

EXECUTIVE SUMMARY

This first National Communication of the Republic of Maldives has been produced with funding from the Global Environment Facility (GEF) as part of the enabling activity project; *Maldives GHG Inventory and Vulnerability Assessment: A Climate Change Enabling Activity*.

A national country team worked closely with relevant government sectors in developing this first National Communication. It was prepared in close adherence to the guidelines provided by Decision 10/CP.2 of the Second Conference of the Parties (COP2) to the UNFCCC. This report is composed of seven main chapters: (1) National Circumstance; (2) National GHG inventory; (3) Mitigation of GHG emissions; (4) Vulnerability to climate change; (5) Adaptation to climate change; (6) Policy and measures; and (7) Project proposals.

National circumstance

The Republic of Maldives is comprised of 1,192 small, low-lying coral islands in the Indian Ocean. The islands exist as a chain of coral atolls, stretching 860 km from latitude 7°6'35"N, crossing the Equator to 0°42'24"S, and lying between 72°32'19"E and 73°46'13"E longitude. The total land area of the Maldives is estimated at around 300 km². The islands are surrounded by coral reefs, which protect these islands from the impacts of strong waves and other such effects.

The Maldives enjoys a warm and humid tropical climate, with the weather mainly being dominated by two monsoon periods: the southwest monsoon (the wet period, from May to November); and the northeast monsoon (the dry period, from January to March).



Indicator	1994	2000
Population	240,255	270,101
Land area (km ²)	300	300
GDP (in mil. US\$, 1995)	338	525.6
GDP per capita (US\$, 1995)	1451	1954
Estimated Share of the informal sector in GDP %	-	-
Share of industry in GDP (%)	10.1(Including electricity)	8.5
Share of services in GDP (%)	73.4	77.2
Share of agriculture in GDP (%)	3.8	2.8
Land area used for agricultural service (km ²)		
Urban population as percentage of total population	25.2 (in the year 1995)	27.4
Live stock population (chicken and ducks only)	180623	211979
Forest area (km ²)	-	-
Population in absolute poverty	-	30,000 (in the year 1998)
Life expectancy at birth (years)	69.12	72.56 (in the year 1999)
Literacy rate (percentage of population)	98 (in the year 1990)	98.94 (in the year 1999)

Year 1994: 1 US\$ = Maldivian Rufiya 11.59

Year 2000: 1 US\$= Maldivian Rufiya 11.77

Table 1: Summary of Maldives national circumstances

The islands of the Maldives have been known to be inhabited for up to 2,500 years. The population of the Maldives, according to the census in 2000, is 270,101 with an annual growth rate of 1.96%. About 25% of the total population reside in the capital, Malé, where most of the economic and commercial development activities take place.

The main contributors to the economy are the tourism, fisheries, constructions and commercial sectors. The tourism and fisheries sectors are very much dependent on the coastal environment of Maldives. All the economic activities rely heavily on the smooth functioning of the Maldives' only international airport, on the island of Hulhulé.

National GHG Inventory

The Maldives inventory of GHG emissions has been calculated for year 1994 and is limited to the best information available for that year. It was not possible to report on emissions of all three major GHGs; carbon dioxide (CO₂), methane (CH₄) and nitrous oxide (N₂O). The inventory was developed mainly for the energy sector using the IPCC Reference Approach.

In the Maldives, diesel is the main fuel consumed and is used to generate electricity and for transportation. It was estimated that 129 Gg of carbon dioxide was emitted from the energy sector and 1.1 Gg of methane was emitted from the waste sector.

Developing the GHG inventory highlighted the need for training in collecting relevant statistical data and modifying the IPCC guidelines to capture the small scale of GHG emissions from the Maldives.

Mitigation of GHG emissions

Maldives is a non-annex I party to the UNFCCC and is not obliged to implement GHG mitigation measures. However, mitigation measures have been developed not only to reduce the Maldives emission of GHGs, but as a step towards achieving greater energy independence for sustainable development.

The mitigation of GHG emissions is possible by lowering the demand on the imported fossil fuel. This can be achieved by increasing the efficiency in generating and utilising electricity and improving the efficiency of the transportation mechanisms.

Reducing methane (CH_4), the main source of emission of GHGs from landfills and sewage discharges, is another possibility. This can be achieved through improving the solid waste disposal methods, management practices and providing treatment of sewage discharges.

The enhancement of the Maldives natural GHG sinks by increasing the vegetation cover and improving the health of the coral reef have been considered as possible mitigation options. Land use, land use changes and forestry and the existence of natural and managed GHG sinks, were not accounted for in the GHG inventory due to lack of sufficient data.

Vulnerability to climate change

Even though the Maldives contributes less than 0.01% to global emissions of GHGs, the Maldives is in fact one of the most vulnerable countries to climate change and sea level rise. The National Vulnerability & Adaptation (V&A) assessment team identified seven main areas of vulnerability:

1. Land loss and beach erosion

Over 80% of the land area in the Maldives is less than 1 m above mean sea level. Being so low-lying, the islands of the Maldives are very vulnerable to inundation and beach erosion. Presently, 50% of all inhabited islands and 45% of tourist resorts face varying degrees of beach erosion. Climate change and projected sea level rise would aggravate the present problem of beach erosion. It is expected that even a 1 m rise in sea level would cause the loss of the entire land area of Maldives.

2. Infrastructure damage

All the human settlement, industry and vital infrastructure in the Maldives lie very close to the shoreline. Therefore, the projected rise in sea level poses a grave threat to the existence of these structures.

According to research, Malé International Airport on Hulhulé island needs to be given priority, as this is the only gateway to the Maldives. The height of the runway is only 1.2 m above mean sea level and is extremely vulnerable to climate change related sea level rise.

Other important vulnerable structures include the investments on tourist islands.

3. Damage to coral reefs

The low-lying islands of the Maldives are surrounded by coral reefs. These coral reefs not only provide protection for the islands, but are related to success of the main economic activities: tourism and fisheries.

Studies show that the corals are very sensitive to changes in sea surface temperature. Unusually high sea surface temperatures in 1998 caused mass bleaching on coral reefs in the central regions of the Maldives.

If the observed global temperature trend continues, there would be a threat to the survival of the coral reefs in the Maldives.

4. Impacts on the economy

The threats posed by climate change to the beaches, reefs and infrastructure on resort islands makes the tourism industry very vulnerable to climate change. This greatly affects the economy as tourism contributes to about a third of the GDP of the country.

Fisheries in the Maldives is another economic activity which relies on the health of the reefs. Although no conclusive links have been established between tuna fishery and climate change, it has been found that seasonal monsoon changes do in fact affect the tuna fishery in the Maldives. It has been found that in El Niño years catches of certain types of tuna increase while the others decrease, and the reverse catch pattern is seen with regard to other types of tuna during La Niña periods.

5. Food security

Due to the poor soil quality in the Maldives, agriculture is a minor industry. The lack of locally grown food items creates a high dependency on imported food, except for tuna and coconut. Therefore the Maldives is vulnerable to changes in productivity of agricultural lands beyond our borders.

The imported food items are first brought to the capital and later distributed to other islands by sea transport. The distribution of food to these islands is very vulnerable to changes in weather. Extreme storm events have led to food running scarce in certain islands. These events have been noted to last for a period of 1-30 days. With climate change and the rise in sea levels, it is expected that more storm events would occur, thereby threatening food security in this island nation.

6. Water resources

The population of the Maldives mainly depends on groundwater and rainwater as a source of freshwater. Both of these sources of water are vulnerable to changes in the climate and sea level rise.

With the islands of the Maldives being so low-lying, the rise in sea levels would force saltwater intrusion into the freshwater lens. The groundwater is replenished by bursts of rain and although there is a predicted increase in the amount of rainfall to the region, the spatial and temporal change in rainfall pattern is uncertain. Therefore, for the Maldives, climate change poses a threat to water availability.

7. Human Health

The effects of climate change and sea level rise on the health sector need to be studied further. Notable relations to changes in climate have been seen for dengue and dengue hemorrhagic fever in the country. Although malaria has been eradicated from the Maldives, with climate change there might be a threat of malaria outbreaks occurring in the country. The poor sanitation in the islands of the Maldives, combined with any future increase in rainfall, would cause more outbreaks of waterborne diseases, such as diarrhoea.

Access to health services and facilities during severe weather is a major concern for rural island communities of the Maldives. Other major concerns from climate change are poor human health due to heat stresses, and poor urban air quality. Based on the IPCC regional climate change scenarios, it is estimated that air temperatures in the region may rise by 2 - 3.8 °C by the year 2100.

Adaptation to climate change

Adaptation options in low-lying islands of the Maldives, which have been identified as especially vulnerable, are limited and response measures to climate change or its adverse impacts are potentially very costly. Adaptation in this section covers two main types of activities. The first being actual physical adaptive measures targeted at the sectors identi

fied in the vulnerability chapter. High importance is given to protecting the islands by building appropriate structures for coastal protection. Several other projects have also been identified for the various sectors.

The second activity is to enhance the capacity to adapt in the Maldives. The Maldives lacks the capacity both technically, and financially to undertake actual adaptive measures. The main areas identified are human resource development, institutional strengthening, research and systematic observation and public awareness and education.

Policies and measures

The mitigation and adaptation chapters discuss in detail measures that can be taken to deal with the implications of climate change and sea level rise in the Maldives. This section identifies how the present existing policies could be improved to include the effects of climate change in national development planning. A National Implementation Strategy is also included at the end of this chapter.

Project proposals

This section includes project proposals for some of the projects suggested in the earlier chapters. These proposals are ready for presenting to external donor agencies.