increases the risks from the tsunami and from global warming. Of 198 inhabited islands, 88 face perennial beach erosion. Wide dispersal of population across very small and remote islands results in diseconomies of scale, high transport costs, and poses unique challenges to development, recovery and relief efforts. Normally, Maldives does not suffer from high risk of natural disasters—the cyclones which affect other parts of the Indian Ocean bypass the Maldives. As a consequence, Maldives has focused on its main perceived long-term risk: global warming and rising sea levels.

### The tsunami

3. *The tsunami* traveled at over 700 kilometers per hour and reached Maldives at 9:20 AM on 26 December 2004. From around 9:15 am, tidal waves generated by the tsunami struck the islands. Tidal waves ranging from 4 to 14 feet were reported in all parts of the country. More than 1300 people suffered injuries; 83 people are confirmed dead and another 25 are missing and feared dead. Unlike other countries affected by the tsunami, Maldives experienced a disaster of national proportion. Thirty nine islands were significantly damaged and nearly a third of the Maldives' 300,000 people were severely affected. Fourteen islands were completely destroyed and had to be evacuated. Nearly 12,000 people have been displaced from their islands, and another 8,500 people are temporarily relocated to other places on their own island; thus 7% of the population of Maldives were displaced. The force of the waves caused widespread devastation of shelter and infrastructure in the atolls. Flooding caused by the tsunami wiped out electricity on many islands, destroying also their communication links. Water supply was disrupted in about 15% of the islands and 25% had major damage to the essential infrastructure such as jetties and harbors that links these islands with Malé. Electricity supply in many affected islands has yet to be restored. The impact on an economy largely based on tourism, fisheries, and agriculture will be substantive. Livelihoods of thousands have been undermined and will continue to suffer.

## Context of this report

4. *Context.* Immediately, following the tsunami, the Government contacted the World Bank and the Asian Development Bank (ADB) to request their support in developing a joint assessment of the tsunami damage and recovery needs. The first assessment mission went to Maldives during early January 2005 where it was joined by the UN System, making this a joint assessment by the three organizations. The Japan Bank for International Cooperation (JBIC) joined the latter stages of the mission. A follow-up mission finalized this assessment between February 1-7 2005, revising the initial estimates based on new data and extensive comments received from the Government and other partners. The team would like to thank its principal counterparts in the Government for the cooperation extended. The team's work was also facilitated by visits from senior management including the Secretary General of the United Nations, the President, Vice President and Country Director of the World Bank, and the Country Director of the Asian Development Bank. The Team was led by Qaiser Khan from the World Bank and Meriaty Subroto from the ADB. Moin Karim was appointed as the Coordinator for the UN system. The list of team members is provided at the end of the main report.

## Assessment Methodology

5. *Approach.* The overall approach followed was similar to that developed for disaster assessments by the UN Economic Commission for Latin America and the Caribbean. Focus was on costing the loss of physical assets. Direct damages to physical assets were considered separately from indirect damages such as loss of incomes and livelihoods, e.g. income loss from reduced fishing due to loss of fishing equipment. The costs of responding to the disaster include three elements—immediate relief, reconstruction and risk mitigation. In many cases rebuilding to previous standards may not be appropriate because old standards would continue vulnerability. All rehabilitation will have to be according to current standards which in many cases are higher than the standards to which destroyed units were built.

6. *Development strategy.* Before the tsunami, the Government already had in place coherent and well developed long-term strategies for the country and various sectors. This report analyzes what kind of effect the tsunami has on the overall development strategy and on sector strategies.

7. *Human hardship.* The physical damages to various assets and infrastructure has translated into severe human hardship. These include loss of sources of income and the adverse impact on livelihoods, loss of lives and injuries, and losses of personal effects including savings held in cash. While the report discusses some of these human hardships, the costing exercise is confined to physical damages.

## GOVERNMENT RESPONSE

### Emergency Response

8. *Swift and coordinated response.* The Government of Maldives (GoM) acted quickly, mounting a dynamic relief and rehabilitation operation with support from UN agencies, NGOs, and other development and military partners. On 26 December 2004, a Ministerial Committee and Task Force were set up and all officials were concentrated at the National Disaster Management Center to facilitate response and coordination. Significant achievements were made through dedicated and determined efforts through sea and air transportation. Communication was restored to 11 atolls within the first 24 hours and relief supplies were dispatched from 2:00 am on 27 December. Communities mobilized in support of their neighbors. The private sector

contributed to the relief effort. Despite break down of communication to atolls, within 24 hours information flow and data gathering began and continues. There is frequent contact with the population to understand and address relief and recovery needs.

9. *Coordination.* The Ministry of Defense is coordinating the overall relief effort and the Ministry of Finance and Treasury is coordinating the donor assistance while the Ministry of Planning and Development is coordinating data gathering and long term response. This rapid and coordinated response helped quickly mitigate the worst effects of the tsunami and has allowed the Government to move from the emergency phase to start restoring some semblance of normality. The relief task was rendered difficult by the destruction of some jetties and the loss of transport vessels.

### **Tsunami Relief and Reconstruction Fund**

10. *Transparency.* The Government has been keen to assure transparency and carefully account for funds so that resources are properly and effectively utilized. Every day during the emergency phase, the Auditor General has checked the accounts.

11. *Tsunami Relief and Reconstruction Fund to handle tsunami finances.* To further assure transparency in the long-term, the Government of the Maldives has set up The Tsunami Relief and Reconstruction Fund (TRRF). This fund will receive resources from the budget as well as from local and international sources. TRRF will expend funds for relief, recovery, and reconstruction work to address objectives set by the Government and donors. A Monitoring Board consisting of representatives from the government, the private sector, and donors would monitor and supervise the utilization of the funds. TRRF would be administered by the Government Accounting Bureau of the Ministry of Finance and Treasury. The accounting of TRRF would be maintained as per international accounting standards with proper internal controls. The activities of TRRF would be audited by internal auditors and external auditors engaging international accounting firms. The management, organizational structure and implementation arrangements, including procurement and financial management, will be detailed in the Financial Management Policies, Procedures and Guidelines, and in its Operations Manual. The financial management systems and processes are established in line with the requirements of the International Financial Institutions. Detailed information on funds received by source and expenditures by item, vendor, and destination would be publicly available.

12. *Donor harmonization.* The Government would like donors provide as much of their funding as possible through TRRF to: (a) assure transparency and harmonization; (b) eliminate duplication of efforts; and (c) reduce administrative overheads. The World Bank has already expressed its intention to provide Tsunami support through TRRF. In addition to the resources channeled through TRRF, direct assistance will be provided from the UN agencies and others.

### **Responses of the International Community**

13. *United Nations.* The United Nations Office of Coordination and Humanitarian Assistance deployed a UN Disaster Assessment and Coordination team to the Maldives the day after the tsunami hit to provide technical assistance to disaster assessment and the management and coordination of disaster response. The UN Team released US\$300,000 of immediate emergency funds and other in-kind support. It also provided coordination and logistics support. The United Nations Children's Fund (UNICEF) provided \$100,000 and helped to address food, hygiene, water, sanitation and shelter-related needs, including providing first aid kits for those affected. The United Nations Population Funds (UNFPA) focused specially on the specific reproductive

health needs of women, including pregnant women. Medical supplies were provided by the World Health Organization (WHO). The UN World Food Program (WFP) launched an emergency operation addressing the immediate food needs on December 29, 2004. On 6 January 2005 the UN System launched a Flash Appeal, requesting US\$65 million for the Maldives. Up to the release of this assessment, less than half the target has been met. The shelter and livelihood components of the appeal are completely unfunded.

14. *Bilateral donors.* The response of international community to the Flash Appeal has been positive and rapid. For example, on 30 December 2004, contributions of \$1.4 million had been committed by Bhutan, China, Greece, Japan, the Republic of Korea, and the USA. Norway donated water containers, and a consignment of 16,000 liters of water from DFID arrived at the same time; Germany fielded teams on several islands with water desalination plants. A 17-member Australian Medical Team arrived with supplies in the Maldives on new-year day 2005. Other emergency relief support, including cash donations, were committed or received from a number of government and private institutions and individuals from all over the world within a few days.

15. *NGOs.* Over twenty international NGOs as well as the International Federation of Red Cross (IFRC) have provided direct and/ or indirect assistance in cash and kind. They have been joined by national NGOs. NGOs have been active both in material and psychological support.

16. *Multilateral development partners,* including the international financing institutions, fielded their assessment missions in early January 2005, or pledged to provide grant assistance and/or soft lending to finance emergency and medium term rehabilitation and reconstruction projects. The joint needs assessment mission of the Asian Development Bank, the Japan Bank for International Cooperation (JBIC) and the World Bank was fielded in the first week of January 2005. Apart from the assistance offered by these institutions, the Islamic Development Bank (IDB) offered grant assistance of \$200,000.

17. *Total assistance received and pledged.* As of end-January, total commitments of cash assistance amounted to \$25 million from bilateral, UN, and private sources. In addition, the ADB is preparing grant financing of \$20 million and the World Bank will provide \$14 million in mixed grants and credits. These sums do not include the substantial value of in-kind assistance provided or pledged. However, it appears to be clear that foreign financing received or pledged so far falls far short of the estimated reconstruction needs (see Table 1).

## STRATEGIC CONTEXT

### Development Strategy of the Maldives

18. *Development achievements.* The Maldives has enjoyed rapid economic growth over the past 25 years, based on the highly successful development of a tourism industry aimed at the upper end of the global tourism market, a prosperous fishing industry, and an expanding service sector. Since 1980, per capita incomes tripled, reaching \$2,400 in 2003. The literacy rate among females aged 15 and above has reached 97%, and the net primary school enrolment rate has risen rapidly, from 38% to 93% over the last three decades. The health status of the population has also improved considerably. The average life expectancy at birth grew from 50 years in 1970 to 72 years in 2002.

19. *Geographic challenges.* The unique geography and vulnerability poses two key development challenges for the country. First, the dispersion of the population across the



archipelago raises the cost of delivering social services to the population, as it is difficult to realize economies of scale in service provision. Second, some inhabited islands have become ecologically uninhabitable and the Government has recognized that many islands are threatened by global warming. The long term strategy of the Government to address rising sea levels attributed to global warming has been to attract parts of the population to so-called focus islands; focus islands have been selected, among other criteria, based on the ability to defend them in the future. The basic strategy to respond to the tsunami remains the same; indeed, the tsunami has resulted in greater impetus to implement this strategy of population consolidation more rapidly. The continuing immigration to Malé from other parts of archipelago in response to ecological vulnerability in the outer atolls and better job opportunities and superior social and public services in the Malé region has severely increased population pressure in Malé. Addressing these challenges is an important thrust of the Government's poverty and development strategy described below.

20. *Addressing regional disparities.* The government has developed a two-pronged strategy to distribute the benefits of economic growth to all parts of the country. The first element of the strategy is to develop two regional centers, one in Addu Atoll in the far south and the second in Haa Dhalu Atoll in the far north. These centers are designed to have airports, good ports, and other social and infrastructure facilities. The regional centers are to be complemented by safe islands (also termed focus islands) on different atolls to act as atoll service hubs and growth centers. The second part of the strategy seeks to distribute the benefits of tourism to all atolls by allowing new resorts to be opened in the atolls which currently lack resorts. The opening of the new international airport and international port in Addu Atoll will bring tourism and other economic opportunities within reach of the more isolated southern atolls. The government is also improving domestic maritime transport and other public infrastructure in selected atolls. It expects these developments to reduce regional differentials and promote growth and employment opportunities outside of Malé.

21. *Public service provision.* The provision of social services in the Maldives poses special challenges given the dispersion of its population. The country has high public expenditures, in line with other small island economies with dispersed populations, at 40% of GDP. Improving public expenditure management is major challenge. The Government's previous strategy to widen access to services across the archipelago consisted of creating facilities and providing services on all islands, including those with small populations. In the education and health sectors, this approach has led to the establishment of a primary school and a primary health post on each inhabited island. Each island has its own Island Office and Court. Youth Centers and Women's Centers have also been established in a number of islands. However, establishing and maintaining secondary schools and more advanced health facilities on each island would be extremely expensive given the current population dispersion. In addition, public expenditure of 40% of national income currently supports only a basic level of local government services to the atolls, with advanced services concentrated only in the central Malé region. Widening access to high quality local government services to the atolls is also likely to be extremely costly. Hence, the government needs to maximize cost effectiveness in developing strategies to improve access and develop the quality of education, health care and local government services in the outer atolls.

22. *Telecommunication.* The development of a national broad-band network to provide access to internet based public services within atolls is also an important element of the government's strategy to improve the coverage and quality of local government. Currently, the cost of intra-atoll and inter-atoll communication and information transmission is severely constrained by the high cost of telecommunications and the absence of adequate transmission capacity. The Government strategy is to develop a broad-band network which would enable focus

islands to supply services to the primary islands within their atolls more cheaply and effectively. In addition, a broad-band network would facilitate inter-atoll communications by substantially reducing costs and increasing the volume of information that can be transmitted.

### **Impact of the tsunami on the Government's development strategy**

23. *Population concentration.* The principal impact of the tsunami on the Government's development strategy will be to accelerate the process of population concentration. The tsunami lent new urgency to the policy of population concentration, which will go a long way to reduce diseconomies of scale in service provision and will provide protection against sea-level rise. Another impact of the tsunami has been a rethinking of environmental measures needed to defend focus islands; a new plan for creation of safe focus islands has been proposed. The proposed safe island design would involve elevated zones, high buildings, special drainage zones, and sloping revetments for environmental protection. These measures could add considerably to the costs of establishing focus islands. For fiscal reasons, the number of safe/focus islands on which these types of public investments are concentrated will need to be limited. Ideally, there should be at the most one safe/focus island per atoll. The success of the population concentration policy will depend on ensuring the socio-economic viability. The Government has re-stated its policy against forced resettlement in a recent communication to donors.

24. *Financial markets.* The tsunami revealed under-insurance of private assets such as houses, fishing boats, and tourism resorts which has led to the government becoming the *de facto* insurer of last resort. Furthermore, many families lost their savings kept in homes that were destroyed. The disaster has highlighted the need to extend insurance cover and to make banking services more accessible.

## **SUMMARY OF TSUNAMI DAMAGES**

### **Estimated Damage and Financing Needs**

25. *Total damages* are estimated to be about \$470 million, close to 62% of GDP (see Table 1). About \$298 million of this are direct damages, and the rest are indirect losses. Although the cost of damages appear high, the direct damages amount to about 8% of the replacement cost of the entire national capital stock, estimated at around \$3.8 billion at 2004 prices. Compared to the other tsunami affected countries, Maldives has higher per capita income and greater capital stock in relation to their affected population. Moreover, there has been heavy investment in high-end tourist resorts. The tourism sector has the largest direct damages, with losses of \$100 million (of which half is insured), followed by the housing sector with losses close to \$65 million.

26. *The indirect damage estimates* need to be treated with caution, particularly when it comes to tourism and livelihood. The largest indirect losses occurred in the tourism sector which has seen a sharp drop in tourist arrivals (as of end-January 2005, 7600 tourists are in Maldives as compared to 17,000 at the same time one year back).

**Table 1: Estimated Losses and Financing Needs  
(in US\$ million)**

Sector	Losses			Cost of reconstruction (2)			
	Direct losses	Indirect losses (1)	Total losses	Needs for next six months	Medium terms needs (3)	Total costs	Public financing needs (4)
Education	15.5		15.5	8.4	12.7	21.1	21.1
Health	5.6		5.6	4.9	7.3	12.2	12.2
Housing	64.8		64.8	22.2	51.8	74.0	74.0
Water and sanitation	13.1		13.1	18.4	27.2	45.6	45.6
Tourism	100.0	130.0	230.0	10.0	90.0	100.0	0
Fisheries	13.2	11.9	25.1	5.8	8.3	14.1	14.1
Agriculture	10.8	0.3	11.1	4.8	6.3	11.1	11.1
Transport	20.3		20.3	2.0	25.0	27.0	24.9
Power	4.6		4.6	1.9	2.8	4.6	4.6
Livelihoods		30.0	30.0	17.4		17.4	17.4
Environment				3.7	6.1	9.8	9.8
Disaster risk management				0.7	3.7	4.4	4.4
Other costs for new host islands (5)				5.0	10.0	15.0	15.0
Administration etc. (5)	50.0		50.0	15.0	35.0	50.0	50.0
<b>Total</b>	<b>297.9</b>	<b>172.2</b>	<b>470.1</b>	<b>120.1</b>	<b>286.2</b>	<b>406.3</b>	<b>304.2</b>
Losses / costs as percent of GDP (2004 est.)			62%			54%	40%
Estimated revenue loss (5)							60.0
Total financing gap including revenue loss							364.2
Total financing gap including revenue loss as percent of GDP							48%

*Notes:*

(1) Indirect loss estimates particularly in tourism and livelihoods are not robust.

(2) Reconstruction costs in some sectors are higher than damages because (a) some partially damaged houses will need to be fully rebuilt because the original islands are not livable anymore; and (b) new environmental standards apply to new facilities.

(3) Medium term covers the period from 6 to 36 months.

(4) Public financing needs differ from reconstruction costs because certain losses may be covered by insurance and financial resources available to owners.

(5) Preliminary estimates.

*Source: These estimates were arrived at jointly by the Mission and the Government.*

## Estimated Reconstruction Costs

27. *Overall Needs.* Reconstruction costs for some sectors may be higher than total losses due to the need to rebuild to higher standards to reduce vulnerability (e.g. housing) and because current construction or environmental standards are higher than when original facilities were built (e.g. sanitation), or because modern equipment or supplies are of higher quality and provide improved services (e.g. health, education). Some of the indirect losses cannot be recovered: production losses from fishing, agriculture, and tourism cancellations cannot be restored. The financing needs have been divided into short-term and long-term needs. The short-term needs reflect investments needed urgently within the next six months; the long-term needs cover the period from six months to three years. The overall financing needs for the next three years is expected to be \$406 million; of this, \$120 million would be needed within the next six months (that is, first half of 2005).

28. *Public Finance Needs.* The needs for public financing are lower than the overall financing needs because parts of the reconstruction cost will be absorbed by the private sector (insurance, households, and businesses). Estimated needs for public finance include the costs of restoring basic services, infrastructure, and housing, as well as the cost of certain mitigation measures made urgent by the tsunami. In addition, the tsunami has led to a government revenue shortfall that needs to be financed. Most recent estimates put this at \$60 million. Total public financing needs are expected to be about \$304 million; of this, housing is the largest component. More detailed sector-specific estimates are provided below, following the discussion of cross-cutting issues (macroeconomic impact, social and livelihood impact, environmental issues, and disaster risk management).

## MACROECONOMIC IMPACT

29. *Impact.* The tsunami will have a major impact on the Maldivian economy, much of which will become manifest over the next 6-12 months. The most likely effects in 2005 include: a severe economic slowdown with low real GDP growth of about 1% of GDP for 2005, a doubling of the current account deficit from 12% of pre-tsunami GDP to 25% for 2005, and a significant widening of the fiscal deficit to about 14% of GDP. Employment has been adversely affected by the low tourism occupancy rates and the losses of fishing vessels, equipment, agricultural crops, and other productive assets. Banks will need to reschedule loans to many of their clients and ensure adequate finance for ongoing operations and rebuilding. Overall, the reconstruction effort is likely to encounter constraints in timely financing, and there are potential bottlenecks in transportation and labor.

30. *Tourism and macroeconomic impact.* There is uncertainty about the growth impact of the tsunami. The slowdown in GDP growth has been estimated to around 1% in 2005 (as compared to a pre-tsunami forecast of 7.5); However, it is also possible that the GDP outlook could be even worse. To a large extent, the macroeconomic impact will depend on the speed at which tourism recovers. As of end-January tourist arrivals were picking up strongly, suggesting that supply constraints (bed nights available) will be a key factor determining tourism sector growth in addition to demand constraints. Most of the resorts did not sustain serious damages, and as of January 31, 2005 a large part of damaged resorts have already been repaired. By April 2005, bed night capacity will likely recover to 95% of its pre-tsunami level. However, given that the slump in tourism has occurred in the months that normally would have had peak occupancy rates, the tourism sector is likely to experience a 25% decline in bed nights in 2005 relative to 2004. Given that tourism represents directly one-third of GDP, and has an even greater indirect impact, this decline causes concern regarding the economic prospects for 2005. However, the sector will

likely recover its pre-tsunami capacity towards the latter part of 2005, resuming its role as the country's prime engine of economic growth. Economic growth has been projected by the IMF to recover strongly in the 2006-2010 period to 6-9% per year.

31. *Mitigating the economic downturn.* Key measures to mitigate the adverse macroeconomic impacts of the tsunami include:

- Income support to the affected population, as is being done through cash transfers, which also help maintain adequate liquidity in the atolls.
- Supporting the affected populations restore their livelihoods by financing the replacement of key assets and tools and by employing local labor in rebuilding infrastructure.
- Encouraging the resumption of tourism activity by conveying a clear message to the rest of the world that (a) serious damages were limited to a few islands, (b) key infrastructure, like the airport, is safe and functioning normally, and (c) the impact of the tsunami was minor on most of the resorts, which are open for business.
- Ensuring that the reconstruction effort is consistent with macroeconomic stability over the medium term, by containing the fiscal deficit, maintenance of the fixed exchange rate, and price stability.

## **SOCIAL AND LIVELIHOOD IMPACT**

### **Social Impact**

32. *Community mobilization.* The social fabric of the tsunami hit islands in the Maldives has been seriously impacted by extensive physical damage, loss of life and livelihoods, and displacement of people. Most affected people lost savings kept in cash in the house. The affected communities have a heightened vulnerability to poverty. The impact of the losses has been exacerbated by the shock and fear caused by the tsunami. Although traumatized, island communities have demonstrated a strong sense of independence, resilience and cohesion in mobilizing themselves into groups to remove rubble, initiate small scale reconstruction activities on mosques and houses, distribute relief supplies, and sheltering those made homeless. In a country of many small islands, community organizations have traditionally played an important role in providing public and collective services as in many other areas of local life. The capacity of communities to mobilize themselves represents one of the most important assets for the reconstruction work ahead. Community mobilization and self-help needs to form a cornerstone and a key organizing principle for demand-driven local recovery programs, and strengthening of community capacity is important to assist them play their role effectively.

33. *Gender.* The planned reconstruction activities will take into account women's needs and utilize their skills. Moreover, interventions to support livelihood recovery will also support women's income generating work, for example, in fish processing, handicrafts, agriculture, tailoring, food processing and catering, retail, and many other activities. Every effort is being made to prevent school dropouts and other interruptions to children's education.

34. *Support needs.* Following a disaster such as the tsunami, family and social support networks can sometimes weaken, leaving women and children more vulnerable to psychological and emotional stress. The government is providing immediate psycho-social support services to

affected families, especially traumatized children and is also training new trauma counselors. Management of temporary shelters for the displaced persons are providing for safety and privacy.

35. *Capacity building.* The recovery effort offers an opportunity to enhance capacities of the stakeholders. In view of the massive efforts to be undertaken for reconstruction, it is vital to ensure that all concerned, and particularly government departments and island communities have the necessary support to play their role effectively in the planning and implementation of the recovery effort. The need for capacity strengthening should therefore be taken into account into the recovery programs.

### **Displacement**

36. Given the spatial dispersion of the population and the absolute scarcity of land, some people, including those whose islands are no longer habitable have shifted either temporarily or on a permanent basis to new islands. Many of the internally displaced people (IDP) have been housed in the homes of host families. This arrangement is now leading to increasing uneasiness on both sides, as IDPs feel they have overstayed their welcome. Most of the affected are returning to their original islands; some communities however will be resettled either out of choice (the community anyway desired to shift to a larger or safer island) or out of necessity (the home island has been completely destroyed, submerged, or rendered uninhabitable). The government has clearly stated that nobody will be forced to relocate against their wish. When relocating, island communities jointly decide where to go to and move together as a community.

### **Safety nets, employment, and livelihoods**

37. *Vulnerability and chronic poverty.* In Maldives, recent vulnerability analysis has shown that there are vulnerable groups which even prior to the tsunami were under-served by public safety nets. The poor and vulnerable groups include large families with no breadwinner, most of whom are headed by single women (divorcees and widows), and certain single elderly. The large majority of the poor and vulnerable groups are located in the atolls. These groups are in need of support both before and after the tsunami. The imperative of providing immediate support to the tsunami affected population should not undermine the financing and implementation of a medium-term social protection strategy designed to combat chronic poverty and vulnerability among groups located in all atolls, both affected and unaffected.

38. *Tsunami-induced vulnerability.* The tsunami created new vulnerable groups, i.e. those who lost their houses and other assets (in-kind or cash) and livelihoods. In the absence of targeted public support for asset restoration, recovery of lost livelihoods may take very long. Creating employment and restoring livelihoods are critical dimensions of the reconstruction process and will kick start the economy of the tsunami affected islands, restore a sense of normalcy, and support the social and economic inclusion of the displaced populations. Such support will need to be rapid if it is to be effective. It will need to be well targeted if it is to be affordable. Reconstruction efforts should be undertaken involving the affected communities directly.

39. *Livelihood support.* The government has decided on a policy of urgent support for livelihood restoration, termed the Island Livelihood Revitalization and Development Program. This program comprises of (a) in-kind equipment (e.g. fishing equipment, fish processing equipment, start-up packages of seeds and tools for agriculture); (b) small and short term cash grants for working capital; (c) subsidized micro credit for agricultural and other producers; (d) government financing of repairs to fishing vessels; and (e) procurement of new cost-effective fishing vessels to replace those that were lost. The procurement of new fishing vessels is

proposed to take place under a pre-existing government-run program in which the Government procures the vessels (from domestic shipyards) and delivers them to fishermen. The restoration of livelihoods of the affected producers will be speedy and efficient.

40. *Targeted cash assistance to tsunami-affected groups.* However, some affected households—including families without able-bodied members such as single mothers with many children, the disabled, the elderly—may not benefit from the livelihood assistance and need to be helped through targeted interventions. In the very short term, the main need is to provide shelter and income support to the displaced. This is already well underway, inasmuch as Rf.30 million (\$2.3 million) has been disbursed to the affected population under an emergency cash transfer program; the program disburses Rf.1500 (\$117) per family member to those who completely lost their houses; Rf.1000 (\$78) per person to those whose houses were damaged and needed repairs; and Rf.500 (\$39) per family member to those whose houses were flooded and therefore lost their belongings. This program is still undergoing and it is estimated that an additional Rf.20 million (\$1.6 million) will be disbursed shortly. Once complete, this program will have reached approximately 63,000 beneficiaries. Multisectoral teams from Malé together with island committees identified the beneficiaries, registered them, and disbursed the assistance as a one-time cash transfer. The government is aware that not all affected have yet been served, and efforts are ongoing to cover all the affected. The Ministry of Gender, Family Development, and Social Security has also proposed an additional follow-up income support program for affected individuals not covered by livelihood restoration programs, i.e. the elderly and people with disabilities. This new proposed scheme would give Rf.500 (\$39) per month per person for a period of 10 months, confined to a select target group of around 2000 individuals, with total cost Rf.10 million (\$780,000). Free health care might also be provided. These programs are commendable and deserve full support.

41. *Public works.* The restoration of damaged housing and other infrastructure such as island offices and courts in the affected islands represents an opportunity to provide short term employment to the affected population. Launching of such programs would require rethinking and modification of the current policy of contracting out housing and other construction to private sector professional contractors. Some of the activities currently planned to be given to private contractors could be executed by the affected communities through paid labor. However, the feasibility and desirability of public works involving local paid employment depend crucially on whether there is a pool of excess unemployed labor available in the affected islands.

## ENVIRONMENTAL ISSUES

42. *Environmental impact.* Even more than most island nations, the Maldives are highly dependent on the fragile ecosystem of their coral reef islands. The tsunami has proven once again the extreme vulnerability of small island states. It was reported that 35% of the 198 inhabited islands were subject to high or very high impact by the Tsunami with major physical damage to buildings, infrastructure, crops and natural vegetation. The tsunami generated a range of environmental problems with the potential to harm human health and damage the environment. The tsunami caused widespread deposition of coral sand, vegetation, municipal waste from dump sites, healthcare waste, human excreta from damaged septic tanks, hazardous substances (oils, asbestos, batteries, etc.) and demolition waste (concrete, coral fragments, timber, etc.) from destroyed buildings waste across the impacted islands. The tsunami resulted in saltwater intrusion into fresh water lenses on almost all of the 1,200 islands, resulting in vegetation browning and dieback. It is likely that the coral reefs around the islands have been damaged by sedimentation and excessive amounts of debris. In addition, the tsunami resulted in beach erosion and soil wash-off.

43. *Chronic environmental issues.* The response to the tsunami has highlighted a number of chronic environmental issues. Current waste management practices on the islands are poor, and include open burning of waste, stockpiling of hazardous waste including clinical waste, dumping of waste on islands, beaches and the open sea. The Maldives has no regulations for the use, procurement and disposal of hazardous substances including asbestos, polychlorinated biphenyls (PCBs), anti-fouling paints (used on fishing boats), batteries and pesticides.

44. *Environment Act.* In accordance with Law No. 4/93, the Environment Protection and Preservation Act of Maldives, all activities to be implemented as a result of tsunami damage should take due consideration of the guidelines provided by the government authorities, and specifically the Ministry of Environment and Construction (MEC). MEC and other concerned government authorities shall provide the necessary guidelines and advice on environmental protection. As most reconstruction involves replacing damaged assets and construction materials are imported, environmental impacts are not expected to be large and can be easily addressed. Exceptions are disposal of waste water and solid waste where past practices were inadequate and where upgrading during reconstruction is warranted.

## **DISASTER RISK MANAGEMENT**

45. *Need for a risk management system.* The recent disaster has increased Government awareness to the risk exposure of Maldives and the measures needed to manage risk. The Government is starting preparation of a risk management system to reduce the human and economic impact of future disasters. The three pillars of a risk management strategy consist of risk information, risk mitigation, and risk transfer.

46. *Risk exposure.* Maldives has suffered various extreme events such as storms and floods, but the risk is low due to their low frequency. Historical records show that in the last two centuries the northern part of Maldives has experienced five major storms. The last one, in 1991, was recorded as the most severe with winds reaching 90 km/hr. Floods were also reported in some islands, with the island of Foamullah experiencing nine such events between 1977 and 1989. Nevertheless, the impact of storms are not as severe as the potential impact of global climate change. The coastal setting of Maldives makes it highly vulnerable to effects associated with sea level rise and potential increased risk from global climate change such as flooding and storm. Among the priority vulnerabilities of Maldives are land loss and erosion, infrastructure damage, and damage to coral reef. The risk linked to tsunamis exists even if the probability is very low.

47. *Disaster Risk Management Strategy (DRMS).* Developing a DRMS would aim at reducing the country's vulnerability and reduce the potential effects of risks on the national economy. In Maldives, risk reduction is strongly linked to the GoM's long-term strategy to regroup the population into selected focus islands. The first pillar of this strategy is risk information. This would ensure a good understanding of risk, gathered from a vulnerability assessment. GoM would participate in a regional warning system and develop a national communication program to inform all layers of stakeholders from the government to the island representatives and the local communities. A program would be developed on preparedness planning to organize first response and emergency relief. The development of a broad band network, as planned by the Government, could contribute to this program. Finally, updated information based on a comprehensive risk mapping should be made available to the population.

48. *Risk Mitigation and Transfer.* The second pillar, risk mitigation, includes non structural as well as structural measures. The non structural actions include the adaptation of the legal and



regulatory system, with land use planning and the building code to reduce the risk in the reconstruction process. The land use plans should incorporate the risk mapping information to identify the different levels of risk in the zoning. The building code should introduce the appropriate measures of construction to limit the vulnerability of built environment. Structural measures should also participate in enhancing resilience of the main sectors, tourism, fisheries and key infrastructure to disaster, and could include sea defense works, adapted road and water networks. The development of the strategy, linked to the focus island policy, must be complemented by the identification of shelters, with construction, or retrofitting, of multi purpose shelters. The third pillar would be risk transfer which would ensure distribution of risk between the government, households, and insurance companies. Sectors such as tourism, fisheries, and banking, in particular, could benefit from insurance against risk.

49. *Institutional Organization and Legal Framework.* It would be advisable that the National Disaster Management Center (NDMC) continues as an institution to address disaster management program in the country. To start with, the National Disaster Management Center would focus on ensuring that in the reconstruction process, risks are not rebuilt. It would also help in developing guiding principles for reconstruction and further development in key sectors such as housing and critical infrastructures which have a strong role in vulnerability reduction. As often in similar cases, the recent disaster has increased Government awareness to the risk issue and developed its willingness to reduce potential effect of future disasters on the economy. The Government could consider the opportunity of the reconstruction period to start the preparation and implementation of such a Risk Management system. The paragraphs below will detail the risk exposure of the country and the three pillars of a risk management strategy, risk information, risk mitigation, and risk transfer.

## **DAMAGE AND RECOVERY NEEDS BY SECTOR**

### **Education**

50. *Damages in the education sector.* Damages sustained in the education and training sector range from damaged school infrastructure to insufficient teaching staff as expatriate teachers left. Sixty-three percent of schools in the atolls have been spared, with minimal or no damage and are immediately ready to open. However, the remaining 37% of the schools require varying degrees of repair and rehabilitation to be functional. Six schools have been completely damaged. The damages include collapsed boundary walls, water storage facilities, toilets, and septic tanks. Although some buildings may be intact, they may have developed cracks or their foundations made unstable. School provisions and equipment (textbooks, stationery, uniforms, blackboards, library books, computers and printers), school records, and teaching and learning materials are damaged and rendered unusable, if not swept away. Despite these problems, all schools managed to start their next academic session on time. However, replacement of provisions for the affected schoolchildren is an immediate priority, along with the repair and rehabilitation of damaged school facilities and construction of temporary/additional classrooms in host islands, and providing technical support to untrained teachers. Teachers and schoolchildren have also been traumatized by the disaster and need psychosocial support.

51. *Recovery Needs.* Recovery of damaged education sector infrastructure will cost \$21.1 million excluding the postsecondary education sub-sector.

## Health and Nutrition

52. *Emergency health arrangements.* Discussions with the Ministry of Health (MOH) team, UN agencies and field visits to islands in Thaa Atoll (Madifushi and Buruni) revealed that critical emergency needs such as safe drinking water, food, and emergency medicines are essentially in place in those islands. Populations who lost their homes have been provided temporary shelters either in their own or in other host islands, and those reporting major injuries have been promptly attended to. The MOH has put in place a disease surveillance system to monitor outbreaks of communicable diseases and respond to emergency health needs. Teams of counselors and volunteers are visiting relief camps and affected islands to provide psychosocial support. The MOH has authorized the health facilities to locally procure emergency medicines. The critical challenge now is to sustain these inputs until more permanent arrangements are in place, and to render the damaged health facilities functional as early as possible. Also, the essential public health programs that were formerly run very efficiently in Maldives need to be put back on track. More importantly, the psychosocial support initiative now needs to move to a long-term operational framework; as a first step, a training program in psychosocial first aid has been started. The MOH in consultation with the partners is putting together a comprehensive medium-term plan for the health sector. The preliminary estimates suggest that about \$7 million would be required over the medium term.

53. *Damage Assessment and Recovery Needs.* The total cost to get the health sector back to their pre-tsunami state is expected to be \$12.2 million.

54. *Nutrition.* Malnutrition rates among children were high prior to the tsunami. The causes of malnutrition include problems with food accessibility in terms of availability and affordability, food utilization, water and sanitation, health status, and the social and care environment. In order to address these factors, a holistic approach involving multiple sectors is required with training and support to build local capacity as key areas to help ensure broader development objectives.

55. *Other Food Security Issues.* Food security is a particular challenge in the Maldives given the logistical and transport complexities as well as the high dependence of island communities on food imports. Findings from the Rapid Vulnerability Assessment carried out by the World Food Program (WFP) indicate a need for targeted food assistance for displaced families in 13 islands in the short term. Food assistance is recommended only as a stop gap measure during the time it takes to recover livelihoods and establish cash based safety net programs, including cash based employment schemes, such as those linked to reconstruction, which are considered the most appropriate medium and long-term response.

## Housing

56. *Damage Assessment.* Private housing suffered severe damages, with preliminary damage assessment of \$65 million. The wave damaged directly structural and non structural elements of the houses, breaking boundary walls and facades, and indirectly, subsided land, leading to the collapsing of houses in the absence of foundations. The day after the Tsunami, 29,000 persons were displaced, and 13,000 remain in temporary shelters as of today. Some homeless families have been sheltered by friends or relatives. The preliminary assessment reports 1847 houses totally destroyed and 3500 partially damaged. It will be revised after a technical survey carried out by engineers on the islands. The damage assessment has included the direct cost of housing damage, and indirect cost of emergency shelters. The cost of debris removal has been considered marginal.

57. *Reconstruction strategy for housing.* Prior to estimating the reconstruction costs, GoM needs to formulate a reconstruction strategy. The Government is willing to absorb a large share of the housing reconstruction costs, providing the families whose houses were destroyed or damaged with built-up houses. For the houses to be built anew, GoM has proposed a two-stage housing reconstruction plan. In the first stage, a basic dwelling unit of 61 square meters comprising of two bedrooms, one living room, one toilet, and a kitchen will be constructed according to standards stipulated in the building code. Construction will be carried out by contractors with scope for local communities to participate in construction activity and benefit financially (contract selection gives weight to use of local labor and sub-contractors). In the second stage, financial incentives will be provided for households to extend/modify/improve the basic unit according to their individual needs. The scheme has several merits: it is faster; it is relatively easy to enforce quality standards and building code regulations; it is particularly convenient for labor-short households such as single women with many children and busy fishermen; it does not interfere with normal economic activities in fishing and agriculture; and, to the extent the economies of scale in construction are passed on by contractors to the government in terms of lower unit costs, it could be cheaper. Its disadvantages appear to be the lower level of community participation and involvement especially in the first stage, and high level of government financial support.

58. *An alternative approach to housing* could seek greater involvement of local communities in housing reconstruction. For example, every affected household could be provided with building materials and some cash on the condition that within a stipulated time a basic structure (foundation and load bearing walls) will be ready, to be approved by certified building inspectors to ensure compliance with building codes. The main disadvantage of opting for approaches with greater community self-help and participation is that it could potentially take much longer to complete the houses; and it may place undue burden on some labor-short households. Thus different approaches have different merits and demerits; it appears desirable to consult with communities on the kind of approach they want, though it would be necessary for each affected community as a whole to adopt one single approach to reap economies of scale.

59. *Reconstruction costs.* The mission has estimated reconstruction to be US\$74 million, of which immediate needs of \$22.2 million. The unit costs per house are about Rf.250,000 (\$20,000) based on the first round of bidding. A 15% price contingency has been added to this in case the volume of construction and transport congestion results in an increase in real unit costs. The mission suggests some recommendations (detailed in annex) to overcome the potential constraints imposed by a limited capacity of the construction sector. The mission also recommends adapting the building code to improve construction standards.

## **Fisheries**

60. *Fisheries losses—damages (asset loss):* Rf.321 million (\$25 million). Based on data from the Ministry of Fisheries, Agriculture, and Marine Resources (MFAMR), 120 fishing vessels were lost or totally damaged. 50 fishing vessels were partially damaged or lost equipment. 5 reef fishing boats lost equipment and 16 ocean cages were lost. In particular, 374 fish processors lost equipment, while 8 boatsheds and 2 fishery institutes were damaged.

61. *Recovery Needs—Rf.180 million (\$14.1 million).* The estimated recovery cost for the damaged or lost vessels and provision of necessary equipment is about 7% higher than the actual replacement cost given by MFAMR. This is in order to allow for the costs of assessing impacts on reefs and marine resources, and provide micro credit to cottage fish processors in the form of operational capital to restore their livelihoods. Some of the immediate works have already been undertaken at a cost of Rf.12.0 million, financed through the government budget.

## Agriculture

62. *Damage (asset loss)*—Rf.142 million (\$11 million). Based on data from MFAMR, the tsunami damaged field crops in 2,103 farms; destroyed backyard crops and agricultural tools in 11,678 homesteads; and damaged more than 700,000 fruit trees and 840,000 timber trees in inhabited islands. The damage to land and groundwater resources is severe in 35 agricultural islands, and saline water intrusion has affected 112 inhabited islands. A detailed damage assessment is required to prepare an immediate recovery plan for the agriculture sector.

63. *Recovery Needs*—Rf.143 million (\$11.1 million). The reestablishment of the agricultural crops will involve improvement of soil, forestry, and water resources, importation of planting material, and provision of extension services, some of which will have to be obtained from other countries. The agricultural sector should be reestablished in a sustainable manner by strengthening institutional capacities and providing support services.

## Water Supply, Sanitation and Solid Waste Management

64. *Damage (asset loss)*— Overall damage due to loss of assets is estimated to be Rf. 168 million (US\$13.1 million). Preliminary estimates suggest the potential loss of up to 1000 community rainwater tanks, 6000 household rainwater tanks and 20,000 m<sup>3</sup> of rainwater supplies. Roof water harvesting piping and gutter systems are also expected to be damaged affecting an estimated 5000 households. The team has estimated that up to 850 well-pumps are estimated to have been lost as a result of flooding. In addition the quality of groundwater supplies in 36 islands may have been compromised due to saline and sewage contamination. There is no assessment of the number of damaged toilets, but based on coverage and housing destruction, it is estimated that an approximate 5000 toilets and 3500 septic tanks may need to be provided, whilst small bore sewer and outfall loss in highly affected areas needing replacement could be as high as 126 km and 2.4 km, respectively.

65. *Recovery Needs* – Rf..584 million (US\$45.6 million). Short-term needs (Rf.235 million, US\$ 18.4 million) should focus on (i) the provision of immediate safe water to affected areas, (ii) provision of basic temporary sanitation facilities and rehabilitation of existing sanitation infrastructure, (iii) initiating a solid waste management program for clearing and recovery of debris material, as well as (iv) attending to immediate community awareness and capacity building required to undertake the above tasks. The Government in coordination with agencies such as UNICEF is already providing packaged water and reverse osmosis units, which should be followed by the supply of household and communal rainwater tanks. Detergent and disinfectants, as well as water chlorination tablets are being provided where water from wells is to be used. Temporary sanitary latrines, septic tank desludging systems and the construction of temporary sludge drying beds must be provided to communities in substantially to very high impact areas. This is to be coupled with a solid waste management program for the safe and optimal solid waste disposal of tsunami resulting debris, including the provision of communal wheel bins and selected equipment (shredders, glass crushers and composting bins).

66. *Medium term needs* (Rf..349 million, US\$ 27.0 million) and associated strategy will focus on (i) rehabilitation and reconstruction of infrastructure damaged by the tsunami and (ii) upgrading, introduction and development of sewage treatment and disposal facilities in islands where rebuilding or potential relocation is required, (iii) introduction and development of solid waste management systems, including formalization of solid waste management centers, (iv) institutional strengthening and capacity building for environmental management. This shall include new sewerage systems (potentially attached to cost-effective locally-adapted treatment

facilities), and the formalization of solid waste management centers and services in affected atolls.

## **Tourism**

67. *Background.* Tourism is the main industry in the Maldives and has enjoyed strong growth over the past decade with arrivals reaching 615,000 in 2004. For the 87 resorts, bed occupancy rates averaged a very strong 85% for the year with high average room rates. Total receipts from the industry, including multiplier effects, are estimated at about \$415 million in 2004. The industry accounts for approximately 33% of GDP directly; considering indirect impacts, tourism contributes an estimated 60-70% to GDP. The tourism industry, directly and indirectly, also accounts for a high portion of government revenues. Lease payments from hotel projects were \$48 million in 2004 with bed and departure taxes contributing \$41 million and custom duties another \$43 million. This excludes tax revenue generated from landing fees, telecommunication taxes, much of which is tourism related, and other miscellaneous charges. The hotel sector alone accounts for 17,000 jobs; when consideration is given to other tourism businesses and multiplier effects, the tourism industry is likely responsible for well over 25,000 jobs.

68. *Impact.* The impact from the tsunami is significant for both the private and public sectors. Direct damage to the tourism infrastructure and other related businesses is estimated at over \$100 million, some of which will be covered by insurance. Approximately 30% of beds are currently not in operation. More significant is the loss of revenue from the downturn in tourist arrivals. Airport arrivals were 5,625 for the first 11 days of January 2005 compared to 20,308 for the first 11 days of January 2004. Assuming that tourists return gradually with a rebound close to pre-tsunami projections by July, the loss in total tourism receipts is preliminarily estimated at \$80 to \$100 million. With large fixed costs, cash flow problems are likely at in some resorts and in other businesses serving the tourism sector. It is unclear at this point how large the impact on employment will be: much depends on how quickly the industry recovers. For employees that depend on the 10% service charge for the majority of their income, even if jobs are maintained, the financial impact of lower occupancies will be significant. On the Government side, tax revenues will suffer considerably with an estimated loss of \$25 million just considering the departure and bed tax, a portion of the customs duty and some waiving of lease fees on beds not in operation.

69. *Measures to mitigate the impact.* The key to minimizing the financial impact is to bring tourists back as quickly as possible. This requires a focused marketing effort to get the message out to the travel trade and to tourists that the tourism sector is up and operating, that most resorts were unaffected, that it is safe to visit the Maldives and that visitors are welcome. \$2 million is recommended for this marketing effort. To relieve the financial burden on resort owners, a partial waiving of lease payments for beds not in operation and the duty free importation of needed construction materials for the rebuilding process are recommended. There may be aid available from various aid organizations to channel through financial institutions for on-lending to SMEs in tourism and other sectors to ease cash flow problems. The International Finance Corporation (IFC) of the World Bank Group may be able to assist with financial packages for some of the larger companies. Other recommendations can be found in the Annex.

## **Transportation and Communications**

70. *Damage (asset loss)* – \$20.3 million. The damage to transport and communication infrastructure (harbors, jetties, causeways, navigational aids, airports, telecoms) was less than originally feared. This can largely be attributed to the facts that ports and maritime facilities are

generally located at the inner side of the atolls, away from the direct tsunami impact and that the airports are located on islands where the tsunami had limited impact (Malé and Gan). About 4,200 m length of quay wall, and 15,000 m of harbor/sea walls and breakwaters have been damaged or destroyed, and about 370,000 m<sup>3</sup> of dredging will be required to remove tsunami-inflicted siltation of harbor basis and approach channels. Five causeways have been partly damaged. While the telecom sector initially completely failed, all connections were restored by 7 January 2005. It is estimated, though no hard data is available, that about one third of the navigation aids were damaged or destroyed.

71. *Immediate needs—\$2.0 million:* as immediate needs, the navigation aids system needs to be restored and transport equipment such as landing barges should be procured to prevent surging prices in the construction sector.

72. *Recovery needs—US\$24.95 million:* The above listed damage to the infrastructure should be restored within a one-to-two year period to remove bottlenecks and inefficiency in the transport chain which would have direct impact on commodity prices and living standards.

## **Power**

73. *Damage.* The tsunami had damaged the electric power supply system in 95 islands (about 48% of the islands with electricity) and left the populations without electricity for several days.

74. *Government's Immediate Response:* The Government instructed the State Electricity Company Limited (STELCO) to send teams to 53 most affected islands to collect information related to the damage as well as temporarily restoring electricity. STELCO has been able to restore the power supply in many islands if only to a bare minimum in terms of providing electricity in the islands' offices and the temporary tents in the evening. The STELCO teams repaired a number of damaged generators and installed small temporary generators in a few islands.

75. *Government Recovery Program:* The Government is planning to restore the electricity supply systems in all affected islands to pre-tsunami level. The immediate program, to be implemented over the next 6 months, will prioritize the replacement of the damaged distribution network and the repair of damaged generators. The next step, to be completed in 1.5 to 2 years, will be the installation of new generators, construction of powerhouses, installation of new switchboards, and streetlights.

76. *International Community Response:* the International Federation of Red Cross (IFRC) has provided 22 generators of 20 to 150 kW capacity each, with cables and distribution boxes. The generators have been installed in 22 islands and have been operating since 29 January 2005. The value of the IFRC contribution was about \$0.6 million. The British Royal Navy sent teams to repair the generators in a few islands. The United Nations Development Program (UNDP) will replace damaged electricity cables in some islands using \$0.3 million from the United Nations Foundation.

77. *Damage (asset loss) – Rf.49.5 million (US\$4.65 million).* Based on data received from the National Disaster Management Center (NDMC) and STELCO, the power supply system in a total of 95 islands was damaged. The damage facilities include: 24 power houses; 104 generators, 652 streetlights, 34 switchboards, 632 distribution boxes, and more than 121 kilometers of cables.

78. *Recovery Needs* – Rf.49.5 million (US\$4.65 million). It covers the installation of new equipment including generators, cables, distribution boxes; reconstruction of a number of power houses, and connection to the households consumers. The cost estimates cover the reconstruction works for the period of 18-24 months, of which \$1.86 million is required over the next 6 months.

### **Public administration**

79. *Damages* are estimated at \$50 million (preliminary estimate, subject to change). An assessment of the damage to other public offices such as island offices and courts may be required to establish the extent of damage and the recovery needs. Several island courts suffered damage, equipment destroyed, and court records lost. Repair of these public offices are vital to enable them to function effectively in support of the recovery efforts. It is likely that there would be an increased demand for their services due to the processes involved in reconstruction efforts where legal and other public administrative issues can arise.

### **CONCLUSION**

80. The tsunami caused severe damage to the physical infrastructure of several islands in Maldives and has set back the high levels of economic growth and social development achieved in recent years. Total losses are estimated to be \$470 million, or 62% of GDP. Of the total losses, damage to assets is \$298 million, or about 8% of the replacement cost of the total national capital stock. The damaged assets include tourism resorts, houses, schools, health facilities, boats, transport and communication equipment, water and sanitation, and electricity infrastructure; there has also been substantial damage to agricultural crops and lands. The destruction of houses, livelihoods, household items, and loss of lifetime savings has had a traumatic impact on many Maldivians. In economic terms, the largest damages were sustained in the tourism sector and housing. Lost tourism income and destroyed livelihoods will cause GDP growth, employment, and government revenues to contract this year. The damages to assets and incomes will translate into severe economic and social distress; rapid public action to provide assistance to the affected communities could however avert some of this distress and prevent severe shocks to private consumption and further hardship to the affected Maldivians. Reconstruction of public assets and restoring lost government revenue will require financing of \$364 million, most of which will need to come from external sources.

81. The strong Maldivian tradition of community cohesion and support, coupled with swift and well-organized government response supported by the donors, has resulted in a speedy and successful relief effort. Such community involvement can and should continue during the recovery phase. While the efforts of the Maldivians are commendable, this Needs Assessment has demonstrated the urgent need to support the reconstruction efforts of the government with adequate foreign assistance in grants and highly concessional loans in order to restore the damaged infrastructure and rebuild people's livelihoods.

**Attachment 1****LIST OF TEAM MEMBERS OF THE EMERGENCY TSUNAMI DISASTER NEEDS ASSESSMENT  
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## **Annex 1 - Macroeconomic Impact\***

*Overview.* The tsunami will have a major macroeconomic impact, much of which will become manifest over the next 6-12 months. The most likely effects in 2005 include: a significant weakening in economic performance, with low real GDP growth (estimated at 1%), a substantially larger current account deficit (maybe as large as the equivalent of one quarter of GDP, though reserves may remain largely unchanged depending on the availability of external financing), and a significant widening of the fiscal deficit (including grants) to over 10 percent of GDP. Lower demand and the small share of construction related materials in the Consumer Price Index (CPI) mean that price pressures as measured by the CPI are likely to be muted. Employment has been adversely affected by the tourism downturn, the loss of fishing vessels and equipment, the destruction of agricultural crops, and damage to other productive assets. Commercial banks are in the process of rescheduling loans to large commercial clients while the smaller micro and enterprise loans will require refinancing. For the larger assets, claims have been filed by the owners with insurance companies and these are expected to be paid over the next 6 months by the insurance companies either through their own resources or through reinsurance. Overall, the reconstruction effort may encounter constraints in financing, and bottlenecks in transportation and labor.

*Background.* Economic performance in the year leading up to the tsunami disaster on December 26, 2004 was strong, despite a substantial widening of the current account deficit. Real GDP growth is estimated to have accelerated to 9 percent in 2004, fueled by strong tourism growth. Tourist arrivals rose by about 13 percent to over 635,000, with knock-on effects in the rest of the economy. The construction sector also grew strongly, expanding by over 28 percent in 2004 with the development of 6 new resorts and other activities. Although the value of domestic exports and tourism receipts showed significant gains in 2004, the expansion of tourism and construction sharply raised imports (partly due to higher oil prices), leading to a widening of the current account deficit to about US\$90 million, equivalent to about 12 percent of GDP. Financing was sufficient to permit a small build in reserves. After falling by almost 3 percent in 2003, the consumer price index rose by over 6 percent in 2004, largely due to higher fish and food prices. Buoyant revenues from tourism helped narrow the overall fiscal deficit (including grants) from 3.3 percent of GDP in 2003 to 2.8 percent of GDP in 2004, even accounting for the impact of the public sector wage increase implemented in September 2004.

*The impact of the tsunami on growth* will depend largely on the evolution of tourism and fisheries. As of end-January, there are indications that tourist arrivals may be rebounding more quickly than previously anticipated. Most of the resorts did not sustain damages, and many of the damaged resorts have already been repaired. The GoM expects bed night capacity to recover to 95 percent of its pre-tsunami level by April, 2005, and 100 percent by the end of the year. Still, given that the slump in tourism is occurring in the months where occupancy is normally at its peak, the GoM is projecting a 25 percent decline in the tourism sector in 2005 relative to 2004. The fish catch is expected to remain largely unchanged in 2005, despite the loss of equipment and some vessels, because most of the larger vessels were not damaged and the surviving fleet is being used more intensively. A sharp expansion in other sectors, such as construction and government services, is likely to offset much of the negative growth effect stemming from the tsunami, but since tourism and fisheries account for about 40 percent of GDP, overall growth is likely to decelerate to about 1 percent in 2005, and may be negative, before returning to the pre-tsunami growth trajectory of between 6 to 8 percent growth in 2006.

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\* This Annex was prepared in close consultation with the Government of Maldives and the IMF.

*Worsening external balances.* The slowdown in the tourism industry may widen the current account deficit to the equivalent to 23% of GDP. Imports are projected to grow by about 13 percent in 2005, as lower tourism related imports are offset by increased imports of construction materials and some restocking. With fish landings remaining broadly unchanged, the loss of the garment industry is likely to cause a significant fall in exports.

*Financing and external debt.* The availability of external financing will also play an important role in determining what is feasible in terms of the extent and pace of reconstruction. Significant external resources are needed, including grants and loans to the government, as well as private funds, in order to finance the widening budget and current account deficits. A financing gap of about US\$70 million exist in the Balance of Payments; unless adequate foreign assistance is received to close this financing gap the Reserves will be severely impacted. Even if foreign assistance is substantially larger than these amounts, only a portion is likely to be given as grants. The government will need to be mindful of not running-up debt stocks to uncomfortable levels. New loans are likely to raise external public debt significantly, increasing from about 42 percent of GDP in 2004 to over 46 percent of GDP in 2005. Private funds associated with insurance payouts, equity investment, loans for resort reconstruction, and financing bank liquidity are also anticipated, amounting to about US\$100 million. Any shortfalls in financing could impose significant financing constraints and limit the pace of reconstruction.

*Public finances.* The impact of the tsunami on the fiscal position of the GoM is likely to be substantial, as spending needs rise while revenues are likely to fall. Preliminary revenue projections suggest that government receipts from the tourism bed-night tax, and duties on tourism related imports are likely to decline significantly. As a result, the GoM has decided to refrain from waiving import duties on resort reconstruction materials, or granting closed resorts relief from their resort lease rent obligations (the GoM will allow deferrals within 2005). Concomitantly, expenditure was projected to rise by about 25 percent in the 2005 budget prepared before the tsunami (in part due to the 39 percent average pay increase for all public sector employees). With safety net payments and public spending on relief, clean-up, and reconstruction, expenditures may rise even more. In an effort to contain rising expenditures, the GoM is considering deferring all capital investment projects that have not already been started, and the government is taking steps to reduce recurrent spending. Still, as already mentioned the overall budget deficit including grants is likely to widen to the equivalent of over 10 percent of GDP in 2005.

*Key measures* to mitigate the adverse macroeconomic impacts of the tsunami include:

- Providing income support to those affected by the tsunami and maintaining adequate liquidity in the atolls, as is being done through cash transfers.
- Helping the people in the atolls restore their livelihoods by financing the replacement of key assets and tools, and by employing local labor in rebuilding infrastructure.
- Encouraging the resumption of tourism activity by conveying a clear message to the rest of the world that (a) damages were limited to some islands, (b) key infrastructure, including the airport, is safe and functioning normally, and (c) the impact of the tsunami was minor on most of the resorts, which are open for business.
- Ensuring that the reconstruction effort is consistent with macroeconomic stability over the medium term, by containing the fiscal deficit, maintaining the fixed exchange rate, and preserving price stability.

*Summing up.* Provided adequate external finance is available, the recovery of tourism is swift, and the GoM continues to manage the economy prudently, including ensuring an adequate level of fiscal restraint, the macroeconomic impact of the tsunami can be mitigated to some extent. However, the evolution of the macro-economy remains uncertain, and the GoM will need to monitor key indicators carefully and be prepared to implement contingency measures as needed.

Table A.1: Key Economic Indicators

	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	
									Est.	Pre-Tsunami Forecast	Post- Tsunami Forecast
<i>(Annual percentage change)</i>											
Growth and prices											
Real GDP	9.1	10.4	9.8	7.2	4.8	3.4	6.5	8.4	9.0	7.5	1.0
Consumer prices (period average)	6.2	7.6	-1.4	3.0	-1.2	0.7	0.9	-2.9	6.4	5.0	6.8
<i>(Percent of GDP)</i>											
Central government											
Revenue and grants	28.9	31.0	30.4	32.1	32.3	33.0	33.1	34.9	35.2	37.9	43.9
Of which: Grants	4.5	2.9	2.6	2.3	2.3	2.8	1.6	1.4	0.8	0.9	7.2
Expenditure and net lending	31.4	32.3	32.3	36.1	36.7	37.7	38.0	38.2	38.0	41.9	54.4
Of which: Capital spending	13.6	12.8	12.8	13.7	11.8	12.3	12.5	13.6	11.4	11.4	21.1
Overall balance	-2.5	-1.4	-1.9	-4.1	-4.4	-4.7	-4.9	-3.3	-2.8	-4.0	-10.5
Overall balance, excl. grants	-7.0	-4.2	-4.5	-6.4	-6.6	-7.5	-6.5	-4.6	-3.6	-4.9	-17.8
Financing											
Domestic	-0.5	-1.5	-0.1	3.2	4.3	2.8	0.4	-1.5	-1.4	1.3	-2.9
Foreign	3.0	2.9	2.0	0.8	0.0	1.9	4.5	4.7	4.2	2.7	4.8
<i>(Twelve-month percentage change at year-end)</i>											
Money and credit											
Domestic credit	-2.4	8.8	18.6	8.0	14.5	19.4	11.7	-5.8	31.7		
Public sector	-10.2	-15.1	9.2	14.1	23.3	7.0	6.5	-25.5	-26.0		
Central government, net	-10.6	-11.4	1.4	12.9	30.9	8.4	5.1	-19.6	-45.2		
Private sector	9.5	38.9	25.7	4.0	8.0	29.9	15.3	6.8	57.3		
Broad money	26.0	23.1	22.8	3.6	4.1	9.0	19.3	14.6	32.6		
<i>(In millions of U.S. dollars)</i>											
Balance of payments											
Current account	-7.4	-34.7	-21.9	-78.9	-51.5	-58.7	-35.7	-31.8	-90.3	-127.4	-187.8
(In percent of GDP)	-1.6	-6.8	-4.0	-13.4	-8.2	-9.4	-5.6	-4.6	-12.0	-14.7	-22.7
Trade balance	-185.6	-217.3	-215.9	-262.4	-233.3	-236.0	-212.4	-262.3	-368.8	-420.2	-478.7
Exports (1)	79.9	89.7	95.6	91.5	108.7	110.2	132.3	151.9	172.7	148.2	131.0
Imports	-265.5	-307.0	-311.5	-353.9	-342.0	-346.3	-344.7	-414.3	-541.5	-568.5	-609.8
Non-factor services, net	201.1	218.0	232.4	234.6	238.8	244.2	251.7	311.1	376.7	397.4	239.9
Official capital (net)	17.3	6.6	14.6	5.2	-1.9	7.8	26.8	33.8	27.2	29.1	40.0
Private capital (net) (2)	41.0	42.9	42.9	42.9	25.6	24.3	33.9	56.8	71.6	82.3	80.0
Errors and omissions (net)	-7.1	12.6	-6.6	23.6	19.9	5.2	14.9	15.5	16.0	0.0	0.0
Overall balance	43.7	27.4	29.1	-7.2	-7.9	-21.4	39.8	74.3	24.5	-16.0	-67.8
Gross official reserves (year-end)	77.6	99.7	119.9	128.5	124.1	94.3	134.5	161.0	205.1	189.3	205.1
(In months of the following year's imports of goods and non-factor services (NFS))	2.6	3.0	3.5	3.4	3.3	2.5	3.1	3.4	3.4	3.4	3.4
(In percent of short-term ext. debt)	572.9	781.5	745.7	308.4	252.1	209.3	252.5	419.7	419.7	419.7	419.7
External debt (year-end)	177.2	178.1	200.8	212.9	211.6	209.8	259.0	280.9	316.6	345.7	385.7
(In percent of GDP)	38.5	35.6	37.2	36.1	33.9	33.6	40.4	40.7	42.0	39.9	46.6
Debt service	11.8	27.9	16.3	19.0	22.1	22.0	23.3	22.9			
(In percent of exports of goods and NFS)	3.2	6.9	3.8	4.4	4.8	4.8	4.6	4.0			
Exchange rates											
Rufiyaa per US\$	11.77	11.77	11.77	11.77	11.77	12.24	12.80	12.80	12.80	12.80	12.80
NEER (percent change)	2.8	8.4	5.4	0.5	6.7	0.8	-6.4	-9.4			
REER (percent change)	6.5	14.0	2.3	2.6	3.4	-0.6	-6.6	-14.5			
Memorandum items:											
Nominal GDP (millions of rufiyaa)	5,301.0	5,981.8	6,356.9	6,935.4	7,348.4	7,650.8	8,201.0	8,842.0	9,639.2	11,085.1	10,603.1
Nominal GDP (millions of U.S. dollars)	450.4	508.2	540.1	589.2	624.3	625.1	640.7	690.8	753.1	866.0	828.4
GDP Per Capita (in U.S. dollars)	1800	1989	2071	2214	2300	2265	2284	2423	2603	2949	2779

Source: Ministry of Finance and Treasury, Ministry of Planning and National Development, Maldives Monetary Authority, IMF and staff projections.

(1) Includes re-exports.

(2) Estimated private capital inflows of US\$ 128.7 million to the tourist sector have been spread evenly over 1997-99.

Table A.2: Gross Domestic Product by Sectoral Origin

	1998	1999	2000	2001	2002	2003	2004	2005	
							Est.	Pre-Tsunami Forecast	Post- Tsunami Forecast
<i>(In millions of rufiyaa at constant 1995 prices)</i>									
Gross Domestic Product	5648.2	6056.6	6345.5	6564.4	6992.8	7581.1	8263.4	8879.6	8342.3
Primary	578.8	599.2	595.2	625.5	724.8	738.3	759.6	790.3	758.8
Agriculture	165.5	168.8	174.7	181.4	188.6	196.3	204.6	213.3	194.4
Fisheries	373.8	388.1	381.2	402.4	494.7	498.0	507.7	527.8	507.7
Coral and sand mining	39.5	42.2	39.3	41.7	41.5	44.1	47.2	49.1	56.7
Secondary	801.2	900.5	914.9	989.0	1091.7	1173.5	1289.7	1348.6	1503.2
Manufacturing	435.4	483.3	505.1	532.4	615.1	627.5	638.2	613.4	625.4
Electricity and water supply	156.4	178.5	203.9	226.3	247.6	275.0	303.4	331.6	303.4
Construction	209.4	238.7	205.8	230.3	229.0	271.0	348.1	403.6	574.4
Tertiary	4493.5	4798.7	5084.6	5205.4	5448.8	5969.8	6546.2	7093.7	6433.2
Wholesale and retail trade	270.4	278.9	287.8	288.9	295.6	308.3	325.1	346.0	325.1
Tourism (Resorts, etc)	1854.2	1982.3	2094.0	2093.5	2162.6	2482.5	2766.2	2876.5	2074.6
Transport and communications	825.4	854.2	919.1	934.2	998.0	1078.8	1216.4	1310.4	1338.1
Financial services	194.3	208.6	215.1	220.4	235.1	251.4	269.3	286.2	282.8
Real Estate	460.6	483.9	496.7	507.4	530.7	550.3	571.2	596.4	594.1
Business services	166.1	178.3	183.9	188.4	201.0	211.3	222.4	236.4	231.3
Government Administration	590.5	677.8	750.7	833.0	883.9	943.0	1029.2	1293.2	1440.9
Education, health and social services	131.9	134.6	137.2	139.6	141.9	144.2	146.4	148.5	146.4
FISM	-225.2	-241.8	-249.3	-255.5	-272.5	-300.5	-332.1	-352.9	-352.9
<i>(Annual percentage change)</i>									
Gross Domestic Product	9.8	7.2	4.8	3.4	6.5	8.4	9.0	7.5	1.0
Primary	7.0	3.5	-0.7	5.1	15.9	1.9	2.9	4.0	-0.1
Agriculture		2.0	3.5	3.8	4.0	4.1	4.3	4.3	-5.0
Fisheries		3.8	-1.8	5.6	22.9	0.7	2.0	4.0	0.0
Coral and sand mining		6.8	-6.9	6.1	-0.5	6.2	7.1	4.0	20.0
Secondary	17.2	12.4	1.6	8.1	10.4	7.5	9.9	4.6	16.6
Manufacturing		11.0	4.5	5.4	15.5	2.0	1.7	-3.9	-2.0
Electricity and water supply		14.1	14.2	11.0	9.4	11.1	10.3	9.3	0.0
Construction		14.0	-13.8	11.9	-0.6	18.3	28.5	15.9	65.0
Tertiary	8.9	6.8	6.0	2.4	4.7	9.6	9.7	8.4	-1.0
Wholesale and retail trade		3.1	3.2	0.4	2.3	4.3	5.4	6.4	0.0
Tourism (Resorts, etc)		6.9	5.6	0.0	3.3	14.8	11.4	4.0	-25.0
Transport and communications		3.5	7.6	1.6	6.8	8.1	12.8	7.7	10.0
Financial services		7.4	3.1	2.5	6.7	6.9	7.1	6.3	5.0
Real Estate		5.1	2.6	2.2	4.6	3.7	3.8	4.4	4.0
Business services		7.3	3.1	2.4	6.7	5.1	5.3	6.3	4.0
Government Administration		14.8	10.8	11.0	6.1	6.7	9.1	25.7	40.0
Education, health and social services		2.0	1.9	1.7	1.6	1.6	1.5	1.5	0.0
<i>(Percent of GDP)</i>									
Primary	10.2	9.9	9.4	9.5	10.4	9.8	9.6	8.9	9.1
Agriculture	2.9	2.8	2.8	2.8	2.7	2.6	2.5	2.4	2.3
Fisheries	6.6	6.4	6.0	6.1	7.1	6.6	6.1	5.9	6.1
Coral and sand mining	0.7	0.7	0.6	0.6	0.6	0.6	0.6	0.6	0.7
Secondary	14.2	14.9	14.4	15.1	15.6	15.5	15.6	15.2	18.0
Manufacturing	7.7	8.0	8.0	8.1	8.8	8.3	7.7	6.9	7.5
Electricity and water supply	2.8	2.9	3.2	3.4	3.5	3.6	3.7	3.7	3.6
Construction	3.7	3.9	3.2	3.5	3.3	3.6	4.2	4.5	6.9
Tertiary	79.6	79.2	80.1	79.3	77.9	78.7	79.2	79.9	77.1
Wholesale and retail trade	4.8	4.6	4.5	4.4	4.2	4.1	3.9	3.9	3.9
Tourism (Resorts, etc)	32.8	32.7	33.0	31.9	30.9	32.7	33.5	32.4	24.9
Transport and communications	14.6	14.1	14.5	14.2	14.3	14.2	14.7	14.8	16.0
Financial services	3.4	3.4	3.4	3.4	3.4	3.3	3.3	3.2	3.4
Real Estate	8.2	8.0	7.8	7.7	7.6	7.3	6.9	6.7	7.1
Business services	2.9	2.9	2.9	2.9	2.9	2.8	2.7	2.7	2.8
Government Administration	10.5	11.2	11.8	12.7	12.6	12.4	12.5	14.6	17.3
Education, health and social services	2.3	2.2	2.2	2.1	2.0	1.9	1.8	1.7	1.8
Memorandum items:									
Nominal GDP (millions of rufiyaa)	6356.9	6935.4	7348.4	7650.8	8201.0	8842.0	9639.2	11085.1	10603.1
Nominal GDP (millions of US\$)	540.1	589.2	624.3	625.1	640.7	690.8	753.1	866.0	828.4
GDP per capita (US\$)	2071.0	2214.0	2300.0	2265.0	2284.0	2423.3	2602.7	2948.8	2778.9
GDP deflator (percent change)	2.0	1.7	1.1	0.6	0.6	-0.6	0.0	7.0	1.8
CPI (percent change, period average)	-1.4	3.0	-1.2	0.7	0.9	-2.9	6.4	5.0	6.8

Source: Ministry of Planning and National Development, IMF and staff projections.

Table A.3: Balance of Payments

	1998	1999	2000	2001	2002	2003	2004	2005	
							World Bank Est.	Pre-Tsunami Forecast	Post- Tsunami Forecast
<i>(In millions of U.S. dollars)</i>									
Current account balance	-21.9	-78.9	-51.5	-58.7	-35.7	-31.8	-90.3	-127.4	-187.8
Trade Balance	-215.9	-262.4	-233.3	-236.0	-212.4	-262.3	-368.8	-420.2	-478.7
Exports, f.o.b.	95.6	91.5	108.7	110.2	132.3	151.9	172.7	148.2	131.0
Domestic exports	74.3	63.7	75.9	76.2	90.4	112.5	121.4	95.9	91.0
Re-exports	21.3	27.8	32.8	34.0	41.9	39.5	50.3	52.3	40.0
Imports, f.o.b.	-311.5	-353.9	-342.0	-346.3	-344.7	-414.3	-541.5	-568.5	-609.8
Services (net)	204.3	203.6	208.8	207.0	216.3	272.7	332.7	353.4	205.9
Balance on nonfactor services	232.4	234.6	238.8	244.2	251.7	311.1	376.7	397.4	239.9
Receipts	331.3	342.8	348.5	354.1	362.9	432.1	515.4	550.5	384.9
Of which tourism receipts	303.0	313.5	320.7	327.1	337.1	401.6	478.5	506.4	358.9
Payments	-98.9	-108.1	-109.7	-109.8	-111.1	-121.0	-138.8	-153.1	-145.0
Balance on factor services	-28.2	-31.0	-30.0	-37.2	-35.4	-38.4	-44.0	-44.0	-34.0
Receipts	8.6	9.0	10.3	8.2	5.6	6.2	6.0	6.0	6.0
Payments	-36.8	-40.1	-40.3	-45.4	-41.1	-44.6	-50.0	-50.0	-40.0
Unrequited transfers (net)	-10.3	-20.1	-27.0	-29.7	-39.6	-42.3	-53.1	-60.5	85.0
Official	20.3	20.4	19.3	19.9	10.6	12.7	6.9	5.5	60.0
Private	-30.6	-40.5	-46.2	-49.6	-50.2	-54.9	-60.0	-66.0	25.0
Non-monetary capital (net)	50.9	71.7	43.5	37.3	75.5	106.1	114.8	111.4	120.0
Official medium-and long-term	14.6	5.2	-1.9	7.8	26.8	33.8	27.2	29.1	40.0
Disbursements	25.7	17.6	12.4	23.4	43.5	51.1	47.6	50.1	60.0
Amortization	-11.1	-12.5	-14.3	-15.6	-16.7	-17.4	-20.4	-21.0	-20.0
Private capital incl.	42.9	42.9	25.6	24.3	33.9	56.8	71.6	82.3	80.0
Net errors/omissions.	-6.6	23.6	19.9	5.2	14.9	15.5	16.0	0.0	0.0
Overall balance	29.1	-7.2	-7.9	-21.4	39.8	74.3	24.5	-16.0	-67.8
Monetary movements	-29.1	7.2	7.9	21.4	-39.8	-74.3	-24.5	16.0	67.8
Maldives Monetary Authority	-20.2	-8.6	4.4	29.7	-40.2	-26.5	-24.7	-13.1	0.0
Commercial Banks	-8.8	15.8	3.5	-8.3	0.4	-47.8	0.3	29.1	0.0
Additional external financing requirement									67.8
Memorandum items:									
Domestic export growth (value, in percent)	6.3	-14.3	19.1	0.4	18.6	24.5	7.9	-21.0	-25.0
Import growth (value, in percent)	1.5	13.6	-3.4	1.3	-0.4	20.2	30.7	5.0	12.6
Tourism receipts growth (in percent)	5.9	3.5	2.3	2.0	3.0	19.1	19.2	5.8	-25.0
Current account balance (in percent of GDP)	-4.0	-13.4	-8.2	-9.4	-5.6	-4.6	-12.0	-14.7	-22.7
Gross official reserves (millions of US\$)	119.9	128.5	124.1	94.3	134.5	161.0	205.1	218.2	205.1
In months of the goods imports	3.5	3.3	3.3	2.5	3.5	3.6	3.6	3.6	3.3
External Debt (millions of US\$)	200.8	212.9	211.6	209.8	259.0	289.5	316.6	345.7	385.7
External Debt (percent of GDP)	37.2	36.1	33.9	33.6	40.4	40.7	42.0	39.9	46.6
Debt service (millions of US\$)	16.3	19.0	22.1	22.0	23.3	22.9			
Debt service (% exports, goods and NFS)	3.8	4.4	4.8	4.8	4.6	4.0			
Exchange rate (Rufiyaa/US\$)	11.77	11.77	11.77	12.24	12.80	12.80	12.80	12.80	12.80
GDP (millions of US\$)	540.1	589.2	624.3	625.1	640.7	690.8	753.1	866.0	828.4

Source: Maldives Monetary Authority, IMF and staff projections.

Table A.4: Summary of Central Government Finance

	1998	1999	2000	2001	2002	2003	2004	2005	
							Prv. Est.	Pre-Tsunami Budget	Post- Tsunami Forecast
<i>(In millions of rufiyaa)</i>									
Total revenue and grants	1930.2	2225.3	2372.7	2522.6	2714.9	3087.9	3395.2	4200.8	4650.8
Total revenue	1765.7	2062.6	2206.8	2310.9	2582.4	2964.3	3320.7	4106.4	3882.6
Current revenue	1763.6	2058.6	2202.6	2294.3	2577.9	2936.8	3302.4	4080.4	3856.6
Capital revenue	2.1	4.0	4.2	16.6	4.5	27.5	18.3	26.0	26.0
Grants	164.5	162.7	165.9	211.7	132.5	123.6	74.5	94.4	768.2
Expenditure and net lending	2053.3	2506.4	2694.2	2885.9	3117.3	3375.3	3663.9	4644.8	5765.8
Total expenditure	2113.9	2494.9	2739.9	2912.1	3135.5	3551.9	3758.1	4743.0	5864.0
Current expenditure	1297.9	1545.5	1875.9	1971.4	2109.4	2345.7	2657.9	3475.1	3627.7
Capital expenditure	816.0	949.4	864.0	940.7	1026.1	1206.2	1100.2	1267.9	2236.3
Net lending	-60.6	11.5	-45.7	-26.2	-18.2	-176.6	-94.2	-98.2	-98.2
Current balance	465.7	513.1	326.7	322.9	468.5	591.1	644.5	605.3	228.9
Primary balance	-41.5	-182.4	-215.1	-246.8	-265.9	-265.9	-265.9	-265.9	-265.9
Overall balance excluding grants	-287.6	-443.8	-487.4	-575.0	-534.9	-411.0	-343.2	-538.4	-1883.2
Overall balance	-123.1	-281.1	-321.5	-363.3	-402.4	-287.4	-268.7	-444.0	-1115.0
Financing	123.1	281.1	321.5	363.3	402.4	287.4	268.7	444.0	1115.0
Foreign financing	129.3	56.7	3.6	145.8	372.4	419.4	405.4	304.6	505.6
Domestic financing	-6.2	224.4	317.9	217.5	30.0	-131.8	-136.7	139.4	-303.0
Exceptional financing									912.4
Total public debt (end of period)	2605.5	2782.9	3002.9	3326.4	3856.9	4144.3	4413.0	4857.0	5071.8
Of which foreign	1625.2	1681.9	1685.5	1831.3	2203.7	2674.6	3073.8	3378.4	3990.1
<i>(Percent of GDP)</i>									
Total revenue and grants	30.4	32.1	32.3	33.0	33.1	34.9	35.2	37.9	43.9
Total revenue	27.8	29.7	30.0	30.2	31.5	33.5	34.4	37.0	36.6
Current revenue	27.7	29.7	30.0	30.0	31.4	33.2	34.3	36.8	36.4
Capital revenue	0.0	0.1	0.1	0.2	0.1	0.3	0.2	0.2	0.2
Grants	2.6	2.3	2.3	2.8	1.6	1.4	0.8	0.9	7.2
Expenditure and net lending	32.3	36.1	36.7	37.7	38.0	38.2	38.0	41.9	54.4
Total expenditure	33.3	36.0	37.3	38.1	38.2	40.2	39.0	42.8	55.3
Current expenditure	20.4	22.3	25.5	25.8	25.7	26.5	27.6	31.3	34.2
Capital expenditure	12.8	13.7	11.8	12.3	12.5	13.6	11.4	11.4	21.1
Net lending	-1.0	0.2	-0.6	-0.3	-0.2	-2.0	-1.0	-0.9	-0.9
Current balance	7.3	7.4	4.4	4.2	5.7	6.7	6.7	5.5	2.2
Primary balance	-0.7	-2.6	-2.9	-3.2	-3.2	-3.0	-2.8	-2.4	-2.5
Overall balance excluding grants	-4.5	-6.4	-6.6	-7.5	-6.5	-4.6	-3.6	-4.9	-17.8
Overall balance including grants	-1.9	-4.1	-4.4	-4.7	-4.9	-3.3	-2.8	-4.0	-10.5
Financing	1.9	4.1	4.4	4.7	4.9	3.3	2.8	4.0	10.5
Foreign financing	2.0	0.8	0.0	1.9	4.5	4.7	4.2	2.7	4.8
Domestic financing	-0.1	3.2	4.3	2.8	0.4	-1.5	-1.4	1.3	-2.9
Exceptional financing									8.6
Total public debt (end of period)	41.0	40.1	40.9	43.5	47.0	46.9	45.8	43.8	47.8
Of which foreign	25.6	24.3	22.9	23.9	26.9	30.2	31.9	30.5	37.6
Memorandum item:									
Nominal GDP (millions of rufiyaa) (1)	6,356.9	6,935.4	7,348.4	7,650.8	8,201.0	8,842.0	9,639.2	11,085.1	10,603.1

Source: Ministry of Finance and Treasury, IMF and staff estimates.

Note: In the event of a shortfall in the amount of exceptional financing available, domestic and external financing will rise accordingly.

## **Annex 2 - Social Impact Assessment**

### **Introduction**

1. The tsunami spawned by the earthquake on December 26, 2004 in the Sumatra region of Indonesia, is the worst natural disaster in the history of Maldives and in the region.. Waves of 1 to 4 meters smashed the Maldivian archipelago devastating housing, livelihoods and productive assets on coastal islands. Eighty-two people are dead, and 26 people are missing. Some islands have become inhabitable, and over 12,000 people, about 5% of the population, is currently homeless. Social and economic impacts from losses in the tourism, fisheries and agriculture sectors on the lives of island communities is great, and exacerbated by shock and fear and increased vulnerability of these people to poverty.

2. The 290,000 people of the Maldives inhabit 199 of the 1,192 low-lying small coral islands that make up this archipelago. According Vulnerability Poverty Assessment 2004 data of the 199 inhabited islands, only 28 of these islands have a land area greater than one square kilometer. One third of the inhabited islands have a population of less than 500 and 78% of the inhabited islands have a population of less than 1,000. More than a quarter of the population lives in the capital, Male', with a total land area of less than one square mile. Although the people of the Maldives have made significant progress in human development over the last two decades, vulnerabilities of various kinds persist, especially among the 74% of the population that residing in the outer atolls. Income poverty as such has declined dramatically over the last seven years. In fact, the number of Maldivians currently surviving on less than one dollar PPP a day is negligible. Non-Income Poverty is however still a relevant phenomenon in the Maldives and is closely related to isolation and limited access to social services, such as health and education. The average poor person comes from a large household with a high dependency ratio, lacks formal education, and resides in atolls where income opportunities are limited by the high cost of transportation and inability to generate economies of scale in delivering services. Female headed households and households primarily occupied in agriculture are among the poorest.

### **Livelihoods**

#### ***Situation***

3. The social fabric of the tsunami hit islands in the Maldives has been seriously impacted by extensive physical damage, loss of life and livelihoods and displacement of people. The current displaced population is estimated to be about 12,482. About 6,681 people are internally displaced in their original resident islands and 5,801 are displaced on other islands. Eighty-two people have died and 26 are still missing. Out of the 199 inhabited islands of the Maldives, 13 islands were severely impacted with total destruction, 56 islands sustained major physical damage, and 121 islands were impacted by moderate damage due to flooding. The loss of lives, livelihoods and loss of or damage to homes and productive assets including agricultural land, fruit bearing trees, fishing vessels and equipment, as well as loss of employment on island resorts, has been exacerbated by the shock and fear caused by the tsunami, and increased the vulnerability of those who suffered these losses to poverty. Although these island communities have been traumatized, they have demonstrated a strong sense of independence, resilience and cohesion in mobilizing themselves into groups to remove rubble, initiate small scale reconstruction activities on mosques and houses, and distribute relief supplies. In a country of many small island communities, community organizations have traditionally played an important role in providing public or collective services. The capacity of communities represents one of the most important assets of reconstruction and a key organizing principle for targeted demand-driven recovery programming at the local level.



### ***Immediate Needs***

4. **Income Generation.** Creating employment and income generating opportunities is a critical dimension of the reconstruction process to restart the economy of tsunami affected islands, restore a sense of normalcy, and support the social and economic inclusion of the most vulnerable, including displaced populations, female headed households and the disabled, even if these opportunities are limited in duration. Immediate actions could be taken to implement community based employment programs that provide an income both in cash or kind through the rehabilitation of rural infrastructure and construction activities. These employment programs can be implemented through the Food-for-Work and LBES (labor based equipment supported) approaches. Actions should be taken to strengthen and extend community safety net systems and provide support to the poorest and most vulnerable groups in each community, as well as establish victim's assistance programs which include skills based training and microfinance activities (both of these activities can be continued in the medium term). Early policy action is also required to ensure that sectoral reconstruction efforts, such as infrastructure and housing rehabilitation, use labor-intensive methods wherever possible, to maximize their employment impact.

5. **Livelihood Support.** To assist displaced populations and those who have lost homes, assets and livelihoods, the Government of Maldives (GoM) has initiated a cash transfer program and proposed a livelihood support assistance program (see Annex 3).

6. **Empower Individuals and Communities.** While relief and livelihood support programs are important in the immediate aftermath of a natural disaster, they should be replaced as soon as possible with efforts to foster ownership and involvement of affected people. Relief assistance can create an environment conducive to competition for handouts and dependency. Greater local participation and contributions to the reconstruction effort lead to more sustainable development outcomes. For this purpose it is necessary to use the self-organizing potential on the islands. Traditionally a large proportion (on average 16% ) of the island community is involved in voluntary activities (VPA 2004 data). Very often initiatives and projects are undertaken completely on voluntary basis by the islanders to benefit the entire community<sup>1</sup>. To mobilize these resources would be a very important empowerment strategy and reduce the risk of dependency.

7. **Communication and Transparency.** Communication and information dissemination are important to the successful implementation of the tsunami recovery and reconstruction program. Policy initiatives and financial assistance will not be effective without a systematic process to convey their content swiftly and equitably to the affected communities, to assess and hear their suitability and sustainability within communities, and to make appropriate adjustments based on community feedback. In view of this, there is a clear and immediate need for GoM to devise a communications strategy to support the recovery program and ensure an effective dialogue between the government, affected communities and other partners. An effective grievance redressal mechanism would a necessary corollary of such a strategy.

### ***Medium-Term Needs***

- Continue interventions initiated in the short term including support to vulnerable groups, community-based activities which support community infrastructure rehabilitation, microfinance, and SME.
- Scale up existing micro-finance schemes and start up new ones, especially for women.

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<sup>1</sup> Examples are the construction of schools, jetties, seawalls, mosques, social centers etc.

- Provide demand driven education opportunities at the community level which link in with and support skills development and microfinance activities.
- Continue to build and strengthen the local capacity of community based organizations, in combination with the mobilization and assistance of the local volunteers.
- Ensure co-ordination among multilateral agencies during the transition from relief to development, with a focus on sustainability leading to eventual self-reliance.
- Develop and implement national safety net program for the disabled and other vulnerable social groups.

## **C. Displacement**

### ***Situation***

8. Out of a national population of 290,000 dispersed among 199 islands, about 12,482 people are currently displaced by the tsunami. About 6,681 people are internally displaced in their original resident islands and 5,801 are temporarily displaced in other islands. The islands of R. Kandholhudoo and M. Kohufushi are the most seriously impacted with displaced populations of over 1,000 people. Five islands, Th. Vilifushi, Th. Madifushi, L. Mundoo, Dh. Maaemboodhoo, Ga. Villingili, have displaced populations between 500-1000 people. Thirty-eight islands have displaced populations between 50-500 people. An estimated total of 4,130 houses are reported to be in need of complete reconstruction or repair. This includes 2,190 houses which are reported to be uninhabitable and needing complete reconstruction, and about 1,940 houses which are in need of repair to make them habitable. Given the spatial dispersion of the population (the average population per island outside the capital Male', is about 800) and the absolute scarcity of land, people whose islands are no longer habitable have been temporarily moved to "safe/host islands". In the North Maalhosmadulu Atoll (RAA), for example, most people from the severely impacted island of Kandholhudoo have been moved to 11 different safe islands in the atoll. For the most part, this relocation is expected to be temporary, however, in view of GoM's long-term strategy to regroup populations in selected "focus" islands to achieve economy of scale in delivering services, some people relocated to safe islands may be moved to proposed focus islands for long-term resettlement and not return to their original islands. GoM has indicated that there are also groups of displaced people who have indicated a reluctance to return to their original resident islands, or whose islands are no longer habitable and who may potentially be relocated to focus islands. Data is not yet available identifying numbers of people who will return to their original islands and who may move to focus islands.

9. GoM's focus island strategy is articulated in the Sixth National Development Plan (2001-2005). Under the proposed strategy, 85 focus islands have been selected to receive a higher level of services and incentives which would be offered to island communities through subsidies to move to these islands. The number of populated islands is expected to be reduced over the years from the current 199 to less than 100. The objective of the policy is to obtain economies of scale in delivering services, particularly in health and education, as well as transport, power and telecommunications. These focus islands are also to serve as growth centers, fostering employment and income generation opportunities by developing community based tourism and small scale enterprises. This initiative is supported by lending from the World Bank through the IHD project.

10. The relocation policy to focus islands is voluntary. The government has clearly stated that all relocation will be voluntary. Relocation has in the past been supported by resettlement grants amounting to Rf 300,000 per household resettled. According to GoM, there is high demand to relocate, and nineteen island communities have already requested relocation to focus islands. Even though the need for relocation has been aggravated due to the physical destruction by the tsunami, Maldivians are traditionally and socially bound to their islands. Relocation therefore might prove difficult (a) when the to

be relocated communities feel their island is still physically inhabitable or (b) when the community is at risk of falling apart, by relocating them to another island where they would be a minority or dispersing the community over several different islands. Nevertheless efforts to achieve successful relocation must be pursued, and installation of proper incentives and subsidies might help convince island communities to abandon their former social and economic base. While the overall thrust of the policy to reduce poverty directly and lessen regional income disparities is positive, there is a risk that these resettled households will be dependent on GoM not only for services, but also for livelihoods. Furthermore, GoM must have a clear strategy for addressing issues relating to those households who do not want to relocate to focus islands. The question of the possible adverse impact of livelihoods, asset values, standards of living and accessibility to basic services for those households who choose not to relocate along with the rest of their island community is to be addressed. This question is especially pertinent in the context of post-tsunami relocation, where people may need to be moved to focus islands on a much earlier time horizon than originally planned. Since GoM owns all land, and the ownership of the land holding is limited to a leasehold in perpetuity, without the right to sell or transfer land, issues related to land ownership and values are not applicable. The question posed above is also relevant in the context of the World Bank's social safeguard policy on involuntary resettlement. Involuntary resettlement is highly unlikely, however, if people choose to not voluntarily relocate to focus islands, and this leads to loss of livelihoods and assets then appropriate mitigation measures will need to be developed.

*Immediate*

- Initiate a detailed assessment of the displaced population, including gathering more concise data on number of people displaced, homeless, status of displacement – whether temporary or permanent. The assessment should include consultations with affected people to understand their needs and concerns about displacement, and options for returning to their original island, if possible, or relocation to other islands, including the possibility of relocation to focus islands. Specific focus should be placed on understanding the needs of vulnerable people, including the disabled, elderly, and female headed households.
- Develop a more systematic strategy for relocation of people whose islands may no longer be habitable, and facilitate integration with host populations on safe islands. A more clear strategy is also needed to address issues associated with people who may choose to not relocate to other islands, including options and mitigation measures.
- Undertake information dissemination/outreach activities to inform displaced populations about actions being undertaken by the government to facilitate their return to their original resident islands or relocation to other islands and to ensure an effective dialogue between the government, affected communities and other partners.

## **Annex 3 – Livelihoods and Safety Nets**

### **INTRODUCTION**

1. Sources of livelihood have been affected by the tsunami of 26 December 2004, if not lost, and children and adults and alike suffer from psychological trauma. This Appendix focuses on the impact on employment, livelihoods, and safety nets.

### **EMPLOYMENT**

2. According to the 2000 Population and Housing Census (Census), 56% of working-age Maldivians were in the labor force,<sup>1</sup> with about a third of them employed in Male'.<sup>2</sup> Men are almost twice as likely to be in the labor force as women, 73% against 38%. The largest employer of Maldivians is the Government and government companies. In Male', Maldivians are mainly in community, social, and personal services; transport and communications, and wholesale and retail trade. In the atolls, people work in community, social, and personal services, manufacturing; hotels and restaurants; and fishing. Atoll women are mostly in community, social, and personal services, and manufacturing. Atoll men are mainly in fishing and hotels and restaurants while few women are employed in these sectors.

3. The Maldivian labor force is significantly augmented by expatriate workers. The share of expatriate workers in the total labor force was 24% in 2000 (30,664 workers). According to the Census, expatriates are mostly employed in unskilled (42%) and semiskilled (36%) occupations. More than 80% are employed in resorts, construction, business activities, education, apparel, and hotels and restaurants. Most expatriate workers are from Bangladesh, India, and Sri Lanka.

4. People in the atolls engaged in economic activities are mainly self-employed or working in groups or working with family members (52%). In the fishing sector, the majority (53%) is being employed by another individual, and a good percentage (32%) work for their families or a group.

#### **Impact of the Tsunami on Employment**

5. *Tourism.* Tourism is Maldives' largest industry and accounts for 33% of the GDP and more than 60% of the foreign exchange receipts, and employs a significant number of both locals and expatriate workers. Under the assumption that the impact of the tsunami on employment in the tourism sector is in proportion to the number of closed resorts, the approximate number of affected Maldivians is about 2,200 and the number of affected expatriates is about 2,400; this may, however, be lower as some resorts have kept some workers to undertake repair duties. Retention of all expatriate and local workers during an unexpected slump is a challenge. The contraction in tourism will also impact adversely other ancillary sectors like the food industry and the handicrafts sector which mainly cater to the tourists.

6. *Fisheries.* Despite the rapid development of other sectors in recent decades, fisheries remains important in terms of employment, value-added in production, export earnings and overall level of economic activity outside the tourism region. Tuna constitutes most of the annual fish catch. However, reef fisheries continue to expand at a rapid rate. From preliminary VPA data, fisheries is ranked as the

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<sup>1</sup> The 2000 Population and Housing Census took 12 as the eligible age for employment. As of May 2003, the legal age for working and labor regulation was raised to 18. Throughout this report, we use 15 to 64 as reference ages for the labor force. The reference period used for employment in the 2000 Census was "last week," which may lead to the understatement of unemployment and labor force participation.

<sup>2</sup> The labor force data are collected by the Census, the most recent of which was in 2000.

first economic activity of the island in half of the inhabited islands; about 17% of atoll residents are involved in fishing.

7. *Damage to Fisheries.* All islands that reported complete flooding, including islands whose residents were evacuated to other islands, have ranked fishing as their first economic activity in the preliminary VPA data. From the number of fishing vessels lost and damaged, it is estimated that over 6,000 have lost their fishery-related livelihood. Restoration of their incomes is highly dependent on the time for minimum repair of their houses and availability of funds to replace lost boats. Women play an important role in processing, storage and marketing of fish and would thus experience loss of income associated with lower fish harvests.

8. *Agriculture.* The agriculture sector accounts for a small percentage of the country's GDP. Large-scale agriculture is practiced in a few islands; more Maldivians are involved in home-gardening and communal agriculture that is the source of own consumption and the surplus sold for extra income for the households. One in 20 atoll resident is engaged in agriculture.

9. *Damage to Agriculture.* Damages sustained by the agricultural sector are in terms of loss of income attributable to lost crops for the current season but also throughout the period until the time that the land can be replanted again. This impacts not only on the incomes of the farmers, but also on the food consumption and food security of islands who buy their produce. As of 13 January 2005, the Government reported that there is almost 30% damage to field plots of inhabited islands. In addition, field missions and rapid assessments report complete damage to home gardens in several islands. Three islands that were completely flooded are engaged mainly in agriculture, i.e. Baara, Kashidoo, and Isdhoo. In terms of direct employment, over 700 people (16%) were engaged in farming and who may now have to look for other sources of income until agricultural activities could be resumed. In islands where flooding reached at least a quarter of the island's area, close to 2,200 residents were directly involved in agriculture.

10. *Self-Employed Craftsmen and Construction.* In the islands that were completely flooded, small tools and equipment of craftsmen, semi-skilled, and skilled workers would have been swept away, if not damaged.

11. *Small and Medium Enterprises.* Flooding from the tsunami damaged equipment and inventories; these will need to be repaired or replace. Lower incomes due to lost livelihood will lead to less business transacted. In addition, small and medium enterprises that have taken on business-related loans would now have a hard time meeting their repayment obligations. However, as reconstruction begins and as funds become available to replace capital equipment, businesses in trading will prosper.

12. *Expatriate Workers.* Given the large presence of expatriate workers in the Maldives, the tsunami has also impacted on their lives. Some closed island resorts, the largest employer of expatriates, have laid-off some personnel. In the education and health sectors, expatriate workers are part of the fabric of communities as teachers, nurses, craftsmen, and skilled workers. Communities that have lost their assets include expatriates who would also need assistance to rebuild their lives.

#### **POVERTY, VULNERABILITY, AND LIVELIHOODS**

13. *Vulnerabilities.* In Maldives, recent vulnerability analysis has shown that there are vulnerable groups which even prior to the Tsunami were under-served by public safety nets. The poor and vulnerable groups include large families with no breadwinner, most of whom are headed by single women (divorcees and widows), and the single elderly with no public or private transfer incomes. The large majority of the poor and vulnerable groups are located in the atolls. These groups are in need of support both before and after the Tsunami. The Tsunami created new vulnerable groups, i.e. those who lost their assets (in kind or

cash) or livelihoods; especially hard affected are the elderly (having sometimes lost lifetime savings held in cash), people with disabilities, pregnant women and small children and their mothers. While jobs may recover relatively quickly, those livelihoods that depend on physical assets such as fishing vessels, perennial crops, fish processing equipment, or other tools will require public assistance to restore to the pre-Tsunami situation. In the absence of targeted public support for asset restoration, recovery of lost livelihoods may take very long and could create severe hardship. For livelihood restoration, careful targeting of those most hurt by the Tsunami will be vital in order to contain costs and prevent widespread abuse of public assistance.

14. *Loss of Personal Effects.* In the most affected islands, families have lost small implements, household furniture, household appliances, including television sets and refrigerators, and cash savings kept in their houses. Many electrical appliances have been rendered unusable or need to be repaired. An initial estimate of the value of typical household assets, exclusive of cash savings, among the variously affected 80,328 individuals range from about \$15.7 million to about \$17.4 million.

### **Public assistance**

15. *Tsunami-affected groups.* Creating employment and restoring livelihoods are critical dimensions of the reconstruction process and will kick start the economy of the tsunami affected islands, restore a sense of normalcy, and support the social and economic inclusion of the displaced populations. Such support will need to be rapid if it is to be effective. It will need to be well targeted if it is to be affordable. Livelihood assistance support through cash grants and community based employment programs that provide an income in cash through the rehabilitation of island infrastructure and construction activities that involve local communities in paid work and in decision-making would be important options to consider. While both relief/consumption support and livelihood support programs are important in the immediate aftermath of a natural disaster, they should be replaced as soon as possible with efforts to foster ownership and involvement of the affected people. Relief assistance can create an environment conducive to competition for handouts, dependency, abuse, and mis-targeting. Greater local participation and contributions to the reconstruction effort can lead to more sustainable development outcomes. While construction work carried out by contractors usually employs men, often expatriates, community-led construction is most likely to ensure women's participation and employment. As far as possible, the majority of reconstruction efforts should be undertaken involving the affected communities directly.

16. *Public assistance needed.* In the absence of a formal social safety net system, the social safety net comprises family members and the community to which an individual belongs. However, in a disaster where whole island communities are similarly affected, this informal safety net system would fail to function as everyone faces the same unfortunate situation—the Tsunami has been a highly covariate shock. There is an essential role of third parties in providing a safety net, and the government is fully aware of its role and responsibility in this regard and is implementing targeted safety nets supported by the international community.

### **Livelihood support**

17. *Restoring livelihoods of tsunami affected population.* In the aftermath of the tsunami, many Maldivians now find themselves not only homeless, but also without any form of livelihood. Agricultural crops, both annual and perennial, were destroyed; fishing vessels sustained damages or were completely destroyed; equipment for artisanal fish processing (traditionally, a female occupation) was washed away, as was craftsmen's equipment; equipment used mostly by women in home employment such as sewing machines, cooking utensils, and stoves have been lost; and working capital of micro and small enterprises kept in cash often vanished. Moreover, some workers in closed resorts are without work while repairs are

underway, and the earnings of those still at work are reduced because of lower-than-usual occupancy, even in functioning resorts.

18. *Proposal for livelihood support.* The government is proposing a policy of urgent support for livelihood restoration that comprises of (a) in-kind equipment (e.g. minor fishing equipment, fish processing equipment, start-up packages of seeds and tools for agriculture); (b) small and short term cash grants for working capital of micro-entrepreneurs (fish processors, farmers, and traders); (c) subsidized micro credit for agricultural and other producers; the proposal suggests a 6% rate of interest, approximately half the market rate; (d) government financing of repairs to fishing vessels; and (e) procurement of new, technologically upgraded fishing vessels to replace those that were lost. The procurement of new fishing vessels is proposed to take place under a pre-existing government-run program in which the Ministry of Agriculture and Fisheries procures the vessels (from domestic shipyards) and leases the vessels to the fishermen. The proposal for livelihood restoration is based on extending pre-existing arrangements to the affected producers. Given the need for speed, this may be preferable. However, it is vitally important that the groups benefiting from subsidized credit be carefully targeted to those directly affected by loss, and that such credit subsidies be time-bound (say, 6-18 months). In the longer run, there is a need to reconsider the arrangements under which fishing vessels are owned and financed, looking for options that devolve ownership to the fishing community, involve the private sector in financing, and remove purchase of fishing vessels from the government budget whose deficit is already widening; these goals could be achieved for example by giving government guarantees instead of direct government purchase and ownership as practiced hitherto. However, some affected households—including families without able-bodied members such as the disabled, the elderly, single mothers etc—will not benefit from the livelihood assistance and need to be helped through targeted safety nets in the form of cash transfers.

19. *Need for credit.* In restoring means of livelihoods, a source of funds is necessary. At present, the banking system extends loans to individuals and businesses who can present collateral; this source of funds is not necessarily accessible to many of the tsunami victims who have lost their assets. Micro credit schemes can be instrumental in helping Maldivians rebuild their lives. These have been introduced in the Maldives by UN-system projects and have shown promising results. These, however, are limited in geographical scope. These schemes need refinement with respect to targeting the poor, balancing the “profit-orientation” and “social-orientation” of lending when channeled through the Bank of Maldives, helping women, community mobilization for development, and addressing the needs of the youth. Where support for micro enterprises is provided, this should include development of capacity for business management and support for marketing products. Repayments of loans extended to affected individuals and businesses will need to be rescheduled within a more realistic time frame.

### **Income support**

20. *Targeted cash assistance to Tsunami-affected groups.* In the very short term, the main need is to provide shelter and income support to the displaced. This is already well underway, inasmuch as Rf. 30 million has been disbursed to the affected population under an emergency cash transfer program; the program disburses Rf. 1500 per family member to those who completely lost their houses; Rf. 1000 per person to those whose houses were damaged and needed repairs; and Rf. 500 per family member to those whose houses were flooded and who therefore lost household items and belongings. This program is still undergoing and it is estimated that an additional Rf. 20 million will be disbursed shortly. Once complete, this program will have reached approximately 63,000 beneficiaries. Multisectoral teams from Male’ together with island committees identified the beneficiaries, registered them, and disbursed the assistance as a one-time cash transfer. However, since the economy has been in a state of flux after the Tsunami, with people moving around the country in search of shelter, the government is aware that not all affected

have yet been served, and that targeting may not have been fully effective, something which is not unusual in a widespread disaster situation. The Ministry of Gender, Family Development, and Social Security is currently exploring options for better targeting of those affected, and has also proposed an additional follow-up income support program for those individuals who are unlikely to be covered by the livelihood restoration programs mentioned above, i.e. the elderly and people with disabilities. This new proposed scheme—the details of which are being worked out—would give Rf. 500 per month per person for a period of 10 months. The target group would be around 2000 individuals, and the total cost would be Rf. 10 million (\$780,000). Free health care might also be provided (cost: Rf. 0.7 million).

21. *Public works.* The restoration of damaged housing and other infrastructure in the affected islands represents an opportunity to provide short term employment to the affected population. By launching public works programs employment could help support incomes to the affected and willing individuals. However, the feasibility and desirability of public works depends crucially on the availability of unemployed and willing labor in the affected islands. If public works are found feasible, attention should be paid to critical design features such as low wages to promote self-targeting, a reasonable degree of labor intensity, community involvement in the choice of projects, and technical engineering assistance for technical design of the work. Launching of this program would require rethinking of the current policy of contracting out housing and other construction to private sector professional contractors. Some of the activities currently planned to be given to private contractors could be executed by the affected communities through paid labor. The activities could include housing repair and construction, debris removal, road work and maintenance, water and sanitation, construction of sea walls, and so on. There is a fear that community housing and other construction would not fulfill critical quality standards; this risk can be contained through appropriate measures such as technical assistance and supervision to ensure building codes are met.

### **Concluding remarks**

22. *Need for communication strategy.* Effective communication, transparency and information dissemination particularly as rumors of “relocation” spread are essential to the successful implementation of the tsunami recovery and reconstruction program. Policy initiatives and financial assistance will not be effective without a systematic process to convey their content swiftly and equitably to the affected communities, to assess and hear their suitability and sustainability within communities, and to make appropriate adjustments based on community feedback. In view of this, there is a clear need for GoM to devise a communications strategy to support the recovery program and ensure an effective dialogue between the government, affected communities and other partners. The communication strategy should contribute to ensuring that expectations will not get out-of-control and to ensuring transparency when assistance is being delivered.

23. *Need for a comprehensive social protection strategy.* Consumption support and livelihood restoration of the affected groups requires immediate short-term public action. The imperative of providing immediate support to the affected population should not, however, undermine the design and financing of a medium-term social protection strategy designed to combat chronic poverty and vulnerability among groups located in all atolls, both affected and non-affected. The strategy should protect individuals and households from both idiosyncratic shocks and covariate shocks. The World Bank is currently working with the Ministry of Gender, Family Development, and Social Welfare on the design of such a strategy.



## **Annex 4 - Education and Training Sector**

### **Introduction**

1. As of 2000, all children in the Maldives have access to the first seven years of formal schooling, one of the landmark achievements of the country. Provision of education to over one-third of its population is by no means a minor achievement for the Maldives: Students are scattered over 199 inhabited islands and a school is available in all these islands. Education is tuition-free from pre-school through higher secondary schooling. In 2004, there were 63,300 students enrolled in the primary grades, 26,141 in the lower secondary grades, and 1,622 in the higher secondary grades. Secondary schools are available in atoll capitals and in the larger islands with high population. In 2004, there were 225 schools with primary classes, 117 lower schools with secondary classes, and 15 schools with higher secondary classes. Postsecondary education and skills training is provided mainly by the Maldives College of Higher Education (MCHE) through its various faculties. MCHE has five campuses spread throughout the country. MCHE offers academic programs, long-term training programs, and short-term training programs. MCHE receives requests from atoll chiefs for short-term skills training.

### **The Government's Immediate Response**

2. The Government's response to the tsunami has been swift and impressive. At the national level, the Government created a National Disaster Management Center that immediately collected information on the status of the affected islands and regularly updates them. The Center is also coordinating assistance received from various groups, including governments and private individuals.

3. As part of the Government's overall response in the education sector, the Ministry of Education (MOE) set up the Post-Tsunami Task Force in Education (Task Force) to collect information on the damages sustained by schools and to support the efforts to open the affected schools for the new school year. In view of the damages received from the tsunami, the Government delayed general school year opening from 9 January to 25 January. However, the Government started classes in 4 schools on 9<sup>th</sup> January as scheduled for grades sitting national examinations in May 2005.

### **Methodology of Damage and Needs Assessment**

4. **Consultations and Site Visit.** The Mission visited three islands in Thaa atoll: (i) Madifushi, a severely damaged island; (ii) Buruni, which is also badly affected but less people were displaced; and (iii) Vilifushi, which was among the worst hit and could not be reached because it was totally deserted and had to be aerially surveyed from the sea plane. The Mission interacted with the head teacher and some community members in the islands visited. The Mission held discussions with members of the Task Force of the MOE, Ministry of Finance and Treasury officials, and UNICEF staff.

5. **Methodology.** The data on immediate assessments carried out by the Task Force and other relevant documentation form the basis for this report's observations. With a view towards meeting the needs of the education system to begin the academic year on 25 January, the Task Force in Education undertook immediate assessments of schools in the affected islands. MOE sent out teams to survey the damage. By school opening date of 25<sup>th</sup> January all affected schools had been visited and the short-term assessment report completed on 26<sup>th</sup> January. However, the assessment was undertaken using rapid assessment methodologies and was not comprehensive, thereby necessitating small adjustments as new information is received from islands.

## Damage Assessment

### A. *Classification of Schools According to Damages Sustained*

6. The Task Force classified 315 schools in the country (including pre-schools) according to the extent of damages attributed to the tsunami. This is to facilitate targeting and prioritization of needs. The criteria used to categorize schools are in Table 1.

**Table 1. Classification of Schools According to Damages**

Grade	Criterion	Number of Schools Total = 225	Number of Students Affected
A	A No damage A+ Displaced students enrolled in the school; temporary classrooms and teacher accommodation required on identified islands	199 (63%)	46,001
B	No structural damage, no damage to boundary wall; 5-10% across the board for furniture, equipment and teaching materials; 10% repair and repainting	52 (17%)	12,148
C	C 30% damage to furniture, equipment and teaching materials on ground floor, 10-30% damage to boundary wall and some structural damage to buildings and toilets; 30% rewiring and repainting C+ Flooding of ground floor; destruction of boundary wall (50-100%); structural damage to buildings and toilets, 50-100% furniture and equipment damaged/destroyed; 50-100% rewiring and repainting	55 (17%)	14,613
D	Total replacement of school including equipment and furniture; rebuilding accommodation for the headmaster and teachers where applicable	9 (3%)	1,875

Source: MOE Post-Tsunami Task Force

7. Damage to the physical infrastructure caused by the tsunamis is limited to the atolls; Malé's facilities were spared, but are experiencing increased immigration from displaced atoll communities and the resultant overcrowding.

8. As indicated in Table 1, a positive feature is that 63% of schools in the atolls have been spared, with minimal or no damage but 14% of these schools (A+ category) require provisions for displaced students. Displaced families have relocated to neighboring islands ("host islands"). These islands will require additional classrooms to "receive" this influx of additional students. The number of displaced households is still indicative as displaced families continue to move from one island to another. However, this classification based on MOE's rapid assessment can facilitate a targeted approach and some degree of prioritization. MOE's priority has been to address repair, reconstruction and rehabilitation issues for schools in the A+, B, C, C+ and D categories (45%) in order to make them functional.

## Nature of Damages

9. **Physical Infrastructure.** An observation made during the field visit and corroborated by other agencies and MOE is that even in the Category D islands, while community-built residences have collapsed in most cases, the basic structure of school buildings is intact. The damages in these cases include collapsed boundary walls, toilets, and septic tanks, among others. Although some buildings may be intact, they may have developed cracks or their foundations made unstable; technical assessments are ongoing with the assistance of a team of Australian volunteer engineers. The greater damage on school provisions and equipment (textbooks, stationery, uniforms, blackboards, library books, computers and printers), school records, and teaching and learning materials due to flooding is across the board. If these were not swept away, these were observed in the visited islands to be completely damaged by the flooding and rendered unusable. While schools have started on 25 January 2005 with the basics required to become functional, *replacement of these provisions for the about 74,637 affected schoolchildren becomes an immediate priority along with the repair and rehabilitation of damaged school facilities and construction of temporary/additional classrooms in host islands.*

10. **Depletion of Human Resources.** A significant impact of this disaster could be the loss of a large number of trained, expatriate teachers who have been the backbone of the schools in the atolls. There are 5,239 teachers, 35% (1,830) of whom are expatriates; in secondary schools, expatriates comprise about three-quarters. These teachers, who are largely from India and Sri Lanka, were away at the time of the tsunami for annual vacations and may themselves have been affected in their countries and/or may be feeling insecure about returning to Maldives. At the time of school opening on 25<sup>th</sup> January, only about 60% of expatriate teachers reported to work. *Ensuring teacher availability and training of teachers becomes therefore yet another immediate priority.* MOE has recruited 200 trainees from the Faculty of Education to meet the immediate gap but their in-service training and medium-term replacement remain key concerns.

11. **Psychosocial Impact.** A significant impact of the disaster is psychological trauma, particularly among the vulnerable children and adolescents. In the field visit, it was observed that the community was already showing remarkable resilience, even in situations where they had lost their lifetime savings; however, some children and adolescents were observed to be roaming around aimlessly and demonstrating behavioral problems related to anxiety and insecurity. *Providing group counseling and getting children back into a school routine as early as possible, which can itself serve as a healing process, tops the list of immediate priorities.*

## Needs Assessment

1. Relief and recovery in the education and training sector has been targeted towards ensuring that **all school age children get back into school no later than January 25, 2005**, including those studying in the 37% schools that are damaged. Damaged schools have to be made functional and effective. This would require: (i) setting-up learning spaces/temporary classrooms and other additional spaces in host islands/schools and running double shifts; (ii) repair of damaged buildings and classrooms, provision of water, sewage and sanitation facilities, boundary wall reconstruction, etc.; (iii) provision of teaching and learning materials, furniture, and other school supplies; and (iv) ensuring adequate number of teachers in position appropriately trained not only to teach but also to serve as student counselors.

12. Additional local teachers will need to be deployed to take the place of expatriate teachers who are yet to return. As the first readily available teachers are the students at the Faculty of Education of the

Maldives College of Higher Education who are not yet fully trained, regular professional support and monitoring have to be extended to them during the school year.

13. **Professional Guidance:** The role of the professional guidance programme which has been initiated by MOE is to provide professional guidance and support, not only to the untrained teachers recruited from the Faculty of Education, but also for all teachers and school administrators in the country who may be working in situations where all teaching materials, teaching aids, schemes of work, lesson plans, etc. may have been destroyed and/or in situations where the number of school sessions have been increased to meet the needs of displaced students. These situations can be expected to cause a fall in the quality of teaching and learning unless measures are taken to maintain quality. As such, the professional guidance programme will twin every affected school in the country with a Male' school. Through this twinning initiative, school heads and other staff from Male' schools would visit affected schools; provide them with schemes, lesson plans, etc.; undertake informal training workshops for teachers and awareness meetings for parents; undertake demonstration lessons using active learning methods; assist and advise in the management set-up; and possibly arrange for brief attachments in Male' for staff of affected schools as a training tool. As of date, twinning initiatives have been arranged for Laamu, Meemu, Dhaalu, Thaa and Kaafu atolls with one school in Male' taking responsibility for all affected schools in its twin atoll.

14. **Counseling and emotional support** should be provided to children and adolescents to help them recover from the shock and regain confidence. This could be possible by resuming schooling immediately and seeking professional guidance for teachers and other community volunteers. When MOE staff visit the islands during assessments, head teachers/supervisors and teachers could be oriented on their additional roles as counselors. Assistance could also be sought from international professional psychological counseling institutions to train community volunteers and teachers in a cascade model to enable them to provide psychosocial support to the community in a continuous and more professional manner.<sup>1</sup> MOE has already started a school-based psychological support programme under which 1 teacher is being trained from each school to provide psychosocial intervention.

15. **Cost Estimate of Short-Term and Medium Term Needs.** The following cost estimates (see Table 2) were provided to the Mission and are still tentative and will be revised as new information is received. The estimated cost of relief and recovery, including reconstruction, is estimated range from about \$11 million to about \$15.5 million, depending on the Government's decision to replace the schools that have been completely destroyed.

**Table 2. Cost Estimate of Short-Term and Medium-Term Recovery and Reconstruction Needs in the Education Sector**

<i>Subcomponents</i>	<b>MRf (,000)</b>	<b>US\$ (,000)</b>
<b>A. Short-Term</b>		
<i>Elementary and Secondary Education</i>		
School Facilities (Semi-Permanent)	77,587	6,038
Student Supplies	41,327	3,216
Teacher Requirements	8,006	623
Professional Guidance	4,050	315
Logistics and Transport	1,910	149
<i>Subtotal</i>	<i>132,880</i>	<i>10,341</i>

<sup>1</sup> Agencies like UNICEF, Save The Children Fund, and the International Red Cross are already initiating activities in this area.

<i>Postsecondary Education</i>	2,105	165
Contingency (5%)	6,644	517
<b>Short-Term Total</b>	<b>141,629</b>	<b>11,023</b>
<b>B. Medium-Term</b>		
School Facilities (Permanent)	46,000 – 58,000	3,580 - 4,514
<b>GRAND TOTAL</b>	<b>187,629 – 199,629</b>	<b>14,603 – 15,537</b>

Note: \$1 = MRf.12.85

Assumptions: (i) costs are in proportion to the extent of damage - nil for Category A, 15% for Category B, 30% for Category C, and 100 % for Category D. Costs expected to be incurred in Category A islands acting as host islands receiving additional students are built into the costs for the islands of original residence; and (ii) an incentive of MRf.150 per month for 3 months is provided to motivate teachers to go to damaged islands.

Source: MOE Post-Tsunami Task Force Estimates, Maldives College of Higher Education

		MRf	USD
1	SCHOOL FACILITIES	153,836,565.75	11,971,717.18
2	STUDENT SUPPLIES	26,740,407.55	2,080,965.57
3	PROFESSIONAL GUIDANCE & TEACHER REQUIREMENTS	978,625.00	76,157.59
4	CONSTRUCTION	24,136,615.00	1,878,335.80
5	TRANSPORT	5,018,230.00	390,523.74
6	LOGISTICS	15,063,309.80	1,172,242.01
7	CONTINGENCY	45,154,750.62	3,513,988.38
8	TOTAL	<b>270,928,503.72</b>	<b>21,083,930.25</b>

Exchange rate: \$1=Mrf 12.85

16. **Government Strategy to Meeting Short-Term Needs.** The above cost estimates reflect the Government's strategy for the immediate to the short-term. MOE is focused on providing the necessary learning and teaching materials, textbooks, school supplies, basic school equipment, and uniforms, among others to enable schools and students to start the school year. MOE is presently distributing these materials to the affected islands. In the host islands to which families have relocated, space constraints attributable to the increased number of students is planned to be met by building additional semi-permanent classrooms. When families are relocated back to their home islands, these rooms will be used for school-related activities. MOE will undertake repair and rehabilitation in Category B and Category C schools.

17. The shortage of teachers resulting from the tsunami is being met by the deployment of untrained teachers, mostly student-teachers in various professional courses in the Faculty of Education. The Government is also establishing teaching support relationships ("twinning") between the larger schools, in Malé, and the affected schools. The "mentor" school will extend regular technical support to the staff of the affected schools.

18. To address the psychosocial needs of schoolchildren, the Government has started the training of 1 teacher from every affected school to undertake psychosocial interventions in their schools.

19. **Comments on the Cost Estimates.** The unit cost used for calculating the cost of semi-permanent classrooms is on the high side and will need to be rationalized vis-a-vis the design specifications. Construction can be moved towards becoming more community-based and community groups/education committees could be constituted to manage the funds and oversee construction, if not construct the schools themselves. To facilitate this, the committee members could be trained in some basic construction quality indicators. International experience on this has shown a significant decline in unit costs and better quality. There may be savings from expatriate teachers salaries to the extent that they do not return.

### **Donor Response and Financing Immediate and Reconstruction Needs**

20. The Government has initiated discussions with various development partners, notably the World Bank and the UNICEF. *Commitments*, to date, *amount to an estimated \$10 million*, which fulfills a large percentage of the immediate requirements. Development partners and NGOs have also initiated relief work. The commitments obtained as of 13 January 2005 are as follows:

- World Bank will provide \$2.63 million from its Third Education Training Project.
- UNICEF will be providing goods and services valued at about \$7.4 million. UNICEF will support child-friendly education for pre-school through grade 7, through its Quality Education Program, and will provide for: (i) improvements in the physical environment, including cleaning-up, construction, repairs, water, sanitation and environmental improvement; (ii) teaching and learning materials. UNICEF has, in fact, started delivery of “school-in-a-box” kits that include student and teacher materials, school supplies, and recreational materials, among others; (iii) teacher training in “active learning methodology;” (iv) establishing child-friendly classrooms; (v) strengthening community development and participation; and (vi) strengthening supervision systems.
- UNICEF and UNFPA, in partnership with international NGOs will address psychosocial needs of communities, including schoolchildren. UNICEF, Save the Children Fund, and the International Red Cross have already initiated activities in counseling.
- The Australian Government is providing technical assistance to analyze the stability of foundations and construction integrity of affected schools. UNICEF is providing technical assistance for a comprehensive needs assessment of the school sector.
- Procurement of office equipment to replace those damaged by the tsunami in the postsecondary education will be partly met from the Postsecondary Education Development Project of the Asian Development Bank.

### **The Medium- to the Long-Term**

21. **Medium- to Long-Term Strategy.** The Government’s current education sector strategy follows the vision laid out in Maldives Vision 2020. MOE has an education master plan that covers the period of 1996 through 2005 and will soon develop a master plan to cover the decade from 2006 until 2015. The targets to be achieved under Maldives Vision 2020 includes: (i) ten years of formal schooling will be the minimum standard throughout the Maldives, and good quality tertiary education will be established in the country. A system for the provision of technical skills for achieving and sustaining social and economic development will also be established; and (ii) the youth of the Nation will be participating fully in the Nation’s progress and prosperity, and will have the opportunities they need to achieve their full potential.

22. **Issues for Medium- and Long-Term Planning.** In connection with this disaster, the Mission recommends that the following issues be considered during the development of the next Master Plan:

- Reviewing and revising school and teacher training curricula and learning and teaching materials to include knowledge, safety and precautionary measures, and coping strategies relating to natural calamities, including tsunamis, earthquakes, and cyclones; first aid, health education, and sanitation and hygiene; and life skills, including communication skills;
- After third-party evaluation, expanding UNICEF's initiatives in active learning methodology to all schools and include it in teacher training. The approach allows for better internalized learning, development of communication skills, development of competencies through "hands-on" experience, and more wholesome personality development.
- Including schools in a disaster management plans as "shelters." The tsunami disaster has demonstrated that the construction quality and standards of schools are strong enough to withstand its impact.

24. The Mission also recommends:

- strengthening and expanding educational facilities in focus islands, including building residential schools for students from smaller islands;
- increasing the number and strengthening the capacities of Maldivian teachers and thus reducing the dependence on expatriate teachers;
- improving the overall quality of education at all stages and moving towards a self-managed system of school assessment, which would be more relevant in the geographical context of the Maldives; and
- establishing atoll resource centers and strengthening their facilities and faculties to support more decentralized and need-based training, which could facilitate continuous training and professional development of teachers.

### **Next Steps**

25. To complement Government's efforts to reopen and reconstruct schools, the Mission recommends the following to be considered as next steps.

- Detailed assessments of repair and reconstruction needs of each affected school, particularly on the technical aspects, have to be accomplished. Some may pose safety risks to students and teachers.
- The role of the community in school civil works should be considered, not only in management and monitoring, but also in actual construction itself. This will not only contribute to increasing ownership of education, but it will also help provide jobs that are sorely needed.

***Summary of Recovery and Reconstruction Needs in the Education and Training Sector***

Priority	Issue	Resource Needs	Commitments
<b><i>Short-Term</i></b>			
1. Replacement of school furniture and equipment	Assessment of the precise needs by school and island are ongoing.	Procurement is ongoing to meet the opening of the school year.	<ul style="list-style-type: none"> <li>• UNICEF will provide goods and services and support for civil work valued at about \$7.4 million.</li> <li>• WB will provide from the Third Education and Training Project about \$2.6 million.</li> <li>• ADB will provide about \$0.1 million from the Postsecondary Education Development Project for relevant postsecondary equipment needs.</li> </ul>
2. Replacement of teaching and learning materials, and provision of school supplies			
3. Construction of additional semi-permanent classrooms			
4. Ensuring adequate number of trained teachers	The expected number of teachers for the school year, including student-teachers, are still less than pre-tsunami levels.	“Attachments” between Malé-based and larger schools, and affected schools will be put in place for the former to provide technical support.	
5. Providing psychosocial support to affected schoolchildren	Teachers, and school personnel and some community members need to be trained in counseling .	Technical assistance	<ul style="list-style-type: none"> <li>• UNICEF and UNFPA, in partnership with NGOs, will provide both community- and school-based psychosocial support.</li> </ul>
6. Developing more comprehensive rehabilitation plan, including technical assessment of affected standing school infrastructure	Many school-buildings may have seemingly received minor damages. However, given the geology of the atolls and the extent of flooding, structures need to be examined for their stability and integrity, particularly their foundations.	Technical assistance	<ul style="list-style-type: none"> <li>• An Australian technical assistance team is already going around the country to assess the foundations of school buildings.</li> </ul>
<b><i>Medium-Term</i></b>			
Replacement of six completely damaged schools.	Assessment still to be made.	\$3.6 to \$4.5 million	



## **Annex 5 - Health and Nutrition**

### *Situation Analysis.*

1. The Tsunami has caused 83 deaths in Maldives and most of these are among young children and the elderly. Over 2,000 injuries have been reported, including some fractures and head injuries. The Ministry of Health (MOH) has put in place a disease surveillance system to monitor water quality and report outbreaks of communicable diseases on a daily basis, especially diarrhea, acute respiratory infections and unexplained fevers.

2. Discussions with the MOH team, UN agencies and field visits to islands in Thaa Atoll (Madifushi and Buruni) revealed that the critical emergency needs such as safe drinking water, food, and supply of essential medicines, are mostly in place. Populations who lost their homes have been provided temporary shelters either in their own or in other host islands.. All major injuries reported have been promptly attended to.

3. Vitamin A administration and immunization round had been completed as per schedule during the months of November and December 2004. This will help with disease prevention among children. However, it is likely that vaccination schedules will be interrupted because of breakdown in cold chain and loss of vaccines. Nevertheless, it is important that children under five years of age receive Vitamin A two times per year.

4. The following additional considerations must be addressed:

- Reconstruction of the Expanded Programme on Immunization (EPI), and resumption of routine EPI activities (rather than undertaking mass vaccinations throughout the country);
- Immunization coverage to ensure universal child immunization (UCI);
- Ensuring adequate supply of drugs, medical equipment and supplies;
- Resumption of health promotion and health education programmes;
- Nutrition – monitoring the growth of children under five years of age;
- Epidemiological investigation and management of epidemics and malnutrition;
- Strengthen/improve laboratory diagnostic capacity to respond to the needs of the surveillance system.
- Preventive measures and treatment (outpatient and inpatient);
- Ensuring good quality community, maternal and neonatal health services, as well as family planning services and health services for pre-school children;
- Improvement of environmental health services, including health care waste management;
- Adherence to global commitments (e.g. polio eradication); and
- Prevention and control of HIV/AIDS, dengue fever, diarrhea, Acute Respiratory Infections (ARI), and filariasis.

5. The Maldives had high levels of pre-tsunami coverage for EPI vaccines. The Government of Maldives plans to resume its routine immunization programme (including for measles) by the end of January 2005. If warranted based on the epidemiological situation, including vaccine coverage, WHO is prepared to provide technical assistance in conjunction with a measles campaign for all children under 15 years of age.

6. During the field visits it was observed that the government-built structures such as schools, health centers, and island offices could withstand the Tsunami effect better than the residential homes which are mostly built with coral reefs and lime. However, to make these health facilities functional, essential equipment, supplies (medicines, consumables, etc.) and critical staffing should be in place. Discussions with MOH revealed that few expatriate staff have left the country after the Tsunami. While it would be possible to fill the positions of general duty medical officers and nursing staff early on, filling positions of

specialists may take longer time. In many health facilities it will be necessary to replenish all equipment and medical supplies before they can function again.

7. The importance of addressing reproductive health in crisis situations cannot be underestimated. Maldives had good coverage of reproductive health services prior to the disaster, maternal mortality had declined and skilled attendance at birth was high at 85%. Currently, there are 1,800 pregnant women scattered across the 200 islands who have been affected by the disaster. Within six months 900 of these women will deliver, regardless of the health facilities available. Safe delivery conditions are a major cause of concern as is nutrition for pregnant women. In addition, ensuring contraceptive availability for users is also important.

8. In a crisis the family support so vital to young people is often destroyed. Youth traumatized by catastrophic events tend to engage in higher risk sexual behaviour with known consequences. Sexual and gender based violence may also increase. The victims are often women and adolescent girls and boys. Reaching out to adolescents and young people with psychosocial support as well as information and education campaigns is vital.

9. The communities are demonstrating phenomenal resilience by organizing local support networks and coordinating relief operations. To provide emotional support, teams consisting of two counselors, one volunteer and a police officer were formed. These teams have so far visited 10 Atolls and four relief camps established in Male and have been providing counseling. To address shortage of trained volunteers, psychological first aid training has been started to train 60 volunteers in groups of 20 each. A toll free telephone has also been established for providing counseling support. Actions also have been started for longer term psychological support through adult educators.

10. This approach is in line with the WHO's policy on psychosocial support to disaster victims which emphasizes on such support being community-based, culturally appropriate taking into account the needs of special groups such as children, women, elderly, severely injured, etc. WHO recommends that the psychosocial support be provided by community-based workers who understand the needs of disaster victims and are trained in psychosocial support strategies. These activities need to be undertaken in collaboration with the Ministry of Health and other concerned Ministries, i.e., MFDG&SS, and the WHO country office.

11. Malnutrition was a common problem in the Maldives even prior to the disaster. Approximately 25% of the children under five have stunted growth and it is believed that this disaster will intensify the situation. Anaemia affects 51% of women and is considered an indirect cause of maternal mortality. The Maldives is dependent on the import of most food items; home gardens, which are used for fruits and vegetables, have been flooded and cannot be restarted in the near future. Fish has been the major source of protein in the country. Proper nutrition assessments, interventions and monitoring are vital to minimize the long-term effects of childhood malnutrition that may increase due to the disaster. Food supplementation for pregnant and breast-feeding women, as well as for children under the age of five may be necessary.

12. Maldives has a regular school de-worming programme, as baseline data on soil-transmitted helminthiasis indicated high prevalence rates (over 70%). Due to the sanitation breakdown caused by Tsunami, the country's infection rates are expected to increase exponentially. It will be important to de-worm whole communities (except children under one year of age) in the affected islands at 4-6 monthly intervals during 2005, using albendazole or mebendazole.

13. There is a need to ensure adequate risk communications (and communications in general) for the various parts of the health sector of the Maldives. Appropriate experts should be identified to examine the requirements and implement appropriate TA.

14. It is imperative to include logistics related to the health sector as a key element of any emergency response to disasters, including the Tsunami effects on the Maldives. The following must be ensured:

1. Medical supplies and equipment reach the beneficiaries in a timely fashion, and are distributed according to precise guidelines.
  2. The technical requirements are delineated for:
    - water and sanitation
    - Pharmaceuticals (in collaboration with medical officers)
    - Hospitals and health centers equipment
  3. Supplies are properly managed at warehouse levels by setting up a comprehensive information system; also, clear procedures exist for stock handling (FIFO, FEFO, etc.).
  4. Transport and communications are available and used properly in order to optimize the delivery process.
15. At this state of the recovery process, two important questions need to be answered clearly:
- How will an operational level of activity at the damaged health facilities be reached quickly?
  - How will the necessary supply of pharmaceuticals for essential public health programmes and common diseases be restored and maintained on an ongoing basis?
16. It is important that MOH distribute (to donors and others) a national list of essential drugs and medical supplies as appropriate. If such a list is not available, then WHO should distribute its own guidelines for drug donations. A complete inventory of the supply received from donors and supplied to the Government of Maldives, as well as a distribution list to the atolls, should be made available. This will allow for an accurate assessment of the needs, and will ensure proper accountability.
17. To date, one regional hospital, two atoll hospitals, 19 health centers, 21 health posts, and 33 family health sections have been affected to varying degrees.
- After replacement of the initial list of equipment government has provided the donor agencies, it will be necessary to conduct a more comprehensive assessment of the health facilities that have been damaged. Ideally, such assessment should be carried out by a medical officer, assisted by a logistics expert. This will enable the donor agencies to have a better picture of the comprehensive needs for rehabilitating the damaged health facilities in terms of equipment and civil works..
  - Equipment specifications should also be transmitted to the MOH authorities, so they can determine its usefulness and foresee the level of training required (if necessary) to operate and use the new equipment.
18. Some islands have been evacuated and their populations have been relocated to other islands. For planning the rehabilitation of health facilities and resumption of health programs, information on the following aspects would be essential, especially in the light of “safe island” approach being proposed by the GoM:
- The number of persons affected
  - The islands to be and/or already evacuated
  - The islands to receive relocated people
  - The deployment schedule

19. Based on the reports received from the assessment teams visiting disaster-affected islands, the MOH is regularly updating the damage assessments of the health facilities. The initial assessment suggest that about 30 facilities (including one Regional Hospital, two Atoll hospitals; eight health centers and 11 health posts) have been damaged to varying degrees. Infrastructural damage has occurred in some health facilities, and essential medical equipment and supplies have been destroyed in almost all of these facilities. (See Attachment 1 for details). This may increase as more information becomes available.

20. Several challenges remain, including:

- a. How to ensure sustained supply of safe drinking water until damaged water supply systems are fully restored?
- b. How to maintain basic sanitation, especially for the displaced populations, until more permanent arrangements are made?
- c. How to herald in safe food practices among the masses given the above conditions, and in view of the poor cold chain infrastructure across the Maldivian islands (excluding Male')?
- d. How to provide psychosocial support and ensure the mental well being of the affected populations on a sustained basis consistent with WHO policy on psychosocial support to disaster victims<sup>1</sup>?
- e. How to improve the early warning and rapid response systems for epidemic born diseases that ensure timely and complete reporting from all islands on a regular basis?
- f. How to ensure good reproductive and safe delivery conditions as well as the supply of essential reproductive health commodities.
- g. How to quickly operationalize the damaged health facilities ?
- h. How to restore supply of pharmaceuticals for essential public health programs and common diseases?
- i. How to improve disaster preparedness and response of the health sector in Male'?
- j. How to reduce the vulnerability of health facilities to future disasters?
- k. How to minimize any environmental damage (e.g. damage to reefs due to leaking of chemicals used in clean-up operations)?

21. A summary of these critical issues, initial assessment of resource needs, and information on commitments both in kind and cash are presented in Attachment 2. All UN agencies are focusing on meeting the emergency needs of the affected population by providing crucial inputs to ensure food, shelter, safe water and sanitation. Inputs are also being given to make essential health services functional and restart the schools during January 2005. Details of inputs being provided by UNICEF, WHO and UNFPA are listed in Attachment 3. While WHO will be providing technical assistance and critical supplies and equipment, UNICEF and UNFPA in addition to these inputs are willing to support emergency construction activities. It is now critical for the Government of Maldives to improve its emergency preparedness and develop a comprehensive recovery plan detailing financing needs and sources. The existing norms of MOH may be revised prior to rehabilitating the health facilities, in order to minimize their structural and non-structural vulnerability.

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**Annex 5, Table 1: Detailed Needs Assessments in thousands at current prices**

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<sup>1</sup> WHO does not recommend that affected persons be 'labeled' with psychiatric diagnoses, not every victim be evaluated by psychiatrist or treated with medications. Nevertheless, the technical guidelines for psychosocial support remain a health issue and is an important mandate of WHO. WHO's role lies in establishing the psychosocial needs of the community, establishing technical guidelines to be used, training people for implementation of psychosocial support strategies and monitoring of the programme. Actual implementation in the field can be done by persons trained through the WHO guidelines and can be done by NGOs, self-help group, other UN groups, etc.

Name of The Island	Structural & Building Services Damages	Equipments & machineries	Medical Consumables	Furniture's	Transport	Duty	Handling	Site visits & machinery installation	Total
HA. Filladhoo HP	423.2	148.7	10.9	38.2	25.0	39.9	10.0	36.8	<b>732.6</b>
R. Kandholhudhoo ( Dhuvaru) HC	2143.9	1656.8	957.0	80.1	15.0	646.1	10.0	79.3	<b>5588.1</b>
M. Kolhufushi HC	430.0	1656.8	957.0	95.6	15.0	646.1	15.0	31.7	<b>3847.2</b>
M. Muli RH	5858.4	8386.0	2686.5	2785.5	60.0	2575.5	65.0	126.8	<b>22543.8</b>
M. Madifushi HP	1694.8	148.7	10.9	38.2	15.0	39.9	15.0	95.1	<b>2057.5</b>
Dh. Gemendhoo HP	1694.8	148.7	10.9	38.2	25.0	39.9	15.0	79.3	<b>2051.7</b>
Dh. Rinbudhoo HP	1694.8	148.7	10.9	38.2	25.0	39.9	15.0	79.3	<b>2051.7</b>
TH. Vilufushi HC	2164.0	1656.8	1093.3	95.6	25.0	714.2	15.0	92.0	<b>5855.9</b>
Th. Madifushi HP	1694.8	148.7	10.9	38.2	25.0	39.9	15.0	92.0	<b>2064.4</b>
L. Mundoo HP	1694.8	148.7	10.9	38.2	25.0	39.9	15.0	67.8	<b>2040.2</b>
L. Kalhaidhoo HP	1694.8	148.7	10.9	38.2	25.0	39.9	15.0	67.8	<b>2040.2</b>
L. Dhabidhoo HP	430.7	148.7	10.9	38.2	25.0	39.9	15.0	67.8	<b>776.1</b>
Sh. Maroshi HP	425.8	148.7	10.9	38.2	25.0	39.9	15.0	26.8	<b>730.2</b>
Sh. Komandoo HC	440.5	1656.8	957.0	128.4	25.0	646.1	16.0	26.8	<b>3896.6</b>
N. Maafaru HP	1694.8	148.7	10.9	38.2	25.0	39.9	15.0	79.3	<b>2051.7</b>
K. Guraidhoo HC*	432.4	1656.8	957.0	95.6	10.0	646.1	15.0	21.7	<b>3834.6</b>
AA. Mathiveri HP	1729.3	148.7	10.9	38.2	10.0	39.9	15.0	79.3	<b>2071.2</b>
V. Keyodhoo HP	367.5	148.7	10.9	23.0	10.0	39.9	15.0	31.7	<b>646.7</b>
V. Rakeedhoo HP	1694.8	148.7	10.9	38.2	10.0	39.9	15.0	79.3	<b>2036.7</b>
V. Thinadhoo HP	1709.2	148.7	10.9	38.2	10.0	39.9	15.0	79.3	<b>2051.1</b>
V. Fulidhoo HP	375.2	164.2	10.9	38.2	10.0	39.9	15.0	31.7	<b>685.1</b>
V. Felidhoo HC	802.9	323.3	1556.0	182.7	10.0	320.7	15.0	31.7	<b>3242.3</b>
M. Veyvah HP	1694.8	164.2	10.9	38.2	10.0	39.9	15.0	79.3	<b>2052.2</b>
Dh. Vaanee HP	1680.4	148.7	10.9	38.2	25.0	39.9	15.0	79.3	<b>2037.3</b>
Dh. Hulhudheli HP	1680.4	148.7	10.9	38.2	25.0	39.9	15.0	79.3	<b>2037.3</b>
Dh. Maeboodhoo HP	1680.4	148.7	10.9	38.2	25.0	39.9	15.0	79.3	<b>2037.3</b>
L. Isdhoo-Kalaidhoo HC	638.8	1713.2	957.0	80.1	25.0	660.2	45.0	36.8	<b>4156.2</b>
L. Maabaidhoo HC*	417.2	1656.8	957.0	80.1	25.0	653.4	20.0	26.8	<b>3836.4</b>
GA. Villigili AHP	3163.4	8877.7	1345.9	5969.6	75.0	2555.9	68.0	98.8	<b>22154.3</b>
Hdh. Naivaadhoo HP	6.1	0.0	0.0	20.9	10.0	0.0	3.0	36.8	<b>76.8</b>
Hdh. Nellaidhoo HP	13.0	0.0	0.0	0.0	10.0	0.0	3.0	36.8	<b>62.8</b>
B. EYDHAFUSHI AHP	316.3	3235.2	0.0	0.0	10.0	808.8	10.5	31.7	<b>4412.5</b>
B. Dharavandhoo HC	9.8	5.3	0.0	0.0	10.0	0.0	3.0	31.7	<b>59.8</b>
K. Dhiffushi HP	6.1	4.4	10.9	12.6	10.0	2.7	3.5	31.7	<b>82.0</b>
K. Maafushi HC*	2143.9	1656.8	1093.3	80.1	10.0	680.1	15.0	47.6	<b>5726.8</b>
M. Maduvvari HC	405.0	0.0	0.0	5.5	10.0	0.0	3.0	31.7	<b>455.2</b>
Dh. Meedhoo HP*	494.3	166.0	957.0	38.2	25.0	280.8	31.7	31.7	<b>2024.6</b>
B. kendhoo HP	403.6	3.0	0.0	6.7	10.0	0.0	3.0	31.7	<b>458.0</b>
Gdh. Rathafandhoo HP	413.1	1.3	0.0	3.3	4.5	0.0	2.0	31.7	<b>455.8</b>
B. Kihaadhoo HP	1680.4	148.7	10.9	38.2	20.0	39.9	15.0	79.3	<b>2032.3</b>
M. Raiymandhoo HP	1680.4	148.7	10.9	38.2	20.0	39.9	15.0	79.3	<b>2032.3</b>
Th. Kinbidhoo HP	396.7	1.2	0.0	4.8	4.5	0.0	2.0	36.8	<b>446.0</b>

Th. Burunee HC	1250.5	1656.8	957.0	80.1	25.0	646.1	15.0	92.0	<b>4722.5</b>
N. Kudafari HP	59.7	0.0	0.0	4.9	1.0	0.0	1.0	14.5	<b>81.2</b>
TH. Hirilandhoo	6.1	0.4	0.0	0.0	0.5	0.0	0.5	14.5	<b>22.0</b>
DPH Supplies	0.0	964.8	0.0	0.0	0.0	237.3	4.5	0.0	<b>1206.6</b>
Port Health ( Hulhule)	0.0	10.5	0.0	4.3	2.5	0.0	2.5	0.0	<b>19.8</b>
Pharmaceutical Post ( Hulhule)	0.0	10.5	0.0	7.8	2.5	0.0	2.5	0.0	<b>23.3</b>

Sub total **135606.9**

Warehouse rent for 2 month ( 2 warehouse) @60000.00 **240.0**

contengency 15% **20341.0**

Total MRF millions **156.2**

Total US\$ millions **12.2**

### Focus areas of support by UN agencies

UNICEF	WHO	UNFPA
<ul style="list-style-type: none"> <li>• Improving water and sanitation services</li> <li>• Promoting child-friendly schools environment; rebuilding of schools and health facilities</li> <li>• Education and child protection.</li> <li>• Rehabilitation of cold chain equipment for immunization program</li> <li>• Supply of vaccines</li> </ul>	<ul style="list-style-type: none"> <li>• Supply of essential medicines and medical equipment (including logistics)</li> <li>• TA support to disease surveillance (including laboratory), environmental health, and food safety</li> <li>• TA to support reconstruction and rehabilitation of health systems</li> <li>• Mental health (Psychosocial support)</li> </ul>	<ul style="list-style-type: none"> <li>• Supply of reproductive health and family planning commodities</li> <li>• Inputs for providing care to pregnant women such as safe delivery kits</li> <li>• Rehabilitation of health facilities</li> <li>• Psychosocial support and life skills education to adolescents</li> </ul>

## **Annex 6 - Housing Sector**

### **Pre-assessment Situation**

The national population of 290,000 is dispersed among about 200 inhabited islands spread over a distance of more than 900 km. The average population per inhabited island outside the capital city Male is around 1000. Some islands such as Male or to a lesser extent Kandholhudhoo have a high population density, other islands a population below 150. Around 29% of the population excluding Male' is supposed to live on densely populated islands, while 10% of the inhabited islands have of population of less than 250. Such diversity and spatial dispersion leads to the need for planning development strategies at various levels.

Outside Male' the average dwelling is estimated to be around 14 years old and to have an average built up area of about 1500 square feet. It is very common for the major part of the house not to have a ceiling. Typically dwellings would have a cement floor, plastered walls and either galvanized-, corrugated- or asbestos sheet roofs. Secondary characteristics include the presence of a compound (>90%), rainwater tank (>75%) as well as a septic tank (>75%).

1. Maldives Housing and Urban policy. Under the Sixth National Development Plan, GOM has embarked on a relocation program called the *National Population Consolidation Strategy and Program*. Under this strategy, regional focus islands are created serving the Northern and Southern atolls. In addition, 85 atoll focus islands have been selected to receive a high order of services. The other inhabited islands, called primary islands would receive a minimum level of services and population would be encouraged through various forms to move toward the focus islands. The objective of the regional development strategy is to obtain economies of scale in delivering services, in particular health and education but also transport, electricity and telecommunication. It would also aim to lower country vulnerability to sea level rise due to climate change, made even more sensitive with the last event.

2. Land use planning and building regulations are under the responsibility of MHUDB. Planning regulations require that land use plans for any island or area be divided into separate land use zones. The main ones are residential areas, institutions and general services, sport and recreation, commercial and industrial areas, infrastructure and utilities and environmental protection zones. Regulations related to plot uses have not yet been drafted. MHUDB also permits non residential uses on the plot after housing needs have been met, while it does not permit fish processing.

3. Building code requirements concern environmental regulations (building ventilation, natural light), building height limits for Male, and the existence of boundary walls. At present the total proportion of multi-storey dwellings is estimated to be less than 20% though increasing. Outside Male' this around 15% of island population is estimated to be living in multi-storey dwelling. The code forbids the use of coral as concrete aggregate.

### **Damage Assessment**

4. Emergency situation. Over the total of 250,000 persons living in the islands affected by the tsunami, 29,000 persons were displaced the day following the event, and, currently 6,681 people are homeless in their own islands and 5,801 are displaced in other islands. The total number of homeless and displaced is 12,482. In addition to these displacements, other families whose houses have suffered extensive damage have been sheltered at friends' or relatives'.

5. The quantitative assessment on housing has been carried out by the islands and consolidated at the emergency center. Draft results were made public a few days after the tsunami, showing a rapid response to disaster. Since then, engineers have started to survey the islands to fine tune the damage assessment. The data below do not yet include the result of the technical survey, and should be updated shortly. The wave damaged structural and non structural elements of the houses, breaking boundary walls and facades, and indirectly subsided land, leading to the collapsing of houses in the absence of foundations. On the other hand, resilience to the wave of public buildings such as schools or health centers proved much higher. Based on the preliminary assessment, they only suffered minor damages, mainly non structural.

6. Damage assessment includes the direct cost for housing reconstruction or repairs and the indirect costs including temporary shelters and debris removal. The direct damage refers to the total or partial destruction of housing, and is exclusive of the cost of furniture or housing equipment which has been considered separately. The individual water tank, estimated at USD300, has been included but not the septic tank which cost has been taken into account in the sanitation sector. The estimate is based on an average housing unit of 2 to 3 bedrooms, with an area of 60 sqm. Unit prices for construction provided to the mission vary from 3200Rf/sqm<sup>1</sup> (USD250/sqm), to 4500Rf/sqm<sup>2</sup> (USD350/sqm).

7. The cost of partially damaged housing is difficult to estimate. However, in a technical estimate done jointly by UNDP & a private company with the participation of Government engineers in two affected islands (Nalafushi & Muli) the unit cost for repair of partially damaged houses vary from USD 4000 to 5000.. Hidden damage or lack of land stability can increase the repair cost with time. The technical survey will bring more accurate figures and one approach is to assess the damage in the units in detail , and increase the number of units for repair, and decrease the number of units to be fully reconstructed. The mission will then use Rf. 75,000 for repair of per unit partially damaged house .

8. Temporary shelters are of two types. A total of 638 tents were provided for the very short term, up to 2 weeks, in addition to temporary communal shelters , 40 emergency shelters for 160 people each are being built on the islands. The unit cost of these emergency shelters is of Rf 300,000<sup>3</sup>. Debris and rubble will be removed from the sites but will remain on the islands. The cost is therefore considered marginal. Some islands have already started to sort the debris so that some recycling could be contemplated. Sterile debris could also be used for sea protection works.

### **Mitigation measures.**

9. The mitigation measures described below have been identified in relation to the Maldives risk exposure to climate change. As stated in the main text, the history of natural hazards is limited in the Maldives, which have suffered storms and tidal waves of moderate level. The latter one is subject to amplification with climate change and may become in the future a main issue for the low-lying and most vulnerable islands. The mitigation program in relation with housing would then follow a 3 prong-pattern

- People relocation to safe areas. This solution is of higher efficiency in terms of risk management but could also be lengthy and sensitive. It is totally consistent with the *National Population Consolidation Strategy and Program* presented above and will be implemented on a voluntary basis. Thus, even with incentives, its implementation can require some time. There is information

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<sup>1</sup> Figures provided by MACI, Maldives Association of Construction Industries, based on a 2004 residential units project. The cost of a 1400sf (126sm) unit was of Rf 400,000.

<sup>2</sup> From MHUDB

<sup>3</sup> Information provided by the emergency center, Minister of Planning.



that few islands<sup>4</sup> have requested relocation to safer islands. . Beyond these islands, the mission suggests to provide detailed information to the families on the reconstruction alternatives so that they would be able to make an appropriate choice. Urban development in these islands is planned with high level of prevention such as sea defense works, emergency shelters in adapted community centers.

- Reconstruction on site. For the population willing to remain on site, the approach for reconstruction should aim at mitigating the risk. First, reconstruction should comply with regulations, such as land use planning, and building codes, as in the previous case. Siting of the housing unit should be preceded by an assessment of the zones of high vulnerability, and reconstruction limited in these areas. Finally, it could be necessary to provide the population with additional measures such as shelters in public buildings. However, the level of protection would be limited in this case.
- Building code and planning code. A pertinent and well enforced legal and regulatory framework is the basis of a good risk management strategy. From a preliminary review by the mission, only the building code would need some adjustment.<sup>5</sup> The mission suggests a short study of the complementary requirements that would be necessary to ensure better structural stability. The study could be based on (a) the lesson drawn by the structural resilience of public buildings during the disaster, (b) recommendations for sustainable design and building approaches, with reuse of construction materials, and use of environmentally sound materials, and (c) the need for a satisfactory trade-off between stronger structure and acceptable housing cost. The land use plans may need to be revised to adjust the zoning to an updated hazard mapping based on the most recent data.

### **Reconstruction strategy**

10. The proposed reconstruction strategy is based on exceptional arrangements originated in a total loss of assets and income from a substantial part of the population. The mission noted that the Government is willing to take a large share of the housing reconstruction cost, providing the affected families with acceptable and liveable housing conditions, and therefore, giving the population the possibility to re-start their activities rapidly. Indeed, such a strategy would provide an overall benefit for the country economy, which main resources, such as tourism and fisheries, have been harshly affected by the disaster. However, this strategy should not jeopardize the Government new policy orientation to develop a private participation in housing finance. In the longer term and beyond the emergency situation, the sector development would benefit from a better share of the housing cost between the public and the private, and the government objective to develop a comprehensive housing finance system should continue.

11. Strategy principles. The objectives of the reconstruction program should be (a) acceptable to the population in terms of household expectations, and (b) acceptable to the government in terms of budget and time frame. It would not be advisable to select generous reconstruction principles that would largely meet population expectations but would take many years to implement due to different constraints, and thus leave part of the population in temporary shelters for long periods. In this framework, the Bank would advise to look for solutions that include as much as possible community participation in the

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<sup>4</sup> According to MPND, eighteen islands had agreed to be reallocated, prior to the tsunami.

<sup>5</sup> In particular, the choice of construction material could raise some issue. Almost all roofs are made of some type of metal sheet, in which the use of asbestos is supposed to be very common. Regulations may need to be adjusted. In addition, the water and sanitation issues should be addressed, securing that people use 'safe' drinking water and do not discharge sewage and human waste into the groundwater. Furthermore plot size should be adaptable to household-size to ensure a minimum of living standard in terms of space per individual.

reconstruction effort. From the experience of other countries in similar cases, the household participation could be envisaged through labor, the government providing construction materials, or through housing expansion, the government providing core units. The Bank recommends that the conditions be simple to facilitate the implementation but still adapt to various needs. Design criteria should adapt to the size of family of specific needs but in a limited range of options.

12. The GOM reconstruction strategy is yet to be defined. The mission had the opportunity to discuss two alternatives. The first one, proposed by some islands, would provide all affected families with 2 bedroom core units of 60 sqm. In addition, and according to specific situations, the Government would propose (a) a compensation of Rf 7,000, or (b) a larger house, or (c) a larger plot. The final product would therefore be adapted to specific needs, such as financing activities with creation of workshops or tree plantation, or addressing the need for larger families. The second one, presented by a private architect, proposes the construction of core housing units of 59 to 71 sqm at Rf 2025/sqm, as a first stage. The construction includes basic masonry building envelope with plaster and paint finish on the exterior, roofing with corrugated system, indoor unfinished walls, bathroom unit and basic kitchen equipment. The total cost would be of Rf 144,000 and could be constructed in 6 months.

13. In both cases, the population direct contribution would come from the potential expansion of the housing unit. Another indirect contribution that the Government should seek is to encourage the hiring of local labor by the construction companies. This solution would supply resources to unemployed households and reduce the need for foreign labor immigration.

14. Identification of beneficiaries. In cases of emergency such as this one, the selection criteria can be directly linked to the loss of asset, and made independent from the income. However, reconstruction should be prioritized to inhabited houses. If some families had moved to Male or other islands previously to the tsunami, the reconstruction of their house is not a priority. The mission suggests that the households database would be updated with information providing from the technical survey, size of family and specific data. The database should also be completed with the information on families living on affected islands and ready to be reallocated to safer islands. Based on discussion with MPND and after identification of four islands ready to be reallocated, an additional figure of 334<sup>6</sup> new housing units has been taken into account as an indirect cost of the reconstruction program.

15. Land title. The proposal to provide all families relocating to focus islands with land titles is being considered by the GOM

16. Housing unit design and construction. As discussed above, a proper choice of construction materials and housing unit design is an important step in the risk mitigation process. The reconstruction program will follow the same construction standards than the *National Population Consolidation Strategy and Program*, with foundation, concrete structures, masonry and metal roofing. However, the mission emphasizes the need for construction quality control, at the design level, as well as the completion stage.

17. Construction sector. In addition to the budgetary constraint, the reconstruction program could face another stumbling block with the limited capacity of the construction companies. From discussions with MACI, the mission understood that the construction companies could undertake the construction of 1700 housing units in the short term if (a) the construction sites are limited, (b) the companies would exclusively address the housing needs, and (c) additional supply of engineers and labor would be supplied. Considering the additional need in infrastructure and tourism and the dispersion of the damage in many islands, the probability to have a bottle neck is high. Thus, the assistance of foreign companies

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<sup>6</sup> Islands of HDh Nellaidhoo, M Madifushi, Dh Vanee, Th Gaadhiffushi . Preliminary figure to be adjusted with the exact number of families living in the island.

and skilled labor to the local companies seem a necessary step. In addition, all administrative and bureaucratic steps, such as quota authorization for foreign labor, should be adapted to avoid delays.

18. Recommendations. The Bank recommendations are based on the preliminary damage estimate for housing which represent a large part of the total reconstruction cost. It may be needed then to consider some alternatives to increase efficiency, address the limited capacity of the construction sector and reduce the costs:

- Consult with families to ensure that recovery addresses their concerns and priorities in the context of island planning and housing design.
- Promote appropriate designs with various economic brackets, and possible requirements for house based industries like fish processing (smoking) and bread fruit processing and other homebased productive work.
- Promote self help repair and provide the households with architectural assistance or, at least, with a booklet of technical guidelines.
- Propose import tax waiver for families undertaking self help repair on their house.
- Propose tax waiver on construction materials for private sector who would be involved in the reconstruction process.
- Promote hiring of local labor by construction companies.
- Facilitate the administrative procedures to construction companies, such as quota authorization, and

Reconstruction cost. Based on the proposed recommendations of the reconstruction program, the cost can be fine tuned as follows. The low hypothesis unit price for reconstruction have been adjusted to Rf 2500 /sqm based (plus the water tank of Rf 300 per unit) on more modest construction standards and potential economy of scale due to the large quantities. The unit size is of 60 sqm, and housing compensation costs of Rf 7,000 have been added to the previous estimate, as well as housing construction for the 334 households of partially devastated islands that decided to be fully relocated. The high hypothesis is to provide units of 60 sqm at a unit price of Rf 4500/sqm without compensation.

**Table 1: Estimated Losses and Financing Needs for Housing in Maldives ( Rufiyaa thousands)**

<b>Item</b>	<b>Number of Units</b>	<b>Losses</b>		<b>Costs of Reconstruction</b>		
		<b>Unit Costs for 60 sq. meter. house</b>	<b>Total Costs</b>	<b>Number of Units (1)</b>	<b>Unit Costs for 60 sq. meter. house</b>	<b>Total Costs</b>
Houses Completely Destroyed	1847	250.0	461,750.0	2,300	250.0	575,000.0
Houses Partially Destroyed	3500	75.0	262,500.0	3,200	75.0	240,000.0
Cost of Temporary Shelter				40		12,000.0
Sub-Total			724,250.0			827,000.0
Cost Contingencies @15%			108,637.5			124,050.0
Total in Millions Maldives Rufiyaa			832.9			951.1
Total in Millions of US Dollars			\$64.8			\$74.0
Resources Required till June 30, 2005			\$19.4			\$22.2
Resources required July 31 2005 to December 31, 2007			\$45.4			\$51.8
Notes: (1) Number units for full reconstruction are greater than for the units destroyed because of the need to relocate some people to other islands because their islands of origin are no longer livable.						

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## **Annex 7 - Water Supply, Sanitation and Solid Waste Management Sectors**

### **I. Introduction**

1. Impacts resulting from the absence of basic infrastructure and environmental services in the atolls have been further exacerbated by the damage that followed the high waves and flooding of the Indian Ocean tsunami which hit the Maldives on 26 December 2004, leading in some cases to absolute destruction of existing infrastructure. The sector has been seriously affected: whilst provision of water supply and basic sanitation services are in urgent need of reconstruction and/or development, the need to expedite adequate solid waste management practices and structuring the sector for efficient operation have emerged to be critical at this stage.

### **II. Government's Immediate Response**

2. Following the immediate creation of a task force for emergency relief on 26 December 2004 and the specific establishment of a water and sanitation work group coordinated by the Medical Relief Unit at the National Disaster Management Center (NDMC), water and sanitation emergency requirements for the Maldives were identified to support approximately 2,200 affected households (equivalent to an estimated population of 15,000) in 69 islands, of which 36 highly or very highly affected islands are to be prioritized. However, the exact number of affected households and the level of damages to the water and sanitation facilities have not been identified. Basic drinking and cooking water supplies are in the process of being distributed in the form of packaged water (30,000 liters) and 20 small reverse osmosis (and associated generators) desalination units. In addition, water disinfectant tablets, detergent tablets (10,000), ground bladder PVC tanks (5-10 m<sup>3</sup>) for water storage, water-testing kits and laboratory equipment (for residual chlorine content and total fecal coliforms testing), household HDPE (2.5 m<sup>3</sup>), as well as dustbins (15,000 pieces being proposed) are in the process of being acquired and delivered. Transportation, boat availability and coordination logistics have proven to be a key in the delivery of goods and services.

3. The communities in the islands have mobilized, in many cases initiating the removal of solid waste and debris from water wells, clearing and concentrating construction debris in peripheral areas. Where possible, communities have organized sharing the provision of overall drinking and cooking water supplies, undertaking activities communally (such as cooking), as well as sharing sanitation facilities and shelter, where housing and services remain standing and functioning.

4. UNICEF, various bilateral donors such as German THW, NGOs such as Oxfam, and local private parties have actively participated in the delivery of water supplies and services and other basic necessities to hundred of families throughout the country. Several of these also plan to continue supporting rehabilitation and reconstruction programs, therefore close donor coordination will be required.

### **III. Methodology of Damage and Needs Assessment**

5. **Methodology.** Damage and needs evaluation considers asset losses and acceptable replacement alternatives. This assessment is based on data and information provided by the Government (data management center) and supplemented by data and analyses obtained from a variety of existing reports prepared under the supervision of various Government agencies over the past 5 years, as well as field visits. A precise assessment of the damage is not possible at this stage, due to the wide spatial spread of damage, the relatively short period following the disaster and data logistics. The data available to the mission was limited and in order to strengthen sector findings, a questionnaire on water supply and sanitation was prepared and conveyed to the atoll and island offices for immediate completion and return to NDMC. Time and response restrictions have only permitted to use some of this data for extrapolation

and generation of projections. On receipt of all information from this survey, a more detailed assessment could be completed. The needs assessment has focused in identifying adequate solutions for the 69 most affected islands.

6. **Consultations and Site Visits.** GOM is conducting a series of engineering and technical site visits in order to more accurately establish reconstruction needs. The task force has provided the mission with a set of reports, covering a number of islands, which contain damage estimates for different sectors including housing. Additional reports have been prepared by a series of donor agencies, including the International Red Cross and Red Crescent Federation and AUSAID, all of which have been considered in this assessment. Moreover, the mission visited Kholufushi and Naalaafushi Islands in Meemu atoll, one of the most affected, on 11 January 2005 in order to collect information on the extent and nature of damages in the island, for possible extrapolation to other centers. The needs assessment is in line with Government's policy, which was confirmed through meetings with the Ministry of Finance and Treasury (MOFT), Ministry of Planning and Development (MPND), the Maldives Water and Sanitation Authority (MWSA), The Maldives Housing and Urban Development Board (MHUDB), Ministry of Environment and Construction (MEC) and the Ministry of Atolls Development (MOAD).

#### **IV. Damage Assessment**

7. **Water Supply.** Water supply in the atolls is almost entirely provided through a combination of rainwater tanks (both household and communal), which are the principal source of drinking water and groundwater extraction, mainly through domestic wells. Prior to December 2004, Malé, R. Kadhohudhoo and Kommandhoo (28% of the total population) were the sole inhabited islands with access to desalinated water. For a number of years, population and development pressures have lead to increasing groundwater extraction, resulting in the depletion of the freshwater lens, which in turn, has led to saline intrusion into the ground aquifer. Groundwater resources have also been at risk of bacterial contamination caused by effluent leakage and pollutant migration from poorly constructed and maintained septic tanks.<sup>1</sup>

8. The tsunami event further aggravated the limited freshwater resource available to the country. The freshwater lens has been significantly affected throughout the country and the duration and the reversibility of this impact is uncertain.<sup>2</sup> As a result, tested wells have shown unusually high conductivity and saline levels, particularly in those islands completely flooded and classified by GOM as suffering of "high" or "very high" impact. Monitoring of the saline content of the convex lens-shaped body of freshwater positioned above seawater and its transition zone over the next few months will allow for a more accurate evaluation. In addition, poor construction and tsunami wave-damage to septic tanks and other sewage systems have resulted in pollutant migration and sewage contamination of groundwater sources.<sup>3</sup> Groundwater, commonly utilized for washing and bathing, has been reported not to be adequate for use in 48 islands, although this situation may change with cleaning of wells and chlorination.

9. Drinking and cooking water, harvested only in household and communal water tanks has been estimated to be totally lost in the 69 most affected islands, adding up to a potential estimated amount of 13,000m<sup>3</sup>, which could be as high as 20,000 m<sup>3</sup> for the entire country. This is a particularly important loss at the beginning of the dry season, when water-harvesting rates are at their lowest. Five hundred rainwater tanks, amounting to a total of 800,000L, have been reported lost or damaged by the islands offices. However, its has also been observed that many islands significantly affected have not yet reported their

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<sup>1</sup> *State of the Environment, Maldives 2004*, reported groundwater resources in 54% of islands not to be suitable for drinking due to salt water intrusion and 46% of islands where groundwater was not suitable due to pollution (Ministry of Environment and Construction. 2004. *State of Environment, 2004*. Maldives).

<sup>2</sup> Hydrological and conductivity testing should be undertaken as a function of precipitation to monitor the evolution of freshwater lens recovery.

<sup>3</sup> Bacteriological testing undertaken by UNICEF and MWSA displays positive values for *E-Coli*.

losses, and the based on atoll data extrapolations, the number is estimated to be substantially larger adding to as many as 1000 community rainwater tanks and 6000 household rainwater tanks. Roof water harvesting piping and gutter systems are also expected to be damaged affecting an estimated 5000 households. Eight hundred and fifty well-pumps are estimated to have been lost as a result of flooding. No damage has been reported to existing reverse osmosis facilities serving the Maldives prior to the tsunami disaster. Overall damage due to loss of assets in the water supply sector is estimated to be MRf 65 million (\$ 5.1 million).

10. **Sanitation.** Sanitation in most islands is effected partly by pour-flush latrines connected to a sewage system, or to a much lesser extent, by use of holes in backyards. In high-density island environments, the construction and operation and maintenance of septic tanks is complex, and often suffers from poor performance due to a variety of reasons which include absence or limited desludging. Small-bore systems are a common alternative but they are generally not well designed, often malfunction, and usually convey raw sewage directly into the lagoon. Assets rapidly deteriorate due to deferred maintenance and faulty systems are conducive to marine pollution. Furthermore, a large number of septic tanks are solely associated to a soak-pit, from which sewage can freely migrate through the highly porous island soil, contaminating groundwater sources. Remaining septic tank systems are connected to sewerage systems with a sea outfall. Sewage treatment systems in the Maldives are scarce.

11. The extent of damage to the sanitation and sewerage network is still uncertain. Estimates regarding the number of toilets which may have been potentially lost has been directly correlated to the number of houses in need of repair or reconstruction and estimated to be as large as 5000 units. In extensively affected areas, where entire islands have been subjected to flooding for an extended period of time and delayed flood water retreat periods, septic tanks may need replacing, or when the structures remain undamaged, desludging will be required to ensure desalination and adequate bacterial anaerobic digestion conditions. The number of septic tanks and associated connections lost to the tsunami is estimated to be 1,500 units, whilst small bore sewer and outfall loss in highly affected areas needing replacement could be as high as 126 km and 2.4 km of outfall. Whilst Malé is not served by a needed sewage treatment system, Kulhudhufushi pilot semi-mechanical aerobic sewage treatment plant, and MWSA reed bed piloting facilities have not yet reported any specific damages to their infrastructure. Overall damage to sanitation infrastructure loss (in the form of latrines, septic tank and sewerage networks and sea outfall damages) has been estimated to be MRf 72.4 million (\$ 5.6 million).

12. **Solid Waste Management.** Solid and hazardous waste management has emerged to be one of the greatest challenges in the Maldives. Whilst, the central landfill facility of Thilafushi<sup>4</sup> serves Malé, Vilingili, Hulhumale, resorts and industrial islands, no formal waste management systems exist in the atolls, with the exception of Kuldhufushi and Hithadhoo landfill sites. While no loss of assets or damages have been reported at this stage in either the atolls nor the Thilafushi center, the potential environmental impact which might have resulted from the discharge of hazardous waste from Thilafushi island into the Ocean needs to be reviewed, as part of a strategy leading to the construction of a safe and environmentally acceptable solid waste management center for the country's capital. Visits to both North and South Regional Development Management Centers are required to confirm absence of damages to soil or facilities, particularly to Kuldhufushi, where damages were reported to be substantial, as it is uncertain whether the design of these centers could accommodate tsunami resulting debris. Since no lining had yet been made available to either center, no damage is associated with it, however it remains much needed. More importantly, the need to expedite adequate solid waste management practices in the atolls and structuring the sector for efficient operation has emerged to be critical in order to rapidly cope with the collection and disposal of debris resulting from tsunami damage and destruction. Overall damage

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<sup>4</sup> According to the State of Environment report, more than 103,000 tons of waste is transported yearly from Malé to Thilafushi (Ministry of Environment and Construction. 2004. *State of Environment, 2004*. Maldives).

to waste disposal systems, specifically relating to medical waste and damage and loss of hospital incinerators is estimated to be MRf 1 million (US\$ 0.08 million).

## **V. Needs Assessment**

13. **Immediate and Short Term Needs (3–6 months).** Immediate and short term efforts should focus on (i) the provision of immediate safe water to affected areas, (ii) provision of basic temporary sanitation facilities and rehabilitation of existing sanitation infrastructure, (iii) initiating a solid waste management program for clearing and recovery of debris material, as well as (iv) attending to immediate community awareness and capacity building required to undertake the above tasks.

14. Short-term needs in the water supply and sanitation sector should focus primarily on immediately providing:

- (i) safe drinking and cooking water supplies, initially (dry season) in the form of small mobile desalination systems (46 units) and/or bottled water (more costly and with higher associated logistic and transportation requirements), soon after to be followed by the repairing and provision of new household and communal (schools, hospitals, mosques and communal areas) rainwater tanks (1000 community rainwater tanks and 6650 household rainwater tanks replacing units lost as well as providing clean water to individuals previously depending on groundwater sources for drinking and cooking) and rehabilitation of associated roof rainwater harvesting piping and gutters, for immediate replenishment at the end of the dry season, fulfilling drinking and cooking water requirements. This should be complemented with the supply disinfectants and water chlorination tablets, where water from wells or water sources otherwise considered unsafe, are to be used.
- (ii) temporary sanitary latrines<sup>5</sup> (1800 units) to communities in high or very high impact areas, where toilets have been destroyed or reconstruction and rehabilitation of septic tanks prevents the utilization of such facilities. This should be coupled with the acquisition of septic tank desludging systems (34 units) and adequate impermeable lining for the construction of temporary sludge drying beds;

15. Immediate actions to be undertaken in the solid waste management sector should focus on providing:

- (iii) a solid waste management program, focusing on waste segregation and material reuse/recycling, particularly in those islands most affected by the destructive tsunami wave<sup>6</sup>. The program will emphasize waste segregation into biodegradables for composting, recyclables for further re-use and sale for recycling, and non- recyclables (including hazardous) for safe disposal in centralized facilities. The program should include the purchase of communal wheeled and/or household bins for the 48 reported most affected islands, and equipment allowing for both the separation of wastes and its safe and effective processing and removal from the islands. In order to achieve a cost efficient system, which could be financially sustainable in the medium term, the program requires to consider atoll-level coverage. Selected equipment shall include amongst other shredders, glass crushers and composting bins (48 systems);<sup>7</sup>

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<sup>5</sup> Community acceptance of these units needs to be confirmed, else cultural sensitization/awareness could be raised.

<sup>6</sup> The tsunami wave resulted in a large amount of house destruction. Awareness must be raised as part of short term activities to avoid construction waste from being indiscriminately disposed of in landfills.

<sup>7</sup> Logistical difficulties have been encountered in the transportation and transfer of small bulldozers required for clean up operations.



- (iv) The program should also consider the immediate formulation of a strategy/logistic plan by MEC, in joint collaboration with MPND and MOAD, to optimize immediate waste management and disposal needs, such as would be the collection of a critical amount of recyclables for sale and recovery of costs, waste segregation by type and ultimate disposal of hazardous waste (eg destroyed asbestos roofing) debris from tsunami-resulting destruction;<sup>8</sup>
- (v) a comprehensive community awareness program to inform and train communities on the proposed program of intervention, including hygiene materials, hygiene promotion/education, environmental solid waste management as well as community organization for effective support. The Hygiene Promotion Programme targeting schools children and communities should be re-initiated.<sup>9</sup>
- (vi) in addition, institutional development and support to the atolls administration through capacity building programs will be necessary to implement the above needs;

16. **Cost Estimates for Immediate and Short Term Assistance (3–6 months).** Cost estimates for the above activities are in Table 1. These are tentative and based on the 2004 available unit cost data. They include transportation costs and 10% annual price contingency. The estimated cost for immediate relief and short-term assistance is estimated to be MRf 234 million (\$ 18 million)

**Table 1. Cost Estimates for Immediate and Short Term Assistance**

<b>Subcomponent</b>	<b>MRf ('000)</b>	<b>US \$ ('000)</b>
Water supply	131,780	10,300
Sanitation	41,700	3,260
Solid Waste Management	33,740	2,640
Environmental Awareness and Education	6,400	500
Total	213,610	16,690
Contingency (10%)	21,360	1,670
<b>Grand Total</b>	<b>234,970</b>	<b>18,360</b>

17. **Donor Response and Financing of Immediate and Short Term Needs (3-6 months).** The Government has initiated discussions with various international agencies and NGOs, including UNICEF and ADB. Total contributions are still to be finalized but should include:

- (i) UNICEF has committed to providing (15+3) reverse osmosis boat-mounted units for desalination, whereas others, including Oxfam UK (3 units), Graham Tek Singapore (2 units) and THW and Kappel Engineers (4 units) have already committed up to 9 plants, 2 of which are large size.
- (ii) Various bilateral and private sector donations amount at present to over 100,000L of packaged drinking water.
- (iii) The Norwegian Government has at present committed to providing 50 -1000L collapsible storage containers whilst the German Government proposes to provide 8

<sup>8</sup> The program should focus on (i) developing infrastructure for the disposal of different waste components separately, (ii) maximizing the opportunity for local processing and re-use of materials, including the introduction of composting (iii) maximizing the opportunity for local income generation, through transshipment of segregated and baled metals, glass, plastics and other recyclable materials to a central facility, (iv) maximizing opportunities for community-based approach to solid waste collection and disposal practice, (v) maximizing the opportunities for better household waste management practices and the use of planned collection and disposal facilities, (vi) using the community's potential for operation and maintenance.

<sup>9</sup> Particular attention is to strengthen people's knowledge, attitudes and day-to-day practices for adoption of safe hygiene practices. Findings from assessments have indicated that thousands of people are under threats of diseases due to damaged water & sanitation facilities, crowded conditions for displaced people and seawater contamination. The MoH with assistance from UNICEF and in collaboration with Ministry of Education and WHO is developing a hygiene promotion campaign which will focus on key hygiene behaviour to reduce health risks for the population.

- water purification units for production of drinking units, laboratory equipment and pumps.
- (iv) Oxfam will be providing a selection of water equipment, including 4-11m<sup>3</sup> tanks and 3-10m<sup>3</sup> ground bladder PVC tanks. The International Federation of the Red Cross and Red Crescent will be providing 2-10 m<sup>3</sup> ground water bladders,
  - (v) UNICEF has also proposed the supply of 60 individual garbage bins with covers (large), 60 garbage bins with covers (small) and 60 dustbins opening 2 way, as well as 2 conductivity meters.

18. **Medium-Term to Long-Term Assistance (Up to 2-3 years).** This phase, covering a period of up to 2-3 years should focus on providing a comprehensive sanitation and solid waste management program both to help improve the standard of living of island-affected communities and prevent further marine and terrestrial contamination. The sector strategy will need to provide for

- (i) rehabilitation and reconstruction of environmental infrastructure damaged by the tsunami<sup>10</sup>;
- (ii) upgrading and development of sewage treatment and disposal facilities in islands where rebuilding or potential relocation is required and population is sufficiently large as to ensure the scheme's sustainability;
- (iii) introduction and development of solid waste management systems, including formalization of solid waste management centers and solid waste management capacity building programs including promotion of composite from biodegradable materials to support community/household composting of solid waste and sewage sludge for tsunami-damaged soil enrichment;
- (iv) community mobilization and organization for utilities management, operation and maintenance;
- (v) institutional strengthening and capacity building for environmental management, including:
  - a. development of environmental awareness programs for island communities;
  - b. formulation and piloting of environmental (water testing, pollutant migration, geohydrological studies) monitoring programs;
  - c. institutionalizing land use planning as a necessary tool in environmental management;

19. Natural and water resources in islands where displaced communities are being hosted are at risk of overextraction and additional polluting pressures. These have been addressed through the provision of additional rainwater tanks (600), under the assumption that population density allows to accommodate families in individual plots. In addition, the design of a suitable hygiene and sanitation program including sewage treatment prior to disposal for these selected islands with critical population levels has been incorporated in the development plans for island expansion, to preserve the environmental absorptive capacity of the islands. Long term recovery of the water lens needs to be monitored through a purpose-design monitoring program and comparison with exiting pre-tsunami base-line from wells and 20 boreholes in North and South Regions and Malé.<sup>11</sup> Aquifer recharge practices such as those incorporated in the design of road drainage mechanisms will have to be further promoted in reconstruction activities.

20. The overall sanitation strategy and choice of technical options considers the suitability of locally adapted technology, affordability and financial sustainability considerations, institutional arrangements

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<sup>10</sup> This shall ensure the continuation of programs such as school water and sanitation programs, such as UNICEF WES program.

<sup>11</sup> As part of the needs assessment, the provision of 2 water testing systems per affected atoll and associated consumables has been incorporated.

and cultural factors. Selection of adequate sanitation infrastructure covering tsunami most affected islands, should include:

- (i) Rehabilitation and replacement of damaged sanitation infrastructure (up to 5000 toilets and 1600 septic tanks) in households and communal buildings;
- (ii) Construction of permanent septic and hygienic sludge drying beds (a total of 69 units will be required, based on population needs on substantially to very highly affected islands);
- (iii) Repair or replacing of damaged small bore sewer and sea outfall, where damaged, and in selected cases, introduction of sewerage network systems in islands solely relying on a septic tanks/soak pit systems (up to 21 systems to be provided in total);<sup>12</sup>
- (iv) Introduction of cost effective septage treatment facilities, particularly in islands with both high population levels and high population densities, as may result from the Government proposed 'safe-island' programs and potential relocation needs.<sup>13</sup> For this purpose, further testing and MWSA piloting efforts for the identification of adequate and adapted systems such as reed bed systems should be further promoted;
- (v) Preparation of a sanitation and water strategy addressing increasing population in proposed safe islands, which shall include treatment and management options for optimization of resources and environmental sustainability.

21. Solid waste management facilities in the atolls should be formalized as solid waste management centers, where relief equipment is to be secured in adequately designed deposition bays, providing safe and properly laid electricity and water services, provision of concrete pads and leachate containment (expected to be minimal where waste is to be stored for short periods of time) and enclosing of light waste by means of fencing. Means for safe disposal of hazardous waste debris, especially asbestos which was commonly used in construction and roofing, must be separately addressed.<sup>14</sup> In addition, replacement of clinical waste small-size incinerators has been considered for atoll and regional hospitals in highly affected islands (3 in total).

**Table 2. Cost Estimates for Medium Term Assistance**

<b>Subcomponent</b>	<b>MRf ('000)</b>	<b>US \$ ('000)</b>
Water supply	21,280	1,660
Sanitation *	255,880	19,950
Solid Waste Management	18,880	1,470
Environmental Monitoring and Environmental Awareness Programs	21,250	1,600
<b>Total</b>	<b>317,010</b>	<b>24,730</b>
Contingency (10%)	31,710	2,470
<b>Grand Total</b>	<b>348,810</b>	<b>27,210</b>

\* Considers introduction of sewage treatment systems and basic reed-bed sewage treatment facilities for 15 highly affected islands with critical population level.

## **VI. Long Term Development Needs**

22. Although beyond the objectives of a tsunami-damage and needs assessment, development needs identified to be urgently required in the Maldives include (i) provision of safe drinking water to

<sup>12</sup> Coverage has been addressed taking into account the sustainability of these schemes when new systems are to be constructed, and this has been related to population size.

<sup>13</sup> It is expected that septic tanks for up to 30% of the affected population may be required (6000 new septic tanks), and upgrading of systems to include full sewerage systems, reed bed treatment and outfall to see through raiser mains for up to 15 islands.

<sup>14</sup> Provision for this has been included under the Environmental Section.

individuals subject to shortages, (ii) provision of acceptable sanitation and sewage treatment options throughout the country, including Malé, which shall be coupled with the introduction of user fees, (iii) a long-term solid waste management approach for the Maldives needs to review available acceptable options for the disposal of non-recyclables and hazardous waste. As part of the formulation of a countrywide long-term waste management strategy, GOM must consider collection and treatment of non-recyclables and hazardous waste in a centralized small-scale incineration facility (one which should be located in the vicinity of Malé) or the provision of an environmentally safe sanitary landfill site(s) comprising a section fulfilling hazardous waste specifications, in key islands such as Regional Development Centers. The latter should include the much needed lining and upgrading of Thilafushi central landfill site.

## **V. Next Steps**

23. A detailed assessment of reconstruction needs for the various affected islands will have to be undertaken, this will partly determine how to prioritize activities, both in a geographic and sectoral context.

24. In addition, Government policies and strategies in selected subsectors, currently under preparation or review, will need to be confirmed.

## ANNEX 8 - TOURISM SECTOR

### Situation Analysis

1. Tourism is the main industry in the Maldives, with total receipts estimated at about \$478 million in 2004. The industry contributes approximately 31% to the GDP directly but an estimated 60-70% when indirect impacts are considered. The tourism industry, directly and indirectly, also accounts for a high portion of Government revenues. Lease payments from hotel projects were \$48 million in 2004 with bed and departure taxes contributing \$41 million and custom duties estimated at another \$46 million. Just these three items account for \$135 million and this excludes taxes generated from other sources such as landing fees, telecommunication taxes, other company royalties, etc.

2. The hotel sector alone accounts for 17,000 jobs out of an economically active population of about 88,000 and when consideration is given to other tourism businesses and multiplier effects, the tourism industry is likely responsible for over 25,000 jobs. It should be noted that some 40% of jobs in the hotel sector are filled by expatriates, detracting from the economic benefits to the Maldivian economy.

3. Several years ago the government decided to focus on high end tourism with potentially lower volumes but higher spend tourists instead of pursuing a mass tourism approach. The rationale was to maximize the economic impacts and minimize the potential negative impacts often associated with the industry, particularly given the Maldives' small size and fragile ecosystem. This sustainable approach has worked well in terms of encouraging boutique style luxury resort development and attracting high spend tourists, maximizing revenues generated by the industry for both government and private sector investors while maintaining environmental and social sustainability. While there is still a mix of properties to cater to a variety of markets, the Maldives now hosts some of the world's top resorts. Visitor satisfaction is reflected in a relatively high repeat rate of 20-30% and investor satisfaction is reflected in relatively high rates of return for most projects and increasing interest from a number of the world top hotel chains to establish a presence in the Maldives. While Government has set the overall policies and direction for tourism, the sector has been very private sector driven.

4. Tourism has been the main driver behind the country's strong economic growth over the past several years. Arrivals increased from 430,000 in 1999 to 615,000 in 2004, an annual growth rate of over 7%, despite the global slowdown in travel after 9/11, the weak global economy and the outbreak of SARS which devastated several other tourism destinations in Asia. 2004 had been a banner year for the Maldives with bed night demand up some 12% over 2003 and bed occupancy running at about 85%, impressive for any destination. The largest markets for the Maldives are Italy (20%), UK (17%), Germany (11%), France (10%) and Japan (7%).

5. The impact from the tsunami has been significant on the sector and can be divided into the direct and indirect impacts: 1) Direct: damage to the tourism infrastructure and other related businesses, and 2) loss of revenue from the downturn in tourist arrivals, both to the private sector and Government and the impact on those working directly or indirectly for the industry:

6. *Direct Impacts; Damage to Tourism Infrastructure* The tsunami caused 3 fatalities and a number of seriously injured among foreign tourists. Of the country's 87 resorts, 21 sustained considerable damage and are closed. By the time the tsunami hit, there was a registered total of 17,476 resort hotel beds, 1,700 beds on safaris and 427 beds in guesthouses. Before the tsunami hit a number of these beds were not operational for various reasons such as undergoing rebuilding and refurbishment work. Currently the total number of beds out of operation stands at 5042 (about 30%) about it is expected that 3,800 will likely re-open over the next few weeks or months while 1,200 have sustained more serious damage and will remain closed for all of 2005. Another five resorts (874 rooms) were under construction or renovation with plans

to open at some point during '05. Therefore, by the end of '05 the bed inventory, even without the 5 badly damaged resorts, should return to late '04 figures with supply growth resumed in '06 as some of the more severely damaged resorts re-open. In addition to resorts, there are over 100 safari vessels (1700 beds) and 24 guest houses (360 beds). There is a likelihood of the possibility of increase in physical damages and numbers of beds likely to be out of operation due to other effects of soil erosion, changes to water table and result of unsafe structures. This can be declared only after a detailed structural damage assessment of each building in the resorts is completed.

7. For the damaged resorts, preliminary estimates of the cost to rebuild are around \$100 million. While some of the physical damage will be covered by insurance, not all the insurance assessments have been undertaken as yet and it would appear that in many cases there were limits for natural disasters which fall short of replacement cost, insurance caps and other clauses which limit the amount of insurance payment received. Replacement values stated in various policies may also be undervalued. One estimate is that in the final analysis maybe 50% of the physical damage will be covered by insurance. Most policies also cover business interruption while a resort is not operating, however, they will generally not cover cash flow losses related to market conditions or the overall decline in visitor arrivals once the hotel is operational.

8. *Indirect Impacts; Decline in Tourist Arrivals* The country was at the height of the peak tourism season when the tsunami hit. While only a portion of the country's resorts were damaged, due to the ongoing publicity of the badly affected areas, all resorts are suffering. Trip and flight cancellations have been significant and bed occupancies are now ranging from 30-40% for the opened resorts (20-30% based on a full inventory of 17,000 beds) where these are more typically over 90% at this time of the year. This suggests that room night demand is down somewhere between 65-75% and seems to match airport arrivals which were 5,625 for the first 11 days of January '05 compared to 20,308 for the first 11 days of January '04. With low load factors, both scheduled and charter flights have been reduced. Cancellations are starting to decline and some new reservations are starting to come in, albeit slowly. Discussions with some of the larger hotel operators suggest that travel should start to pick up in February and more earnestly in March.

### **Economic Impact**

9. Private sector tourism businesses and companies that support the tourism sector indirectly are suffering from the physical damage to their properties and other assets, to the extent that damage was sustained, but even more so from the loss of income from the downturn in arrivals. To counter heavy overhead expenses it can be expected that employee redundancy measures will be taken by resorts. Many resorts have already reduced staff numbers in response to low occupancy, while some have decided to retain full staff under the assumption that business will return to normal levels shortly. Facing the risk or reality of at least temporary unemployment, some staff have chosen to return to home islands. Even if staff remain on the payroll, however, well over 50% of their income is typically derived from the 10% service charge. The annex attached to this report was prepared by UNDP and provides a list of companies that have been affected with the downturn as well as smaller businesses and individual working in the informal sector that may be affected. The status of the employees in the 5 resorts that are completely devastated and out of operation is not yet known.

10. The negative impacts on the economy from the downturn in tourism will depend on how quickly visitor numbers rebound. Recent experience indicates that the travel industry is fairly resilient with most crises prompting an initial setback in arrivals but fairly quick rebounds. In Egypt, which experienced several incidents of violent attacks against tourists, the pattern has been an initial sharp drop in arrivals but visitor numbers rebounding within 1-2 years. The recent earthquake in Turkey also resulted in a drop in arrivals followed by sharp rebound in one year and the situation was similar for the bombing of a Bali

nightclub. Obviously, any further earthquake or tsunami activity in the Maldives, health epidemics etc., would hamper the recovery process, but barring such events, the industry should start to rebound fairly quickly, assuming that appropriate marketing/communication campaigns are undertaken to bring tourists back. The fact that loss of life from the tsunami was relatively small compared to other tsunami-hit tourist destinations should aid the recovery time as well as the fact that the Maldives is a very unique destination and not easily compared to or replaced by other competitive destinations.

11. Aside from the losses to private tourism businesses, two scenarios are set out below to estimate the impact of the downturn to the economy. These numbers are based on a financial model developed within the Ministry of Tourism which is not yet finalized and are considered preliminary. The first scenario (a) assumes a gradual rebound in bed night demand with a full rebound to pre-tsunami projections by July and average bed occupancy of 67% for the year, based on available inventory. A more pessimistic scenario (b) assumes 50% bed occupancy for the year. Both scenarios assume a slight discount in room rates. While the table below gives an approximate assessment of the revenue loss due to fall in tourism, an assessment of the direct income loss of resort owners and their employees is yet to done to estimate the full impact of this setback.

	2004	2005 (a)	2005 (b)
Average bed occupancy (%)	85%	67%	50%
Gross receipts from tourism* (US\$m)	\$415	\$190	\$160
Estimated loss		(\$225)	(\$255)
Tax revenue (bed & departure tax) (US\$m)	\$41	\$34	\$28
Estimated loss		(\$8)	(\$14)
Customs duty on tourism goods (US\$m)	\$43	\$29	\$24
Estimated loss		\$14	\$19
Loss of lease rent if waived for rooms out of inventory (US\$m)		\$3.4	\$3.4

\*includes direct and indirect effects and multipliers

## **Short Term Recommended Actions**

### ***1. Marketing/PR Campaign***

12. Rationale: To minimize financial damage associated with the downturn in tourism, First and foremost there is a need to increase confidence that the Maldives is a safe place to visit and bringing tourists back. The international press coverage on the tsunami's damage to the country and the inference in some cases that it would be insensitive or disrespectful to travel to the country for a holiday is clearly a deterrent in bringing travelers back. The message that it is safe to travel here, that the tourism industry is up and operating with most resorts unaffected and that visitors are very much welcome needs to be clearly communicated to the travel trade and to tourists directly. It is recommended that \$2 million be added to the current destination marketing budget.

13. Suggested activities include:

- Detailed media strategy
- Focused efforts targeted at travel trade, particularly tour operators from major markets, travel writers, travel publications, airlines
- Working with embassies to ensure travel advisories are lifted as appropriate and that accurate information is available
- Focused marketing on former visitors

- Strong attendance at upcoming travel trade shows (BIT, ITB, etc.)
- Develop incentive programs for tourists to visit (free nights or meals, special gifts) rather than straight discounting or rooms

14. Responsibility: The Maldives Tourism Promotion Board (MTPB), funded primarily by Government with some income from the private sector, is quite capable of managing these marketing efforts in conjunction with the Ministry of Tourism (MoT), Maldives Association of Tourism Industry (MATI) and the Tourism Promotion Advisory Council; the Pacific Asia Travel Association (PATA), an effective regional organization with a focus of tourism marketing and vast experience in crisis situations, may also be able to provide some useful assistance.

## ***2. Encourage Rebuilding Efforts/Support Cash Flow Shortfalls***

15. Rationale: The repair or rebuilding of damaged resorts and other businesses serving the tourism industry directly or indirectly will help to speed the recovery process. To reduce the financial burden on hotel owners, duty-free importation of materials required for rebuilding is recommended. Many companies will likely face working capital or cash flow shortfalls due both to the decline in on going business plus the likely increase in accounts receivable from tour operators. There may be money available from aid organizations to channel through banks and other financial institutions for on-lending to tourism and other companies although appropriate vehicles and manpower will be required to administrate. The Maldives National Chamber of Commerce and Industry (MNCCI) has developed an interesting scheme to assist small and medium scale businesses and has already collected over \$500,000. IFC is also in initial discussions with some of the larger companies to support rebuilding and/or debt restructuring. Responsibility: Ministry of Finance, MoT, MNCCI, private and public sector financial institutions,

## ***3. Consider Temporary Waiver or Partial Waiver of Lease Payments***

16. Rationale: To ease the financial burden of resorts, the annual lease payment should be temporarily waived. These lease payments represent a high fixed cost for the hotel operation and will be difficult for hotels to pay if the hotel is closed for repairs/reconstruction. Even for hotels which are operating, significantly reduced cash flows from lower occupancies and possibly discounted room rates will stretch financial resources unless they have a fairly sizable amount of cash or other liquid assets. A rough estimate of the cost to Government to waive lease payments while beds are not in operation, based on an average lease payment per bed of \$2,800/yr (\$8 per bed/day) would be \$3.3 million. It is understood that some lease agreements do have a clause waiving payments in the event of closure due to natural disaster. Responsibility: Ministry of Finance, Ministry of Tourism

## ***4. Limit New Supply in Short Term***

17. Rationale: Depending on how quickly tourism rebounds and at what magnitude, there may be a short-medium term oversupply of resort rooms viz a viz room night demand. Government may want to consider slowing down the leasing process for the 11 new islands/resorts that were bid on in 2004 (approximately 1600 beds) until there is a clear picture that tourism arrivals are fully back on course. Responsibility: MoT

## ***5. Assessment of Possible Structural Damage***

Rationale: Ensure that resorts in operation are structurally sound and safe for occupancy

Rationale: Any accident at a resort resulting from structural problems would add considerable damage to the Maldives's image and credibility as a tourism destination. To the extent that



resorts were badly hit and have not yet been evaluated by a structural engineer, these assessments should be undertaken ASAP.

## **Long Term Actions**

### ***1. Assess Impact on Marine Life***

18. Rationale: The impact of the tsunami on fish, coral reefs, etc., should be fully assessed. Aside from the importance of the marine environment from an environmental perspective, premier diving is a key attraction and selling point for the Maldives. It is critical to assess the impact, if any, to communicate this message to the travel trade, dive associations etc. and, to the extent that damage may have occurred, take remedial actions. The effect of global warming on the Maldives has long been a concern and the impact of this potential threat to the industry should be studied as well. Responsibility: Ministry of Environment, MoT; possible GEF finance

### ***2. Develop a Crisis Management Plan and Committee for Tourism-Related Crisis Rationale***

19. The tourism industry is vulnerable to numerous risk factors from natural disasters, climate change, terrorism, health scares, changes in flight schedules, violence against tourists to political problems and economic downturns in source markets. It behooves every destination to develop a crisis management plan to better understand and manage risks and ensure better preparation for handling the wide variety of crises. PATA has also had vast experience in this area and may be able to provide assistance. Responsibility: Ministry of Tourism, MATI, Ministry of Health, National Security, other Government emergency units, PATA

### ***3. Provide Technical Assistance on Insurance***

20. Objective: The tsunami crisis brought insurance problems within the industry to the fore with respect to coverage lapses, caps, undervalued assets, etc. and it would appear that the complexities of insurance are not fully understood. It would be useful for hotel owners to receive training and advice on insurance matters and this may more practically be approached at the industry level.

### ***4. Develop an on-going Financial/Accounting System to track impacts of tourism on the economy***

21. Rationale: Government should develop a Tourism Satellite Accounting System (TSA) to more accurately track the economic impact of the tourism sector on the economy. Alternatively, the Planning Department of the MoT has already drafted a model, which achieves many of the same objectives and this could be refined/finalized for ongoing tracking.

### ***5. Improve value added associated with the industry***

Rationale: While the economic benefits of tourism are already significant, these could be strengthened with focused efforts to ensure that more related economic activities stay within the country. This has long been recognized as an important issue and actions taken but these efforts should be strengthened, including training and hiring more local staff in the industry, particularly women, and improving/developing better linkages between tourism and the rest of the economy, particularly agriculture.

## **Annex 9 - Fisheries Sector**

### **I. Introduction**

1. The fisheries sector, the traditional production activity in the Maldives and a big drive of the economy along with the other main economic sector, tourism, were seriously affected by the tsunami of 26 December 2004. The sector (fisheries and fish processing), which has experienced strong growth in recent years contributed about 9.3% to the Gross Domestic Product (GDP) in 2004.<sup>1</sup> The sector is primarily rural based and is intimately integrated with rural livelihoods and income. It has evolved from a traditional subsistence-based pole and line tuna fishery to a number of commercial fisheries and small processing units. The fishing industry is the second major source of foreign exchange after tourism. Although about a third of the annual catch is consumed domestically, fish exports currently account for almost half of the country's exports. Fish exports in 2003 amounted to \$75.6 million (equivalent to \$250 per capita). The sector is a major provider of employment in the Maldivian economy, particularly in outlying atolls. With 14,955 fishermen, the sector employs 11% of labor force and about 20% of the total population is dependent on fisheries as the major income earning activity.<sup>2</sup>

### **II. Post-tsunami Situation Analysis**

2. Within the fisheries sector, the pole and line tuna harvesting subsector and the small-scale fish processing sub sector were the ones most affected by the tsunami. Several fishing communities were displaced from their islands. Over 100 fishing vessels in the medium size range and 20 artisanal fishing vessels are reported lost or seriously damaged. An additional 22 vessels are out of commission due to damage to engine and fishing gear. With an average of 10 crew per vessel, this means a direct loss of income earning opportunity for about 1,200 fishermen. Fishery infrastructure such as fishery island harbors and safe anchorage, and boat sheds have been damaged in several islands. Traditional fish processors, mainly women, in the most affected atolls in the central region lost their productive assets and production stocks. Those most seriously affected will lose the high fishing season (January – April). The economic losses will be severe, specially for the artisan, small-scale fishers and fish processors. Fishery assets lost and/or destroyed are summarized in Annex 1.

### **III. The Government's Immediate Response**

3. Immediately after the tsunami, the Ministry of Fisheries, Agriculture, and Marine Resources (MFAMR) and the Maldives Industrial Fishers Company (MIFCO) agreed to raise the purchase price of pole and line skipjack tuna from Rf3.75 per kg to Rf4.00 per kg to fishers in all fishery zones of the country.<sup>3</sup> The financial burden of the increased price to fishers is borne by the state owned enterprise, Maldives Industrial Fishers Company (MIFCO) and three private tuna businesses. Although fish landings in the southern atolls and in the hardest hit central atolls showed a significant immediate recovery following the price increase, fishing effort and fish catch is still substantially below annual averages for the peak season. Further action is needed in order to induce more fishers to resume fishing and to increase their income earned. In addition to raising fish prices, about 32 tons of frozen tuna held in cold storage by MIFCO and other private companies were released as food aid to affected people. Some of the collector vessels too were deployed for transport and relief work. Tuna purchase companies provided fuel as credit to vessels of the affected islands.

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<sup>1</sup> Based on Statistical Yearbook of Maldives (2004), this figure includes fish processing. Excluding fish processing of 2.7%, the contribution of the fisheries sector to the GDP in 2003 is 6.6%.

<sup>2</sup> Ministry of Planning and National Development, January 2005, Statistical Yearbook of Maldives (2004), Male, Maldives.

<sup>3</sup> MIFCO is a fully state owned enterprise involved in processing and export of tuna. MIFCO operates a cannery and few cold storage facilities and also owns a fleet of collector vessels.

#### **IV. Methodology of Damage and Needs Assessment**

4. The Ministry of Planning and National Development (MPND) has prepared a set of reports containing damage estimate for different sectors including fisheries and marine resources. The mission's first round of discussions was held at national level with MPND, Ministry of Finance (MOF), and the National Disaster Management Center. The mission held discussions with MFAMR staff at Male, and local fishers in the tsunami-affected areas during the field visit. The mission visited Dhiffushi Island in Male atoll on 11 January 2005 in order to gain first-hand information on the extent and nature of damages in the island.

5. Given the limited time available to the Mission, the team relied primarily on the Government data and information for the damage and needs assessment, with the rapid assessments reports, prepared by MPND, being the major source. As a first step, MPND has identified 69 most affected islands.

#### **V. Damage Assessment**

6. According to the estimates prepared by the MFAMR, the total cost for repair and rehabilitation of the damages to fisheries industry from the 2004 tsunami would amount to about Rf321 million (\$25.10 million equivalent). These damage assessments and cost estimates cover repair and/or replacement of fishing vessels, engines, fishing gear and accessories, fish processing equipment and infrastructure. A summary of the losses is given in Table 1 and details are given in Annex 2. Each atoll office has assessed the tsunami damage and reported to MFAMR. While there is a need for a more detailed survey to ascertain the assessment and verify the cost estimates, there is agreement about the broad extent of damages to fishing vessels, which need immediate repair. The details of damage and social implications are as follows:

(i) The direct losses in the sector are estimated at Rf168 million (\$13.18 million equivalent). The losses include 120 fully damaged and lost fishing vessels; 27 partially damaged fishing vessels; lost equipment of 337 cottage fish processors and 37 commercial processors; lost equipment in 5 reef fishery harvesting boats, including loss of 16 ocean cages of the export sector; damage to 8 boatsheds; and finally, damage to the Mariculture Research Station and the FAD (Fish Aggregation Device) Centre.

(ii) Indirect losses in the sector is estimated at Rf152 million (\$11.92 million equivalent) as fishers will lose fishing business and a large number of the fishers have been displaced from their home islands, particularly in the central atolls. In addition, a large number of island communities in the atolls base their livelihoods on cottage-based processing of Maldives fish. Therefore, loss of livelihood activities and productive assets will have serious negative impacts on the affected fishery communities. Assistance to rehabilitate their livelihood or to establish income-generating activities will be necessary.

7. **Other Observed Impacts:** The 2004 tsunami had other adverse social impacts on the fishing communities. As they rarely use banking facilities to deposit savings and keep their savings in their house, they lost their savings when the tsunami hit their houses. Lost lifetime savings of fishers will have a long-term impact on the tsunami-affected populations. Access to financial assistance through small-scale credit or income-generating activities will be needed to support livelihood recovery. Fishing communities will also face difficulties in loan repayment as a major portion of damaged fishing vessels were built with loans from financial institutions. Without fishing vessels, they cannot catch fish during the peak fishing season from January to April, and the small-scale cottage processors cannot produce Maldivian fish up to April. They will therefore face difficulties in loan repayment during the lean fishing season.

**Table 1: Damage Assessment for Fisheries Sector**

No.	Type of Facility	Unit	Damage to Infrastructure <sup>1</sup>		Total Damage to Infrastructure	
			Full	Part	Rf Million	\$ Million <sup>2</sup>
1	Fishing vessels	No.	120	50	147.50	11.52
2	Fish processors <sup>3</sup>	No.	374	0	17.80	1.39
3	Reef fishery <sup>4</sup>	No.	0	5	1.88	0.15
4	Infrastructure <sup>5</sup>	No.	8	2	1.55	0.12
5	Business loss <sup>6</sup>				152.57	11.92
<b>Total</b>					<b>321.32</b>	<b>25.10</b>

<sup>1</sup> Damage estimate is based on MFAMR's revised estimate, received on 2 February 2005.

<sup>2</sup> \$1.0 = Rf12.80

<sup>3</sup> 337 Cottage fish processors and 37 commercial processors lost equipment and materials.

<sup>4</sup> Reef fishery damages include lost equipment and materials of the harvesting fleet and lost ocean cages.

<sup>5</sup> Infrastructure includes fully damaged 8 boatsheds, Mariculture Research Station, and FAD centre

<sup>6</sup> Direct income losses from fishing and other businesses estimated here. MFAMR estimate of Rf405.04 million as business losses also include financial costs for vessels and loss in GDP.

8. The estimated fleet incapacity during the peak fishing season may lead to a drop in the total annual fish catch, resulting in a worst case scenario of 8.6% reduction in the fisheries sector GDP compared to 2003. Maldivian fishers experienced reduced profits and savings during 2004, as a result of the increased fuel prices in 2004, increasing operational costs, and the accompanying fall in world market prices for tuna. Thus, even for the unaffected segment of the fishery, recovery from 2004 losses may be slow due to sustained low world market prices and diminished buying capacity of the major tuna purchasing companies in the country.

## VI. Needs Assessment

9. **Rehabilitation Strategy:** MFAMR plans to complete the rehabilitation works in two phases of short-term and mid-term in order to restore the livelihoods of fishers as soon as possible. The needs assessment shows the total estimate of Rf180.34 million (\$14.09 million equivalent). The estimate for each phase is in Table 2 and the rehabilitation strategies are as follows:

- (i) **Phase I: Short-term:** Based on the MFAMR estimates for damages, the immediate repair works in the fisheries industry are now estimated to cost Rf74.79 million (\$5.84 million equivalent). The repair works include building 10 new medium range vessels, repairs to partially damaged fishing vessels, replacement of lost/damaged fishing gear and engines, replace of equipment in reef fishery, replacement of damaged equipment and facilities for Maldivian fish production. The short-term need also include microcredit arrangement for the tsunami affected cottage processors for their operational capital. Some initiatives have already been taken to build new vessels and replace equipment at a cost of Rf15.50 million (\$1.21 million equivalent) through Government financing. Phase I also includes an assessment of impact on reefs and marine resources. The community development approach will be applied to microcredit operations through informal fisher groups.
- (ii) **Phase II: Mid-term:** According to MFAMR, mid-term rehabilitation works are estimated to cost Rf105.55 million (\$8.25 million equivalent). These works include replacing damaged fishing vessels and fishing gears.

**Table 2: Needs Assessment for Fisheries Sector**

No.	Activities	Phase I Short-term	Phase II Mid-term	Total Amount	
		Rf Million	Rf Million	Rf Million	\$ Million
1	Replace damages fishing vessels (inclusive of engine, gear, etc.)	28.35	72.09	100.44	7.85
2	Replace fishing gear/engines etc. in partially damaged boats	24.43	8.41	32.84	2.57
3	Replace damaged equipment and facilities for Maldivé fish production	9.45	7.05	16.50	1.29
4	Replace damaged /destroyed boat sheds	0.67	-	0.67	0.05
5	Repair mariculture station and FAD Centre	0.89	-	0.89	0.07
6	Assess and monitor impact on reefs and marine resources	3.00	6.00	9.00	0.70
7	Micro credit arrangements	8.00	12.00	20.00	1.56
	<b>Total</b>	<b>74.79 (\$5.84 M)</b>	<b>105.55 (\$8.25 M)</b>	<b>180.34</b>	<b>14.09</b>

10. **Long-term Strategy (Beyond 3 years):** As a part of preparation activities for the Government's 7<sup>th</sup> Development Plan, the Government undertook the World Bank-assisted fisheries sector review in 2001. The MFAMR expects to prepare a fisheries master plan by 31 December 2005, which is one of ten recommendations of the sector review. In the preparation of the proposed master plan, the rehabilitation of the tsunami-affected fisheries activities could also be further pursued.

11. **Assessment and Mitigation of Risks:** There will be a risk of provision and operations of microcredit in implementing the rehabilitation works. As the tsunami-affected cottage processors are most at risk, they need urgently microcredit to operate facilities or the urgent income-generating activities through other labor-intensive civil works. Therefore, the Government should provide microcredit based on the previous microcredit operations.

## **VII. Possible Recovery Plan**

12. **The Government:** Besides the Government started to build 10 new vessels, the Government would like to respond immediately to the needs by using the Ministry's revolving fund of Rf9.50 million to the affected atolls. In addition, MFAMR requested the Government to allocate additional financial sources of Rf24.39 million to meet the needs in the fishery sector. In addition, the Government would like to get assistance from the development partners, including multilateral and bilateral donors, United Nations agencies, and international NGOs in order to assist the tsunami-affected fishers. Based the joint donors' assessment on the tsunami damage and needs, the Government will seek any assistance from the potential development partners through the Donor Conference, which is tentatively scheduled in March 2005.

13. **Development Partners:** To respond the immediate needs to rehabilitate the tsunami damage, ADB plans to allocate \$2.6 million grant in its emergency assistance package expected to be approved by March 2005. The United Nations Food and Agriculture Organization and the UNDP showed keen interest to participate in the recovery program.

## **Annex 10 –Agriculture Sector**

### **A. Introduction**

1. The tsunami spawned by the 26 December 2004 earthquake in the Sumatra region of Indonesia is documented as the worst disaster ever hit the Maldives. Enormous waves of 1 to 4 meters smashing the islands at high velocity swamped the coastal islands of the Maldivian archipelago and wiped out islands, shelter and livelihood. Reports indicate more than 82 people dead, 26 people missing, and over 12,000 people homeless. The tsunami hit major economic sectors of tourism, fisheries and agriculture. The agriculture sector was badly hit as the tsunami brought saline water to cultivable area, where natural resources for agriculture, soil and water, are limited and thousands of perennial trees are uprooted.

2. In Maldives about 75% of the inhabited islands are utilized in some form of agriculture. Crops are grown in farms, backyards of inhabited islands and in uninhabited islands. Perennials such as coconut, breadfruit, mango, citrus, pomegranate, guava and semi-perennials and annuals like banana, papaya, chili, root crops and a range of vegetables are grown in subsistence as well as commercial scales. In recent years commercial farming has developed and both public and private sector had invested in this sector. Taro and other root crops, mango, banana, breadfruit, coconut, guava and pomegranate are cultivated at home gardens. Other horticultural crops such as papaya, pumpkin, eggplant, sweet potato, cassava, watermelon and other cucurbits are grown in field plots. Uninhabited 941 islands are leased out through the traditional leasing system for developmental activities including agriculture. Thirty-two islands are rented for long-term period of 21 years for commercial farming. These commercial islands have an estimated cultivable area of 1,000 ha calculated based on vegetation coverage. The total agricultural production is estimated 35,821 tons in 2003, and shared 2.6% of Gross Domestic Product

### **B. Post-tsunami Situation Analysis**

3. Agriculture sector is among the worst hit sectors, as the basic natural resources of agriculture (soil and water) are affected by tsunami waves causing temporary, semi-permanent or even permanent damage to these resources. Although the extent of damage is not totally assessed yet, it is assumed to be significant especially in 26 islands, which were inundated by seawater for a considerable period. Destruction to homes, standing crops and those around homesteads, arable land, loss of farming equipment and damage to agriculture infrastructure are substantial. As stated above, the related decline in production and yield levels of field and other crops, including homestead cultivation of coconut and other fruit trees is significant. Furthermore, the damage caused by seawater on productive soil and ground water which is the only source of irrigation in these islands are of serious concern for any future agricultural activities. Table 1 provides extent of damage to agricultural islands.

### **C. The Government's Immediate Response**

4. The Government has done an excellent job in responding to the tsunami damage and assisting the affected people. The Ministry of Fisheries, Agriculture, and Marine Resources (MFAMR) have collected information about the tsunami damage on agriculture in close coordination with the Ministry of Planning and National Development (MPND). The mission could use the collected information and data that was very useful for the mission's damage and needs assessment.

**Table 1: Extent of Damage to Agriculture Islands**

<b>Agricultural status of islands</b>	<b>Number of islands affected<sup>1</sup></b>	<b>Total number of islands</b>	<b>% of Affected</b>
Major source of income	13	26	50
Secondary source of income	22	42	52
Alternate source of income	12	27	45
Income from agriculture is little significant	65	89	73
Non agricultural islands		16	
<b>Total</b>	<b>112</b>	<b>200</b>	

<sup>1</sup> More than 33% of the island was flooded

#### **D. Methodology of Damage and Needs Assessment**

5. The MPND has forwarded a set of reports containing damage estimate for different sectors including agriculture. The first round of discussions was held at national level with MPND and MFAMR. The mission held discussions with MFAMR staff at Male, and local farmers in the tsunami-affected areas during the field visit. The mission visited five affected Islands including Mendhoo Agricultural Center in Laamu atoll on 11 and 12 January 2005 in order to gain first-hand information on the extent and nature of damages in the islands.

6. As the mission had no time to assess the damages in depth, the mission relied on the Government information and data for damage and needs assessment. The tsunami damage assessments have been prepared by each atoll office and reported through the NDMC. The MFAMR's rapid assessments reports were also very useful to identify the tsunami-affected agriculture activities in the most affected 68 islands. The damage estimates are based on assumptions and current market prices and many assumptions to verify real damage. The needs assessment included agricultural activities, which will facilitate the resumption of economic activities, particularly farmers.

#### **E. Damage Assessment**

7. **Direct losses:** According to the MFAMR estimates, the direct losses are estimated at Rf137.63 million (\$10.75 million equivalent). About 317.1 ha (50% of the field plots) in the inhabited islands had been destroyed due to saline water intrusion and loss due to crop failure and loss of 269,330 plants. Apart from the fields, perennial trees such as coconuts, breadfruits, mango, betel leaf, guava, water apple are reported to be uprooted by the waves and dying (except coconut) because of salt toxicity. Banana has been severely damaged, as the crop is very susceptible to salt stress. The ground water aquifer in more than 50% of the inhabited islands has been completely affected by salt intrusion and also in remaining islands the water quality has deteriorated. The extent of damage to the arable land and to groundwater is not easily quantifiable, and also the impact of salts on land and groundwater could be permanent in severe cases. The improvement of these resources would be time consuming and heavily depended on rainfall. However, the tsunami has minor impacts on livestock in inhabited islands. As there is an immediate need to conduct extensive and detailed survey to ascertain the precise assessment and prepare immediate repairs, the Government expresses keen interest to undertake a detailed survey of actual damage as soon as possible. Table 2 summaries the damages in the agriculture sector and details of the estimates are provided in Table 3.

8. **Indirect losses:** Expected business loss from trade of agricultural production was estimated at Rf4.24 million (\$0.32 million equivalent) as half of the agricultural production from the crops, fruits, and

timber could be traded if the tsunami does not destroy them. The period following the tsunami coincides with the peak tourist season. Farmers whose crops and plants, which were not affected by the tsunami, will also face losses due to reduced demand from the tourism sector during this period of time.

**Table 2: Damage Assessment for Agriculture Sector**

No.	Type of Facility	Unit	Damage	Estimate*	
				Rf Million	\$ Million <sup>1</sup>
1	Field crops	Farms	2,103	68.93	5.39
2	Perennials / Fruit trees	Households	11,678	30.65	2.39
3	Agricultural input /tools	Households	11,678	8.76	0.68
4	Infrastructure	Farms	2,103	4.14	0.32
5	Timber and forestry products	No.	841,776	8.41	0.66
6	Damage in uninhabited islands <sup>2</sup>			16.60	1.30
7	Mendhoo agriculture station			0.14	0.01
8	Business loss <sup>3</sup>			4.10	0.32
<b>Total</b>				<b>141.73</b>	<b>11.07</b>

<sup>1</sup> Exchange rate at \$1 = Rf12.80

<sup>2</sup> 20% of damage in inhabited islands

<sup>3</sup> 50% of traded value of agriculture products

**Table 3: Assumptions in Damage Estimate**

1. Field crops	Total farms recorded by MFAMR is 2,543 and 2,103 farms are severely affected.
2. Perennials and fruit trees	Total number of households in 199 islands (except Male, Hulumale and Villingili) are 32,173, and out of these 112 agricultural islands are affected, and 11,678 households of these islands incurred crop losses have been damaged.
3. Agricultural tools	Average value of agricultural tools in each affected household is assumed to be Rf750.
4. Infrastructure	Here the irrigation wells and tubing, fences, shads, stored inputs and field huts, were considered at an average estimated value of Rf1,000.
5. Timber and forestry	Data are available at MFAMR from 115 affected islands.
6. Business loss	Traded value of agricultural produce at Male market (Statistical Year Book 2004, MPND) was considered as 50% of the total production as agricultural commodities are traded within/across islands/atolls and directly to resort markets.

9. **Other Observed Impacts:** MOFAMR has two agriculture stations in the outer islands. Research and development, training and demonstration programs are conducted at the stations. The southern station located at Laamu, Mendhoo island was the worst affected due to the disaster. 1,610 papaya plants, 100 banana tissue culture seedlings, 100 chili, 45 guava, 2,000 sweet potato cuttings and 4,000 taro plants



were damaged. Among these plots there were valuable 'mother plants' which were used for planting material production. This will severely affect the training programs scheduled at the station for 2005, as well hamper research and demonstration activities.

10. The impact of the disaster will be felt for a longer period of time. The tourism sector has only recently started relying on local farm produce. Most have in the past complained about unreliability of supplies from local producers. The confidence that has been built during the past is likely to be eroded once again due to the disaster. Hence, it is likely that some or most of the resorts will once again turn to imports even for those products that have in the recent years been supplied by local farmers.

11. The tsunami disaster has caused stress and trauma in many farming communities. Displacement of families either from their island or home may incur additional loss to the agriculture sector. Many are reluctant to start any farming activities, as they fear loss and devastation. More females than males are in this category as they are more emotionally vulnerable. Farm incomes depend strongly on the availability of the transport infrastructure accessible to the island. Destruction of jetties, harbors and transport vessels will impact the prices received and incomes earned by farmers.

12. Although no large forest exists in the islands, a number of forest shrubs and plants such as *Terminalia*, *Guettarda*, *Hibiscus*, *Cordia* and other commonly grown timber species are reported to be dying in the islands. Mangrove ecosystems are very vulnerable and it is reported that the surge of waves had completely washed off some of the mangrove areas.

## **F. Needs Assessment**

13. **Recovery Strategy:** MFAMR plans to complete the rehabilitation works in two phases to destroyed livelihoods should be immediately restored through short-term measures and improve agricultural productivities through the community development approach in the rehabilitation works by establishing informal farmer groups. In order to rehabilitate the agriculture sector, it is necessary to focus on short-term interventions and mid-term interventions. These needs identified from the assessment of the damages caused to the agriculture sector, as indicated above. Immediate needs focus on the supply of loss assets and infrastructure in order to restore agricultural livelihoods with minimum delay. Immediate interventions needs appropriate and timely replacement of loss productive assets and include supply of seeds and planting material, supply of fertilizer and basic agricultural tools, rehabilitation of soil and water resource in affected areas, and provision of extension services to facilitate recovery phase.

14. For mid-term strategy, as a part of Government's Development Plan, the agricultural productivity should be further strengthened through diversification and commercialization of agriculture from the subsistence farming. Immediately after the 2004 tsunami, the Government will undertake the ADB-assisted Agriculture Sector Review and prepare the agriculture master plan. In preparation of the master plan, the rehabilitation of the tsunami-affected agriculture activities could be included. The long-term recovery plan includes detailed assessment of status of land and water resource, strengthening marketing and support services, strengthening institutional capacity, and development of agricultural infrastructure.

15. **Assessment:** The total rehabilitation cost is estimated at Rf142.63 million (\$11.09 million equivalent). The rehabilitation estimates by phases for the agriculture sector are in Table 4.

- (i) Phase I: Short-term: Given the MFAMR estimates for damages, the immediate repair and replacement works in the agriculture sector are now estimated to cost Rf62.33 million (\$4.87 million).

- (ii) Phase II: Mid-term: MFAMR estimate for damages suggests that mid-term rehabilitation works are estimated to cost Rf80.30 million (\$6.27 million). These works will be taken up after detailed survey and verification by the consultants for completion by 30 June 2006. The community development approach will be applied to the rehabilitation works through informal farmer groups.

16. **Assessment and Mitigation of Risks:** There will be two risks in implementing the rehabilitation works, limited technical expertise of MFAMR and limited income generating opportunities. First, while the restoration of agriculture activities in the 112 agriculture islands requires intensive extension services, MFAMR's extension service is not adequate to provide the urgent recovery support required for restoration of the tsunami-affected agriculture sector. Therefore, technical assistance from development partners is required to provide foreign technical experts. In this aspect, coordination between the Government and development partners or among the development partners requires close monitoring of development for urgent restoration of the agriculture sector. Second, tsunami-affected farmers need urgent income-generating activities through other labor-intensive civil works to restore their livelihood. However, as MFAMR had limited experience in livelihood restoration activities, livelihood activities need to be flexible to introduce livelihood diversity, including group production and marketing and increasing the value added onto agriculture production through local skills training.

**Table 4: Needs Assessment for Agriculture Sector**

No	Activities	Phase I	Phase II	Total	
		Short-term	Mid-term	Amount	
		Rf Million	Rf Million	Rf Million	\$ Million
1	Replace basic production inputs and infrastructure	42.90	51.98	94.88	7.41
2	Improvement of soil, forestry <sup>1</sup> , and water resources in affected area	5.24	4.40	9.64	0.75
3	Provision of extension services to facilitate recovery phase	4.56		4.56	0.36
4	Detailed assessment of status of land, forestry, and water resources	3.20	4.12	7.32	0.57
5	Credit facilities	6.43	7.80	14.23	1.11
6	Human capacity building		2.00	2.00	0.16
7	Strengthening institutional capacity (adaptive research, multiplication of planting material, etc.)		6.00	6.00	0.47
8	Development of agricultural infrastructure in uninhabited islands		4.00	4.00	0.31
	<b>Total</b>	<b>62.33</b>	<b>80.30</b>	<b>142.63</b>	<b>11.14</b>
		<b>(\$4.87 M)</b>	<b>(\$6.27 M)</b>		

1 Includes perennial fruit trees

#### **F. Possible Recovery Plan**

17. **The Government:** The MFAMR would like to request the Government to allocate financial sources to meet the needs in the agriculture sector to immediately response to the needs of the affected atolls. In addition, the Government would like to get assistance from the development partners, including multilateral and bilateral donors, United Nations agencies, and international NGOs in order to assist the tsunami-affected farmers. Based the joint donors' assessment on the tsunami damage and needs, the

Government will seek any assistance from the potential development partners through a Donor Conference, which is tentatively scheduled in March 2005.

18. **Development Partners:** To respond the immediate needs to rehabilitate the tsunami damage, ADB plans to allocate \$2.2 million grant in its emergency assistance package expected to be approved by March 2005. The UN Food and Agriculture Organization and UNDP showed keen interest to participate in the recovery program.

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

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 m<sup>3</sup> 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 sore 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 Immediate	Phase II Mid-term Restoration		Total
	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 <sup>1)</sup>		0.14	0.14	0.27
Male International Airport <sup>1)</sup>		1.00	1.00	2.00
Civ.Av.Nav aids (Satelite.based)		1.00		1.00
<b>Total</b>	<b>1.00</b>	<b>21.89</b>	<b>1.14</b>	<b>23.03</b>

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



### **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 (m<sup>3</sup>)
  - 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 m<sup>3</sup>

#### **Entrance Channel**

- Typical area dredged is estimated from those identified = about 2,000 square meter (m<sup>2</sup>)
- Assume 3m in depth
- Unit price is Rf50 per m<sup>3</sup>, 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 m<sup>3</sup>, same as dredging
- For grading and compaction, assume Rf1,000 per m<sup>2</sup>

## **Annex 12 – Power Sector**

### **I. Introduction**

1. On 26 December 2004, a tsunami swept many islands of the Maldives resulting in the worst disaster ever to hit the country. It totally disrupted the power supply system in at least 95 islands (about 48% of the total islands with electricity) and left the population without electricity for days before the first technical team arrived to those islands to temporarily restore the electric power.

2. Various organizations are providing electric power in Maldives, with the State Electric Company Limited (STELCO), a government-owned enterprise, as the largest supplier. STELCO is currently responsible for supplying electricity to the capital island of Male and to 25 of the larger outer islands. In other outer islands, the electricity is being supplied by the Island Development Committees (IDCs), cooperatives, NGOs and small private companies. Each provider is responsible for both power generation and distribution to the households. Diesel-based generators are used to generate power in all islands. STELCO holds the largest share of power supply with a total installed generating capacity of 49 MW. The power supply in the resort islands is being taken care by the respective private resort operators.

3. The IDCs are community-based extensions of the Government and are the grass root institutions involved in the development of the islands. NGOs running power supply systems range from community-based formal and registered organizations to informal community clubs using the sale of electricity as a fund-raising activity. The private sector companies are operated and owned by small-scale family entrepreneurs, or by more substantial private companies. In some of the outer islands, more than one electricity provider is operating in one island. The generating capacity of the electricity providers in the outer islands is estimated at 16 MW. Distribution network from the generators comprises mainly underground low voltage cables, except in Male and a few large islands where high voltage cables are used.

4. The Maldives Electricity Bureau (MEB) is responsible for regulating generation, distribution, and utilization including tariff setting. MEB has just recently established an electricity standard by adopting the Singapore standards. However, MEB does not have sufficient resources to enforce the standards and regulations to the outer islands and therefore, in many islands the electricity installations do not meet the safety standards.

5. At the request of the Government of the Maldives, a joint Asian Development Bank, the United Nations, and the World Bank mission visited the Maldives from 5 to 17 January 2005, and from 1 to 2 February 2005. The Mission's objective is to help the Government assess the damages caused by the tsunami, identify and prioritize the emerging needs.

### **II. The Government's Immediate Response**

6. Immediately after the disaster, the Government created a National Disaster Management Center (NMDC) that immediately collected information on the status of affected islands and regularly updates them. The NMDC is also coordinating assistance received from various groups, including government and private companies.

7. Despite of the different organizations providing the electric power, the Government has assigned STELCO to send teams to 53 most affected outer islands, including 4 STELCO's islands. STELCO has been able to quickly restore the electricity in their 4 islands and has temporarily restored electricity in many of the affected outer islands, if only to a bare minimum in terms of providing electricity in the

islands' offices and the temporary tents in the evening. STELCO's teams have been able to repair some of the damaged generators and provide temporary small generators in a few islands.

### III. Methodology of Damage and Needs Assessment

8. **Consultation and Site Visit.** The Mission held discussions with staff from the Ministry of Planning and National Development (MPND), the Ministry of Finance and Treasure (MOFT), STELCO, and staff from international organizations. The Mission also visited Kolhufushi and Naalaafushi islands in the Meemu Atoll and discussed with some community members and the deputy chief of the respective islands.

9. **Methodology.** The methodology to collect the data is two-fold: (i) through questionnaires to be filled by the islands chief; and (ii) through STELCO's teams to collect the information first hand. The data on the immediate assessments carried out by STELCO's team as well as by the NDMC was analyzed by the Mission and provides the basis for this report.

### IV. Damage Assessment

10. According to the data collected, the extent of damage varied from island to island. In almost all affected islands, the damage occurred to the distribution network, i.e. cables, distribution boxes, and household connections. The strong wave scoured the ground (which is mainly sand), pulled out the cables and tore them. In some islands, the powerhouses, generators and switchboards were also damaged to a varying degree; some of the generators can be repaired and others have to be replaced. Streetlights in a few islands were also damaged.

11. Much of data were collected in the period immediately after disaster where the attention was more on the relief effort. This situation was aggravated by the non-functioning communication systems, which made the transmission of data difficult. Table 1 summarizes the damage assessment (for details see Attachment 1).

**Table 1: Summary of the Damaged Power Supply Facilities**

Damaged Facilities	Number
Power House	24 nos.
Generator	104 nos.
Streetlights	652 nos.
Switchboards	34 nos.
Cables	>121 km
Distribution boxes	632 nos.

12. This data has to be interpreted carefully to come up with the reasonable cost estimates. The number of generators damaged is 104; however, it does not necessarily imply that all 104 generators have to be replaced. There are some that can be repaired, and not all those generators were used in the first place. On the other hand, the length of damaged cable is estimated at 121 km, but based on the Mission's observation during field visit, it is believed that the actual requirement is much higher.

13. The direct cost of the damage will be the replacement cost of the damaged equipment, including the installation cost which is estimated at about \$4.6 million (see reconstruction cost in para. 15 below). No indirect cost of the damage is envisaged.

## V. Needs Assessment

14. **Immediate Needs.** To restore the power supply system on a more permanent basis within the shortest possible time, repairing the damaged generators, replacing the damaged cables and distribution boxes, are considered a priority. STELCO has prepared cost estimates for immediate rehabilitation of the power supply within 6 months amounting to about \$1.9 million. These estimates do not include the cost for repair in 4 STELCO islands, which is considered minor and for which STELCO has assumed full responsibility (STELCO has submitted a claim to the insurance company on the damage of their generators and switch boards).

15. **Medium-Term Needs.** To bring back the system to the pre-disaster level, more time, resources and detailed survey will be needed. It is estimated that such a reconstruction program will cost an additional \$2.7 million and will be completed within 1.5 to 2.0 years. This will bring the total cost to \$4.6 million. A summary of the cost estimates is presented in Table 2 below, while the details are in Attachment 2.

**Table 2: Summary of Cost Estimates**

No.	Description	Phase 1		Phase 2		Total
		MRf ('000)	\$ ('000)	MRf ('000)	\$ ('000)	\$ ('000)
<b>1.</b>	<b>Equipment</b>					
a.	Generators	0.00	0.00	7,096.88	555.44	554.44
b.	Switchboard	6,120.00	478.13	0.00	0.00	478.13
c.	Cables	7,650.00	597.66	0.00	0.00	597.66
d.	Distribution boxes	2,875.60	224.66	0.00	0.00	224.66
e.	Streetlights	0.00	0.00	1,773.44	138.55	138.55
f.	Tools	0.00	0.00	1,035.00	80.86	80.84
g.	Accessories	525.28	41.12	88.67	6.93	48.04
h.	Fuel tanks	0.00	0.00	6,900.00	539.06	539.06
i.	Meters and consumer panel	0.00	0.00	4,876.00	380.94	380.94
	<b>Subtotal (1)</b>	<b>17,171.88</b>	<b>1,341.55</b>	<b>21,769.99</b>	<b>1,700.78</b>	<b>3,042.33</b>
<b>2.</b>	<b>Works</b>					
a.	Transport of equipment	1,717.19	134.16	1,487.00	116.17	250.33
b.1.	Installation of generators	0.00	0.00	580.00	45.31	45.31
b.2.	Installation of cables	4,500.00	351.56	0.00	0.00	351.56
b.3.	Installation of distr. Boxes	442.40	34.56	0.00	0.00	34.56
b.4.	Installation of streetlights	0.00	0.00	326.00	25.47	25.47
c.	Construction of powerhouse	0.00	0.00	11,500.00	898.44	898.44
	<b>Subtotal (2)</b>	<b>6,659.59</b>	<b>520.28</b>	<b>13,893.00</b>	<b>1,085.39</b>	<b>1,605.67</b>
	<b>Total</b>	<b>23,831.47</b>	<b>1,861.83</b>	<b>35,662.99</b>	<b>2,786.17</b>	<b>4,648.00</b>

16. The reconstruction of power supply system will be a considerable challenge because the limited number of experts available in the country. While community members can participate in certain labor-intensive works such as constructing the powerhouses and laying the underground cables to help provide

jobs that are badly needed, most of the experience electrical technicians and engineers are working with STELCO. The number of qualified local contractors is also limited. Given the large amount of reconstruction works to be immediately carried out, assistance from international and local organizations will be needed and should be well coordinated. A summary of priority steps is presented in Attachment 3.

17. The next stage would be to further improve the power supply system in the affected islands. However, this stage is considered beyond the scope of the emergency reconstruction efforts and should be handled in an annual development planning and programming.

18. It should be emphasized that the power supply facilities are not the Government's asset, as they mostly belong to the IDCs as the electric power provider. However, because of the natural disaster, the Government may decide to finance the reconstruction works, including replacement of the damaged facilities. It is understood that the Government would do this on a grant basis to the IDCs.

## **VI. Response from International Agencies**

19. The International Federation of Red Cross and Red Crescent Societies (IFRC) had immediately provided generators, cables and distribution boxes. A total of 22 generators of 20 to 150 kW capacity have been delivered and installed in 22 affected islands. Those generators have been operating since 29 January 2005. The grant from IFRC was valued at \$0.6 million. It is recommended that IFRC also provide spare-parts for at least 2 years of operation of the generators.

20. The British Royal Navy teams assisted STELCO in installing the new generators from IFRC and repairing some of the damaged generators in January 2005.

21. The United Nation Development Program (UNDP) will provide cables and distribution boxes to compliment the equipment provided by IFRC. The total fund available is \$0.3 million, granted by the United Nation Foundation.

22. It is recommended that the Government coordinate the relief efforts to avoid duplication and to know exactly if there is a funding gap. A summary of input that may be provided by different parties is in Attachment 4.

## **VII. The Long Term**

23. **Long-Term Strategy.** The Government recognizes that providing reliable and efficient power supply in the outer islands will contribute to the national development objectives by reducing the disparities in services among the islands and the vulnerability of the outer islands populations. The Government has therefore given high priority to improved electrification in the outer islands, and prepared a Sector Policy on Outer Islands Electrification in June 2001. The aim is to establish the financial viability of the outer islands power providers and place them on a sound footing. The sector policy also highlights the importance of strengthening sector entities including implementing agencies, island power providers, and sector regulators to build their capacity in long-term development planning and management of power supply systems in the outer islands.

24. Based on the policy, the Government has established investment strategies and priorities to improve power supply in the outer islands on an affordable and sustainable basis. Of the 97 focus islands, 75 were identified for improvement of electricity supply.

25. **Issues for Long-Term Planning.** While the tsunami disaster may have no impact to the sector policy, the investment strategy may need to be slightly modified in terms of islands targeted for the improvement of power supply system. As some of the focus islands were badly affected by tsunami and the populations of those islands were evacuated to other islands, the Government is currently considering to permanently relocate those people in selected “host islands”. While taking account of the possible change of the target islands, the outer islands electrification improvement program clearly remains a priority and should be continued in an accelerated pace to achieve the objectives of the sector policy.

### **VIII. Next Steps**

26. To complement the Government’s efforts to reestablish the power supply in the shortest possible time, the Mission recommends to the Government the following to be considered as next steps:

- (i) Assign STELCO to carry out detailed survey to all affected islands to come up with more reliable data and more accurate cost estimates.
- (ii) Coordinate the repair and reconstruction program to be implemented by STELCO with assistance from international agencies and local organizations to avoid duplication.
- (iii) Continue the outer island electrification improvement program, specifically by expediting the implementation of the ongoing Outer Islands Electrification (Sector) Project.

Attachment 1

Damage Assessment Report of Power Supply Facilities

No.	Name of Islands	Number of Main Equipment Damage				
		Power House	Generator		Cables (m)	Distribution Boxes (No)
			No.	Capacity (kW)		
	<i>Haa Alif Atoll</i>					
1	Vashafaru		1	40		4
2	Filadhoo				330	4
3	Hathifushi		1	10		
4	Baarah				670	6
	<i>Haa Dhaal</i>					
5	Naivaadhoo				160	1
6	Nolhivaranfaru				1,020	
7	Nellaidho		1	60		
8	Kulhudhuffushi					1
9	Vaikaradhoo				3,840	1
10	Maavaidhoo				100	1
	<i>Shaviyani Atoll</i>					
11	Kaditheemu				7,521	5
12	Feidhoo					Damaged
13	Feevah	1	1	50		25
14	Maakandhoodhoo	1	2		240	15
15	Maroshi	1	3	40	8,000	31
16	Komandoo				2,600	13
17	Narudhoo					6
18	Noomara					8
19	Maaugoodhoo		1		Damaged	2
	<i>Noonu Atoll</i>					
20	Maafaru	1	4	106	12,000	50
21	Kudafari	1	3	40	1,400	3
22	Holdhudhoo					4
	<i>Raa Atoll</i>					
23	Kandholhudhoo		2	300	14,000	10
24	Maduvvari				Damaged	4
25	Meedhoo					1
	<i>Baa Atoll</i>					
26	Kendhoo		2	80	200	2
27	Kihadhoo		1	40		1
28	Dhonfaru					2
29	Dharavandhoo					Damaged
30	Eydhafushi					2
31	Fehendhoo		2	10		

No.	Name of Islands	Number of Main Equipment Damage	No.	Name of Islands	Number of Main Equipment Damage	No.
32	Goidhoo		5	40	1,372	20
	<i>Lhaviyani Atoll</i>					
33	Olhuvelifhushi	1				10
34	Maafilaafushi				1,400	
	<i>Kaafu Atoll</i>					
35	Kaasidhoo (STELCO Island)		2	200		1
36	Gaafaru				200	1
37	Dhiffushi		1	60		1
38	Thulusdhoo				500	2
39	Gulhi					2
40	Huraa					8
41	Himmafushi (STELCO Island)		3			2
42	Maafushi (STELCO Island)	1				27
43	Guraidhoo (STELCO Island)				Damaged	Damaged
	<i>Alif Alif Atoll</i>					
44	Mathiveri		2	96	1,600	
45	Bodufolhudhoo					2
	<i>Alif Dhaal</i>					
46	Mandhoo					Damaged
47	Dhagethi		1	100		Damaged
48	Fenfushi				Damaged	
	<i>Vaavu Atoll</i>					
49	Fulidhoo		2	68	800	5
50	Felidhoo	1			Damaged	Damaged
51	Keyodhoo				650	20
52	Rakeedhoo		2	20	500	3
53	Thinadhoo					5
	<i>Meemu Atoll</i>					
54	Madifushi	1	2	16		Damaged
55	Veyvah		1	55		
56	Muli	1	3	244	1,750	34
57	Naalaafushi		1	50	300	3
58	Kolhufushi	1	4	184	2,100	5
59	Dhiggaru		1	80	1,600	Damaged
60	Maduvvari		1	40	1,300	6
	<i>Faafu Atoll</i>					
61	Magoodhoo				Damaged	1
	<i>Dhaalu Atoll</i>					



No.	Name of Islands	Number of Main Equipment Damage	No.	Name of Islands	Number of Main Equipment Damage	No.
62	Meedhoo	1	3	168	3,600	22
63	Ribudhoo				800	
64	Hulhudheli				500	
65	Gemendhoo	1	4	22	Damaged	22
66	Vaane	1	3	71		
67	Maaeoodhoo		2	40	4,800	13
	<i>Thaa Atoll</i>					
68	Buruni		1	14	2,132	6
69	Vilufushi	1	3	180	2,500	21
70	Madifushi	1	3	50	3,500	15
71	Dhiyamigili	1	3	31	3,500	44
72	Guraiddhoo	1	1	100	8,000	21
73	Hirilandhoo				500	
74	Omadhoo				2,500	10
75	Vandhoo	1	1	28	2,400	
76	Gaadhiffushi	1	2	32	3,000	26
77	Thimarafushi				3,200	6
78	Kinbidhoo		2	80	3,000	39
	<i>Laamu Atoll</i>					
79	Isdhoo		1	80	296	3
80	Dhabidhoo		4		Damaged	Damaged
81	Maabaidhoo		2		1,000	20
82	Mundhoo	1	3	65	800	23
83	Kalhaidhoo	1				Damaged
84	Gamu	1			5,000	28
85	Fonadhoo		3			39
86	Gaadhoo		3	31		
87	Kunahandhoo		4	63		7
	<i>Gaaf Alif Atoll</i>					
88	Viligili		1	200		18
89	Maamendhoo	1				2
90	Dhaandhoo					1
91	Kodey				1,000	
92	Dhiyadhoo				1,322	1
	<i>Gaaf Dhaal Atoll</i>					
93	Hoadedhoo					Damaged
94	Gadhdhoo					11
95	Thinadhoo				1,240	

## Attachment 2

## DETAILED COST ESTIMATES FOR RECONSTRUCTION

No. Description	Total					Phase 1			Phase 2		
	Quantity	Unit	Unit Price MRf	MRf	US\$	Quantity	MRf	US\$	Quantity	MRf	US\$
<b>1. Equipment</b>											
a. Generator	29	no.	244,720	7,096,880	554,444	0	0	0	29	7,096,880	554,444
b. Switchboard	34	no.	180,000	6,120,000	478,125	34	6,120,000	478,125	0	0	0
c. Cables	150,000	m	51	7,650,000	597,656	150,000	7,650,000	597,656	0	0	0
d. Distribution boxes	632	no.	4,550	2,875,600	224,656	632	2,875,600	224,656	0	0	0
e. Street lights	652	no.	2,720	1,773,440	138,550		0	0	652	1,773,440	138,550
f. Tools	23	no.	45,000	1,035,000	80,859	0	0	0	23	1,035,000	80,859
g. Accessories		LS		614,952	48,043		526,280	41,116	0	88,672	6,928
h. Fuel Tanks	23	no.	300,000	6,900,000	539,063	0	0	0	23	6,900,000	539,063
i. Meters and consumer meter panel	2,000	hh	2,438	4,876,000	380,938	0	0	0	2,000	4,876,000	380,938
<b>Subtotal (1)</b>				<b>38,941,872</b>	<b>3,042,334</b>		<b>17,171,880</b>	<b>1,341,553</b>		<b>21,769,992</b>	<b>1,700,781</b>
<b>2. Works</b>											
a. Transport of equipment		LS		3,204,187	250,327		1,717,188	134,155	0	1,486,999	116,172
b.1. Installation of generators	29	no.	20,000	580,000	45,313	0	0	0	29	580,000	45,313
b.2. Installation of cables	150,000	m	30	4,500,000	351,563	150,000	4,500,000	351,563	0	0	0
b.3. Installation of distribution boxes	632	no.	700	442,400	34,563	632	442,400	34,563	0	0	0
b.4. Installation of streetlights	652	no.	500	326,000	25,469	0	0	0	652	326,000	25,469
c. Reconstruction of Power House	23	no.	500,000	11,500,000	898,438	0	0	0	23	11,500,000	898,438
<b>Subtotal (2)</b>				<b>20,552,587</b>	<b>1,605,671</b>		<b>6,659,588</b>	<b>520,280</b>		<b>13,892,999</b>	<b>1,085,391</b>
<b>Total</b>				<b>59,494,459</b>	<b>4,648,005</b>		<b>23,831,468</b>	<b>1,861,833</b>		<b>35,662,991</b>	<b>2,786,171</b>

**Attachment 3**

**Assessed Needs and Commitments**

<b>Priority</b>	<b>Issue</b>	<b>Resource Needs</b>	<b>Commitments</b>
Ensuring power supply in the tsunami-affected islands.	Power supply has to be restored up to the pre-disaster level in a shortest possible time.	<p>Reliable data and costs estimates are needed for:</p> <ul style="list-style-type: none"> <li>a. Electrical equipment and materials</li> <li>b. Installation of equipment, including distribution system, and connection to the households.</li> </ul>	<ul style="list-style-type: none"> <li>a. Part of the equipment and materials have been committed by the IFRC.</li> <li>b. Some of the damaged generators will be repaired by a team from the British Royal Navy.</li> <li>c. STELCO has started considerable works in temporarily restoring the power supply and will continue to install the equipment, although its resources are limited.</li> <li>d. UNDP will procure and install cables and distribution boxes using funds from the UN Foundation.</li> </ul>

## Attachment 4

### Summary of Inputs by International and Local Agencies and Communities

IFRC	British Royal Navy	UNDP	STELCO
<ul style="list-style-type: none"> <li>• Provide part of the required equipment, including generators, cables, distribution boxes, accessories and spare-parts.</li> </ul>	<ul style="list-style-type: none"> <li>• Together with STELCO, repair some of the damaged generators.</li> </ul>	<ul style="list-style-type: none"> <li>• Provide and install part of the required equipment, mainly cables.</li> </ul>	<ul style="list-style-type: none"> <li>• Carry out emergency repair of power systems in all affected islands.</li> <li>• Conduct survey of the requirement of equipment.</li> <li>• Together with the British Royal Navy, repair some of the damaged generators.</li> <li>• Install the new equipment to be provided by the IFRC in some of the islands.</li> </ul>

## **Annex 13 - Environment**

### **Introduction**

#### ***1.1. Background***

At around 7.58 am local time on 26 December 2004 an undersea earthquake, with a magnitude of 9 on the Richter scale, occurred some 250 kilometers off the coast of Sumatra, Indonesia. It triggered a devastating tidal wave or “tsunami” measuring around 10 meters high and traveling at 500 km/hour. It hit several countries in the Indian Ocean, including Indonesia, Sri Lanka, India, Thailand, Myanmar, Bangladesh, the Maldives, the Seychelles, Yemen, Somalia, Kenya and Tanzania. The first quake was followed by aftershocks ranging from 6 to 7.3, themselves large enough to destroy thousands of lives and livelihoods. It is estimated that as many as 150,000 people may have lost their lives. The final death toll is likely to be higher. In response to the disaster, the UN system at the country level began assessing urgent humanitarian needs in order to launch a flash appeal to the international community for urgent funding. The United Nations “Indian Ocean Tsunami/Earthquake Flash Appeal” was launched on 6th January 2005. The appeal focuses on providing emergency requirements as well as some medium term recovery needs for people in Indonesia, Maldives, Myanmar, Seychelles, Somalia, Thailand and Sri Lanka from January to the end of June 2005. In total it calls for US\$ 977 million to fund the critical work of some forty UN agencies and NGOs. Following the launch of the Flash Appeal the focus of the United Nations (UN) and the International Financing Institutions (IFI) has shifted towards promoting an effective transition towards recovery and reconstruction of the Maldives. In order to support the reconstruction of the Maldives, the United Nations, World Bank and Asian Development Bank jointly undertook a Needs Assessment during 11-14 January to form the basis for the recovery and reconstruction budget for the Maldives until 2008. The Needs Assessments were based on data gathered during field visits and on interaction with Maldivian stakeholders. Each of the sectors have produced a sectoral report highlighting their priorities and budgetary requirements for the immediate post-tsunami period (0- 6 months), as well as indicative priorities for the remaining period of 2005 until 2008, taking into account the humanitarian/reconstruction needs of the Maldives as well as the absorptive capacity within the government and economy. UNEP has been the focal point for developing an environmental needs assessment as well as for integrating environmental actions along with budgetary requirements into each sector.

#### ***1.2. Scope and Approach for the Environmental Needs Assessment***

Immediately following the disaster, the Joint UNEP-OCHA Environment Unit sent an environmental expert to the Maldives as part of the United Nations Disaster Assessment Team (UNDAC). The UNEP expert was tasked to assess the nature and scale of the environmental emergency. In consultation with the UNDAC team and the Ministry of Environment and Construction (MEC), site assessment missions were undertaken to three representative inhabited islands that were severely impacted by the tsunami: Guraidhoo Island (Kaafu Atoll), Vilifushi and Guraidhoo Islands (Thaa Atoll) and, two sites of specific environmental interest were also visited: Male Harbour and the main landfill on Thilafushi Island. Following a request from the Maldivian Government, the UNEP Asian Tsunami Task Force sent a waste management expert to the Maldives. The UNEP experts were tasked to collect information on environmental impacts and needs, meet with key Maldivian environmental stakeholders including Ministries, Research Institutes, international agencies, and NGO's, as well as to work with available sector task managers on integrating environmental issues within recovery and reconstruction plans. Consultative meetings were held with the Environmental Assessment Section of the Ministry of Environment and Construction (MEC) during the period 11-14 January 2005. This environmental needs assessment report is based on the information collected by the UNEP experts in this initial period. It represents the first preliminary assessment of the main categories of environmental impacts caused by the disaster in order to inform the immediate relief needs, as well as the medium-term rehabilitation and reconstruction needs. Given the rapid implementation of this

assessment, detailed impact assessments are still required in order to understand the full magnitude and scope of the disaster.

## 2 Environmental Context

### 2.1. Physical Environment

Even more than most island nations, the Maldives are highly dependent on the fragile ecosystem of their coral reef islands. Facing rising sea levels and climate change, the tsunami has proven once again the extreme vulnerability of small island states. It was reported that 35% of the country's 199 inhabited islands had been subject to high or very high impact by the tsunami with major physical damage to buildings, infrastructure, crops and natural vegetation.

### 2.2. Environmental Impacts and Issues

Based on the preliminary assessment work, the following main environmental issues have been identified:

#### A. Tsunami-Related Environmental Damage

- **Disaster waste:** vegetation, re-distributed domestic and hazardous waste, drums, large amounts of demolition waste have been spread over the impacted islands.
- **Groundwater contamination:** shallow freshwater aquifers impacted by infiltrated flood water, oil spillage from generator stores and leaks from septic tanks.
- **Coral reef damage:** potential damage caused by direct wave impact as well as secondary damage from sedimentation and excessive amounts of debris.
- **Coastal damage:** extensive beach erosion and damage to coastal protection measures
- **Beach, soil, vegetation and crop damage:** extensive washing-off of soils, stress and dieback noted in certain species from direct impacts as well as possible salt contamination

#### B. Chronic Degradation of the Environment

- **Sea-Level rise:** linked to global warming, threatens to impact the low lying islands
- **Sewage:** lack of sewage collection and treatment systems
- **Solid Waste:** inappropriate disposal systems especially for hazardous and clinical wastes
- **Coastal water:** pollution by disposal of raw sewage and industrial effluent
- **Natural resource depletion:** including coral sand mining and exploitation of reef resources (over-fishing)
- **Chemical management:** Unregulated use of asbestos, PCBs, anti-fouling agents and pesticides

### 2.3. Institutional Structures for Environmental Governance

In the Republic of Maldives, the Ministry of Environment and Construction (MEC) has the main institutional responsibility for the environment. Within the Ministry, the Environment Division employs 23 staff over 4 main divisions (Assessment and Management, Law and Policy, Planning and Coordination, and, Administration and Information). The Environment Research Centre fulfils the function of providing decision makers with required research and data. The technical capacity of the Ministry to carry out its mandate is limited due to financial and human resource constraints. In addition, it is clear that the current environmental needs exceed the existing financial resources of the Ministry, despite increasing budget allocations in the recent years. The main environmental legislation is the Environment Protection and Preservation Act of Maldives (Law number 4 of 1993). This Enabling Act is concise and lays down the basic responsibilities and duties with regard to the environment but requires many by-laws or regulations to fully implement the legislation. In addition, the monitoring, inspection and enforcement capacities of the Ministry are weak and in some cases even non-existent. The environmental responsibilities of the sectoral ministries are poorly defined and

the co-ordination mechanisms are not present. Against this institutional background, international assistance will be required to address the environmental impacts created by the tsunami disaster.

### 3 Environmental Needs

#### 3.1. Immediate Priorities

**Disaster Waste Management:** The tsunami caused the widespread deposition of vegetation, coral sand, municipal waste from dumps sites, healthcare waste and human excreta from damaged septic tanks, hazardous substances (oils, asbestos, batteries, etc.) and demolition waste (concrete, coral fragments, timber, etc.) from destroyed buildings waste across impacted islands. This waste represents a risk to human health and may impact soils and groundwater. A survey of the impacted islands should be undertaken to determine the nature and scale of the disaster waste management problem. Following the survey remedial action plans (including training in health and safety and appropriate clean-up and disposal techniques) are required. The remedial options include waste segregation by hand or powered shovel (Bobcat-type), with demolition waste being stockpiled, hazardous waste removed (including drums and barrels, asbestos-containing materials, batteries, etc.), metal scrap (reinforcing bar, gas canisters) and plastics. The remaining organic matter would either be shredded and re-placed, to form a compost-layer on the soil, removed to suitable temporary landfills or the three main landfills in the Maldives. The demolition waste could either be re-used in the reconstruction process (sub-base material for foundations) or formed into elevated platforms that could be used as refuges in times of flood, storm surge or tsunami. The cost given here is in addition to those in Annex 4. *Estimated cost: \$1.5 million.*

**Assessment of Environmental Threats to Human Health:** The impact of the tsunami on groundwater salinity, flooding of generator fuel depots, indiscriminate dumping of municipal and hazardous waste especially in remote island communities, the use of pesticides and fertilizers on some resorts and agricultural islands, poor sanitation (septic tank failure) has a potential to impact human health. An immediate groundwater assessment is needed to identify the location of the contaminated sites and to provide recommendations for risk reduction and remediation. *Estimated cost: \$750,000.*

**Coral Reef Impact Assessment Programme:** The impacts of the tsunami on the coral reefs, including the secondary effects on the fishery and tourism sectors, are still to be properly assessed. The scale of the disaster combined with the size of the reef system (7<sup>th</sup> largest in the world) has resulted in a lack of data and information on physical, biophysical and ecological information on status of coral reefs system. In addition, impacts from tourism, land reclamation, harbour development and maintenance, and reef blasting for access channels have all been poorly identified. It is proposed that a comprehensive reef impact assessment programme is initiated. *Estimated cost: \$1.25 million*

**Biodiversity Survey and Recovery Plans:** The tsunami resulted in saltwater intrusion into fresh water lenses on almost all of the country's 1,200 islands. The immediate impacts on vegetation of browning and dieback were visible within days of the disaster. Agricultural land, back yard farming, wetlands, as well as mangrove and other coastal vegetation have all been affected. The impacts of saltwater in the swamps and wetlands can have further impacts on the flora and fauna, including bats and crows. It is recommended that a biodiversity survey (botanical and faunal) be conducted to establish damage to biodiversity and existing habitats and to improve the existing baseline data on biodiversity. Specific attention should be paid to the recently established Hithadhoo Protected Area and the to be established protected areas on GA. Hithadhoo and ADh. Hurasdhoo. In addition, Management and Recovery Plans for immediate impacts on local biodiversity should be developed. *Estimated cost: \$900,000.*

**Strategic environmental assessment of overall rehabilitation and reconstruction program:** All plans and projects for rehabilitation and reconstruction must be strategically assessed to understand their individual as well as cumulative environmental impact in order to take decision on mitigation. To achieve this goal, urgent capacity building support and technical assistance on rapid project environmental screening procedures is required by the MEC and the Ministry of Planning and

National Development to jointly review all reconstruction plans and projects, assess impacts and identify options for mitigation. The strategic assessment should be initiated within weeks, and the project environmental screening interim guidelines should be developed urgently. *Estimated cost: \$300,000.*

**Strengthening Environmental Governance at the National, Atoll and Island Levels:** The Environmental Division of MEC represents an important mechanism for monitoring and controlling impacts to the environment and integrating the environment into other ministerial sectors. However, it is clear that investment is required to enhance the capacity and skills of the environmental administration by training them in environmental best practices and providing them with sufficient equipment, operating budgets and guidelines to initiate environmental monitoring, enforcement, clean up and conduct proactive environmental assessment and management. *Estimated cost: \$1.15 million*

### **3.2. Medium-Term Priorities**

**Development of a Sustainable Waste Management System:** The current waste management practices including the open burning of waste, stockpiling of hazardous wastes, dumping of waste on islands, beaches and the open sea are poor. A new sustainable waste management system should be developed based on the construction of simple composting, recycling and waste incinerators at island level combined with centralised integrated waste management facilities (waste processing unit, to separate hazardous waste, metals, organics, combustibles, plastics and glass, a composting unit, low technology incinerator and lined landfill to accept ash residues). Hazardous wastes should be collected and treated/stored. Waste oil should be used for energy utilization. Construction and demolition waste should be crushed and recycled for use as aggregate or used for infilling material for land reclamation projects and for 'selected fill' to profile and cover new landfills. In addition, the Maldives should develop a national waste management policy/system, develop a regulatory framework (permits, inspection and enforcement), adopt appropriate waste reduction strategies and cost-recovery mechanisms and promote private sector involvement and recycling. A number of landfills including the main Thilafushi site require urgent remediation (municipal waste deposited directly into the sea, uncontrolled burning, poor hazardous waste storage) and re-engineering to modern design standards. *For further discussion and costs, see also Water and Sanitation Sector Report.*

**Sewage and Wastewater Management System:** Apart from a few resort islands, no sewage is treated in the Maldives. Anecdotal evidence indicates that faecal material is frequently visible on the shores of Male Island and that the groundwater at Male is impacted by leaking sewers. In addition, it was reported that few septic tanks on the islands were de-sludged and that a large number were damaged by the tsunami. It is recommended that a comprehensive and detailed review of sewage treatment and related improvement measures be undertaken combined with the adoption of bathing water standards. For further discussion and costs, see also Water and Sanitation Sector Report.

**Climate Change Programme:** Climate change and predicted sea level rise is of grave importance to the Maldives. The estimated predicted sea level rise of 0.09m to 0.88m in the period 1990 to 2100, combined with increased extreme weather occurrences, makes the Maldives one of the most vulnerable countries to climate change and sea level rise. The small sizes of the islands forces human settlements and vital infrastructure to be located near the coast and thus at high risk. There is an urgent need to include climate change predictions in the reconstruction phase and future land use planning. The recommended projects include undertaking a vulnerability assessment and establish a network of monitoring sites for sea level rise and coastal erosion, climate change awareness raising workshops for policy-makers, media, educators and the general public and the development of guidelines to integrate climate change issues into land reclamation projects. For further discussion and costs, see Disaster Management and Vulnerability Reduction Sector Report.

**Coastal Zone Management:** The extent of damage to the coastal environment caused by the tsunami has not been established. Damage to coastal infrastructure, such as quay walls, breakwaters and causeways, as well as extensive beach erosion, has been reported. In order to provide critical



information for the design of coastal engineering and disaster management structures it is recommended that the hydrodynamics around reef top islands are studied including capacity building in the field of coastal engineering and undertaking studies into appropriate erosion management techniques and the development of technical guidelines for shore protection methods and procedures. These studies and guidelines would be prepared by a newly created Coastal Zone Engineering Unit. *Estimated cost: \$ 1.5 million.*

**Disposal Facilities for Clinical Wastes:** There is no proper system for collection and disposal of clinical wastes at present in the Maldives. It is a matter of urgency that equipment (incinerators) is procured and guidelines are prepared for separate collection and safe disposal of clinical wastes in all hospitals and clinics. *For further discussion and costs, see Health Sector Report.*

**Hazardous Substances Control Programme:** There are no regulations for the use, procurement and disposal of hazardous substances in the Maldives including asbestos, polychlorinated biphenyls (PCBs), anti-fouling paints (tributyl tin) and pesticides. A control programme should be initiated. *Estimated cost: \$450,000.*

**Development of Ambient Air Pollution Control Regime:** The capital city of Male has a high population density, high vehicle number and intense construction activity. All of these factors contribute to local air pollution (SO<sub>x</sub>, NO<sub>x</sub> and particulates including unburnt fuels). Although air quality issues are primarily restricted to Male, other centres of population may also be impacted by the uncontrolled burning of wood, waste and dust generated from unpaved roads. There is a need for the development of an ambient air pollution control regime including the following: ambient air standards, monitoring (mobile and fixed), emission limits, inspection, regulation and enforcement action. *Estimated cost: \$750,000.*

**Development of Integrated Transport System:** The marine transport system is based on the ad-hoc use of small vessels which use large volumes of poor-grade marine fuels resulting in elevated emissions of CO<sub>2</sub>, SO<sub>x</sub>, NO<sub>x</sub> and particulates. A scheduled marine transport system should be developed that includes the procurement of larger, more-fuel efficient ferries, the development of harbours and feeder services. Although land-based transport is primarily restricted to the congested city of Male, other islands are constructing roads and allowing vehicles to be imported. A land-based transport system should be developed based on the promotion of public transport, the use of unleaded fuel, replacement of petroleum driven vehicles with liquefied petroleum gas (LPG) or electric vehicles and regular vehicle maintenance and inspections. The import and use of vehicles on small islands should be restricted. *For further discussion and costs, see Transport and Maritime Infrastructure Sector Report.*

**Environmental Land-Use Planning:** The Maldives has limited land-use planning policies and strategies. Procedures should be developed for identifying and controlling development in areas vulnerable to flooding, storm surge and nature reserves (forests or endangered species habitats). *For further discussion and costs, see Housing Sector Report.*

**Sustainable Construction Design and Building Codes:** The current construction and building codes are limited to government buildings. New codes should include sustainable development criteria, such as the potential for reusing construction and demolition (C&D) waste (crushed concrete, etc.), energy efficient materials (solar heating, lighting, thermal insulation, etc.) and the use of CFC-free refrigerants in air conditioning units. In addition, the building codes should include design standards to minimize structural damage during flood events. *For further discussion and costs, see Housing Sector Report.*

**National Environmental Contingency Plan:** The Maldivian islands are vulnerable to natural disasters, such as flooding, storm surge and tsunamis. The Maldives imports all of its fuels (approximately 346,552 tonnes per annum), creating a potential risk of oil spills. It is important that a national environmental contingency plan be developed to enable swift reactions to natural disasters and oil spills and to ensure that environmental impacts are properly managed. *Estimated cost range for*

*design and implementation of national oil spill response plan: \$450,000. For further discussion and costs, see the Disaster Management and Vulnerability Reduction Sector Report.*

**Environmental Management of Diesel Generators:** All of the inhabited islands of the Maldives are supplied by diesel generators. There are no regulations to ensure the safe storage and handling of diesel fuel and diesel engine oil, as well as safe disposal of used diesel engine oil. Key objectives of this program are to prevent leaks and spills of diesel fuel and disposal of used diesel engine oil in open land fields, both of which cause contamination of soil, surface water, and/or groundwater resources. In addition, an incentive programme (subsidies) should be initiated for the procurement of energy-efficient, low-noise generators fitted with spill avoidance equipment. Spill control kits and a spill reporting mechanism should also be developed. *For further discussion and costs, see the Power Sector Report.*

**Energy Conservation and Promotion of Renewable Energy:** The government should promote the use of energy efficient appliances and renewable energy sources through suitable mandatory and voluntary programmes accompanied by national awareness campaigns. *Estimated cost: \$450,000.*

**Environmental Awareness Building:** Environmental awareness building is integral to ensuring sustainable improvements in environmental quality and in preventing immediate danger to populations from exposure to risks from hazardous materials and toxic contamination of air, soil and water resources. During 2005, awareness raising should be conducted through the use of television and media campaigns, followed by efforts to integrate environmental issues into educational curriculum at the national and local levels. *Estimated cost: \$350,000.*

### **3.3. Budget Cost Estimate (millions \$USD)**

<b>Project Proposal</b>	<b>IMMEDIATE (0-6 months)</b>	<b>MEDIUM- TERM (7- 36 months)</b>	<b>Total</b>
Disaster Waste Management	1.5		1.5
Assessment of environmental threats to health	0.75		0.75
Coral Reef Impact Assessment	0.5	0.75	1.25
Biodiversity Survey and recovery plans	0.3	0.6	0.9
Environmental Assessment of reconstruction Programme	0.2	0.1	0.3
Strengthening environmental governance	0.45	0.7	1.15
Coastal Zone Management		1.5	1.5
Hazardous Substances Control Programme		0.45	0.45
Air Pollution Control System		0.75	0.75
National Oil Spill Response Plan		0.45	0.45
Energy Conservation and Promotion of Renewable Energy		0.45	0.45
Environmental Awareness Building		0.35	0.35
<b>Total</b>	<b>3.7</b>	<b>6.1</b>	<b>9.8 million</b>

## **Annex 14 - Gender**

### **Executive Summary**

Gender is an area that cuts across all economic and social sectors. Disparities between men and women exist in representation, participation and benefits in many sectors as well as in economic status and involvement in decision-making. The tsunami disaster has magnified such disparities and disadvantaged women further.

Reconstruction efforts should recognise and address gender disparities, particularly taking into account women's needs as usually male needs and interests are asserted and visible. Gender specific information is necessary in every sectoral intervention and in addition to immediate practical needs; strategic objectives to achieve gender equality should guide response and disaster mitigation.

### **Situation Prior to the Tsunami.**

Maldives had made significant progress towards gender equality with support of national and International Partners. The Ministry of Gender, Family development and Social Security is the lead agency mainstreaming gender concerns into all sectors. Equality of men and women had been promoted in all sectors and increasing attention was being given to Gender-based violence. Gender-related legislation has been gaining attention and it is imperative that the momentum of the recovery and rehabilitation effort be employed in strategically promoting gender equality and women's empowerment.

The rapid economic growth and move towards industrial and service oriented activities caused many women to leave the labour force as the traditional economic activities that they were mainly engaged in declined. This decline was much greater in the rural atolls. However, with increased levels of training and education, labour force participation by women had increased in the last few years. Labour Force Participation Rate (LFPR) for women rose by 9 % in 2000 from the year 1995. Even with this increase there is considerable gender disparity in LFPR with male comprising 71.1% and females 37.4% (2000). Social beliefs and customs discourage women from participation in development, though for girls and women it is not difficult to find employment outside their home island. The increasing levels of male-generated income across the country also have allowed for the reinforcement of traditional gender roles as the need for the wife's or women's income lessened.

Traditionally men and women had relatively equitable role in the fishing industry, with the men going for fishing acting as fishermen and the women carrying out the processing and preparing of the fish. With the a shift in the Maldivian economy towards the service and tourism sector, together with the modernisation of the fishing industry, the fish processing activities done completed by women in the islands have been shifted to factories or have decreased substantially. This has significantly reduced women's contribution to the fisheries sector. At the same time this had considerably lightened women's work loads.

The tourism sector is the largest single contributor to economic development of the Maldives, yet only 4% of its employees are women. There are cultural and social restrictions against women travelling to other islands, and 'acceptable' kinds of work. These constraints limits their mobility and access to employment in that sector. The participation of women in the agriculture industry has been very high. Women maintain farming plots and grow fruits and vegetables in their homes to be sold locally, and within the atoll, and as well as the capital. The high participation of women in the industry can be contributed to greater numbers of men working outside the island.

There are also great numbers of women employed in the government sector. Also, many women are self-employed and work from home in such trades as tailoring, making traditional foods, curry powders, handicrafts etc.

Female headed households are high in the Maldives (46.6% according to the 2000 Census). There continues to be a high incidence of divorce and remarriage. The fact that men often work on other islands in the Maldives and remarriage means that women spend a significant part of their life without the support of a male partner in rearing children and bearing household costs. Thus, the kinship ties and support of the extended family play a crucial role in the situation of women in the country. Maldivian men are usually the social and economic heads of households, however, women shoulder the day-to-day management and decision making within the household. Major decisions are taken by the men the day to day management the household is shouldered by women.

Household management and child care was seen as the domain of the woman in both rural and urban areas. This is true even if the woman is employed outside the home and even in situations where both husband and wife are employed outside the home. The man's role is as the breadwinner of the family although women, in many cases, do contribute considerably to the household income. Women are greatly underrepresented in the legislative bodies and political spheres public life and in decision making positions. However, the numbers are increasing and today there are 5 female parliamentarians (2 elected) and two Cabinet Ministers and one Atoll Chief from.

### **Impact of the Tsumami.**

The Tsunami that inundated the whole of the Maldives has left severely affected more than one third of the people of the Maldives population. Nearly 5% of the population was forced to evacuate their islands. Their homes, all their possessions and their entire livelihoods were destroyed and thousands remain in temporary shelters on other islands.

The death tolls today stand at 80 persons (3 per 10000) most of whom are children. The number women and men who died are exactly the same. Women have not been passive victims of the disaster, but resilient survivors who have been actively taking part in the reconstruction efforts throughout the country. They have being actively involved in care and support and the initiation of economic activities and social and physical reconstruction efforts. Men have also been severely affected and may in many cases not have the psycho-social support structures that are accessible to women.

### **Water and Sanitation, Health Nutrition and Reproductive Health**

The lack of access to clean water, adequate shelter, food, and sanitation and health infrastructure pose a great threat for disease and infection, especially for pregnant women and children to contracting diseases such as diarrhoea, typhoid, hepatitis, viral fever and dysentery. Currently it is estimated that there are 1,500 pregnant women scattered across the 200 islands who have been affected by the disaster. Safe delivery conditions are a major concern as health and infrastructure and services have been severely disrupted and in some cases destroyed. Malnutrition, which is a common problem in the Maldives, is expected to increase as food becomes more expensive and, certain staples, less available. In addition to the destruction of many small businesses that provided staple foods, 30% of agricultural land and many home gardens have been destroyed. Nutritional supplementation for pregnant and lactating women as well as children is in urgent need.

With many health facilities damaged or destroyed, women, men and adolescents who depend on health facilities for reproductive health care and family planning methods have no choice but to go without. This could lead to an increase in unsafe deliveries, maternal deaths, unplanned pregnancies and the

transmission of STIs, including HIV/AIDS. The floods washed away contraceptive commodities on many islands leaving many women and young girls at risk of unplanned pregnancies. A possible increase in the number of pregnant women within the next few months, Given that pre-Tsunami contraceptive use was already low (CPR 34%), an increase in the number of pregnant women in the next few months could cause serious medical problems for pregnant women as prenatal and postnatal health services would not be accessible to all women and medicine would be scarce. Anaemia affects 51% of the female population; this nutritional deficiency is great risk for pregnant women as anaemia is an indirect cause of maternal mortality. Furthermore, the economic constraints on the family and the emotional implications of unplanned pregnancy could fuel social problems.

### **Recovery and Rehabilitation Response**

- Fetching water to cook, clean and bath has traditionally been assigned to women - reconstruction efforts should ensure availability of clean water; beginning with cleaning and replacement of communal wells and water tanks, priority should be given to making clean water available at health facilities to provide safe delivery conditions.
- Specific focus on maternal health is required in the recovery phase; in reconstructing and replacing health facilities special attention should be given to providing facilities with maternal health equipment and medicines
- It is necessary to promote consumption of iron rich foods especially by women
- The momentum to replace lost RH commodities should be utilised to promote family planning and male participation in RH and the health of women and families should be promoted.
- The psychosocial impact of the disaster on men should be assessed and their particular needs addressed.

### **Housing and Shelter**

More than 4,410 houses were damaged, out of which 1,569 houses were totally destroyed and 2,841 partially damaged. 13 Thirteen islands had to be totally evacuated. This has displaced 12,000 people, almost half of whom are female, who are now placed in temporary shelters.

As men are now compelled more than ever to leave their families and go find work to support the family or go back to their islands to start rebuilding their damaged houses, more women are expected to be left alone in the shelters and or living in other people's houses with young children. In temporary shelters and camps that have been set up women and children are more at risk of violence and abuse. The lack of protection that their own homes and families provided may exaggerate the vulnerability of the social position of women, especially of single mothers and young adolescent girls.

#### Women living in partially damaged houses:

Some families have started moving back in to houses that are partially damaged. Many of these houses do not afford proper privacy or protection. This especially puts women and girls at risk of robbery and looting and physical and/or sexual violence. Households headed by single women are considered easier targets for burglary and other crimes, including sexual assault and harassment. Even in households where men are present, the issue of privacy is remains a problem for women and girls in such houses. This situation is exaggerated in cases of families who were not previously living together and are now housed in small congested spaces. This would put younger children and adolescent girls at risk of sexual abuse as well as unsafe sexual practices that could put them at risk for unwanted pregnancies as well as STIs and HIV/AIDS.

### Resettlement issues

The number of people who have been moved to houses in other islands and those who are homeless adds up to almost 20,000. One of the most pressing components of the recovery phase is providing homes for these people. In addition to repairing and reconstructing damaged houses so that people could move back in, other options that are being considered include rebuilding of damaged islands and encouraging communities to shift to new islands in line with the population consolidation and 'safe islands' policy.

### **Recovery and Rehabilitation Response**

- Women should not be marginalised in the rebuilding and reconstruction of their islands and homes, families should be encouraged to take part in this process with women also joining the labour force - opportunities should be provided for active participation of women in construction. rebuilding their homes and communities
- Designing and management of the shelters for the displaced should involve women and women's groups; specially focused measures should be taken to ensure the safety and well-being of women and children in these shelters. Special attention should be given to camp/shelter management to ensure that women and girls have privacy.
- It is important that women who are single parents and/ or who have large families be specifically targeted and to ensure that their homes are repaired or reconstructed as a priority.
- Any housing scheme should particularly take into consideration the gender perspective. Women should be actively involved in the decision-making regarding where and how and planning with regard to in what kind of housing unit or community/island that the family is resettled. This should also extend to designing the layout of the island.

### **Education**

The tsunami disaster severely affected the education sector of the country; completely or partially destroying a number of schools and educational facilities and washing away books and uniforms that are needed to attend school and leaving many parents with no means to provide education for their children. The school going population of Maldives is 35% of the total population and the tsunami destroyed 30% of the 293 schools across the country.

The impact of the Tsunami on education including access and performance could be considerable. Amongst displaced communities. Girls will have less time for studies as their share of domestic work increases; women have the role of caring and cooking in the temporary shelters and in many homes home appliances have been damaged or destroyed, which means that more time must be allotted for those activities. It must be noted that the worsened economic position of the families could also greatly increase the school drop out rates for boys, as they might be expected to work as apprentices with their fathers or male relatives in order to bring in an income. .

A large number of boys and girls now homeless and destitute which provide an unfavourable environment for study and would seriously affect their performance in school. Educational attainment levels for girls are already low in comparison to boys and this could become worse. Risk taking behaviours could increase leading to increase in drug use and unsafe sexual behaviours.

### **Recovery and Rehabilitation Response**

- Monitoring to ensure that girls or boys education is not compromised.

- Provide secure boarding-house facilities with separate housing for girls in islands with secondary/higher secondary schools
- Life skills based education to ensure well being of adolescents and young people.

## **Livelihoods**

The disaster would have highly detrimental effects on the livelihoods of families. The destruction of land and properties and its environmental implications will have negative long term implications, especially for women, as the mobility restrictions faced by women as well as societal norms would make it difficult for them to find alternative sources of income. The destruction of the livelihoods of women also puts them at a greater disadvantage as women have limited opportunities at island level for a means of income. This is particularly the case for single and divorced mothers.

### **Agriculture**

The resulting environmental problems due to the disaster such as the destruction of farming lands and changes in the salinity of the water would prevent women from resuming their income generating activities. This would also deprive them from the opportunity of obtaining an income while staying in their home islands.

### **Fisheries**

The disaster has caused considerable amount of damage to the fishing industry, with the destruction of fishing vessels, property and processing materials and equipments. Although the participation of women in the fisheries sector is low, the women who are presently involved in various activities of fish processing will face considerable setbacks. This will also have adverse effects on families dependent on fishing, with the reduction of their income having negative impacts in terms of their health, nutrition and quality of life.

### **Tourism**

The tsunami waves had destroyed many resort islands, leaving some of them inoperative. This has also caused a reduction in the number of tourists coming into the country. While some of the resorts have closed for reconstruction, some of the resorts might have to lay off staff to reduce the losses. Women are generally tend to be employed in the tourism sector as cleaners, sweepers and cooks and hence at the lower ranks and are at higher risk of losing their jobs.

Women are also involved in community income generating initiatives, such as work groups and in income generating activities organised by the Women's Development Committees such as farming. Displacement would affect such working groups and disrupt their livelihoods.

## **Recovery and Rehabilitation Response**

- Investigating the specific effect to women's livelihoods and sources of income caused by the destruction of property and land needs, covering women from all the sectors, including women who are self-employed.
- Provision of small small-scale loans to self-employed women in small small-scale micro-credit for women to be involved income generating activities to replace equipment etc. destroyed in the disaster. .
- Introduction of micro-credit facilities, complemented by technical training to provide women with alternate sources of income at island level.
- Programs conducted to make communities to change attitudes that restrict women's mobility and access to employment outside their home islands.

- Making employment in resort islands more accessible to women by providing transport facilities and addressing issues such as harassment at work and providing secure living quarters for women.

### **Ownership issues**

Ownership of assets is a major factor which determines the economic and social position of an individual in society. Men and women can own property and land, although generally women own fewer assets than men. As asset ownership is a major factor in an individual's or family's ability to cope with extreme events women and women headed households are in a particularly vulnerable position due to the disaster. It is likely that more women would become economically disadvantaged as a result of the tsunami.

There is the danger that asset replacement during the recovery phase would mostly benefit men directly as they own assets that are more publicly evident such as shops and fishing vessel whereas women often conduct income income-generating activities at home such as sewing or catering. The replacement of women's tools should not be ignored.

### **Recovery and Rehabilitation Response**

- Inclusion of women and women's groups in the organisation and decision making relating to the relating to the replacement of assets, financial assistance and investment into the community
- Investment in communities with tangible capital assets to take place in a gender sensitive manner that takes into consideration the needs and losses of both men and women.

### **Protection of women and children**

A large number of women and children have been housed in temporary shelters and also been moved back to housing that are partially complete. Such temporary housing tends to be shared with large numbers of people which leaves women and children vulnerable to physical and sexual violence and abuse.

While there is a lack of empirical research data in the area of gender-based violence, qualitative research conducted by the government with UN support confirms that violence against women and children existed prior to the Tsunami. This included domestic violence, physical, sexual and psychological abuse. However, the more extreme forms of violence such as dowry deaths and female genital mutilation are absent in the Maldives.

The displacement, loss of security, and destitution caused by disasters is often accompanied by sharp increases in depression, suicide and various forms of violence against women and children. The psycho-social harm to women and children caused by disaster's is as great as the physical harm with a sustained impact on children's development, as it affects all aspects of a child's wellbeing – physical, mental, social and emotional. The collapse of communities and disruption of the familial and social support networks could also leave women and children more vulnerable to psychological and emotional problems.

### **Recovery and Rehabilitation Response**

- Provision of long term psychosocial support and counselling services to families affected by the disaster
- Immediate sensitive treatment and care for victims of violence and other forms of abuse
- Making temporary housing and shelters safe for women and children by increased security and monitoring.



- Creating awareness on the issue of violence and arresting and persecuting perpetrators of violence and abuse towards women and children.

## **Annex 15 - Disaster Management for Vulnerability Reduction**

### **Executive Summary**

The tsunami that hit Maldives on 26<sup>th</sup> December once again demonstrated the vulnerability of the small island nation. Earlier the primary vulnerability resulted from the climate change factors that could cause rise in sea levels and inundate the low lands. Exposure to storms, droughts, heavy rains and high waves caused by cyclones in the South Indian Ocean were also a hazard that the country experienced several times in the past. The disaster risk scenario can be described as moderate in general when considering the hazard pattern. However if one takes into account the topography of the country and their socio-economic patterns, the vulnerability becomes obvious.

### **1. Vulnerability profile :**

The factors that contribute to the vulnerability of country to hazards are its demographic dispersion as well as its geophysical characteristics; The 1,190 islands that make up the republic are grouped into 26 atolls that together form a chain of 820 km in length , set in an area of more than 90,000 km<sup>2</sup> of the Indian ocean. 199 of the islands are inhabited. All are very small. Only 33 inhabited islands have a land area of more than 1 km<sup>2</sup> and no fewer than 67 islands- one third of the total- have less than 500 inhabitants, while 144 islands- 70 % of the total- have less than 1,000 inhabitants.

Another factor is the very small size of islands (on average 16 hectares) and their flatness with very low elevation of 1.5 m above the sea level. 88 inhabited islands face perennial beach erosion . There is on-going damage to the ecosystems (coral reef), land loss and beach erosion due to sea level rise, changes in air and sea surface temperatures and changes in rainfall patterns. The remoteness and inaccessibility of the islands present a challenge in delivery of basic services and high diseconomies of scale. High dependence on imports even for essential items further compounds the vulnerability.

The predominant dependence of the country's economy is primarily on two sources, upon tourism and fisheries sectors. It enhances the vulnerability of economy and community from sea-related hazards. Lack of diversified economic base, because of lack of natural resources such as minerals and fresh water and other resources such as physical space and labor, limits income opportunities from industry and agriculture., Yet dependence on agriculture is high and in inhabited islands 75% of the land is used for some agriculture activity. 941 uninhabited islands are leased out through the traditional leasing system for developmental activities including agriculture The total agricultural production is estimated 35,821 tons in 2003, and shared 2.6% of Gross Domestic Product. There are other occupation categories who are mostly self employed. They are skilled labor like the carpenters, masons, electricians, skilled craftsmen who are mainly dependent on local economy and limited market demand for their livelihood .

These socio economic variables associated with individual hazards gives a more complete picture of the vulnerability of the Maldives.

### **2. Impact of the Tsunami**

The Indian OceanTsunami of December 26<sup>th</sup> 2004 traveled at over 700 kilometers an hour reaching Maldives at 9:20 AM, which is about 3 hours after tremors were felt. Tidal waves ranging from 4 to 14 feet were reported in all parts of the country. The force of the waves caused widespread infrastructure devastation in the atolls. Flooding caused by the tsunami wiped out electricity on many islands destroying communication links with most atolls. There were 83 confirmed deaths and 25 are missing and feared dead. Over 1300 people suffered injuries. Even though less than 100 lives were lost, Maldives is one of the worst affected countries. Thirty nine islands were damaged and nearly a third of Maldives 290,000 people were affected through the loss of or damage to homes, livelihoods

and local infrastructure. The impact on national economy mostly supported by tourism, fishery and agriculture sectors is substantive. Twenty islands - about a tenth of the inhabited islands of the country - have been largely devastated and fourteen islands had to be evacuated. 188 islands had no communications for the first ten hours and four islands have no direct communication up to now. Initially 29,577 people were either displaced or homeless accounting for over 10% of the population. Currently 6,681 people are homeless on their own island and 5,801 have been (temporarily) relocated to other islands, making the total of displaced or homeless 12,482... Water supply was disrupted in about 15% of the islands and 25% had major damage to essential infrastructure such as jetties and harbors that links these islands with Male. Electric supplies in many affected islands are yet to be restored.

There has been considerable environmental damage. Based on the preliminary assessment work, the following main environmental issues arising from this current disaster have been identified:

- **Disaster waste:** vegetation, re-distributed domestic and hazardous waste, drums, large amounts of demolition waste have been spread over the impacted islands.
- **Groundwater contamination:** shallow freshwater aquifers impacted by infiltrated flood water, oil spillage from generator stores and leaks from septic tanks.
- **Coral reef damage:** potential damage caused by direct wave impact as well as secondary damage from sedimentation and excessive amounts of debris.
- **Coastal damage:** extensive beach erosion and damage to coastal protection measures
- **Beach, soil, vegetation and crop damage:** extensive washing-off of soils, stress and dieback noted in certain species from direct impacts as well as possible salt contamination

Maldives has been generally lucky in terms of natural disaster and is not affected by cyclones which often hit other areas of the Indian Ocean and as a consequence, it has focused on what it saw as its main risk – global warming and consequent rising sea-levels. Despite the moderate hazard risks in general, the vulnerability of the country is quite high due to its special characteristics. While Tsunami are infrequent events, they are extremely destructive as demonstrated by the current tsunami disaster. There may be false sense of security regarding the hazard because of the low probability of occurrence but it is pertinent to address it in order to avoid current scale of losses and damage in future.

**3. Institutional Structures:** A Committee on Natural Disasters existed in the country. However, subsequently it was merged in the National Commission for Protection of the Environment (NCPE). The decision could be interpreted as a reduction in the priority given to disaster management. The Ministry of Environment & Construction is recognized as the nodal department for environment related matters. However in the event of a natural disaster, the Ministry of Home Affairs takes charge. Following the tsunami, the Government of Maldives acted swiftly and set up a Ministerial Committee and Task Force. A National Disaster Management Center was established to facilitate response and coordination. The Ministry of Defense, Ministry of Finance and the Ministry of Planning and Development lead the emergency response and relief efforts in collaboration with other Departments, UN agencies and other development partners. . The Center has been the focal point for all response, relief and recovery activities. The functions of the National Disaster Management Center in the long term reconstruction and rehabilitation process is to be yet finalized.

#### **4. Methodology**

In order to analyze the existing disaster management system, the response to current Tsunami disaster and to identify the strengths, gaps and needs for developing a post disaster recovery and disaster risk management program the team mainly used three methods; i) review of relevant documents and reports ii) meetings with various departments and ministries, iii) consultations with the UNDP, UNDAC mission and selected members of the WB and ADB teams and iv) site visit.

#### **4a. Review of reports and documents**

The team consulted a number of government and UN documents and studies. Reports on sectoral damage and recovery needs were also reviewed on Health and Infrastructure damage and loss. Some important documents consulted include: Disaster Preparedness and Mitigation in the Republic of Maldives, ADB, 1993, UN's country and regional Flash Appeals, The State of the Environment 2002/2004, First National Communication of the Republic of Maldives to the United Nations Framework on Climate Change, United Nations Development Assistance Framework for Maldives, Health sector report on Tsunami Emergency Mission and Report by the Infrastructure Sector. In addition internet based review was done to analyze various governmental documents with regards to disaster risk management.

#### **4b. Meetings and consultations**

The team held meetings with the Ministry of Environment and Construction, Ministry of Atolls Development, Team on infrastructure sector assessment, Meteorology department, UNDAC, UNDP, World Bank, ADB. The team visited the National Disaster Management Center and had discussion with a range of agencies involved in disaster response.

#### **4c. Field Visit**

The team visited Kashidho Island in Kaafu atoll in order to assess the extent of damage and government's response to the tsunami disaster. Meetings with atoll chief, island chief and community members were held and damage to housing, agriculture and infrastructure sectors was observed.

#### **5. Scope of the assessment**

This assessment proposes a number of initiatives for integrating disaster risk reduction in the recovery programs. They include mainstreaming disaster risk reduction into all recovery programs, establishment of institutional and legal systems, regional cooperation for early warning system in close partnership with India and Sri Lanka, vulnerability assessment for key sectors (tourism and fisheries) and infrastructure, preparedness planning and safer area development, implementation of mitigation programs in selected islands and sectors.

#### **6. Disaster Risk Management Strategy**

**Overall Comments :** There are three major disaster risks to be addressed. One is climate change factors, the other is storm surge and the third is tsunami. With the overall objective remaining as sustainable development & disaster risk reduction, strategies and programs to address the specific disaster risks need to be developed. It is also important to keep in mind that normal development process aimed at social and economic improvement can significantly generate new disaster risks. The concentration of population on Male already home to 86,000 people or more than a quarter of the population, is of specific concern, All major development programs and projects need to be reviewed for their potential to reduce or aggravate vulnerability and hazard. It is in this context that the Focus Island concept and the Population consolidation strategy may have to be modified to build in better disaster prevention measures. To achieve this, a more integrated approach and collaboration between various government departments responsible for land use planning, environmental planning, and development planning is necessary. Putting in place an institutional mechanism for emergency response and disaster management is as important as decentralized planning for reducing risks through community & civil society participation. Appropriate legislation for setting standards such as building codes, defining roles and responsibilities for key actors and allocation of resources for mitigation measures would contribute significantly to mainstreaming disaster risk in development planning.

#### **Proposed strategy for DRM strengthening and vulnerability reduction**

Key strategic considerations for sustainable DRM programming in Maldives

- The definition of a DRM strategy would benefit from a good understanding of the risk. The main risk is associated with climate change and will entail sea level rise and potential for increased climate events such as flooding and storms.
- Linking disaster risk reduction with Focus Island Policy of the Government. The government's policy in this regard aims to create a regional Development program based upon the a Regional Focus Island concept. This will include the creation of regional growth poles based on investment on social and economic infrastructure on selected Islands. This strategy should include the concept of Safe Islands which covers structural mitigation and protective measures to create disaster safer living environment. In pursuing this strategy, pull incentives based upon the provision of economic opportunities, social amenities, safer housing, should be focused upon those living in high risk islands/atolls to encourage them to move to Safer Atolls. Parameters for safe islands could be developed through technical expertise from geologists based on underground stability and surface conditions. Technical experts would provide guidelines for assessments, based on a program of field observations and measurements on selected islands regarding the geological profiling, underground stability and surface conditions. These guidelines would include exclusion criteria, positive – negative criteria, definition of a “geological island safety scale/range and an evaluation matrix, which can be use in the vulnerable assessment process for future planning and development of islands. Part of these guidelines will contain recommendation to undertake future monitoring, if needed, in respect to relevant long term impacts to the island's underground stability due to the sea level change/ increased evaporation associated with global warming
- Strong linkages must be developed between the efforts on adaptation to climate change and the risk of natural hazards. Many hazards experienced by Maldives are related to sea. The projected sea level rise may result in enhancing the severity of some hazards and their impact. Thus, any efforts focused only upon natural hazard mitigation might not prove very fruitful in the absence of linkages with climate change impact reduction.
- The Maldivian economy is predominantly dependent upon tourism and fisheries sectors. Therefore, vulnerability reduction in these two sectors must be the focus of any efforts aimed at sustainable economic and social development and diversification of economy.
- Inter-atoll and Inter-island emergency response capacity building should be another key element for disaster preparedness in Maldives. The total dependence of Atolls and Islands upon the central government for disaster response can aggravate post-disaster problems, in case the central government functions were disrupted due to any simultaneously occurring incident.
- Community Empowerment will be another key principle to be considered, given the limited human, technological and economic resources of the country. Prepared and organized communities can take better actions for their safety.

The Approach and Priorities. The approach to management of disasters in the Maldives would need a preliminary vulnerability assessment of the risks and then would be developed on two levels. They are as follows :

- Strengthening the Institutional and Legal Systems (ILS) for disaster risk management
- Multi hazard disaster preparedness planning and mitigation activities including training and capacity building

The objective is to design a strategy in direct relation with the level of vulnerability, and risk frequency. Tsunami is a rare event and designing a DRM for tsunami risk is simply not cost effective. The strategy should therefore be designed on the basis of the vulnerability assessment. Thus, the proposal below is presented in a comprehensive format but should be adapted according to the results

#### **6a. Strengthening the Institutional and Legal Systems (ILS) for disaster risk management**

It would be advisable that the Task Force and the National Disaster Management Center (NDMC) continue as an institution to address disaster management program in the country. To start with, the National Disaster Management center would focus on ensuring that in the reconstruction process, risks are not rebuilt. That there is quality check on all structures being reconstructed or repaired and there is equitable and focused coverage in delivery of rehabilitation packages. It would also ensure transparency and accountability in the management and distribution of relief items and reconstruction support. It would also help in developing guiding principles for recovery and reconstruction in key sectors such as housing and restoration of all critical infrastructures which has a strong implication in vulnerability and risk profile. The task force would coordinate reconstruction and rehabilitation strategy of the other partners and donors. To support the functions of the National Disaster Management Center in the Atolls and islands, similar management arrangements with representation of all the relevant stakeholders can be made.

As the functions of reconstruction phase out, the National Disaster Management Center could look at developing a national policy for disaster management which clearly spells out roles and responsibilities of various ministries for management of disaster. The policy should provide legal instruments for enforcing land use planning, building codes and bye-laws and investment in mitigation measures. A creation of National Disaster Management Authority would be more appropriate to retain the focus on disaster management.

#### **6b. Multi hazard disaster response and preparedness planning and mitigation activities including training and capacity building**

There are several components under this thematic priority and possibly planning and implementation would likely go on for several years to reach a level of reduced vulnerability. The components that are included for multi hazard response are as follows

**Establishment of an Early Warning System:** the key to containing damages in the event of a disaster is to have an access to information about the probability of a hazard and the extent of damage it would create if it occurred. It is desirable for the country to participate in the regional warning systems. However, setting up a warning system only for tsunamis is not cost effective for this region. A better idea would be one multi-hazard system that includes floods, storms and droughts along with the rarer events. This would not only require technical and sophisticated warning systems but an equally established national action plan that could decide on evacuation procedures if required. While the development of a proposed Indian Ocean Tsunami Warning system would take 3-5 years, a national warning system linked with storm surge (high wave) alert should be established. An interim (based on available capacities) arrangement should be set up in the Meteorological Department linked to the warning systems of neighboring countries, particularly India and Sri Lanka. The capacities of the Meteorological Department and its linkages and working relationship with other counterpart agencies, and regional and national organizations should be enhanced. Earlier reports in 1993 note the existence of a wave monitoring program at the then Ministry of Public Works and Labor. Further research would be required to identify the current status of that program and its potential for upgrading. The participation of Meteorological Department officials in regional planning and consultation meetings will facilitate the strengthening of early warning system. The hosting of a regional meeting on EWS in Male can help in establishing contacts and working relationships with counterpart agencies. In the medium to long-term (2-5 years), a more sophisticated national system has to be set up and integrated with the proposed Indian Ocean Tsunami EWS.

#### **Emergency Response**

The enhancement of emergency response capacity for future would require preparedness planning for all hazards at national, atoll and island levels (both inhabited and resort Islands) and development of safer areas on each inhabited island. It will be based on the review of and linkages with existing sectoral contingency plans; e.g. aircraft crash/oil spill control, mass casualty management and fire services. This will require designation of a room within the Atoll or Island office that would be equipped with failsafe communications and State of the art emergency response kits & facilities. In

the event of a disaster, the Atoll /island would activate the warning systems and carry out steps for response & relief as per Standard Operating Procedures (SOP). In addition to this, the enhancement of emergency response capacity at the national level may require emergency equipments to be defined. The capacity for provision of inter-island and inter-atoll support for disaster response should also be developed, so that atolls are not totally dependent upon central government. This will include strengthening communication and transportation systems amongst the atolls, developing human resources for search and rescue, medical aid, evacuation, relief supply storage or warehousing and emergency shelters at the atoll levels

### **Preparedness Planning**

A pilot program will be undertaken on preparedness planning in few atolls within the first 6 months. Atolls will be selected from the northern atolls, affected by the 2004 Tsunami or the 1991 High Wave and the others from the south. Preparedness plans will also be developed and implemented in at least 10 islands. These islands will be selected from at least 3 atolls, one from each type of island category; capital, primary, focus and growth pole and resort. Training for officials, fisher associations, women committees and youth groups on various aspects of disaster risk management will be an integral component. Community level volunteer Disaster Preparedness and Response Teams (DPR) will be developed to act as operational arm of the DRM Task Force to disseminate early warning, and organize first response and relief operation. The most effective responders to the current tsunami and organizers of relief efforts should become the fertile base and role models. The island DPR teams should draw on fisherman's association, youth association, sports groups, faith based organizations, and national cadet corps.

### **Safe Area Development**

The development of "Early Warning System" must be complemented by community systems for protective action (emergency shelter, high ground) after receipt of alert warning. This is especially important in the context of the geophysical characteristics of Maldives. Due to the small size of the islands and flatness of land, people don't have many options for evacuation or fleeing upon receipt of warning. Therefore, the need for establishing emergency shelters or high grounds is critical. This will include construction of dual purpose Emergency Shelter cum Community building, or adaptation of existing buildings. It will be worthwhile to explore the potential for elevating the overall floor level of designated areas by 2-3 meters to reduce risks from sea level rise.

## **7. Vulnerability Assessment for Preparedness, Mitigation Planning and Risk Analysis**

Conduct of a vulnerability assessment will be important from various aspects. A community based assessment through island level task forces can strengthen preparedness planning. A national process can help assess mitigation options, identify and locate new assets/infrastructure. It can also be used as input to finalize the population consolidation policy through Focus Island strategy. This Vulnerability Assessment process should be linked with vulnerability assessment of ecosystems and natural resources serving as natural protection; e.g. vulnerability assessment of coral reef with specific reference to long term implications of 1998 damage through bleaching of coral reefs.

## **8. Other Disaster Risk Management Programming**

It is essential that a Disaster Risk Management Program is developed and implemented on a priority basis in order to develop the capacity of Maldivian government and society to reduce the future disaster risks and sustain its development gains. Key elements of such program would include: Enhancing hazard-resilience of lifelines and infrastructure; e.g. markets, hospitals, airports, water-supply and sanitation infrastructure and Jetties, storm risk assessment, preparedness and mitigation in northern atolls, and drought mitigation program including improved rainwater harvesting systems through improved run-off collection, enhanced storage and retention capacity and orientation building on hygiene and rainwater harvesting and management. This disaster risk management program must be closely synergized with the National Plans for Environmental Management (NEAP) and Climate Change Adaptation (NAPA).

## **9. Risk Transfer**

Considering the small size of the Maldivian economy, it would be worth while for the government and private sector agencies to explore and develop mechanisms for risk transfer of any future disaster impact, particularly for the tourism industry. Normally risk transfer mechanisms include insurance and reinsurance. Maldivian government can explore the opportunities through building linkages and partnerships with the public and private sector in neighboring countries like India, Thailand and Sri Lanka.

## **10. Mainstreaming DRM into Development Policy, Planning and Implementation**

In order to ensure sustainability in development gains the integration of disaster risk considerations into atoll and island development planning processes would be required. This would mean considering disaster risks as a factor while making decisions on consolidation of safer islands and population relocation through pull factors. The government's policy in this regard aims to create a regional development program based upon the Regional Focus Island program. This will include the creation of regional growth poles based on investment on social and economic infrastructure on selected Islands . This strategy should include the concept of Safe Islands which include structural mitigation and protective measures to create disaster safe living environment. In pursuing this strategy, pull incentives based upon the provision of economic opportunities, social amenities, safer housing, should be focused upon those living in high risk islands/atolls to encourage them to move to Safer Atolls. Such Islands and atolls can be identified on the basis of an analysis of the past disaster events and the vulnerability assessment. Mainstreaming efforts will also involve review of the status of enactment of building code and implementation of building regulations in Male, the need for development control regulations and integrated coastal zone management regulations. A review of the regional "1993 position paper on Urban and Regional Development" prepared by the office of the Maldives Physical Planning and Design will be conducted from the perspective of risk considerations.

## **11. Enhancing Disaster Resilience of tourism, fisheries and key infrastructure**

Considering the predominant dependence of Maldivian economy and society on tourism and fisheries sectors, it is pertinent that disaster resilience of these two sectors is enhanced. Private and public sector agencies like Banyan Tree in Maldives are already promoting the concept of green and clean tourism. There is a need to link the concept of Safe Tourism into the existing Green and Clean Tourism approach. A review of the disaster resilience of key infrastructure and structural mitigation measures; e.g. the suitability, location, design standards and quality of construction of sea protection measures can guide making better choices.

## **12. Regional Cooperation**

Maldives has been relatively isolated in the area of disaster risk management. It needs to involve in and build partnerships and linkages with other countries and regional and international agencies. This will include strengthening the existing linkages and getting new memberships in various bodies; e.g. the Regional Consultative Committee of ADPC, linkage building with Indian and Sri Lankan Meteorological Departments and other agencies, BIMSTEC, SAARC, ASEAN, Participation in and follow up on World Conference on Disaster Reduction (WCDR). Maldives has played an active role in the past at the SAARC forum through taking leadership to revise the 1992 SAARC study on disaster management, and pushing for a special session on disaster risk management at the forthcoming SAARC summit. The development and strengthening of regional cooperation is also important in order to learn lessons on recovery and DRM programming efforts in all tsunami affected countries.

## **E. Proposed phasing of strategy**

### **14. Phase 1: short term (6 months; Jan - June 2005)**

National Lessons Learnt Workshop on Tsunami disaster, Consultation with recovery task force on following higher standards of resiliency, Training on damage and loss assessment and recovery planning, Adaptation of DesInventar as recovery management information system and development of disaster database, Review and consultation among NDMC and MoE on NEAP/NAPA linkages with DRM program, Policy level consultations on formation of national disaster management



authority, Staffing of the NDMC, Review of the wave monitoring system of 1993, Purchase of EWS equipment for Meteorological Department, Participation of the Maldives on planning process for Indian Ocean Warning System, Pilot Preparedness Program in two atolls and 10 islands, community based vulnerability assessment in two atolls and 10 Islands, Community mobilization training for DP, Review of atoll development plans.

#### **15. Phase 2: medium term (3 Years/July 2005 -December 2007)**

Strengthening the drought rainwater harvesting infrastructure and technology, Equipment and space for the NDMC, Training of DRM authority staff, Regional meeting on EWS in Male, Participation of Meteorological officials in selected regional meetings on EWS, Review of sectoral preparedness plans and formation of national plan, Training in selected atolls and Islands, Purchase of emergency equipment etc, National Study on Vulnerability assessment for key infrastructure and on population consolidation, Risk based analysis of 1993 Urban and Regional Development paper, Identification of vulnerable atolls for MDRM, Risk assessment in tourism and fisheries sectors in 5 atolls, Consultation and planning with tourism and fisheries authorities on mainstreaming risk management, Study on disaster resiliency of key infrastructure; e.g. sea walls, Participation of government officials in RCC of ADPC.

#### **16. Phase 3: long term (5 year/ Jan 2008- December 2009)**

Community training on rainwater harvesting system management, Training of DRM authority staff, Training at national level on DP, Structural measures in pilot atolls and Islands, strengthening the rainwater harvesting infrastructure, Assessment of coral reef vulnerability in relation to the damage done by 1998 ENSO, Consultation with atoll authorities on DRM, Pilot implementation of MDRM measures in five atolls, Participation of government officials in international bodies.

#### **G. Preliminary costs of all phases (in millions USD)**

<b>Disaster Risk Management Activities</b>	<b>Short-term (6 months)</b>	<b>Medium term 2.5 years</b>	<b>Long Term (3+ years)</b>	<b>Total 5 years</b>
Programming	0.1	0.2	pm	0.3 million
Strengthening the institutional and legal system	0.1	0.2	pm	0.3 million
Early Warning System	0.3	0.5	0.3	1.1 million
Preparedness Planning (emergency plan and training)	0.2	1.0	0.5	1.7 million
Vulnerability assessment	-	0.5	0.2	0.7 million
Disaster Reduction in Tourism, Fisheries and key infrastructure sectors	-	1.2	0.4	1.6 million
Regional Cooperation	pm	0.1	0.1	0.2 million
<b>TOTAL</b>	<b>0.7</b>	<b>3.7</b>	<b>1.5</b>	<b>5.9 million</b>