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 Panning 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

Agricultural status of islands	Number of islands affected[1]	Total number of islands	% Affected
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	
Total	**112**	**200**	

[1] 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 inhibited 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[1]
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[2]			16.60	1.30
7	Mendhoo agriculture station			0.14	0.01
8	Business loss[3]			4.10	0.32
	Total			**141.73**	**11.07**

1 Exchange rate at $1 = Rf12.80
[2] 20% of damage in inhabited islands
[3] 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 Short-term	Phase II Mid-term	Total 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[1], 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
	Total	**62.33 ($4.87 M)**	**80.30 ($6.27 M)**	**142.63**	**11.14**

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.