CHAPTER II

STUDY AREA MALDIVES

2.1 INTRODUCTION

The name Maldives derived from the word “maladvipa”, in Sanskrit Maala Divaina means Necklace Islands in Sinhala. The Maldivian people were called Dhivehin. The word Dheeb/Deeb means "island” and Dhives means "islanders" i.e., Maldivians. During the colonial era, the Dutch referred to the country as Maldivische Eilanden in their documentation, while Maldives Islands are the anglicised version of the local name used by the British, which later came to be written as "Maldives”.

2.2 HISTORY OF MALDIVES

The origin of the first settlers of the Maldives still remains a mystery. The historians date early settlers back to 5th century BC with the Aryan immigrants coming from the neighbouring countries- India and Sri Lanka. The Maldivian language is said to be Indo-Aryan with influences from Sinhalese, Tamil, Sanskrit, Persian, Urdu and Arabic. It is believed that Hinduism existed before Buddhism. The Maldivians were practising Buddhism until 1153 AD, when a learned scholar converted the king to Islam. The exact name and origins of this scholar is an on-going debate. Some are of the opinion that he was a Moroccan traveller named Sheikh Abul Barakaath Yoosuful Barubaree. Others say that he was from Persia and known as Sheikh Yoosuf Shamsudheenul Thabreyzi. Mr Mohammed Ibrahim Luthufi, an acclaimed contemporary historian and a researcher, claims that the name of the person who converted Maldivians to Islam was Sheikh Aburikaab Yoosuf Thabreyzi.
Since the conversion to Islam, the Maldives boasts of a recorded history that is rich and colourful. The system of government was a monarchy with Sultans as sovereigns while Sultanas or queens ruled on rare occasions. Traders from Arabia, India, Sri Lanka and Persia visited the Maldives to exchange goods. Slaves were also brought from Africa. Quite often, sailors were shipwrecked in the treacherous reefs of Maldives. These visitors contributed much to the language and culture of the Maldives. However, the visitors' influence did not change the identity of the country as a secluded haven virtually unknown to the rest of the world.

The abundance of cowry shells, coir rope and ambergris in Maldives attracted Portuguese interest in the country during the 16th century. Consequently the Portuguese launched attacks against Maldives. Their attempts were in vain until a better equipped and organised fleet attacked the capital Male. In 1558 they seized control of the country, after defeating Ali the 6th, the reigning Sultan. Since then, they administered Maldives from Goa in India but had their armed forces and a leader stationed in Maldives. Muhammad Thakurufaanu, from the island of Utheemu in Thiladhunmathi Atoll, waged an effective resistance against the invaders. In 1573 after fierce guerrilla warfare Muhammad Thakurufaanu and his compatriots defeated the Portuguese invaders. Muhammad Thakurufaanu was offered the throne and remains a revered national hero.

The Portuguese did not allow the Maldivians to relax even after their 1573 debacle. The country had a restless time fighting off the colonial pursuits and had to strengthen its defence by building forts and acquiring more arms. Nevertheless, there was a substantial time period before the country was captured by an invading force. Malabari pirates from the
nearby south Indian coast finally succeeded in 1752 in seizing the Maldivan throne in the capital, Male. They abducted the Sultan and took him to their country and placed some soldiers to administer Maldives. Only four months later Maldives regained control under the leadership of Muleege Hassan Maniku or Dhon Bandaarain who belonged to a family from Huraa in Male Atoll.

The British colonial ambitions in the Indian Ocean had their effects on Maldives. They recognised the strategic location of Maldives and the prospect of Maldives being under any other colonial power was unacceptable to them. It was in a period of uncertainty, political rivalry and turmoil in the Maldives that the British offered Maldives a treaty, which was to become a watershed in Maldivian history. Some Maldivian politicians also needed British co-operation to suit their ambitions. It was in this atmosphere of instability that the Maldives went into the agreement with British in 1887. The British pledged to protect the Maldives from any foreign aggression while the Maldives in turn agreed not to collaborate with any other foreign power without British consent. The British were also not to interfere with the internal affairs of the Maldives. Historians differ in their opinions as to the extent of the independence that Maldives enjoyed under the status of a British Protectorate.

A written constitution did not exist in Maldives till 1932 and the customs and traditions along with Islamic Shariah formed the Law. The sultans usually consulted a group of advisors or bodun who included his ministers and the Fandiyaaru or Chief Justice. The Islamic scholars usually exercised much influence in the government affairs but quite often they were replaced when the Kings were at odds with them. The hereditary system continued to exist but in many occasions the helm of
power shifted from one family to the other following internal uprisings and the demise of kings. A constitution was introduced in 1932 after the emergence of new educated elite. The new constitution, which provided for a People's Assembly of 47 members, did not survive long. It was literally torn apart by the public and the reigning Sultan Mohammed Shamsudheen 3rd was dethroned shortly thereafter in 1934. The Sultan was believed to have used exceeded his legal powers. A new constitution was formed in 1937.

In 1948 the existing agreement between the Maldives and the British were renewed. In 1953 the Maldives changed from a monarchy to a Republic. Mr Mohammed Amin Didi was the first President of the Maldives. He was a popular politician who had won a referendum held to determine the type of government that the Maldives should have. However, the Republic was short-lived. After a mere eight months Amin Didi was overthrown and a Sultanate was formed once again. The people were outraged because of the prevailing food shortages and the total ban of tobacco by Amin Didi. The Second World War caused famine that continued even in the early 1950s. Against this backdrop it was quite easy to manipulate and mobilise the ignorant masses for political ends by Amin Didi's rivals.

Since the failure of the First Republic, the Maldives was a Sultanate until 1968. The intervening period saw the rule of only one king. Sultan Mohammed Fareedh was to be the last monarch of the Maldives.

During the Second World War, British built a military base in Gan of Addu Atoll and Kelaa of Thiladhunmathi Atoll. They evacuated the bases soon after the war. However, British interest in the Maldives revived during the late 1950s. The British were successful to conclude an
agreement with the Prime Minister Ibrahim Ali Didi for the lease of Gan in Addu for 100 years. This agreement signed in 1956 provided Gan, located in the southern tip of the Maldives, as an airfield for the British. It also included the provision of a part of Hithadhoo in Addu Atoll as a radio communication centre for the British.

The agreement was heavily criticised in the Maldives, and led to the resignation of the Prime Minister. He was succeeded by Mr. Ibrahim Nasir who sought to solve the problem regarded by the Maldivians as an issue endangering the territorial integrity and sovereignty of the Maldives. However, the government of Mr. Nasir was to face more serious problems that threatened the integrity of the country. While the British developed Gan as a base for Royal Air Force, the people of the three southern most atolls revolted against the government of Mr. Nasir. They formed a separate government and declared the 'United Suvadheeb Republic' in 1959. The British support for them was suspected by the government. The grievances of the people of these three atolls against the government were not entirely unjustified. For centuries, the people of the Huvadhoo, Fua Mulah and Addu Atolls sailed in their wooden vessels odi to Sri Lanka and India for the exchange of goods. They travelled independently to these countries without stopping over at Male; hence there was no government control over these trade affairs. However, Mr Nasir introduced measures which were unfavourable to the three southern most atolls including the prohibition of direct sail to the neighbouring countries without clearing through Male. The workers in Addu who could have enjoyed the benefits of direct payment from the British were also disappointed with the arrangement in which they were paid through the government in Male. They believed that the government controlled the exchange rates to their disadvantage.
The separatist uprising was brought to an end by the government of the Maldives in 1963 in some atolls with brute force. However, the unease and hostility continued. The government of the Maldives negotiated with the British for a diplomatic solution. Maldives demanded more independence than the existing agreements provided for. In 1960 an agreement was signed reducing the period of British stay in Addu to 30 years. The British finally agreed to give independence to the Maldives and an agreement was signed in 1965. This historic agreement was signed on 25 July 1965 in Sri Lanka. However, the British presence in Addu Atoll continued till 1976.

In 1968 the monarchy was ended and a Republic was formed. On 11 November 1968, Mr Ibrahim Nasir was proclaimed the First President of the Second Republic. In 1978 Mr Maumoon Abdul Gayyoom was elected the President of the Maldives. He has been the President for the past 26 years.

2.3 POLITICAL HISTORY OF MALDIVES

The Maldives was long a sultanate, first under Dutch and then under British protection. It became a republic in 1968, three years after independence. President Maumoon Abdul GAYOOM dominated the islands' political scene for 30 years, elected to six successive terms by single-party referendums. Following riots in the capital Male in August 2004, the president and his government pledged to embark upon democratic reforms including a more representative political system and expanded political freedoms. Progress was sluggish, however, and many promised reforms were slow to be realized. Nonetheless, political parties were legalized in 2005. In June 2008, a constituent assembly - termed the "Special Majlis" - finalized a new constitution, which was ratified by the
The first-ever presidential elections under a multi-candidate, multi-party system were held in October 2008. GAYOOM was defeated in a runoff poll by Mohamed NASHEED, a political activist who had been jailed several years earlier by the former regime. Challenges facing the new president include strengthening democracy and combating poverty and drug abuse.

The 2011–2012 Maldives political crisis began as a series of peaceful protests that broke out in the Maldives on 1 May 2011. They would continue, eventually escalating into the resignation of President Mohamed Nasheed in disputed circumstances in February 2012. Demonstrators were protesting what they considered the government's mismanagement of the economy and were calling for the ouster of President Mohamed Nasheed. The main political opposition party in the country, the Dhivehi Rayyithunge Party (Maldivian People's Party) led by the former president of the country Maumoon Abdul Gayoom (who was in power for over 30 years under an authoritarian system) accused President Nasheed of "talking about democracy but not putting it into practice." The protests occurred during the Arab Spring.

The primary cause for the protests was rising commodity prices and a poor economic situation in the country. The protests led to a resignation of President Mohamed Nasheed on 7 February 2012, and the Vice President Mohammed Waheed Hassan Manik was sworn as the new president of Maldives. Nasheed stated the following day that he was forced out of office at gunpoint, while Waheed supporters maintained that the transfer of power was voluntary and constitutional. An independent National Commission of Inquiry later ruled that there was no evidence for Nasheed's version of events, a finding supported by the US and the Commonwealth of Nations.
In April 2012, it was announced that new elections were to be held in July 2013. Presidential elections were held in the Maldives under a two-round system. Following 7 September initial vote no candidate received a majority of the vote, and a second round was planned for 28 September, to be contested by former President Mohamed Nasheed and Abdulla Yameen – incumbent President Mohammed Waheed Hassan came fourth in the first round of voting. However, on 27 September the Supreme Court cancelled the run-off and annulled the first round results. A re-run of the first round was held on 9 November, producing a similar result to the annulled election, and the run-off was planned for the following day due to the need to have a new President in place by 11 November. However, the run-off was postponed to 16 November by the Supreme Court after Yameen claimed he needed more time to campaign. Yameen won the run-off with his share of the vote rising from 30% in the first round to 51% in the second round; in comparison Nasheed's share increased by only 2% between rounds.

Nasheed was contesting the election following his controversial resignation amidst the 2011–12 Maldives political crisis with the aim of returning to the presidency after what he maintains was a coup d'état orchestrated by his deputy and successor Mohammed Waheed Hassan. Hassan contested the initial elections, but dropped out of the re-run after receiving only 5% of the vote. Yameen, half-brother of former president Maumoon Abdul Gayyoom was the candidate from Gayyoom's party, the Progressive Party.

The result of the initial vote held on 7 September 2013 was annulled by the Supreme Court and the election was re-run on 9 November. As no candidate achieved majority support, a run-off election (delayed by
Supreme Court decree) was held on 16 November. Abdulla Yameen was elected President.

2.4 STUDY AREA

The Maldives, is also known as the Maldives Islands, is an island nation situated in the Indian Ocean, 500km south west of India and 700 km South West of Sri Lanka. The Maldives is the lowest lying country in the world. The latitudinal and longitude extent is 0° 36' 0" S / 73° 6' 0" E. (Map-2.1) The Maldives is located 500km (300 miles) southwest of the southern tip of India consists of about 1190 low-lying coral islands. These islands are spread over 26 atolls, ring like coral formations enclosing a lagoon, which gives the Maldives its unique paradise-like appearance. No more than 200 islands are inhabited and most of them are covered by lush tropical vegetation and palm trees. About 99% of its territory is covered by the sea. These tropical islands spread over roughly 298 square kilometres (115 sq mi). Fishing and tourism are the country's leading economic activities. Only near the southern end of this natural coral barricade do two open passages permit safe ship navigation from one side of the Indian Ocean to the other through the territorial waters of Maldives. For administrative purposes the Maldives government organized these atolls into nineteen administrative divisions.
Map: 2.1: Location of Maldives
Most atolls consist of a large, ring shaped coral reef supporting numerous small islands. Islands average only one to two square kilometres in area, and lie between 0.1 and 1.5 meters above mean sea level. The highest island is situated at three meters above sea level. Maldives has no hills or rivers. Although some larger atolls are approximately fifty kilometers long from north to south, and thirty kilometers wide from east to west, no individual island is longer than eight kilometers.

On an average, each atoll has approximately 5 to 10 inhabited islands; the uninhabited islands of each atoll number approximately 20 to 60. Some atolls, however, consist of one large, isolated island surrounded by a steep coral beach. The most notable example of this type of atoll is the large island of Fuvahmulah situated in the Equatorial Channel.

Some islands are marshy, while others are higher owing to sand and gravel having been piled up by wave action. Often the soil is highly alkaline, and a deficiency in nitrogen, potash, and iron severely limits agricultural potential. 10% of the land, or about 26 km², is cultivated with taro, bananas, coconuts, and other fruit. Only the lush island of Fuvammulah produces fruits such as oranges and pineapples - partly because the terrain of Fuvammulah stands higher than most other islands, leaving the groundwater less subject to seawater penetration. However, as population grows, even in this island the cultivated areas are shrinking rapidly.

Fresh water floats in a layer known as "Ghyben/Herzberg lens" above the seawater that permeates the limestone and coral sands of the islands. These lenses are shrinking rapidly on Male and on many islands where there are resorts catering to foreign tourists. Mango trees already have
been reported dying on Male because of salt penetration. Most residents of the atolls depend on groundwater or rainwater for drinking purposes.

The sea covers 99% of the Maldives and inside its blue depths lies the mysteries and riddles related to the formation of the Maldives. The islands are formed around a ring shaped coral reef encircling a lagoon. This reef structure, typical of Maldives, is called an atoll. In fact, the English word 'atoll' itself is derived from the Maldivian or Dhivehi word.

There are 26 natural atolls in the Maldives.

**North Male**: Male’atholhu Uthuruburi also known as North Malé Atoll is of irregular shape. It is 58 km long and contains about 50 islands (including the capital Malé). There are also sandbanks, coral patches, innumerable farus and submerged shoals (called "haa" in Dhivehi). The general depths of the interior are between 25 and 35 fathoms (46 to 64 m). The bottom is sandy. There are numerous passages on all sides. Seen from space it is considered one of the most beautiful atolls on the planet.

**South Male**: Male’atholhu Dhekunuburi also known as South Malé Atoll is separated from North Malé Atoll by a deep channel (Vaadhu Kandu). Oblong in shape, this atoll is 35 km in length. It contains 22 islands, all except for 5 are situated in its eastern fringes. Inside this atoll there are also many reefs and little coral patches which make navigation difficult. The general depths of the lagoon are from 25 to 32 fathoms (46 to 59 m), sandy bottom. South of the atoll lies the deep Fulidhoo Kandu.
2.5 DIVISION OF REPUBLIC OF MALDIVES ISLANDS

2.5.1. Inhabited Islands: Those officially recognised as towns, villages, fishing and farming communities with permanent human habitation. They all have an island office and island chiefs (councillor and katheeb).

2.5.2. Uninhabited Islands: Islands with no permanent human habitations. They are sometimes used for agricultural and industrial purposes, and more recently as tourist resorts and picnic islands. Some of these islands are valuable breeding grounds of various species of seabirds and sea turtles.

2.5.3. Disappeared Islands: Islands which during recorded history, have been completely eroded away, claimed by the sea due to the sea-level rise associated with global warming or assimilated by other islands. Some of these islands were previously inhabited and have been important in the history of the country. Some natural atolls are named after them (islands of Thiladhoo and Addu after which Thiladhunmati and Addu atoll are named respectively) while others are thought to have been the sites of the first settlements in the Maldives (Ihadhoo- meaning seen first and possibly the first settlement of the Maldives).

2.6 FORMATION OF ATOLLS IN MALDIVES

There are still on-going debates about the formation of atolls. According to Charles Darwin's theory, when submerged volcanoes rise from the sea, a coral reef grew on its edge. When the volcanoes submerged, the coral reefs encircling a water-filled basin remained. Consequently, islands were formed on the reefs as the tides and currents brought dead coral onto sandbars. These were in turn colonised by plants.
A different view has been provided by Hans Hass. According to him, layers of coral reefs might have built up on top of the submerged mountains until they rose to the surface. The hardest and highest corals remained while the weaker corals in the center of the coral platforms broke down. The remaining corals at the outer edges formed rings that were to form the outer rims of atolls. Islands were formed as debris and sand accumulated on to the remaining reefs.

The reef is cut by deep channels, which the locals have mastered to navigate. Protective reefs safeguard the islands from the elements. However, the islands are susceptible to erosion. The islands are low-lying; emerging almost two meters above the sea level. It is frequent that one part of the island to erode while onto another part the currents and tides deposit sand expanding the island. Over the course of time, some islands may erode completely, while others may be formed gradually on a sandbank. There are still many islands and sandbanks at various stages of formation. Hence, the Maldives is a dynamic country in the making.

2.7 CLIMATE OF MALDIVES

Maldives climate is affected by its location. Maldives is an archipelago situated in the Indian Ocean. The nearness to the equator gives a humid climate to Maldives. The Maldives has a warm and humid tropical climate. The weather is dominated by two monsoon periods: the dry northeast monsoon is from January to March and the wet southwest prevails from May to November. The southwest monsoon is the wetter of the two monsoons and is typically the period when most severe weather events occur. The annual average relative humidity is about 80%.

Although the Maldives is not located in a region of cyclone or other severe weather activities, historic evidence shows that the northern part of
Maldives is affected by storms generated from cyclone activity in other regions of the world (Maniku, 1990 & Woodroffe, 1989). The climate of Maldives is, overall, pleasant and welcoming.

2.7.1. Temperature

The temperature (table 2.1 & Figure 2.1) of Maldives ranges between 24 and 29 °C throughout the year. The high temperature as well as high level of humidity form parts of the climate of Maldives. Analysis of long-term annual maximum and minimum temperatures show a rising trend. Based on the analysis, the annual maximum temperatures increase by 0.17 °C every 10 years, whilst annual minimum temperatures show an increase of 0.07 °C every 10 years. The climate of Maldives is, however saved from being overbearingly hot and humid because of the effect of the sea breezes blowing from the direction of the Indian Ocean towards the land area. The maritime influence makes the climate of Maldives very soothing.
Table 2.1: Mean Annual Temperature (°C) of North and South Male' Atoll (2001 - 2010)

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Source: Metrological Department

Figure 2.1: Maldives: Mean Anual Temperature of North and South Male' Atolls (2001-2010)
2.7.2. Humidity

Although the humidity (table 2.2 & figure 2.2) is relatively high, it ranges between 77 to 82%, the constant sea breezes help to keep the air moving. Two seasons dominate Maldives' weather, the dry season associated with the winter northeast monsoon and the rainy season brought by the summer southwest monsoon.

**Table: 2.2:** Mean Annual Humidity (%) of North and South Male' Atoll (2001 - 2010)

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Source: Metrological Department

**Figure: 2.2**

![Graph showing annual humidity in Maldives](image)
2.7.3. Rainfall

**Table 2.3:** Mean Annual Rainfall (mm) of North and South Male' Atoll

(2001 - 2010)

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<td>149.3</td>
<td>166.8</td>
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Source: Metrological Department

**Figure 2.3**

![Maldives: Mean Rainfall of North and South Male' Atolls (2001-2010)](image-url)
The weather in Maldives is affected by the large landmass of the South Asia to the north. The presence of this landmass causes differential heating of land and water. Scientists also cite other factors in the formation of monsoons, including the barrier of the Himalayas on the northern fringe of the South Asia and the sun's northward tilt, which shifts the jet stream north. These factors set off a rush of moisture-rich air from the Indian Ocean over the South Asia, resulting in the southwest monsoon. The hot air that rises over the South Asia during April and May creates low-pressure areas into which the cooler, moisture-bearing winds from the Indian Ocean flow. In Maldives, the wet southwest monsoon lasts from the end of April to the end of October and brings the worst weather with strong winds and storms. In May 1991 violent monsoon winds created tidal waves that damaged thousands of houses and piers, flooded arable land with seawater, and uprooted thousands of fruit trees. The damage caused was estimated at US$30 million.

The shift from the moist southwest monsoon to the dry northeast monsoon over the South Asia occurs during October and November. During this period, the northeast winds only contribute to the formation of the north eastern monsoon, which reaches Maldives in the beginning of December and lasts until the end of March. However, the weather patterns of Maldives do not always conform to the monsoon patterns of the South Asia. Rain showers over the whole country have been known to persist for up to one week during the midst of the dry season. The mean annual rainfall ranges from (table 2.3 &figure 2.3) 137.4 (2005) to 206.1(2003) mm.
2.8 SOILS OF MALDIVES

The soils of the Maldives are geologically young and consist of substantial quantities of the un-weathered coral parent material, coral rock and sand. In most of the places, soils are coarse in texture and shallow in depth with a top layer of brown soil (0 to 40 cm in depth) followed by a transition zone on top of the underlying parent material of coral reef limestone (MFAMR: ministry of fisheries agriculture and marine resources of Maldives 1995). In some low-lying areas are subjected to significant mechanical breakdown from human activity, fine deep soils are found with accumulated deposits of clay. In a lagoon environment (locally called kulhi) the depth of the clay may be substantial due to the accumulation of material from marine and biological sources over a long period of time. In many places, top layers of the soils have a weakly developed structure and at times a 30 cm thick hard-pan layer cemented with calcium carbonate is present, preventing penetration of the roots of most plants except large trees. The water-holding capacity of the soil is very poor due to high porosity and very high infiltration rates. The soils of the Maldives are generally alkaline with pH values ranging from 8.0 and 8.8. This is mainly due to the presence of excess calcium and, soils containing higher levels of humus, as in depressions and lagoons, are less alkaline. The soils are generally poor and deficient in nitrogenous nutrients, potassium and several micronutrients particularly iron, manganese and zinc. Though the phosphorus content in the soils is high which is present mostly in the form of calcium phosphate and, thus, remains unavailable to plants.

While vegetation in the islands is limited, it is supplemented by the riches of the sea; varieties of corals, abundant colourful fish and other organisms that makes the Maldives 'the home of the children of the sea’.
2.9 FLORA AND FAUNA

Maldives Flora and Fauna is one of the chief aspects of Maldivian geography. The islands of Maldives in the Indian Ocean have a tropical type of climate. The soil layer also plays an important role in the growth and development of the flora of Maldives. Maldives fauna depends on the topography, the climate and the vegetation cover on the islands.

Flora of Maldives is dominated by the grasses and shrubs that form a dense cover on many of the islands. The fertility of the soil makes the northern, southern and eastern islands greener than the central and western islands of Maldives. The chief plant featuring as a part of Maldivian flora is the palm tree, the national symbol of the island nation.

The chief crops like coconut, sweet potatoes, plantain, breadfruit, yams, millet, watermelon, etc also form an integral part of the flora of Maldives. The different kinds of grasses including bamboo are also grown in the islands. The tallest tree found on the islands of Maldives is the banyan tree. The flowering plants add color to the flora of Maldives.

Land animals in Maldives include rats, giant fruit bats, flying foxes and lizards. Maldives fauna also includes insects like scorpions and beetles. Large and colorful crabs are a common sight on the beaches of Maldivian islands.

The seas surrounding the islands of Maldives abound in a large number of bright and colorful marine life forms. The fishes found in the waters include angelfish, unicorn fish, butterfly fish, rock cod, parrot fish and many others. The crustaceans and turtles found in the waters also form important parts of Maldives fauna. Sharks, manta rays, porpoises, sting rays, dolphins are the larger sea creatures found in the waters.
Though the climate of the Maldives provides ideal conditions for luxuriant growth of tropical trees and shrubs, other factors such as salinity, the highly calcareous nature of soils and the salt-laden winds create harsh environmental conditions. This is one of the main reasons why the number of species in the Maldives, either native or naturalized, is limited.

The islands of the Maldives can, in general, be divided physically into three zones namely, i) the foreshore or lower beach, ii) the beach crest (beach top) and iii) the inner island. The foreshore can be further divided into high tide and high-storm levels. The high tide level is normally located at an elevation of 0.5 m above mean sea level and high storm level, which is beyond the reach of normal tides, is located at about 0.8 to 0.9 m. The storm level is affected by storm waves and is composed of gravel or shingle. The average elevation of the beach crest is about 1.2 m and the inner islands are at about 1.45 m above mean sea level (Morner et al., 2003). Each of these zones provides relatively uniform environment with its own associated plant community. Plant community found in different physical zones of the Maldives is more or less similar to plant association reported in Nukunonu Atoll of Western Samoa (Parham, 1971).

2.9.1. Plant communities of the foreshore

The foreshore or lower beach zone, which includes the beach area between the high tide line and the beach crest, is totally exposed to wave action, wind and salt spray. It is unstable and composed mainly of coarse coral sand in the lower portion and shingle. As a result of the harsh environmental condition, this zone supports no vegetation except occasional creeping sand-binders such as Ipomoea littoralis and I. biloba
along with a few individuals of Launaea pinnatifida and Portulaca alata in
the upper portion.

2.9.2. Plant communities of the beach crest

The beach crest or beach top rises gradually and sometimes abruptly to a
height of 0.8 to 1 m above the high tide line and includes a stable beach
frontage composed of coral sand and rubble. Like the foreshore
environment, it is also exposed to winds and salt spray and its lower
margin is occasionally or, in the case of an eroding beach, regularly
inundated by seawater during spring tides. The beach crest may extend 5
to 20 m inland and provides a suitable environment for strand plant
communities including a distinct association of trees and shrubs and a
few sand-binding creepers and herbaceous plants. These strand plant
communities include:

2.9.2. a. The Scaevola taccada scrub community

Which forms an effective windbreak of about 3 to 4 mts. height on the
seaward side of the islands, immediately above spring tide level. It is
normally found on sandy soils or soils dominated by coral rubble. It is the
most common scrub community found on beach crests of both northern
and southern islands of the Maldives.

2.9.2. b. The Pemphis acidula scrub community

Which is commonly found on elevated reef rock, coral conglomerate
beach rock or hard pan coral in open sites at or above the high tide level.
Pure stands of closely growing Pemphis acidula trees, which are
impenetrable, can be seen in these areas and it is usual for the roots of
these trees to be regularly wetted by seawater during high tide. In sandy
areas Pemphis acidula can also be seen growing in association with a
similar looking plant, Suriana maritime. These areas may have coral rock at very shallow depths.

2.9.2.c. Tournefortia argentea community

The *tournefortia argentea* community is found as a dominant strand community of the beach crest particularly in drier places in some of the northern islands. It is located very close to or just above the high tide line and may not form an effective windbreak as the trees do not grow closely together. It is sometimes associated with *Pandanus tectorius* and *Scaevola taccada*.

2.9.2.d. Guettarda speciosa community

The *guettarda speciosa* community is normally found only on highly elevated beach crests and is characterized by the presence of other species such as *Scaevola taccada*, *Pandanus tectorius* and a scattering of *Pisonia grandis* and *Cordia subcordata* trees.

2.9.3. Plant communities of the inner island

The microclimate of the inner islands, protected by the beach-crest communities, supports the growth of a number of trees and shrubs, which occur either in pure stands or as a mixed forest (Forsberg, 1957). In many islands coconut plantations are present immediately adjacent to beach-crest vegetation and in moist areas the shelter provided by a complete coconut tree canopy supports the growth of under story tree species such as ‘*Morinda citrifolia*’ and ‘*Guettarda speciosa*’. In some places, ‘*Pandanus odoratissimus*’, ‘*Calophyllum inophyllum*’ and *Hibiscus tiliaceus*’ are also found in low numbers within coconut groves (Forsberg, 1957). In some other, particularly moist, areas small pure stands of ‘*Hernandia nymphaeifolia*’, ‘*Cordia subcordata*’ and
'Barringtonia asiatica' are present. In drier places including the northern group of islands, pure stands of 'Hibiscus tiliaceus' and 'Premna serratifolia' are also seen. Where extensive coconut plantations are not present mixed species forest is the most common vegetation type found next to beach-crest scrub community. The principal tree species in these forests are 'Pandanus', 'Hibiscus tiliaceus', 'Cordia', 'subcordata', 'Hernandia', 'nymphaefolia', 'Calophyllum inophyllum', 'Barringtonia asiatica', 'Ochrosia oppositifolia', 'Guettarda speciosa', 'Adenanthera pavonina' and 'Terminalia catappa'. These mixed forests also support good growth of under story species such as 'Allophylus', 'cobbe', 'Morinda citrifolia' etc. No regular features in terms of the dominance, frequency or density of tree and shrub species are prominent in the mixed forests. In many islands the original distribution of trees and shrubs has been greatly disturbed by the establishment of extensive coconut plantations. As a result, beach-crest scrub communities and mixed forests are only found up to a short distance from the shoreline in many of the islands before merging into coconut plantations. As described in the species fact sheets, most of the trees and shrubs present in the beach scrub community and mixed forests are tolerant of salt-laden winds, salt spray, soil salinity and shallow nutrient-poor soils.

The above description of the plant communities of the Maldivian islands and the overview of the ecology, propagation, management and economic uses of different species given in the following fact sheets provide a background to the opportunity that exists for the establishment of multi-tiered multispecies coastal bio shields or green belts. Such bio shields are essential for the ecological security of the Maldivian islands and the economic security of the Maldivian people in light of future coastal hazards and predicted increases in sea levels.
2.10 FORESTS

Maldives Forests cover an area of approximately 30% of the total land area of the island nation. The small coral islands forming the archipelago of Maldives do not have any dense forest cover. Vegetation like shrubs and coconut palms form the only forests of Maldives. The forests of Maldives provide timber, which forms an important natural resource in Maldives.

The forests of Maldives are concentrated in the comparatively larger islands of the archipelago. The fertility of the soil layer, the availability of water and the climate of the islands of Maldives affect the growth of forests. The extremely porous soil of the smaller islands is unable to retain water that necessary for the growth of trees and plants.

2.11 MARINE ECOSYSTEM

Maldives waters are home to several ecosystems, but are most noted for their variety of colourful coral reefs, home to 1100 species of fish, 5 species of sea turtles, 21 species of whales and dolphins, 187 species of corals, 400 species of molluscs, and 83 species of echinoderms. Many crustacean species are there as well: 120 copepod, 15 amphipod as well as over 145 crab and 48 shrimp species.

Among the many marine families represented are Puffer fish, Fusiliers, Jackfish, lionfish, oriental Sweetlips reef sharks, Groupers, Eeels, Snappers, Bannerfish, Batfish Humphead Wrasse, spotted eagle Scorpifish, lobsters, Nudibranches, angel fish, Butterfly fish, squirrelfish, soldierfish, Glassfish, surgeonfish, unicorn fish, triggerfish, Napoleon wrasses, and Barracudas.
These coral reefs are home to a variety of marine ecosystems that vary from planktonic organisms to whale sharks. Sponges have gained importance as five species have displayed anti-tumor and anti-cancer properties.

In 2003, sea-temperature warming of as much as 5 °C (9.0 °F) due to a single El Niño phenomenon event caused coral bleaching, killing 2/3 of the nation's coral reefs. In an effort to induce the regrowth of the reefs, scientists placed electrified cones anywhere from 20–60 feet (6.1–18 m) below the surface to provide a substrate for larval coral attachment. In 2004, scientists witnessed corals regenerating. Corals began to eject pink-orange eggs and sperm. The growth of these electrified corals was five times faster than ordinary corals. Scientist Azeez Hakim stated: before 1998, we never thought that this reef would die. We had always taken for granted that these animals would be there, that this reef would be there forever. El Niño gave us a wake-up call that these things are not going to be there forever. Not only this, they also act as a natural barrier against the tropical storms, floods and tsunamis. Seaweeds grow on the skeletons of dead coral. The corals reefs are like the rainforest for marine life.

### 2.12 BIODIVERSITY IN THE MALDIVES

The islands of the Maldives are very small, low lying and isolated. This fact very much limits the richness of the terrestrial biodiversity. As the islands are located purely in a marine ecosystem, the Maldives is very rich and diverse in terms of its marine biodiversity.

Limited studies have been done to study the biodiversity of Maldives. From Tables 1-8 and 1-9, it can be seen that the recorded species of terrestrial flora is more diverse compared to terrestrial fauna. Because of the coastal ecosystem, Maldives has a wide variety of mangrove species.
Given the small island ecosystem, Maldives is home for many species of seabirds. Five sub-species of seabirds have been identified as endemic to the Maldives. Endemicity and the frequency of unique sub-species are high in the southern part of Maldives compared to the north. From a biodiversity prospect, it is very important to protect all islands from the effects of climate change and sea level rise, especially the uninhabited islands, which are hotspots of biodiversity.

Maldives is very rich in its marine flora and fauna. Over 1200 species of reef fish, 250 species of hermetopic corals and 285 species of algae have been identified in the Maldives. These marine ecosystems are very vulnerable to climate change and sea level rise.

As mentioned earlier few studies have been undertaken to study the biodiversity in Maldives. No studies have been undertaken to study the freshwater environment. There might still be many species that have not been identified. Therefore, it is important to do more studies to compile a complete listing of flora and fauna found in the Maldives.

2.13 DEMOFIGUREIC SCENARIO

The total population (Figure: 2.4) in Maldives was last recorded at 0.3 million people in 2012 from 0.1 million in 1960, changing at 278 % during the last 50 years. Population in Maldives is reported by the World Bank. From 1960 until 2012, Maldives Population averaged 0.2 Million reaching an all-time high of 0.3 Million in December of 2012 and a record low of 0.1 Million in December of 1960. The population of Maldives represents less than 0.01 % of the world’s total population which arguably means that one person in every 21834 people on the planet is a resident of Maldives. The population of Maldives is 395,650 in which 231,093 are males and 164,557 are females which represent 1.59
percent increase from 2000 population size. Population density is 1036 per sq. km. Population growth rate having reached peak levels at 3.4% per annum during 1985-1990 began to decrease during 1990-1995 at 2.8% per annum and to 1.9% per annum during 1995-2000. At the percent rate it is expected that the country’s population will double during the next 36 years. The immediate prospect is of an additional 47,924 people in the next decade, approximately equal to the current size of Male.

With the introduction of modern health care services, there has been a decline in mortality rates in Male and the outer islands, not accompanied by a similar decline in fertility. Due to this the Maldivian age structure is very young with nearly 41 percent population under 15 years of age. The implications of such a growth on the environment, food security, nutrition, balance of payments, and demand for jobs, educational institutions and related social infrastructure are of great concern to the Government. Around, 41,089 youngsters, entering the labour market in the next five years, an additional 38,026 children will be enrolled in primary school and will soon be ready to enter the labour market. Thus creations of new employment opportunities are crucial challenges for the development of the country.

Population distribution in the Maldives is yet another concern for the future of the country. At present over 27 percent live in the capital island of Male which has grown from 21 percent in 1977. The growth of Male is largely due to inward migration from Atolls. At the same time, there is very little internal migration between islands. In the interest of improving quality of life of the people, it would be necessary to consolidate the population in a smaller number of islands. Simultaneously, growth
centres are being developed to provide alternate destination to the migrants.

**Figure: 2.4**

![Graph showing population growth rate from 2004 to 2013 in Maldives.](image)


### 2.14 MALDIVES UNEMPLOYMENT RATE

Unemployment Rate in Maldives as shown in figure-2.5 decreased to 11.70 percent in 2010 from 14.44 percent in 2006. Unemployment Rate in Maldives is reported by the Department of National Planning, Republic of Maldives. From 1995 until 2010, Maldivian Unemployment Rate averaged 7.2 Percent reaching an all-time high of 14.4 Percent in December of 2006 and a record low of 0.8 Percent in December of 1995. In Maldives, the unemployment rate measures the number of people actively looking for a job as a percentage of the labour force.
2.15 LITERACY RATE

The Literacy and Neo Literacy Programme, conducted in the Maldives which seeks to create an educated citizenry through achieving universal literacy for adults stems from a growing awareness on the part of the planners that no meaningful development can take place without the informed, intelligent and meaningful participation of the masses who are not seen the beneficiaries but also as the agents of the process of change. With the belief that basic education of the masses is a necessary precondition for development, the effort has been sustained meaningfully. Before launching the programme which began on 1 January 1980 the goals and parameters of the programme were conceived and delineated at various forums and then the outlines of the programme were developed. The country got a head start because of the high literacy rate estimated at 70% and comparable participation rates at the primary level through a network of the traditional indigenous institutions. It is necessary to add that quality of education was considered to be of crucial importance both
for primary and adult education programmes. It was felt that unless the right kind of education of an acceptable quality was imported, it was not possible to achieve the goals the Government had set for itself. It is in this context that the programme of Basic Education of which the literacy and Neo-Literacy Programme forms a key component was conceived and planned. To effectively implement a national programme for literacy a nationwide six year programme of functional literacy was formulated and announced by the President on 1st January 1980. The first phase, addressed itself to eradication of illiteracy, behaviour of adults and encourage them to play an active part in the development and transformation of society, by providing them with new knowledge, skills and values.

Adult literacy and primary school enrolment rates in the Maldives are among the highest in Asia, with little or no gender disparity. However enrolment levels in secondary and upper secondary levels are not so positive. The literacy rate (table- 2.4 & figure-2.6) of the Maldives was 95.5 percent in 1985 and it has increased to 99.3 percent in 2006.

**Table: 2.4:** Literacy rate of Maldives from 1985 to 2006 (in %)

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<tr>
<td>2006</td>
<td>99.3</td>
<td>1.15</td>
</tr>
</tbody>
</table>

Source: Ministry of Planning and National Development
2.16 AGRICULTURE

The potential of agriculture in the Maldives is concentrated in 36 islands that are large enough to support commercial activity. Although the total land area has been estimated at 300 km², only 33 islands have land areas in excess of 1 sq km, and 3 islands have an area larger than 3 sq km. Agriculture is important to a large sector of the population that are marginalized from the country’s commercial fisheries and tourism industries. Nevertheless, agriculture plays a vital role in the livelihood of the rural population. Approximately two-thirds of the population of the Maldives resides in the rural areas. Many of these rural residents are involved in fisheries activities and home-garden agriculture. Over one quarter of the rural labour force is engaged in fisheries and it has been estimated that approximately the same number are involved in some form of agriculture.

Although agriculture’s contribution to the Maldives’ gross domestic product (GDP) has declined steadily, falling from 3.6 percent in 1995 to 2.7 percent in 2003, its contribution to the economy is
underestimated because production is mostly subsistence in nature and usually not measured for purposes of national accounting. The sector plays a key role in providing formal and informal employment opportunities, as well as contributing in an important manner to social issues related to poverty alleviation, providing work for women, providing a safety net for the population, ensuring food security for the outer atolls, and addressing other dimensions not recognized in the national accounts. For these reasons, the 6NDP has emphasized the agriculture sector’s importance to the economy as being greater than its contribution to GDP because of its role in generating employment and income opportunities in the atolls, improving food security, and providing greater self-reliance from import substitution of certain agricultural produce.

The small size of the population and in most cases the small area of the islands suggest the need to explore different markets and add value to production activities. Fishing and agriculture are the most important economic activities in almost all of the inhabited islands. Both activities still retain traditional subsistence characteristics due to the constraints that exist for these activities to expand into fully-fledged commercial activities. This pattern is more noticeable in the field of agriculture where there has been limited intervention in the form of programs that would help the subsector to become commercial. Agriculture is still a family activity and the use of hired labour is minimal. Traditional means of payment are still being followed in several transactions such as the plucking of coconuts where labour is paid in kind. On the islands where rapid field assessments were undertaken for the purpose of the present study, it was found that a significant proportion of the agricultural produce is sent to Male’ as gifts to relatives.
and friends who live in Male’ and also distributed to neighbours and friends in the island itself.

Agriculture has provided crucial support to the livelihood of the Maldivian people over the centuries, despite the nutrient poor soils. Traditional agricultural activities included timber and firewood harvesting, and toddy collecting on both inhabited and uninhabited islands. In recent years several farmers have commenced cultivation of ‘new’ crops that include watermelon, cucumber and papaya that are mainly grown for the domestic market (mainly the capital Male’) and the tourist resorts. Other recent developments include the establishment of commercial egg production targeted mainly at supplying resorts. Goats are farmed commercially for sale on the local market.

2.17 LAND USE FOR AGRICULTURE

In 1991, only 30 islands were classified as agricultural islands on the basis of population engaged in agriculture, but in 1993 there were 42 islands classified as such and this number was revised again in 1996 to 60 important agricultural islands. As of 2004, 32 uninhabited islands had been leased for commercial agriculture development; 28 of these islands, ranging between 0.8 ha to 97.5 ha, had a total land area of 872 ha and the area of 4 islands remained yet to be determined (source: MOFAMR). Of these islands, 26 were leased for a period of 20 or 21 years, 3 for 10 years, and one island each for 15 years and 5 years. No information was provided on the duration of the lease of another island (B. Milaidhoo).

Thirty-two islands are currently leased for a ‘long-term’ period (up to 21 years) to individuals or companies for agricultural production. These leased islands have an estimated total surface area of 996.6 ha calculated
on vegetation coverage. However taking into account the exclusion of a coastal fringe of 10 to 20 meters where soils are less suitable for agricultural production, crops are subject to salt spray, and where protective barriers of coastal vegetation need to remain, the total area suitable for agricultural production is estimated at a maximum of 900 ha, and likely much less. Thus, the total land area suitable for agriculture is estimated at 2,670 ha, consisting of 1,770 ha on inhabited islands and 900 ha on uninhabited islands.

2.18 TRANSPORTATION AND COMMUNICATIONS
Maldives has two airports with permanent-surface runways more than 2,440 meters long, one located adjacent to Male on Hulele Island, known as Male International Airport, and the other on Gan Island in the southernmost Addu Atoll, which is scheduled to become an international airport. Since 1981, after the runway was widened and expanded, the airport on Hulele has been able to handle direct charter flights from Europe. The airport on Gan was used only for domestic traffic. Two additional domestic airports cater to foreign tourists. One on Kadu Island in Haddummati Atoll opened in 1986, and the other on Hanimadu Island in South Tiladummati Atoll opened in 1990. A further domestic airport on Kodedu Island was scheduled to open in 1994.

In 1974 the government created Air Maldives, which had one eighteen-seat airplane. In the early 1990s, Air Maldives flew between Hulele and Gan three days a week, and Kadu twice a week. A twenty-seat seaplane operated by Inter Atoll Air also flew scheduled and chartered flights between Hulele and many of the resorts. In addition, Hummingbird Helicopters (Maldives) and Seagull Airways each operated four helicopters for interisland flights. Another firm, Maldives Air Services, coordinated all air services on the ground.
Maldives has an active merchant shipping fleet used for import and export purposes, including ten cargo vessels, one container ship, and one oil tanker. The government-owned Maldives National Ship Management, Ltd. is the largest of several Maldivian shipping firms.

Male, the only port that can handle international traffic, has been improved by the First Male Port Development Project completed in late 1992. The Second Male Port Development Project, partly financed by a loan from the Asian Development Bank, began in late 1993 and is scheduled for completion in 1996.

The fishing dhoni is the traditional all-purpose vessel in Maldives. Although dhonis have sails, most are also engine-powered. Dhonis are used mainly within the sheltered waters of each atoll. Travel through the open sea from one atoll to another is usually by vedis, larger, square shaped wooden cargo boats.

The primary form of road traffic in Maldives is the bicycle. Motorcycles are the most common form of motor vehicles, of which 4,026 were registered in 1990. Passenger cars on Male are primarily status symbols for the Maldivian elite; however, the larger inhabited islands and resort islands have limited taxi services for transporting people to and from wharves and airfields. In 1992 there were 691 registered passenger cars, and 379 trucks and tractors.

Modern communications are minimal in Maldives. Most people use citizen-band radios on the islands and in boats. Telephone service between Male and the islands is limited. However, most of the resort islands can be contacted directly by telephone, and administrative atoll offices are linked both to Male and each other by radio-telephone. Modernization efforts of the government have resulted in a steady
increase in the number of telephones. The 1984 number of 1,060 telephones increased in 1992 to 2,804. There is good international telephone service through a satellite ground station in Male.