

# Maldivian Gender Roles in Bio-resource Management

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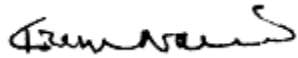
## **Foreword**

FAO recognizes that rural women hold the key to the livelihood security of millions of the households and to achieve conservation and sustainable use of plant and animal diversity. Rural women's roles as food providers and food producers link them directly to the conservation and sustainable utilization of genetic resources for food and agriculture. Centuries of practical experience have vested in rural women in South Asia the unique knowledge and user perspectives about local crop, marine and livestock management systems. Rural men and women in small island countries have lived in a symbiotic relationship with the land and marine diversity that provides livelihood resources and contributes to household food security. Yet, seldom the gender specific roles of men and women in small island countries of South Asia are documented in association with bio-resources management. Under FAO Regional Women in Development programme on gender concerns in natural resource management and household food security, series of studies were commissioned to document gender roles in bio-diversity management in South Asia. This case study on Maldives is one of them.

The study examines the gender roles in livelihood resource management in the ecosystem context of Maldives archipelago, rich in natural wealth, particularly marine bio-diversity. The marine wealth and mangroves are integral components of the livelihood resource base to this small island nation's dispersed communities. Gender specific roles and associated knowledge have played an important part in harvesting of bio-resources for households' productive activities. The publication of this document is very timely since it coincides with the FAO's special focus on Small Island Countries this year.

It is hoped that the key information presented in this case study and its recommendations for managing the bio-resources of the Maldives, will be a significant step ahead toward integrating

gender concerns in the development agenda and mainstreaming women in bio-diversity management.



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April 1999

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## P R E F A C E

Gender analysis deals with the socially constructed roles and relationships among men and women in their day to day activities. There is a wide spread misunderstanding of the distinction between the gender mainstreaming paradigm and the exclusively women-centered development approaches, though both are complimentary to one another. In our efforts in planning for equitable development and sustainable use of bio-resources, it will be crucial to understand gender relations in the community and gender roles in resource management.

In 1996, the FAO Regional Office for Asia and the Pacific, Bangkok, initiated a series of studies on the "gender dimensions in bio-diversity management", in SAARC countries in Asia. M S Swaminathan Research Foundation was invited to undertake this study, first in India and later in Maldives. The studies carried out in India have been published in a book titled, "Gender Dimensions in Biodiversity Management", by Konark Publishers, New Delhi.

The present publication documents the results of the study carried out in Maldives by Dr.(Ms) Hemal Kanvinde of the M S Swaminathan Research Foundation during March, 1998.

The study draws our attention to the richness of the biological wealth of Maldives as well as to the shared and independent roles of men and women in the use of conservation of terrestrial and marine bio-resources. The study documents the gender roles in the management of the bio-resources of Maldives. The analysis of landscape and roles of men and women has led to relevant recommendations including a framework to develop and sustain *People's Biodiversity Registers* by local communities. These proposals for community involvement in bio-diversity management could facilitate the process of mainstreaming both gender and biodiversity in all development activities.

I am indebted to Dr.(Ms) Revathi Balakrishnan, Regional Rural Sociologist and Women in Development Officer of FAO Regional Office, Bangkok for inviting us to undertake this study and to Dr.(Ms) Hemal Kanvinde for carrying out the study with care and devotion as well as for preparing the report. Above all, my thanks go to the Government of Maldives for the help and

advice extended for carrying out this study as well as for their commitment to promoting rapid economic development rooted in the principles of ecological and social sustainability.

1999

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We thank the author Dr. (Ms.) Hemal Kanvinde, M.S. Swaminathan Research Foundation for undertaking the study on "Roles of Men and Women in Bio-Resource Management", in the Maldives. The study examines the issues of gender dimensions in the community life of Maldives, particularly as relevant to using and caring for the biodiversity heritage of the small island country.

We gratefully thank the Government of Maldives for approving and supporting the study through the Ministry of Fisheries and Agriculture (MoFA). In particular the author thanks, Mr. Jadullah Jameel, Director General of MoFA for his interest in the study and Mr. Hassan Maniku, Director, Marine Research Section for sharing his insights on Maldives. She acknowledges gratefully the support of Mr. Ibrahim Shariff of the MoFA for providing guidance as well as helping as an interpreter. A study of this nature that focused on life styles and household resource management concerns, is possible only through the generosity of communities that shared their knowledge and experience with the author. We thank them all for helping us with the study.

We thank M.S. Swaminathan for supporting this study and similar efforts of RAPS Women in Development programme.

Women in Development Service  
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## Summary

The Maldives archipelago is rich in natural wealth, particularly marine biodiversity. Traditionally, the country's island-based communities have depended on these resources for their food and livelihood security. Maldivian men have proven their skills as fishermen, harvesting tuna, shark, reef fish and a variety of other species from the lagoons and waters surrounding their islands. Women have traditionally played the major role in agricultural and household production and childcare, as well as in drying and processing fish and producing a range of local fibre-based handicrafts. Gender roles and associated knowledge have played an important role in these harvesting and productive activities based on bio-resources. Indeed, these local knowledge systems and community-based practices have effectively ensured the sustainable harvesting and conservation of the archipelago's natural capital, helping to conserve the extent of biological diversity over time.

This study analyses the natural and human endowments of the Maldives on the basis of landscape and lifescape characteristics. This approach makes it possible to take into account the importance of the country's ecological, social, economic and political environment to community activities and farm life, as well as the nature and direction of resource flows, and resource use and management within the landscape. Using such a landscape-lifescape approach to analyse and achieve an understanding of gender dimensions is, in many ways, compliments FAO's "Socio-economic and Gender Analysis" (SEAGA) framework for gender planning. In the case of this study, the socio-economic framework is expanded through the incorporation of a larger bio-resource environmental aspect.

One of the primary objectives of this case study is to provide an overview of biodiversity management systems in the Maldives. This also the traditional systems which have served to conserve the country's natural wealth while, at the same time, enabling island communities to harvest these bio-assets to ensure their own survival. The main focus of the study is on Maldivian gender roles in bio-resource management. In this context, the study examines how gender roles have traditionally played a part in the sustainable utilisation and management of natural resources and biodiversity. Different roles and responsibilities of men and women in harvesting and managing terrestrial and marine-based resources are identified and analysed. The analysis covers, for instance, gender roles in land and water management, household agricultural production, seed selection, and harvesting activities, home gardening, commercial agriculture, fishery related activities, etc.

In addition to traditional conservation practices, the study also considers the more recent institutional and legislative framework for biodiversity management in the Maldives. In this context, some of the relatively newly introduced means for *in situ* conservation are analysed, including marine protected areas and protection for valuable species.

Emerging trends pose new challenges for the future sustainability and management of the natural resources of the Maldives. Global threats related to increasing greenhouse gases and an associated rise in sea level are of real concern to an island nation where most of the population lives on land with a negligible height above mean sea level. On a national level, rising population pressures, increased pollution, economic growth, and growing demands for space threaten the resource base on which a large part of the population and economy depend.

At the same time, lifestyles and traditional practices are gradually changing. With the mechanization of the traditional fishing boats since the 1970s, for instance, time and distance

constraints facing fishermen have dramatically reduced, opening up vast new fishing areas. These trends, together with their attendant effects, have implications for the use and management of the Maldives' natural resources in the future. Furthermore, they have increased the need to strengthen and expand existing mechanisms aimed at sustainable resource management.

In this context, the study makes a number of recommendations which will, it is hoped, provide guidance to a country already concerned with the need to balance developmental and environmental objectives. Among these recommendations, the following are particularly important:

- preparation of an inventory of the flora and fauna wealth of the Maldivian Islands;
- preparation of "People's Biodiversity Registers" to catalogue the biological diversity of individual islands and document community-based resource use and management, including gender roles;
- inviting active contribution of women living in atoll communities to the inventory and people's bio-diversity register initiatives;
- incorporation of, and differentiation between, men's and women's activities in national statistics produced for the agriculture and manufacturing sectors;
- use of the government's distance education programme to disseminate knowledge about the national bio-resource heritage to atoll populations;
- incorporating biodiversity heritage aspects and conservation related topics in school curricula;
- identification of means and activities to harness the strength and reach of NGOs in support of effective bio-resource management and conservation;
- inclusion of small business management training within atoll-based vocational training programmes for women;
- provision of training in integrated pest management for women living on atolls;
- implementation of trials on the application of manure to agricultural plots and home gardens and training in composting methods should be carried out in conjunction with island-based women's committees;
- implementation of a programme aimed at the revitalization of earlier traditions related to conservation;
- promotion of seed gardens or seed farms within home plots as a means to increase farmer's seed sufficiency;
- recognition of the intellectual property rights of islanders responsible for the conservation and enhancement of biological diversity over time;
- efforts to expand the cultivation of traditional crops;
- designation of selected islands as "Global Reserves of Diversity" to ensure their sustainable management and protection from tourism, industrialization, pollution, etc.

As the Maldives enters the next phase of development, the current gains on gender equity should be consolidated and further expanded. The country faces the persistent task of managing economic growth balancing it with conservation of natural wealth. The atoll communities have both the traditional knowledge and capabilities to manage their bio-assets in a responsible manner. These communities of men and women are to be well supported in the management of bio-diversity and responsible use of bio-resources.

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## Abbreviations

ARTEP	Asian Regional Team for Employment Promotion, New Delhi
CBD	Convention on Biological Diversity
CITES	Convention on International Trade in Endangered Species
EEZ	Exclusive Economic Zone
EIA	Environmental Impact Assessments
ERU	Environment Research Unit
GDP	Gross Domestic Product
GEF	Global Environment Facility
ILO	International Labour Organization
IUCN	International Union for the Conservation of Nature
MoFA	Ministry of Fisheries and Agriculture
MPA	Marine Protected Areas
MPHRE	Ministry of Planning, Human Affairs and Environment
MRS	Marine Research Section
MWASW	Ministry of Women's Affairs and Social Welfare
NCPE	National Commission for the Protection of the Environment Resources
NGO	Non-governmental Organization
PBR	People's Biodiversity Register
SAARC	South Asian Association for Regional Cooperation
UNCED	United Nations Conference on Environment and Development
UNCLOS III	UN Convention on the Law of the Sea
WMO	World Meteorological Organization

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# 1. Introduction

Though geographically small in size, the Maldives are rich in natural resources, particularly marine biodiversity. These resources have historically sustained the country's scattered island communities, providing for their food and livelihood security. Indigenous community-based practices have traditionally conserved the extent of biological diversity over time, enabling the country's resources to be harvested sustainably to meet people's needs. Local knowledge systems and gender roles have been important in this context. Women have developed skills and capacities to manage the interwoven forest, farm and home garden ecosystems, and to successfully integrate these roles with their responsibilities in a range of other productive activities. Men, on the other hand, have perfected techniques and methods to harvest the marine resources of the lagoons, reefs and open seas.

This study is concerned with the biodiversity management of the Maldives. One of its major objectives is to provide an overview of biodiversity management systems in the Maldives, including the traditional systems which have served to conserve the country's natural wealth while, at the same time, enabling island communities to harvest these assets to ensure their own survival. The report explores the natural and human endowments of the Maldives on the basis of the country's landscape and lifescape characteristics. A landscape approach acknowledges the importance of the ecological, social, economic and political environment to community activities and farm life. It also recognises the importance of resource flows through the landscape and external environment. Lifescape, on the other hand, depicts community life and people's use of resources (SANREM CRSP, 1995).

A major component of the document seeks to identify and examine how gender roles have traditionally played a part in the sustainable utilisation and management of natural resources and biodiversity. In this context, it explores the different roles and responsibilities of men and women in harvesting and managing terrestrial and marine-based resources, and their access to these resources. Using this landscape-lifescape approach to analyse and achieve an understanding of gender dimensions is, in many ways, comparable to FAO's "Socio-economic and Gender Analysis" (SEAGA) framework for gender planning. In this case, the socio-economic framework is expanded through the incorporation of a larger bio-resource environmental aspect.

The findings of this analysis enable a number of conclusions and recommendations to be made regarding the optimum direction for natural resource management in the Maldives in the next millennium. Given the rapid rate of population growth and economic development in the Maldives, together with obvious natural threats to the islands' ecosystems, it is hoped that these recommendations will provide guidance to a country already concerned with the need to balance developmental and environmental objectives.

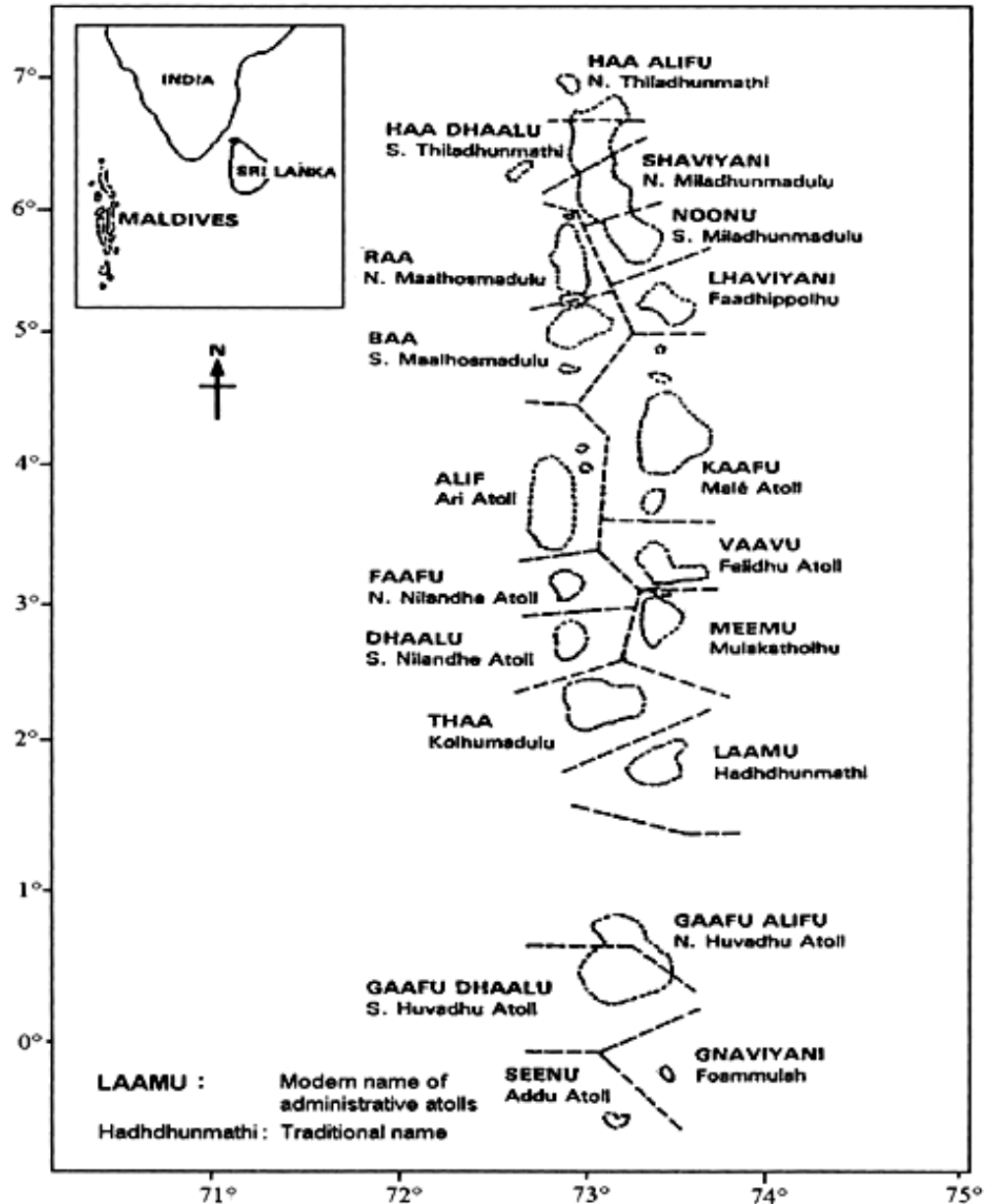
By way of introduction, the following sections focus on the landscape and lifescape of the Maldives. In short, the emphasis is on the scope and makeup of the country's natural, cultural and human capital, as well as its lifescape and governance.

## 1.1 Natural Capital: Dispersed Diversity

Located in the Indian Ocean, the Republic of Maldives occupies an archipelago of some 1 200 coral islands. The islands are formed into 26 natural atolls lying in a north-south chain, 820 km

long and up to 130 km wide (see Map 1). The total area of the country, including land and sea, is about 90 000 sq. km. The lagoons and reef waters of the atolls enclose an area of 21 300 sq. km while the total land area of the islands is less than one percent of the area enclosed by the lagoons. The country's Exclusive Economic Zone (EEZ) covers more than 90 000 sq. km.

**Map 1. Republic of Maldives**

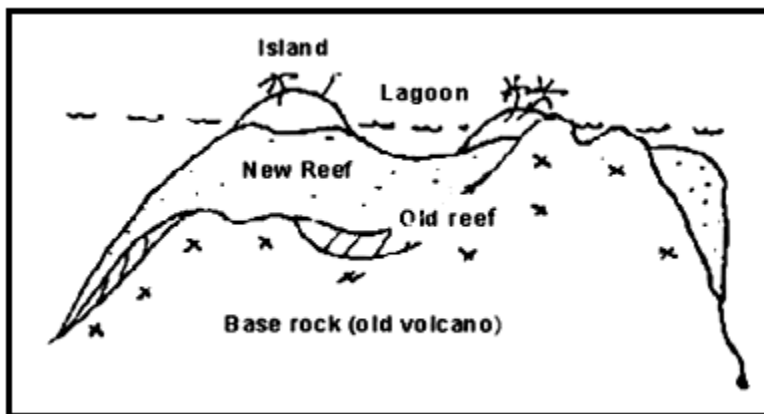


**Formation of Atolls:** Atolls are formed in oceanic waters around the base of extinct volcanoes, and are associated with groups or chains of islands. They are formed by the total disappearance of a volcanic mass

*beneath the sea, and the continued upward growth of coral reefs on this volcanic basement. The result is the formation of a coral atoll, an approximately circular structure or string of islands surrounding a central lagoon.*

The coral atolls of the Maldives are formed upon minor elevations on the Chagos-Lacadvie submarine plateau, which ascends from the deep Indian Ocean. This plateau has provided a base for reef building corals, from where they have risen to the surface as illustrated in Figure 1. Most of the atolls have a number of channels or openings in the outer reef which provide access to the islands in the enclosed interior sea or lagoon of the atoll. The shape of the atolls varies from circular and oval, to pear shaped. Some are fairly large such as Huvadhu Atoll in the south, which has approximately 250 islands and a lagoon area covering approximately 2,800 sq. km. Other atolls are very small and contain only a single island, such as Kaashidhoo and Gaafaru in the North Male' Atoll.

**Figure 1. Profile of an Atoll and Lagoon**



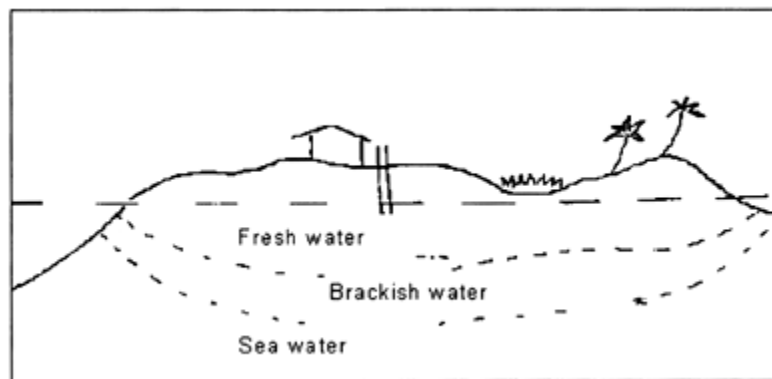
The islands of the atolls are very small, varying in size from 0.5 – 6 sq. km, and include small sand banks as well as larger elongated strip islands. They are generally flat with very few mounds and no rivers; the average elevation is just 1–3 m above high tide level. Some of the larger islands have small fresh-water lakes, some contain swampy depressions, and some have brackish water with mangroves along the edges. The soil on most islands has a poor water-retaining capacity and is highly alkaline due to an excess of calcium from the basal coral rock. Rain water percolates through the highly porous sand and forms a freshwater lens above the sea water (see Figure 2). This fresh water is easily obtained by sinking shallow wells.

The natural resources of the atolls have long been precious to the people of the Maldives. Indeed, for many centuries, Maldivians have survived on their country's marine resources. Natural house reefs surround and protect each of the islands from rough seas. These protective coral reefs are submerged underwater gardens, home to hundreds of species of multicoloured tropical fish, countless shapes and sizes of coral and shells, and various sea grasses. For instance, they shelter 250 species of hermatypic coral, more than 1 200 reef fish, 500 shell varieties, nearly 200 sponge species, over 100 species of marine crustaceans, more than 100 species of echinoderms, some 235 species of marine algae, as well as 5 turtle species.

There are no hills, mountains, rivers or thick jungle in the Maldives. The islands are characterised by tall coconut palms and white sandy beaches. The terrestrial flora includes some 583 plant species, approximately half of which are domesticated or medicinal plants. The islands contain various species of trees used for timber, and are rich in a wide range of trees and plants of food value. These include coconut, bread fruit, banana, mango, screw pine, cassava, sweet potato, taros and millet.

With the exception of several varieties of sea and shore birds, the island's fauna is rather limited. In general, fauna on the islands comprises lizard species, small mammals like tree shrews, fruit bats and rats, and some 130 insect species such as scorpions, centipedes, rhinoceros beetle and paper wasps. In the homestead the domesticated animals reared are goats and chickens.

**Figure 2. The Fresh Water Lens**



## 1.2 Cultural Capital: A Unique Combination of Cultural Influences

Evidence suggests that the Maldives has been populated and thriving since as early as the fourth century BC. Recent excavations have uncovered structures related to the ancient Indus civilisation, and it is suspected that this culture thrived between 2 000 - 1 500 BC. There is also evidence of Buddhism, reflecting Sri Lanka's significant influence. It is argued that the earliest settlers migrated from Arabia, eastern Africa and the Indian subcontinent, among other places. Arab merchants arrived in the ninth century, initiating large-scale trading for coconuts, dried fish and, in particular, money cowry. This also resulted in a gradual transition towards Islam and the rule of Sultans. From the sixteenth century onwards, the islands were influenced by Portuguese and Dutch traders. Yet except for 15 years of Portuguese occupation in the sixteenth century, the Maldives has been an independent state throughout its known history. A British protectorate from 1887–1965, the Maldives became a republic in 1968.

The original population of the Maldivian Islands is believed to be Dravidian and is presumed to have come under the influence of successive waves of immigration, including a large influx of Aryans in the third century BC, and a strong Arab and slight African influence from the tenth century onwards. These trends are reflected in the language, Dhivehi<sup>1</sup>. While exhibiting a strong Sinhalese influence, Dhivehi also includes words from the geographical regions of immigrant communities. The local medicinal techniques reflect traditional Chakra, Ayurveda and Unani medical practices.

### **Gender Roles**

Due to their small population and widely dispersed islands, the Maldivians have developed a socio-cultural pattern characterised by close-knit homogenous communities. Frequent divorces and remarriages have enlarged the family and diluted its influence on children. Traditions favouring segregation of women, common in many Islamic countries, are conspicuously absent in the Maldives. There is free mixing between the sexes and restrictions on female education or employment are absent. Women work alongside men in a number of occupations. Thus gender roles reflect the unique culture that has been fashioned from an amalgamation of the best components of various influencing cultures.

Nevertheless, the traditional gender division of labour is well defined and continues to prevail even today. The islands are dependent upon a seafaring economy. Fishing has provided the main occupation for men on the atolls. According to tradition, men go to sea to fish for tuna during the day, while women tend the home, care for children and produce food and articles for subsistence. Women on the atolls have also traditionally been involved in boiling, drying and salting fish, as well as in various local fibre-based handicrafts, including the production of coir rope and twine, matting, producing palm frond panels and basketry.

In general, two major constraints inhibit the ability of women to participate in economic activities:

- obligations to care for the family, more demanding in the Maldives as a result of the large family size (7.2 persons on average);
- mobility constraints imposed by the island geography, as well as the fact that women cannot migrate with or follow their husbands at will to the place of their new and more lucrative jobs, such as the Gulf States.

## **1.3 Human Capital: Population, Education, Employment and Lifescope**

### **Population**

In 1995, the population of the Republic of Maldives, excluding foreign nationals, was 244 644 persons. An estimate for 1997 put the total population at 263 189, of which about 48.5 percent are women (Official Government Website). The Maldives has one of the highest population growth rates among developing countries in the Asia Pacific Region. For instance, the population grew at 2.79 percent during the 1990–1995 period. Accordingly, the population is young; 47 percent of the population is in the under 15 year age group, while 50 percent is in the working age group (15–64 years) and just 3 percent is in the 65 years and older age group. Life expectancy is 70 for men and 71 for women. The sex ratio is 105 (Fifth National Development Plan, Government of the Maldives).

<sup>1</sup> Dhivehi belongs to the Indo-Aryan language group and is spoken throughout the Maldives. It has a strong Arabic influence.

Of the approximately 1 200 islands in the Maldivian archipelago, only 198 are inhabited. Five islands are industrial and 72 have been developed as tourist resorts. As much as 25.7 percent of the Maldivian population live in the capital Male' (1995 Census). Outside the capital, the population distribution among the twenty administrative atolls is relatively uniform, varying from less than 1 percent to more than 7 percent of the country's total population. There is concern that disparities in population distribution between Male' and the atolls, attributable to slower growth in agriculture and fisheries as compared to other sectors, are increasing. This trend has been described as a backwash effect' whereby Male' and the resort and industrial islands act as

centres of growth, while the remaining islands act as the hinterland (ILO/ARTEP, 1993). The population distribution by age group in Male' and the atolls is illustrated in Table 1.

**Table 1. Population Distribution by Age Group in Male' and the Atolls**

Age Group (in years)	Men		Women	
	Male'	Atolls	Male'	Atolls
	%	%	%	%
Under 1	2.1	4.4	2.7	4.3
1 – 4	9.7	16.5	11.3	15.8
5 – 9	12.2	17.5	14.3	17.0
10 – 14	12.0	12.4	-	12.0
50 – 54	2.8	3.4	2.6	3.1
55 – 59	2.3	3.0	1.8	2.1
60 – 64	1.6	2.8	1.3	1.9
65 and above	1.9	3.7	1.8	2.2

*Source: Population and Housing Census of the Maldives, 1990.*

#### **Education: Gender Equitable Access**

The education system in the Maldives consists of seven years of basic education, three years of lower secondary (ordinary level), and two years of higher secondary education (advanced level). The Maldives achieved a 263 percent increase in enrolments between 1977 and 1995, from 24 203 to 87 878 respectively. Similarly, the 1995 rate of enrolment was an impressive 100 percent, while the drop out ratio was only 7 percent. There are no gender disparities in education at any level (Haq and Haq, 1998). Yet, on the atolls, students are 'forced out' of education given the complete lack of higher education opportunities. Although a few vocational training institutes exist at the post-secondary level, students seeking tertiary education are required to go abroad. The government provides overseas training for its employees.

#### **Employment: Persisting Gender Differences**

In the 1995 census, the economically active population of the Maldives stood at 66 887 persons, representing an increase of 3.1 percent per annum in the 1990–95 period. In the same period, the number of foreign nationals working in the Maldives grew at an annual rate of 16.5 percent to reach 18 510. Foreign nationals comprised 21.7 percent of the total workforce in 1995. In 1995, the total rate of participation in the workforce was 43.7 percent. Yet compared to a participation rate of 63.2 percent for men, women's rate of participation was just 24 percent. The participation rates for younger workers in the 20–44 year age group are higher in Male' than on the atolls. By comparison, for those aged 50 years or above, economic participation rates are higher on the atolls.

Recent shifts in the Maldivian economy, characterised by a move away from primary industry towards tertiary industry, have had repercussions on employment, for both men and women. For instance, the drop in the primary sector's contribution to gross domestic product (GDP) has been reflected by a fall in the employment share of fishing, agriculture, forestry and quarrying; and a reduction in the share of agricultural and fisheries workers in the employed labour force. In contrast, the increase in the tertiary sector's share of GDP has been mirrored in increased



employment in wholesaling and retailing, hotels and restaurants, as well as finance, insurance and business.

Tables 2 and 3 illustrate variations in employment distribution from 1985–90 for various economic sectors in the Maldives as a whole, and on the atolls respectively. They highlight how all those sectors which experienced a decline in their share of employment from 1985–90, also experienced a reduction in their number of employees. Furthermore, they indicate that the main brunt of reductions in employment has been borne by women in the labour force of the atolls.

According to a 1993 report by the International Labour Organization, the most plausible explanation for the decline in employment in agriculture is an under-enumeration of women engaged in agriculture (ILO/ARTEP, 1993). Since the census count enumerated the primary occupation of the respondents, women normally engaged in multiple activities may have been unable to identify any single activity as their primary occupation. Similarly, although a significant proportion of women in the atolls work in agriculture, their involvement in a range of economic activities may have made it more difficult to identify a main occupation, causing the ‘not stated’ category to be disproportionately large. In the Maldives, as in other countries within the South Asian Association for Regional Cooperation (SAARC), women's economic work is often considered as unpaid family labour.

**Table 2. Employment Distribution of Women and Men by Sector in the Maldives (1985 and 1990<sup>2</sup>**

Sector	1985		1990	
	Men	Women	Men	Women
	<b>Number</b>	<b>Number</b>	<b>Number</b>	<b>Number</b>
Agriculture	1673	1386	1438	1181
Fisheries	12170	264	11181	317
Quarrying	604	39	482	14
Manufacturing	5116	6443	4259	4182
Electricity, gas and water	500	4	409	36
Construction	2528	35	3109	42
Distribution	5129	306	8332	552
Transport, storage and communication	3212	115	5024	297
Finance, insurance and business	366	52	869	189
Community, social and personal service	8157	2274	8132	3716
Total	39455	10867	43235	10526
Not stated	858	249	1623	565
<b>Grand Total</b>	<b>40313</b>	<b>11116</b>	<b>44858</b>	<b>11091</b>

*Source: Population and Housing Census of the Maldives, 1985 and 1990*

<sup>2</sup> For Tables 2 and 3, employment is for persons aged 12 years and over and sectors are the same as in the 1985 and 1990 censuses.

**Table 3. Employment by Sector of Women and Men on the Atolls, 1985 and 1990**

Sector	1985	1990	Percentage Change
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	Men	Women	Men	Women	Men	Women
	Number	Number	Number	Number	%	%
Agriculture	1600	1320	1379	1170	-13.8	-11.4
Fisheries	11289	256	10450	310	-7.4	+21.1
Quarrying	381	38	305	14	-19.9	-63.2
Manufacturing	3705	6030	3425	3765	-7.6	-37.6
Electricity, gas and water	207	3	123	8	-40.6	+67.0
Construction	1816	26	2105	32	+15.9	+23.1
Distribution	2824	241	5441	394	+92.7	+63.5
Transport, communication	1602	49	2379	49	+48.5	0
Finance, insurance	95	2	312	26	+128.4	
Other services	3709	860	3935	1663	+6.1	+93.4
Total	27228	8824	29854	7431	+9.6	-15.8
Not Stated	497	186	989	420	+99.0	+125.8
<b>Total</b>	<b>27725</b>	<b>9010</b>	<b>30843</b>	<b>7851</b>	<b>11.2</b>	<b>-12.9</b>

Source: Population and Housing Census of the Maldives, 1985 and 1990.

Table 3 illustrates that employment lost by men in one sector has usually been gained in another. In fact, in most cases the pull of higher wages in the more rapidly growing sectors has been the driving factor explaining men's mobility. By comparison, while some of the many women who lost their manufacturing jobs on the atolls have found new work in the service sector, most have not. Thus, the number of employed women on the atolls declined from 9 010 in 1985 to 7 851 in 1990. This marked decline in female employment in manufacturing<sup>3</sup> is in large part due to a steady decline in local demand for handicrafts products due to changes in consumer tastes and/or the use of substitute synthetic materials. At the same time, with the progressive mechanisation of the fishing industry, and a shift in the external demand for dried and salted fish, women's employment in fish processing industries has declined sharply. It is for these reasons that female employment declined in the Maldives as a whole, despite an increase in women's employment in Male'.

Tourism has been the most dynamic sector of the Maldivian economy during the last ten years and has been the source of many new jobs. For instance, resort construction and maintenance has created employment for many carpenters and masons whose skills were otherwise usually limited to making furniture and houses. Male' has grown into a major trade centre supported by the emergence of a recently developed tertiary sector providing new employment in communication, distribution, finance, other services, etc. In Male', the number of economically active women, as a percentage of the economically active population, has increased steadily from 14.6 percent in 1985 to 27.7 percent in 1995.

Yet most of the economic growth resulting from tourism and associated development has occurred in Male' or the resort and industrial islands, attracting younger and more capable men from the atolls. Consequently, the population of the atolls has a relatively large proportion of women, children and older men, and wide discrepancies are emerging in the lifescapes of people living in Male' and the atolls. These discrepancies are further reflected in declining employment opportunities on the atolls, especially for women. On the atolls, women's share of the economically active population fell in 1990, before increasing again in 1995. In 1995, two sectors continued to dominate employment on the atolls.

- manufacturing which accounted for up to 50 percent of female employment; and
- fishing which represented 34 percent of male employment.

Almost half of the economically active population in the Maldives are employees. Yet some 36.8 percent of women are employees compared to 52 percent of men. Compared to women in Male', women on the atolls are more dependent on setting up their own business and/or working for their families in order to make a livelihood. Nevertheless, women represent only 15 percent of the total number of employers in the country.

<sup>3</sup> In employment statistics, manufacturing includes fish processing.

### **Women Employed by the Public Sector**

Since 1990, women have accounted for almost one third of government employment. For instance, the Ministry of Fisheries and Agricultural (MoFA) has 127 employees, 25 percent of whom are women. The senior level in this Ministry comprises 24 percent of the total number of employees and women represent 25 percent of staff at this level. The highest-ranking post held by a woman is that of Deputy Director. Table 4 illustrates women's and men's employment in senior government positions. There are no distinctions in public sector employment terms and conditions for men and women in the Maldives. Given the lack of variation in women's relative participation at all levels, there appears to be no discrimination in employment in the MoFA. Nevertheless, all MoFA field officers are men. While the government shows no preference for men or women field workers, women do not generally apply for out-posted jobs, in large part as a result of their household and family responsibilities.

**Table 4. Employment of Men and Women in Senior Government Positions**

Governance Level	Men	Women
	%	%
Minister	95	5
State Minister and State Dignitary	100	0
Deputy Minister and others at same level	100	0
Director Generals and others at same level	92	8
Officer at the NSS	100	0
Director and others at the same level	86	14
Deputy Director	86	14
Assistant Director	78	22
Technical Posts at the Under-Secretary level	68	32

*Source: Directory of Women in Senior Government Positions 1996, MWASW.*

Table 5 illustrates women's and men's employment in different public sector institutions. It highlights extremes in women's and men's participation rates in certain types of occupations and appears to indicate a preference among women for certain types of work. Reflecting traditional social norms whereby women are primarily responsible for raising and caring for children, women tend to be more represented in nursing, education and allied activities.

**Table 5. Comparative Employment of Men and Women in the Public Sector**

Government Office	Men (% of total employees)	Women (% of total employees)
<b>Female Participation &lt; 20%</b>		
Addu Development Authority	88.43	11.57
Anti-corruption Bureau	80.95	19.05
Maldives Electricity Board	94.17	5.83
Maldives Industrial Fisheries Company	91.43	8.57
<b>Female Participation &gt; 60%</b>		
Bank of Maldives	37.50	62.50
Chest Clinic	25.0	75.0
Institute for Health Sciences	10.13	89.87
Maldives Post Limited	33.90	66.10
Malé Health Centre	11.11	88.89
National Library	28.0	72.0

Source: Directory of Women in Senior Government Positions, MWASW.

### ***Lifescape: Distinct Life Styles in Urban Male and the Atoll Communities***

The preceding sections have highlighted some of the differences in livelihoods, employment and lifestyles of the residents of the capital Male' and the atolls. In general, the communities living on the atolls continue to practice a more traditional way of life compared to the people of Male'. As the centre of governance and trade activities, Male' offers women and men employment in the public and tertiary sectors. Public sector employees are permitted to take a second job and men tend to be involved in second businesses to earn additional sources of income. Women, on the other hand, have limited extra' time and tend to assume responsibility for household and child care duties after working hours.

The people of Male' have easy access to foreign goods imported for the resorts. The trend is to consume rice, wheat, cereals, powered milk, etc. Fish remains the staple source of protein, and in some households dals/pulses are also prepared. A number of the people living in Male' have been abroad for higher education, and have often developed a taste for international foods. For instance, canned drinks and foods are popular and are easily found in food stores.

Male has 24 hour electricity, good basic education facilities, a few vocational training centres and excellent health services. On the other hand, it is extremely congested, and housing is very expensive. The local water supply is brackish and must be desalinated for drinking. Solid waste and sewage disposal systems are beyond the current capacity of the island. Entertainment in Male' includes home videos, sports such as football or tennis walking along the marina, night fishing, day visits to the resort islands, etc.

### **Maldivian Gender Roles in Bio-resource Management**



Coral Stone Shelters Woven  
Coconut Fronds

## LANDSCAPE



## Bio-Resource Management



Children and Family Care



Fish Trap of Reeds and  
Coir Rope



## LIFESCAPE



Repairing Fishing Net  
Community Activity

Outside Male', on the outer islands, people's lifestyles are very different. In particular, there is a greater dependency on local resources among atoll communities. Given the large-scale migration of men aged between 15–40 years to Male' or the resort islands in search of employment, the availability of male labour is in scarce supply on the atolls. This has attendant effects on agricultural production, particularly in male-dominated production activities such as coconut harvesting. In general, there is a larger proportion of men on the fishing islands, than on islands where agriculture is the main occupation. Women tend to operate small income generating ventures, such as eating houses, shops, tailoring units, etc. and are responsible for managing the household, home gardens and small agricultural plots. Women are also responsible for teaching children the basics of the Koran and Dhivehi, as well as simple arithmetic in the non-formal education centres.

Timber and fuel wood needs are met by individual islands, except in special cases of boat-building where uninhabited islands are visited to harvest appropriate timber. Each island has a plot reserved for the cultivation of fuel wood and timber species. Areas are also earmarked for agriculture and housing. The remainder of the island is left as wilderness. The house reef is well protected. Coral stones washed ashore are used for construction and lime production. While in earlier times, entire houses were made of coral, now legislation only permits corals to be used for the boundary walls in order to safeguard the reef. Given the resort islands now provide the only market for reef fish, there is very little fishing within the reef. Tuna fishing, the mainstay of fishing families, is carried out in the open seas.

Food habits on the atolls are more in tune with local produce. Though rice and wheat flour have reached the palate of every Maldivian, tubers such as cassava, taros and sweet potatoes, and

bread fruit are consumed with greater frequency on the atolls. Fish curry, together with fish soup and its concentrate (*rihakarū*) are very popular.

On the atolls, higher education is not always available, health facilities are minimal and people often have to travel by boat to the main island to gain medical attention. Ferry services between the islands are dependent on demand, as well as weather conditions. Yet, although the islands do not possess adequate electricity, education and health facilities, compared to Male', there is ample land for housing, good water quality, a variety of local foods and a better quality of life. Entertainment is in the form of home videos, evening walks along the beach, discussions at the mosques, meetings of the island committees, and visits to Male'.

## 1.4 Governance

The Republic of Maldives is governed by a Citizens' *Majlis* or Parliament which is elected for five-year terms. The *Majlis* comprises fifty members (two elected from each Atoll, two from Male' and eight nominated by the President) and has the President as its leader. Historically, the 26 natural atolls have been divided into 20 administrative units or atolls. Each atoll is administered by an Atoll Chief and an Atoll Administration with the assistance of elected Island Committees which include women's committees. The island of Male' is a separate administrative division.

A national development plan is prepared every third year to foster the planned development of the country. The Fifth National Development Plan (1997–2000) identifies the following nine key priorities, within three overall areas, to receive particular attention:

### **Management and development of human resources**

- reduction in the high population growth
- enhancement of the national education and skills level for employment
- management and organisation of the development milieu
- pursuit of appropriate growth strategies

### **Establish sustainable and equitable provision of infrastructure and delivery of services and facilities**

- implementation of sound environmental and natural resource management
- strengthening of the legal, regulatory and justice systems
- maintenance of prudent management of the economic system and public finances

### **Planned human settlement**

- establishment of regional growth centres
- managed growth and development of *HulhuMale'*<sup>4</sup>

National biodiversity management in the Maldives is the responsibility of both the Ministry of Planning, Human Affairs and Environment (MPHRE) and the Ministry of Fisheries and Agriculture (MoFA). The Environment Division of the MPHRE is responsible for the development of national guidelines, policies and legislation, as well as follow-up to international conventions and conferences. An Environment Research Unit has been formed to undertake research

related to environmental protection. The National Commission for the Protection of the Environment (NCPE) acts as an independent advisory body to the MPHRE.

The Marine Research Section was established in the Ministry of Fisheries and Agriculture in 1983 with the purpose of carrying out research and experiments on the expansion and improvement of the country's fishery industry. Its mandate has enlarged significantly beyond its initial responsibility.

<sup>4</sup> HulhuMale refers to government programme of township development in an island neighbouring to manage the urban crowding and related problems in Male'.

## 2. Biological Diversity of the Maldives

The richness of biological diversity of the Maldives, among species, within species and between ecosystems, is striking. This is particularly true of marine biodiversity. Hundreds of species of multicoloured tropical fish, in all sizes and shapes, along with an abundance of corals and shells live in the sea and near the reef surrounding every island and reef formation. Though the extent of terrestrial flora and fauna is less rich, it too is nevertheless important within the country's natural resource stocks.

Historically, Maldivians have depended upon their country's marine resources for their survival. Tourism and fisheries, the country's two largest earning industries, are based on marine resources. Accordingly, the future economic prosperity of the Maldivian economy is clearly dependent on guaranteeing the sustainability and status of these natural assets. Yet, despite the tremendous importance of these resources, the extent of biological diversity existing in the Maldives, including marine life, flora and fauna, has not been adequately researched or documented.

The range of biological diversity in the Maldives is largely confined to a tropical island environment. Some studies have shown that flora and fauna differ between the northern and southern islands. Many species resemble their ancestors from mainland Asia, however, they have evolved through time to adapt to the conditions of the Maldives. One theory holds that most fauna arrived on the archipelago using the Lacadives, as well as the direct drift from the north-easterly monsoon winds, and that the majority of wildlife originated in India and Sri Lanka. It does not, however, discount the possibility of colonisation from Africa given similarities with fauna on the southern islands (Webb, 1988). In terms of flora, the archipelago has a diverse vegetation cover, especially given the existence of poor and infertile soils. The south, particularly islands such as Fuamulaku and Hithadoo, have a richer diversification of plant species than northern islands. Some of the habitats available for wildlife in the Maldives are illustrated in Figure 3.

### 2.1 Terrestrial Biodiversity

Compared to the rest of the Indo-Malayan region, the Maldivian Islands exhibit a relatively small proportion of representative species, and the archipelago is not associated with an abundant terrestrial wildlife (Webb, 1988). Similarly, the Maldives are relatively poor in terms of terrestrial floral diversity. The 1994 State of the Environment Report records some 583 plant species in the Maldives, of which 55 percent are cultivated species. Over 30 plant species are recognised for their medicinal value and are utilised for traditional medicine practices. A Catalogue of Plants prepared by the Ministry of Fisheries and Agriculture (1992) lists 429 species of plants as illustrated in Table 6 below. The World Conservation Union has recorded 277 local and 450 introduced vascular plants (Davis, Heywood and Hamilton, 1995). In general, most of the plants currently found in the Maldives, both ornamental and agricultural, have been introduced from outside.

**Table 6. Distribution of Different Plants Species**

Category	Number of species
Fruits	50



Vegetables	53
Cereals	10
Spices	16
Trees used for timber	40
Flowers and ornamental plants	62
Medicinal	122
Other	76

*Source: Ministry of Fisheries and Agriculture, 1992.*

### ***Agricultural Plants and Crops***

Traditional farming systems in the Maldives are based on shifting agriculture, polycultural home gardens, agroforestry and taro pits. A diverse range of crops have been cultivated, including cereals, vegetables, fruits, tubers and plantation crops, by farmers (see Box 1 for a overview of agricultural development in the Maldives). Coconut, taros and banana are native to the Maldives, while a large number of different varieties and other crops have been introduced from elsewhere, a reflection of the many external trade and other relationships build up over the centuries. For instance, crops of Indo-Malayan origin, including coconut, banana, breadfruit, taros, citrus, mango and jujube, originated from the Malabar coast of India and Sri Lanka. Pumpkin, watermelon, papaya, custard apple and sweet potato originated from the Americas.

*Wild stands of coconut exist on all the islands of the Maldives and coconut production remains a dominant agricultural activity. Coconuts and coconut products form an integral part of the Maldivian diet. Coconut timber is widely used for boat-building and construction purposes.*

### **Maldivian Gender Roles in Bio-resource Management**

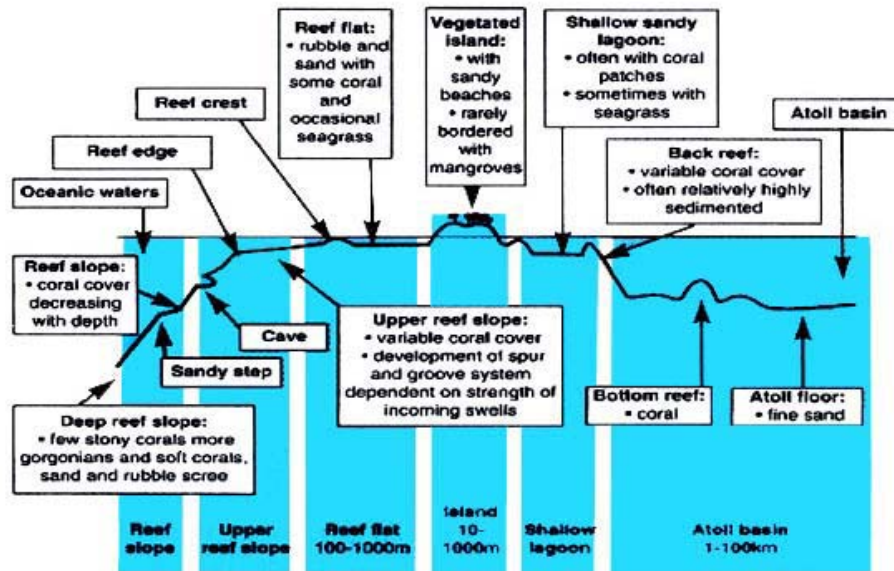


Figure.3. A Cross Sectional View of Different Habitats

Source: McAllister, Anderson and Alfonso 1992

Crops found in the Maldives can be divided into the following five categories:

- Field crops:**
  - millets, maize and sorghum, sugarcane
- Vegetables:**
  - pumpkin, cucumber, ridge gourd, bitter melon, eggplant, snake melon, drumstick, taro, tapioca, sesbania, legumes
- Fruit crops:**
  - bread fruit, banana, pineapple, mango, lemon, pomegranate, star apple, custard apple, passion fruit, screw pine, papaya, jack fruit, guava, jujube, citrus, bilimbi
- Spices and cash crops:**
  - chillies, red onions, watermelons, ginger, turmeric, curry leaf, fennel, cumin, fenugreek
- Plantation crops:**
  - coconut, areca nut

### Box 1: History of Agricultural Development in the Maldives

The history of agriculture in the Maldives can be gleaned from a number of travelogues, monographs and books, some of which were written a few centuries ago. One of the oldest printed texts on agriculture in the Maldives was documented in the seventeenth century by Pierre Pyrard. According to this account, the Maldivian diet included: 2 varieties of millet grown locally; different types of local roots including 2 yam varieties, and a large variety of fruits such as banana, cucumber, melon, figs and plums. Coconut trees supplied raw materials for wine, honey, sugar, milk, wood, thatch and utensils. Wheat and rice were imported from mainland India and Ceylon. Given problems with rats and mice, houses were built on piles in the sea, 200–300m from the shore, in an attempt to protect grain (Pierre Pyrard).

A second account of agriculture in the Maldives dates from the 1920s and was prepared by an

archaeologist from Ceylon. This account notes the cultivation of three varieties of fine grains in selected islands only. It also describes the cultivation of vegetables in home gardens, including sweet potatoes, yams, chillies and areca nut (Bells, 1940). Each of these accounts note that land was left fallow for 4–5 years following 2–4 years of cultivation. None, however, discuss crop cycles, multiple crops, methods of manuring or mulching, or labour involved in agricultural activities.

More recent studies on agriculture in the Maldives, have documented the cultivation of 5 varieties of grain (millets) using slash and burn agriculture (Maloney, 1980). In addition, one study has documented local varieties of coconut, papaya, banana and eggplant on the basis of their physical appearances and inputs from local people (Arora, 1984).

### **Local Knowledge of Crop Varieties**

Substantial local knowledge exists regarding crop diversity in the Maldives. For instance, local men and women on Kela Island are knowledgeable about and able to identify different crop varieties. The “Women Farmers of Kela” have collected and documented local names for the main crops cultivated on their island (Arora, 1984). These local names for the crop varieties on Kela Island are as follows:

Banana: *Malloskeyo, bodukeyo, mosukeyo, fisikeyo, raaskeyo, asshikeyo, fusmallokeyo*

Papaya: *Rangfallho, bodofallho, divehifallho, suwasefallho, kudifallho*

Eggplant: *Dighubashi, seetbashi, dambubashi, vahbashi*

Coconut: *Damru, jafanru, bodru, divehiru, fadhiru*

Chilli: *Githeomirus, damomirus, kunnura mirus, tolemirus, hondedmirus*

Pumpkin: *Bodubarago, dighuborogo, figcheborogo*

Tapioca: *Sandoaluvi, babura aluvi*

Banana, eggplant, chillies and pumpkin are grown in home gardens on Kela Island, while millet, papaya, sweet potato, tapioca, etc. are cultivated in agricultural plots. Most of the domesticated plants are cultivated on good soil areas that lie between residential areas and foreshore vegetation. These foreshore sandy soils often contain some of the naturalised types of cultivated plants, as well as wild variations of cultivated plants.

**Agricultural development in the Maldivian Islands has long been impeded by the existence of a formidable array of constraints.** These include poor soils with a high pH content, limited water supply, scarcity of land<sup>5</sup> and uneven distribution of suitable land, rudimentary farming practices and unavailability of a scheduled inter-island transport system within the country. Nevertheless, in the recent past, agriculture occupied an important place in the Maldives, and continues to be important on the atolls. Nowadays, this importance is declining due to changes in food habits and new opportunities to earn higher incomes in other sectors.

### **Trees used for Timber**

Forests of *psonia grandis* are believed to have covered much of the Maldives before clearance occurred for settlement and agriculture. Today, a large variety of local timber species are grown for domestic consumption. These species represent an important part of the islands' biological diversity. Timber trees are also of economic importance to the occupational livelihoods pursued

by island communities. Timber continues to be the main material used in *dhoni*<sup>6</sup> construction, a vital activity in this island nation. Artificial materials like fibreglass are not widely used by Maldivians for boat construction. Timber is also used for the construction of houses, as well as for handicrafts and firewood. Table 7 illustrates some of the uses of different timber species.

Almost each one of the 1 200 islands making up the Maldives archipelago has some area under mangroves. Not surprisingly, therefore, mangroves are important to the atolls' populations and are used for a range of productive purposes (see Box 2). While some small-scale surveys of mangrove resources on individual islands have been carried out<sup>7</sup>, a national survey does not exist. Given the existence of various threats to the future sustainability of mangroves in the Maldives, a nationwide survey of the country's mangrove resources is urgently required, and steps should be undertaken to better manage mangrove resource.

<sup>5</sup> The total land area of the Maldives is 298 sq. km, of which only about 10 percent is suitable for the plantation of crops.

<sup>6</sup> Locally built boats used for fishing or inter-island transport.

<sup>7</sup> Thirteen different species of mangroves have been reported from the thirteen islands in the central atolls (Untawale and Jagtap, 1991), while 8 species have been identified on the 5 islands of the North and Central Atolls (Choudhury 1993).

**Table 7. Tree Species Used for Timber**

Species	Dhoni Construction	House Building	Dhoni Shelters	Firewood	Handicrafts
<i>Adenthera pavoria</i>	+				
<i>Artocarpus altilis</i>	+				
<i>Azadirachta indica</i>	+				+
<i>Barringtonia asiatica</i>					+
<i>Bruguiera cylindrica</i>	+				
<i>Cocos nucifera</i>	+	+			
<i>Collophyllum inophyllum</i>	+	+			
<i>Cordia subcordata</i>	+	+			
<i>Ficus bengalensis</i>	+				
<i>Guettarda speciosa</i>				+	
<i>Hernandia peltata</i>				+	
<i>Hibiscus tiliaceus</i>	+			+	
<i>Mimusops elengi</i>	+				
<i>Ochrosia borbonica</i>			+		
<i>Pandanus odoratissimus</i>			+		+
<i>Pemphis acidula</i>	+			+	
<i>Premna obtusifolia</i>				+	
<i>Rhizophora mucronata</i>	+				
<i>Scaevola taccada</i>				+	

<i>Sonneratia caseolaris</i>	+		
<i>Syzygium cumini</i>	+		
<i>Terminalia catappa</i>	+		
<i>Thespesia populnea</i>	+		

Source: Sri Bhatarthie, 1993.

**Increasingly, most of the timber species preferred by Maldivians are becoming scarce.** Indeed, the bulk of timber required for *dhoni* and house construction must now be imported. In response, the Government's "Million Tree Programme" seeks to highlight the importance of, and expand, good timber stock. Under this programme, the Ministry of Fisheries and Agriculture is engaged in a national plantation effort as well as the distribution of various tree species with food and timber value. In addition, the planting of casuarina trees to act as wind-breakers or shelter-belts to protect plants from the damaging effects of sea spray and to provide firewood is also being promoted by the MoFA (Official Government Website). The Ministry is also taking necessary steps to plant bamboo seedlings in selected areas in an attempt to meet timber demand for poles for pole and line fishing.

### Box 2 Mangrove Resources in the Maldives

Mangrove stands are either localised in small depressions in the islands or are along the lagoons. In the case of the depression-oriented mangroves which appear to lack any visible connection to saline water, it is assumed that the effect of the saline water percolating into the depression through the sand during spring tides, ensures adequate inundation for the forest.

Mangrove timber is used for boat building, fencing<sup>8</sup>, fuel and poles, and in the dyeing of fish lines. The Ministry of Fisheries and Agriculture issues tree felling permits, for a fee, through the Island Chief. There is, however, no mechanism to monitor the size of the tree felled. Consequently, practice indicates that the best trees are cut, to the detriment of the mangrove stands. Fruits of two mangrove species, *Sonneratia caseolaris* and *Bruguiera cylindrica*, are edible. Fire wood is free of cost. Despite their economic value, mangrove forests in the Maldives are not large enough to be managed or commercially harvested.

Additionally, some practices are damaging to the sustainable future of the Maldives' mangrove resources. For instance, the wooden nails used in boat building are made of *Pemphis*. Branches of 1.5 inch diameter are cut off to chisel out these nails; however, most often young branches are cut, leaving only older branches which contributes to poor regrowth. Mangrove land continues to be used for the disposal of garbage, of both organic and inorganic origin, which is likely to cause long-term damage (Choudhury 1993). Most mangrove patches are overstocked and require judicious thinning and pruning in order to revitalise the forest. Clearfelling of old trees may provide some space for younger plants to grow.

People on the atolls are generally aware of mangrove resources. For instance, during one research visit<sup>9</sup> to a village, all the respondents interviewed, with the exception of girls under 12 years, were able to correctly identify a *Bruguiera* variety. Several instances are known where people have planted mangroves. For instance, during the 1950s, *Bruguiera cylindrica* were planted on Kaashidoo Island, in an attempt to combat a future famine situation.

### Medicinal Plants

The Maldives has a rich tradition of local medicinal practices. Many of the plants growing locally are used in the preparation of medicines. Plant derivatives are also used as pest repellents to

protect crops. Though traditional forms of medicine have not been completely documented, some 122 species of plants with medicinal properties were recorded by the MoFA in 1992. Some of the plants used in medicinal practices are presented in Table 8.

<sup>8</sup> In particular, *lumnitzera* poles are used as fences for agricultural plots.

<sup>9</sup> Research visits to various atolls were carried out by the author during 1998.

**Table 8. Medicinal Plants and their Uses**

English Name	Local Name	Botanical Name	Medical Use
Tasel flower	Kiri kulha	<i>Emilia sonchifolia</i>	<ul style="list-style-type: none"> <li>• gum ailments (e.g. bleeding, ulcers)</li> <li>• night blindness and eye inflammations</li> </ul>
Sensitive plant	Ladhu gas	<i>Mimosa pudica</i>	<ul style="list-style-type: none"> <li>• blood poisoning</li> </ul>
Castor oil plant	Aamanaka	<i>Acinas communis</i>	<ul style="list-style-type: none"> <li>• constipation</li> <li>• diabetes mellitus</li> </ul>
Jasmine	Huvan' dhumaa	<i>Jasminum</i>	<ul style="list-style-type: none"> <li>• strengthening nerves</li> <li>• treat abnormal growths in the eye</li> </ul>
Tick weed (dog mustard/spider flower)	Raabeburi	<i>Cleome viscosa</i>	<ul style="list-style-type: none"> <li>• arthritis and rheumatism</li> <li>• stomach gas</li> <li>• itching in the ears</li> </ul>
Milk hedge/milk bush (pencil euphoria)	Eggamu muraka	<i>Euphorbia tirukalli</i>	<ul style="list-style-type: none"> <li>• fungal skin infections</li> <li>• warts, etc.</li> </ul>
Ginger lily	Kandholhu	<i>Rhoeo discolor</i>	<ul style="list-style-type: none"> <li>• body pains</li> <li>• tuberculosis</li> </ul>
Pot pata	Hudhu huiypilaa	<i>Aerva lanta</i>	<ul style="list-style-type: none"> <li>• urinary infections</li> </ul>
Pomegranate	Annaaru	<i>Punica granatum</i>	<ul style="list-style-type: none"> <li>• severe cases of diarrhoea</li> <li>• cholera</li> </ul>
Frangipani	Gulchampa	<i>Plumeria acutifolis</i>	<ul style="list-style-type: none"> <li>• boil and swellings</li> <li>• rat deterrent<sup>10</sup></li> </ul>
Holy basil	Kulhi thulhaa	<i>Ocimum sanctum</i>	<ul style="list-style-type: none"> <li>• enhance sense of smell</li> <li>• strengthen nerves</li> <li>• constipation</li> <li>• removal of bladder stones</li> </ul>
Barbados aloe	Habaru gas	<i>Aloe barbadensis/Aloe vera</i>	<ul style="list-style-type: none"> <li>• pain relief, including sprains and strains</li> </ul>
Citronella grass (wild)	Kaasinji	<i>Cymbopogan nardus</i>	<ul style="list-style-type: none"> <li>• painful joints, including swelling and arthritis</li> </ul>
Rose	Finifenma	<i>Rosa grandiflora</i>	<ul style="list-style-type: none"> <li>• boils</li> <li>• heart disease</li> </ul>

<sup>10</sup> Bunches of frangipani flowers are kept inside houses to keep away rats.

Source: Veshi and MPHRE.

### **Bird Life**

While a complete study on the ornithology of the Maldives does not exist, some information on the distribution and status of certain species has been compiled by foreign and local researchers. Some 180–200 different species of seabirds, shorebirds and land birds have been identified (Zuhair, 1997). Nevertheless, the extent of terrestrial birds is minimal compared to other tropical islands and most of them have probably been introduced (Zuhair, 1997). With the exception of some seabirds, very few of the identified bird species reside in the Maldives. Most are seasonal visitors, migrants, vagrants or introductions, or have been imported as pets.

The five main endemic bird species are:

- Maldivian little heron
- Central Maldivian little heron
- Maldivian pond heron
- Maldivian water hen
- House crow

More than 70 different species of shore birds have been observed. Seabirds are widely observed throughout the islands. At least 40–50 seabird species have been observed in Maldivian waters, though only 13–15 of these are known to nest and breed locally<sup>11</sup>. Seabirds are extremely important to local communities, especially for their value to fishermen. For instance, tuna schools chase small fish and other marine life such as shrimp to the water's surface where they are preyed upon by several species of seabirds. These seabirds flocks are therefore important an indicator to fishermen of the presence of tuna schools. Indeed, it has been estimated that as much of as 90 percent of tuna schools are located in this manner (Anderson, 1996).

### **Insects, Lizards, Small Mammals**

Besides the several varieties of sea, shore and land birds, fauna on the atolls is rather limited. Fauna mainly consists of insects, lizards and small mammals, notably tree shrews, fruit bats and rats. On the whole, mammals living on the Maldive Islands, including the house mouse, black rat, Indian house shrew and cat, have most probably been introduced (Webb, 1988). The only native mammals living on the Maldives are two species of fruit bats, both with recognised endemic subspecies (see Box 3):

- *Pteropus giganteus ariel* - widespread and common
- *Pteropus hypomelanus maris* - extremely rare and possibly extinct<sup>12</sup>

Serious concern has been expressed regarding the survival of these endemic bat subspecies in the Maldives, and calls have been made for an assessment of their status and conservation (Action Plan for the Conservation of Old World Fruit Bats, IUCN). In 1993, bat species existing on the Maldives' southern and central atolls were surveyed<sup>13</sup>, following which a recommendation was made to prepare a Conservation Management Policy and Plan (Holmes, 1993).

More than 130 species of insects, including arachnids, flies and ants, have been recorded (Holmes, 1993). Spiders, in particular, appear to be rich in diversity. In addition, more than 67 butterfly species have been identified, and other species including scorpions, centipedes, paper wasps and rhinoceros beetle have been observed throughout the archipelago (Webb, 1988).

<sup>11</sup> These include terns *Sterna sumatrana*, *S. albifrons*, *S. anaethetus*, *S. daugli*, *S. bergi*, *S. bengalensis*, and *S. fuscata*, *S. saundersi*, two species of noddies *Anous stolidus* and *A. tenuirostris*, and the white tern *Gygis alba monte* known to breed only on Addu Atoll (Anderson, 1996). Other bird species, including frigate birds, white-tailed tropic birds, boobies and some shearwaters, are also known to breed in the Maldives (Shafeeg, 1993).

<sup>12</sup> It has only one record, from Addu Atoll.

<sup>13</sup> This survey was carried out in November 1993 by the Chiroptera Specialist Group of the Species Survival Commission, together with the Bat Conservation Trust.

Some Maldivian reptilian fauna have also been identified (Webb, 1988):

- 2 gecko species are commonly seen throughout the country.
- 2 agamid lizards, including the common-garden lizard or blood sucker and the snake skink
- 2 snake species, including sub-species of the common wolf snake (*Lycodon aulicus* and *Typhlops braminus*)
- 1 frog species, the short-headed *Rana breviceps*, and a larger toad species (*Bufo melanostictus*)

### **Box 3: Bats in the Maldives - Biodiversity's Friends or Farmers' Foes?**

Bats are vital for seed dispersal and pollination in tropical forests. Several plants in the Maldives, such as *Barringtonia*<sup>14</sup> flowers, exhibit all the characteristics of a bat-pollination. Bats have been seen feeding on the fruits of various wild food plants, including *Pandanus*, *Sonneratia*, *Ficus*, *Morinda*, *Cocus* and *Pisonia*, in addition to the flowers of *Barringtonia* and *Cordia*. They have also been reported to drink from the collecting cups placed in coconut trees by toddy-tappers.

In some cases, villagers regard bats positively. For instance, on Addu Atoll locals believe that by licking the congealed drops of sap on tapped flower stalks, bats enhanced sap flow. In most cases, however, bats are regarded as pests that damage plants and crops. For instance, they are perceived as a problem for the cultivation of star fruit, bread fruit, mango, papaya, banana, guava, stone apple, water apple, 'jeymu', betel nut and custard apple. In the southern islands, where commercial horticulture is undertaken, bats are believed to create severe problems; however, they are not usually killed by farmers. Bats have also been accused of eating small fruits, though local knowledge suggests that this is usually following initial damage by rats. One study has reported that measures are being undertaken to control bats in order to limit their damage to food crops (Dolbeer, Fiedler and Rasheed, 1988).

## **2.2 Marine Biodiversity Resources and Livelihoods**

In contrast to the relatively impoverished terrestrial biological diversity in the Maldives, marine biological diversity exhibits outstanding richness. Indeed, the marine biodiversity of the archipelago is among the richest in the entire region, and the Maldives' has been recognised as having one of the world's most diverse marine ecosystems.

The Maldivian reefs have been described as bursting with a variety of lesser creatures whose sheer numbers defy description (Webb, 1988). More than 250 different species of hermatypic



corals exist, belonging to 41 genera from the north and 55 from the south. Over 1 200 reef fish species have been recorded<sup>15</sup> (Pernetta, 1993). As many as 5 000 different shell species, 100–200 sponge species, more than 1 000 species of marine crustaceans and over 100 species of echinoderms exist. A large range of different types of marine algae<sup>16</sup> have also been documented (Pernetta, 1993). In addition, a variety of sharks, eels, rays, dolphins, whales and aquarium fish are commonly observed throughout the archipelago. Five species of endangered turtles, namely loggerhead turtles, green turtles, hawksbill turtles, olive ridley turtles and leatherback turtles, are also known to live in Maldivian waters (Frazier and Frazier, 1987).

<sup>14</sup> An important timber tree. In particular, the stems are used for making boat prows.

<sup>15</sup> For further information see the pictorial guide to selected reef fish and corals of the Maldives (Anderson and Hafiz, 1989).

<sup>16</sup> Including some 21 species of *Cyanophyceae* (blue-green), 163 *Rhodophyceae* (red), 83 *Chlorophyceae* (green) and 18 *Phaeophyceae* (brown).

### **Fish Species**

A recent research study, carried out by the Marine Research Section (MRS) of the Ministry of Fisheries and Agriculture, has documented economically important fish species in the Maldives. Some 900 species have been identified, nearly 300 of which were completely new records for the Maldives, and 7 of which had never before been recorded anywhere in the world<sup>17</sup>. A second study records some 899 species of pelagic and shore fish, including 201 records new to the Maldives (Randall and Anderson 1993).

At one time, the Maldives was the only country harvesting tuna from the Indian ocean. Tuna fishing remains particularly important to the economy of the Maldives. Eight different types of tuna and similar fish are harvested commercially from the open seas as illustrated in Table 9. Tuna fishing requires live bait fish which are caught in lift nets near the reef and kept alive in the flooded hull of the *dhoni*. Bait fish are composed of species associated with the reef, and are dependent on a thriving reef environment. Twenty different species, regularly caught and used as bait fish, may be classified into three groups:

- Muguraan: several species of fusiliers;
- Boadhi: several species of Cardinal fishes;
- Rehi: silver sprat.

**Table 9. Major Tuna and Tuna Like Species**

English Name	Scientific Name	Local name
Skipjack tuna	<i>Katsuwonus pelomis</i>	Kalubilamas
Yellowfin tuna	<i>Thunnus albacares</i>	Kanneli
Bigeye tuna	<i>Thunnus obesus</i>	Loabodu kanneli
Frigate tuna	<i>Auxis thazard</i>	Raagondi
Little tuna	<i>Euthynnus affinis</i>	Latti
Dogtooth tuna	<i>Gymnosardo unicolor</i>	Woshimas
Wahoo	<i>Acanthocybium solandri</i>	Kurumas
Sail fish	<i>Istiophorus platypterus</i>	Fangadu hibaru

Fishing for reef fish has gained popularity in recent years with the increase in tourism, and new markets have been found on the resort islands and in Male'. In previous times, reef fish were only harvested when tuna was in scarce supply. Now, 45 species of reef fish are commercially

important and salted and sun-fried reef fish are exported. Shark fishing, traditionally important to Maldivians, provides another source of export revenues (see Table 10 for a list of commercially important shark species). Reef sharks are caught for their flesh, while deep water sharks are caught for their high quality liver oil. The following table presents the six main shark types of commercial importance in the Maldives.

<sup>17</sup> The results of this study are documented in four illustrated volumes entitled "Catalogue of Fishes of the Maldives".

**Table 10. Commercially Important Sharks**

Common Name	Scientific name	Local name
Shark	<i>Squalomorpha</i>	Miyaru
Six-gilled shark	<i>Hexachus griseus</i>	Madu miyaru
Spiny dogfish	<i>Centropus sp.</i>	Kashi miyaru
Whale shark	<i>Rhiconodon typus</i>	Fehureihi
Tiger shark	<i>Galeocerdo cuvier</i>	Femunu
Silver tip shark	<i>Carcharhinus albimarginatus</i>	Thila miyaru

In recent years, the volume of total fish catch harvested by French and Spanish ships operating from the Seychelles has fallen from 50 percent to 10 percent of the total catch in the Indian Ocean. This large drop does not, however, mean that the per capita fish catch has decreased. Rather, it could indicate overharvesting of the fish stock.

Marine assets in the Maldives also include giant clam and *bec-de-mer* which are commercially important. A giant clam fishery was started in the Maldives in 1990; however, a 1991 survey of clam resources indicated that overfishing at the present rate would destroy the industry. Harvesting giant clams was banned in 1996. A *bec-de-mer* fishery, begun in 1985, initially achieved good results until the value of dried *bec-de-mer* dropped in 1998. This fall in price was due to the smaller size of the catch and unpalatable species. *Bec-de-mer* is now protected by restrictions on the type of species which can be harvested and on the size of harvest, and the collection of *bec-de-mer* by scuba divers is banned in an attempt to save stocks. A research programme on the culture of giant clams, sea cucumber and seaweed is currently being undertaken.

### 3. Biodiversity Management

Environmental management, including biodiversity conservation and the sustainable and equitable use of land, water and other natural resources, is relatively new to the Maldives. The government has, however, recognised the huge risks which nature poses to the Maldives' small islands ecosystems (see Box 4). Threats induced by climatic changes and impending sea level rise are taken very seriously. The severe storms that swept the country in 1991, causing damage to more than 3 000 dwellings and uprooting or damaging more than 190 000 trees, provided evidence of the country's vulnerability to the elements. At the same time, the government has also recognised the potential dangers posed by human activities and their side effects, such as pollution which causes silting of the lagoons. Similarly, increased attention is now being paid to the pressures on lagoons caused by growing demands for space emanating from population growth.

#### Box 4: Formation and Erosion of Islands

Ocean currents, storms and monsoon changes alter the shape and size of the islands, sometimes resulting in the formation of completely new islands, the erosion of existing islands and joining of other islands. Human activity also sometimes contributes to island formation or erosion. For instance, the island of Udhafushi was formed during the monsoon storms that swept the country in 1987.

Some islands have been formed by using artificial means to accelerate the natural process of island formation. For instance, this method was initially used to “recreate” the island of Feydhoo in Kaafu Atoll. Formerly known as Feydhoo and fairly large in size, this island had eroded away completely as a result of the mining of sand and corals for construction purposes.

Islands have also been created from waste materials. For instance, since 1991 the area known as Thilafushi, South West of Male', was used as a landfill for solid waste and construction debris. Eventually this led to the formation of a new island, now about one kilometre long.

*Source: Government of Republic of Maldives, Official Website, [www.maldives-info.com](http://www.maldives-info.com)*

The Maldives faces a number of problems and concerns which are increasingly likely to negatively impact the sustainability of the country's available land, water and other natural resources. These problems stem from both human and natural causes and many of them require urgent attention. They include:

- coral and sand mining which has severely impaired the capacity of some reefs to act as natural sea defences, and undermined their biological role as fishery areas and repositories of biodiversity;
- waste disposal problems, particularly sewage and solid waste;
- human pollution pressures, especially in Male' but also on selected islands including Thulhaadoo and Kandholhudoo;
- coastal erosion from coral/sand mining, dredging, coastal construction and reclamation, which is exacerbating the impacts of natural events such as wave damage and flooding;
- rising sea level, particularly the potential threat to urban centres, densely populated islands and tourist resorts;
- unconstrained land development on the atolls;
- shortage of human and financial resources for environmental management;

- degradation of freshwater and land resources, including the non-sustainable use of aquifers and fuel wood, as well as sewage contamination of aquifers.

### 3.1 Institutional Framework for Biodiversity Management

An Environment Section was first created in the Ministry of Home Affairs in 1986, before being later expanded and transferred to the Ministry of Planning and Development. Reflecting increasing attention towards environmental issues, the Ministry of Planning and Development was subsequently renamed, firstly as the Ministry of Planning and Environment, and later as the Ministry of Planning, Human Resources and Environment (MPHRE). Biodiversity management in the Maldives is currently the responsibility of both the Ministry of Planning, Human Affairs and Environment (MPHRE) and the Ministry of Fisheries and Agriculture (MoFA).

**The Environment Research Unit (ERU)** was formed in the MPHRE in 1990 to undertake research related to environmental protection and assume responsibility for environmental assessment and management. The Environmental Research Unit is responsible, inter alia, for:

- co-ordination of environmental information;
- ensuring that environmental considerations are incorporated into planning processes, particularly to ensure compliance with requirements for environmental impact assessment of major activities affecting the environment;
- developing national guidelines, policies, legislation, etc.
- follow-up to all national and international environmental actions, including national legislation, policies, guidelines and international conventions such as the Convention of Biological Diversity, the Framework Convention on Climate Change, and the Montreal Protocol.

**The National Commission for the Protection of the Environment (NCPE)** acts as an independent advisory body to the MPHRE. Composed of senior officials from all government departments as well as private sector representatives, the NCPE advises the Environment Minister on matters dealing with environmental protection, sustainable resource utilisation and conservation of biodiversity.

The **Ministry of Fisheries and Agriculture (MoFA)** is responsible for monitoring implementation of the Fisheries Law, as well as the development of sectoral policies and regulations relating to fisheries development in the Maldives. It is also responsible for agricultural development and the protection of agricultural resources. The MoFA works in close collaboration with MPHRE, particularly on issues relating to natural resources and environmental protection.

The **Marine Research Section (MRS)** was established in the MoFA in 1983 with the purpose of carrying out research and experiments on the expansion and improvement of the country's fishery industry. Initially, its major task was to determine to what extent the tuna fishery industry in the Maldives could be developed. Currently, the MRS is also involved in gathering information on the marine environment of the Maldives, as well as undertaking work on the sustainable utilisation and management of marine resource, and the protection of vulnerable and threatened marine species. For instance, it is seeking to strengthen its research on resource surveys, stock assessments and detailed biological studies of fish in Maldivian waters. The MRS is also engaged in the preparation of a catalogue of fish living in the Maldivian Seas (Official Government Website).

Given the relationship between tourism and marine wildlife resources, the **Ministry of Tourism** clearly also has an interest in ensuring that the country's marine resources are maintained in their pristine form. Nowadays, as compared to the unchecked and unplanned expansion and development of tourism in the 1970s, tourism is a carefully monitored and regulated industry (Official Government Website). As such, the Ministry of Tourism also plays an important role in biodiversity management. For instance, it seeks to ensure protected areas are monitored by its tour operators, scuba divers and instructors.

## 3.2 Legislative Framework for Biodiversity Management

### *The International Level*

The Maldives has participated actively in a number of international conferences on environmental issues. The Government of the Maldives abides by the recommendations of:

- the Basel Convention on Transboundary Movement of Hazardous Wastes;
- the United Nations Framework Convention on Climate Change;
- the Vienna Convention on the Protection of the Ozone Layer;
- the Montreal Protocol on Substances that Deplete the Ozone Layer (including ratification of the 1989 London Amendments);
- the Convention on Biological Diversity.

The Maldives may also become signatory to other international agreements, such as the Convention on International Trade in Endangered Species (CITES). Despite certain difficulties, notably boundary issues, increasing options may further open up in the future to exercise certain rights within the 200 nautical mile Exclusive Economic Zone (EEZ), under the UN Convention on the Law of the Sea (UNCLOS III). While this convention has not yet been ratified by sufficient member states for it to become fully adopted and legally binding, it nevertheless represents a useful and broad umbrella agreement to guide the management and sustainable use of coastal water resources. For instance, UNCLOS III can support efforts to minimise coastal resource use conflicts and to alter the notion of the seas as a common property resource.

The Maldives is involved in many United Nations and other international and regional initiatives related to environmental management. These include the Inter-Governmental Panel on Climate Change, in connection with the World Meteorological Organization. The Republic of Maldives hosted the ministerial-level “Small States Conference on Sea Level Rise”. This conference produced the “Male’ Declaration” which calls for greater international recognition of the unique and fragile nature of island environments and improved assistance from the UN system. The Maldives was a participant at the United Nations Conference on Environment and Development (UNCED) in Rio in 1992, at which international consensus was reached on the need to give priority to integrated management and sustainable use of coastal areas. More recently, the Maldives has provided inputs for the 1993 Global Conference on the Sustainable Development of Small Island Developing States.

### *The National Level*

At the national level, two main laws have been developed to provide a framework to guide the sustainable use, management and conservation of the country's natural resources, and to protect these resources from degradation and over-exploitation:

- the Fisheries Law (1970)
- the Environmental Protection and Preservation Act (1989)

In addition, a National Environment Action Plan was prepared in 1989 with the purpose of assisting the government to: a) maintain and improve the country's environment, including the marine and ocean area contained within its Exclusive Economic Zone; and b) manage the resources contained therein for the collective benefit of present and future generations. The National Environment Action Plan identified several high priority issues for urgent attention. In response, a number of actions are now being undertaken to address these issues and improve living standards in general, including a range of conservation measures to help recharge the severely depleted aquifer in Male'.

**The Fisheries Law.** Official conservation efforts were first initiated during the 1970s. The approval of the Fisheries Law by the Citizen's *Majlis* in 1970 was an important step towards establishing a legal framework for environmental protection at the national level. Under the Fisheries Law, regulations exist to protect marine resources, including turtles, whales, dolphins and certain fish. The Fisheries Law was subsequently reformulated during the mid 1980s to meet the challenges posed by the expansion of the fisheries industry and its position as one of the most important economic activities in the Maldives. Following reformulation, the law gained enhanced provisions for the conservation of living marine resources. The tenth clause of the Fisheries Law states:

*“In the event of a special need for the conservation of any species of the living marine resources, the Ministry of Fisheries shall have the right to prohibit, for a specified period, the fishing, capturing or the taking of such species or the right to establish special sanctuaries from where such species may not be fished, captured or taken”.*

**The Environmental Protection and Preservation Act** was approved by the Citizen's *Majlis* in April 1993. This law was important in bestowing the MPHRE with a wide range of statutory powers in the area of environmental regulation and enforcement. For instance, it empowered the MPHRE to draft guidelines for environmental protection and gave it responsibility for the identification and designation of protected areas and natural reserves. As a means to enforce environmental regulations, this act further empowered the MPHRE to levy fines of up to 100 million Rufiya (US\$10 million) in cases of breaches of the law (State of the Environment Report, 1994).

### 3.3 Conservation and Protection in Practice

The concept of *in situ* conservation is fairly new to the Maldives. Marine Protected Areas were demarcated for the first time in 1995. Although uninhabited islands and their reefs have been protected, protection has tended to result from limited resource extraction, as opposed to any concerted efforts at protection. *Ex situ* conservation methods do not exist. For instance, there are no aquariums, zoological or botanical gardens, or sacred gardens (land protected for religious uses).

The main types of *in situ* conservation methods employed in the Maldives include:

- marine protected areas;
- uninhabited islands;

- resort islands (only 20% of land is used and the remaining 80% is left as wilderness);
- agricultural islands where wilderness areas have been demarcated; and
- areas protected by taboos (e.g. presence of *jinni*).

Some research and management programmes aimed at strengthening the future management of biodiversity in the Maldives are currently being implemented. These include:

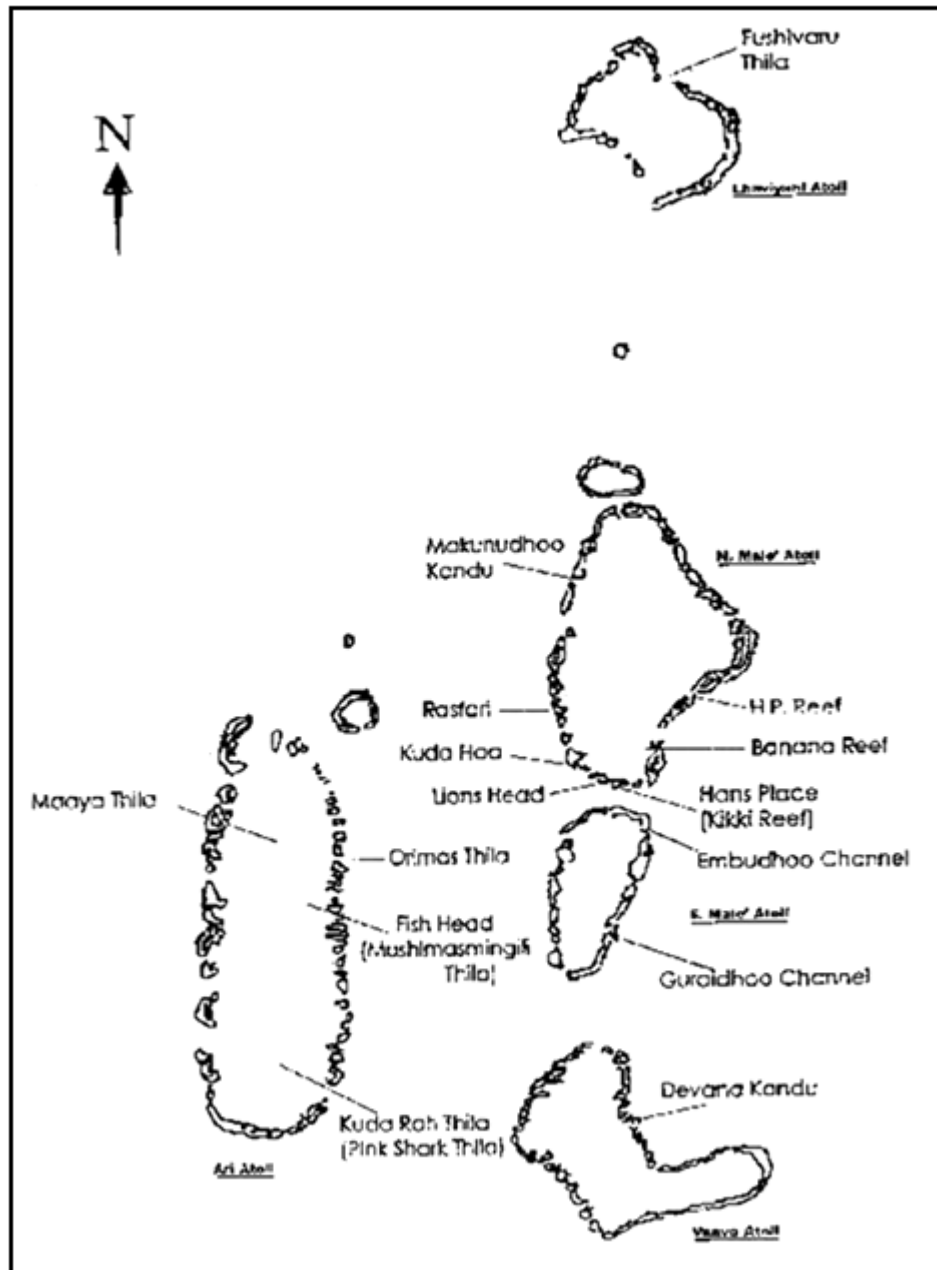
- Integrated Coastal Zone Management and Land Use Plan;
- Assessment of Marine Biodiversity;
- Protection of Marine Ecosystems along the Maldives Coast for Sustainable Development, supported by Global Environment Facility (GEF);
- Initiation of Protected Areas System; and
- Assessment of Coral Damage on Tourist Islands.

### ***Marine Protected Areas***

A recent but important development in conservation has been the designation of 14 Marine Protected Areas (MPAs) in the Maldives' central atolls, covering an area of approximately 12.55 sq. km. They areas have been identified for protection because of their outstanding diversity of corals, reef fish, sharks, rays and eels, as well as the existence of other organisms ranging from sponges and molluscs to bivalves. As protected areas, all extractive and human activities, including coral and sand mining, fishing, collecting, netting and anchoring are banned, with the exception of bait fishing. Catching bait fish is permitted in MPAs given its importance for local tuna fishing, however, the methods used for bait fishing in MPAs must not damage or harm any living organism. The location of Marine Protected Areas is illustrated in Map 2, while Table 11 identifies the key species found in these areas.

The Government of the Maldives is currently examining options to extend marine protected area status to cover other parts of the archipelago. In addition, opportunities to establish terrestrial protected areas are being considered and some national parks may be designated in the near future. A number of potential sites have already been identified, including islands, wetlands, natural heritage sites and other habitats of significant importance. Some of these sites have diverse birds populations, while others are uninhabited islands that serve as rookeries for sea turtles. These include Kottey and the lake in Addu Atoll, parts of Gan, as well as the lakes in Fuahmulah, and the Hithaadhoo Island of the Gaaf Alif Atoll (Country Report, Environment Division, MPHRE, 1996).

### **Map 2. Marine Protected Areas in the Maldives**



**Table 11. Marine Protected Areas (MPAs) in the Maldives**

Protected Area	Size	Key Species
<i>North Male' Atoll</i>		
Makunudhoo Kandu	100×2 000m	Coral, reef fish, shark
H.P Reef	100m radius	Soft coral, gorgonians, reef and pelagic fish
Banana Reef	100m radius	Fish, coral



Kuda Haa	100m radius	Coral, fish, stone fish
Lions Head	500m radius	Shark
Hans Hass Place	500m radius	Coral, caves, reef fish
<b><i>South Male' Atoll</i></b>		
Embudhoo Kanduu	entire channel	Shark and pelagic fish
Guraidhoo Kanduu	entire channel	Coral, shark, reef and pelagic fish
<b><i>Ari Atoll</i></b>		
Maya Thila	500m radius	Fish, shark, manta rays
Orimas Thila	100m radius	Coral, soft coral, reef fish
Fish Head	500m radius	Shark
Kudarah Thila	100m radius	Corals, reef fish, shark
<b><i>Felidhoo Atoll</i></b>		
Devana Kanduu	entire channel	Soft coral, fish, gray reef shark
<b><i>Faadhipholhu Atoll</i></b>		
Fushifaru Thila	100m radius	Superb hard coral, reef fish, pelagic fish, manta rays

### ***Protection for Species***

Just one bird species, the white tern, is currently listed as protected under the Environmental Protection and Preservation Act. Under the Fisheries Law, however, several species have been identified to receive protection against exploitation, trade and/or export as illustrated below. In addition, harvesting giant clams, black coral and pearl oysters from the wild has been banned, and the collection of sea cucumbers is now restricted.

### **Species banned from exploitation, kill or catch of any kind:**

- Loggerhead turtle
- Green turtle
- Hawksbill turtle
- Olive Ridley turtle
- Leatherback turtle
- Dolphin
- Black coral
- Whale
- Whale shark
- Spiny lobster
- Triton shell
- Giant clam
- Napoleon wrasse

### **Species banned from export:**

- Black coral
- Pearl oyster
- Trochus shell
- Storny coral
- Eel
- Triton shell
- Bait fish
- Bigeye scad
- Parrot fish
- Sea turtle
- Puffer fish
- Dolphin
- Whale
- Rays

Given their commercial value, the government has also passed a range of measures to protect rare and valuable species of aquarium fish. In particular, aquarium fish exports fall into one of three categories: i) trade is completely banned; ii) restricted trade is permitted on the basis of quotas; and iii) free trade. Under this type of protection, aquarium fish species are accorded different levels of protection based on their categorisation within a core, interface or utilisation zone.

As previously mentioned, in an effort to conserve the biological diversity of trees used for timber, the Government's "Million Tree Programme" seeks to replenish and expand good timber stock through the promotion of a number of tree species of timber and food value

### ***Constraints and Opportunities in Biodiversity Management***

Despite the aforementioned legislative and practical measures intended to promote enhanced biodiversity management, certain constraints limit the successes which can be obtained. The vast number of geographically scattered islands in the archipelago makes monitoring difficult, and contributes to management problems. At the same time, the number of trained environmental officers is in short supply, reducing their ability to enforce environmental and related legislation. For instance, the capacity of the Environmental Research Unit is limited in terms of both human resources and technical capability. The government's database on environment and related issues is inadequate. Public awareness regarding the importance of environment and biodiversity remains limited, though steps are being taken to change this through awareness and information campaigns based on radio and television and the teaching of environmental science as part of the school curriculum.

The activities of local NGOs in the Maldives are helping to raise national consciousness about environmental issues as illustrated in Box 5. Similarly, indigenous knowledge about natural resources and local communities genuine concerns to protect their island's biodiversity exist and appear to play an increasing role. The importance of overseas courses and local training centres in increasing the national capacity for environmental management has also been recognised.

#### **Box 5: NGO Efforts to Protect Maldivian Bird Life**

It is well known that people in the Maldives like to keep birds as pets and that the market in Male' caters to these demands while also providing a livelihood for the island's bird-catchers

One random survey carried out by Eco Care, a national NGO dealing with environmental issues, found that 28 different types rare birds were being caught on the islands and sold as pets in the Male' market. Some birds, including Maldivian water hens, sandpipers, black-naped terns and brown winged terns, were on sale for as little as 50 Mrf. The most expensive rare bird on the market was a grey pelican priced at 15 000 MRf<sup>18</sup>. Following their successful survey, Eco Care launched a campaign aimed at banning this trade in rare birds. This campaign received a positive response from the government.

Other examples exist of communities fighting to protect their islands' natural resources. For instance, when residents of Gafaali Fitadu Island discovered that a wetland on their island was used as a breeding area by the rare frigate birds, they reported it to the MoFA in order to ensure protection for the areas so that the birds would not be disturbed during breeding. The residents of Adu Atoll made a similar case to protect white terns on their island.

<sup>18</sup> US\$ 1 = Rufiya (MRf) 11.82 (February 1998).

The ecological future of Maldives should be based on the development of strong environmental guidelines that provide mechanisms to safeguard the country's aquifers, promote self-sufficiency on the resort islands, encourage conservation of important local resources, limit new migration to Male', and maintain a significant proportion, for instance 30 percent, of the present uninhabited islands as areas with minimal or no development.

In this context, the main thrusts and objectives for environmental management include:

- further strengthening of national capacity for environmental management, building on traditional Maldivian management practices;
- adoption of environmental impact assessments (EIA) for all major construction projects, and the upholding of other environmental legislation;
- development of environmental standards and protocols for the construction and citing of causeways, jetties and other coastal structures;
- recognition of both the direct value of natural resources such as fisheries and tourism, and also their less obvious, but often more important, indirect value, in particular the value of coral reefs for the 'free' physical protection they provide; and inclusion of both direct and indirect values in cost benefit analysis for new development projects;
- **increased prominence to women in environmental management, the skills of whom are not fully harnessed but could add significantly to human resource requirements;**
- **adoption of population policies to ease pressure on the environment, its resources and living conditions;**
- continuing environmental education and vocational training, the impact of which will influence future development planners and endure long into the next century.

## 4. Gender Dimensions in Bio-resource Management

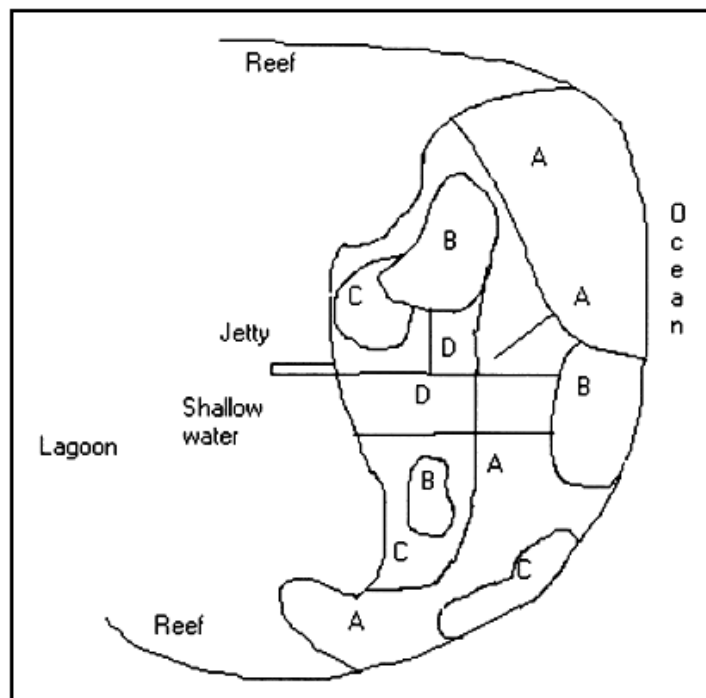
Moving from biodiversity conservation based on the designation of protected areas, towards a system of participatory biodiversity management necessitates consideration of factors related to the sustainable use, and equitable sharing, of the benefits of conservation. This paradigm shift is the goal of the Global Convention on Biodiversity. Adequate knowledge and understanding of community-based practices of natural resource utilisation and conservation are essential in this regard. An understanding of the indigenous technologies used by communities can be used not only to strengthen resource management, but also to enhance the equitable sharing of the benefits of natural resource conservation.

In an attempt to increase understanding about community-based natural resource use and management in the Maldives, the following sections explore community and family-based methods that exist in the use and management of natural resources. In particular, they seek to highlight gender roles and dimensions operating within these practices.

### 4.1 Land Ownership and Management

Land use patterns on the inhabited islands of the Maldives are mapped by the respective Island Committees. Some areas are designated for agricultural production, while others are demarcated for the production of timber or fuel wood (Figure 4 illustrates land use patterns on the Island of Kela). Land ownership in the Maldives can be divided into three categories: house plots owned by individuals; community land; and government land. With the exception of house plots and community land, all land in the Maldives is the property of the government. Land-based activities are shared equally among men and women as illustrated below in Table 4.1.

**Figure 4. Land Use Patterns on Kela Island**



**A: Wilderness with coconut**

**B: Agricultural plots**

**C: Bush**

**D: Home plots**

**Table 12. Gender Roles in Land Management**

Land category	Men	Women
Home plots	<ul style="list-style-type: none"><li>• upkeep of the boundary wall</li><li>• maintenance of the house well and water-harvesting system</li></ul>	<ul style="list-style-type: none"><li>• planting crops</li><li>• care for home garden crops</li><li>• market produce</li></ul>
Community land	<ul style="list-style-type: none"><li>• thinning timber plots</li><li>• maintenance of jetties and similar structures</li><li>• building schools, playgrounds, etc.</li><li>• contribute to agricultural production collect dead corals and make lime</li><li>• timber collection</li></ul>	<ul style="list-style-type: none"><li>• clean wide streets of the village</li><li>• responsible for agricultural production</li><li>• collect sand for house maintenance</li><li>• collect fuel wood</li></ul>
Government land	<ul style="list-style-type: none"><li>• collection of coconuts</li><li>• maintenance of tree nursery</li></ul>	<ul style="list-style-type: none"><li>• maintenance of tree nursery</li></ul>

Despite the importance of waste disposal and management, a system aimed at waste collection and its proper disposal, is lacking in the Maldives. In general, household waste is discarded in the bush which is increasingly littered with both organic and inorganic matter, including plastic bags and tins. Solutions are required to establish a viable system for waste management. Given that poultry rearing practised by communities is based on an 'open' system, whereby hens and chickens forage in the bush, poultry are endangered by harmful waste. Furthermore, in the long-term, waste is likely to enter the lagoon where it is likely to result in silting and/or the death of corals.

## 4.2 Water Resource Management

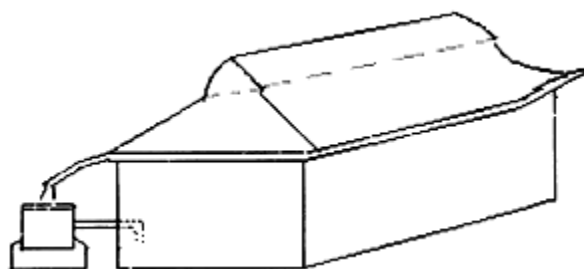
Finite water resources require careful use and management. Not least in the Maldives where the availability of fresh water is limited, and increasing population pressures are causing lower quality ground water. Especially on heavily populated islands, the high population growth rate is taking its toll on water resources and quality with a concurrent increase in the cost of water supplied by desalinating plants.

Since there are no rivers in the Maldives, rain water is very important. Houses usually have both an individual rainwater harvesting tank and a well. Community buildings such as schools, mosques, island offices, etc. have their own rain water harvesting systems, where water is collected for the use of the community. Rain water is used for drinking and cooking, while well water is used for washing. Utensils and clothes are washed in the open, sometimes on the

beach. Waste water is often directed to vegetable patches in home gardens. Small open wells are dug in agricultural plots so that plants can be easily watered in their early growing stages. Both men and women are involved in watering plants.

Men play an important role in the harvesting of water resources and in the maintenance of water collection systems, including digging and maintaining wells. Traditionally, rain water was collected by Maldivians in tall clay pots. Now, an open-ended pipe, forming a gutter along the boundary of the roof, is put in place at the end of each sloping roof to direct the flow of rain water into a ferro cement tank on the ground below. A pipe runs from this tank to the kitchen providing water for the household (see Figure 5). In the past, roofing was constructed of *cadjan* (woven coconut frond); however, this material did not contribute to efficient water-harvesting and today roofs are usually made of corrugated iron sheets, enabling water to be harvested in a clean and efficient manner. The entire system of rain water harvesting is established and maintained by men. For instance, collection tanks are thoroughly cleaned by men once a year.

**Figure 5. Household Water Harvesting System**



### 4.3 Gender Roles in Agricultural Production, Seed Management and Harvesting

Maldivian law does not permit ownership of agriculture land. As a result, land designated by the Island Committee for agricultural purposes can be used by all the residents of the island. Households are required to inform the Island Committee about the size and location of their plots. Since agriculture is practised for subsistence, plots are small in size, ranging from 100–500 sq. m. Land is in sufficient supply on the atolls to enable inhabitants to abandon plots after 2 to 4 years and select new plots. Given that agricultural land is not individually owned, communities are not normally interested in enhancing and/or conserving land productivity.

As illustrated in Table 13, women are heavily involved in all aspects of agricultural production, from the selection of land, to decisions regarding which crops to grow, to harvesting. Traditionally, chillies were planted for commercial sale and other crops were grown for home consumption. Nowadays, women also cultivate horticulture crops for commercial purposes in their agricultural plots (see Figure 6).

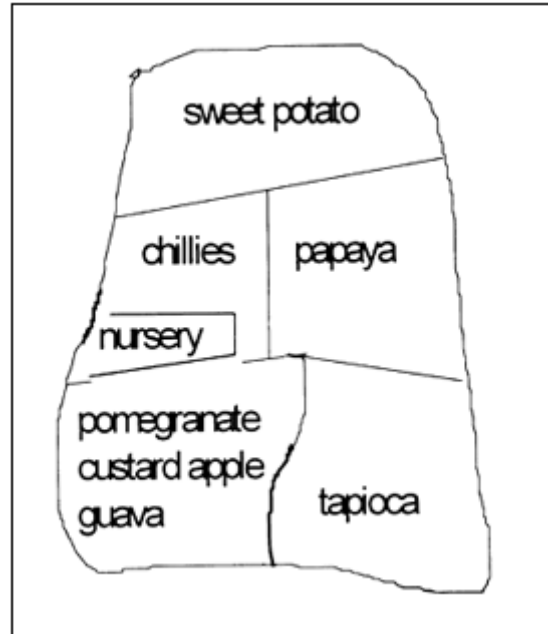
**Table 13. Gender Roles in Agriculture**

Activity	Men	Women	Children
<i>Pre-harvest</i>			
• plot selection		+	

• clearance	+	+	+
• burning of the dried waste		+	
• fencing against salt laden winds		+	
• digging well	+		
• land preparation		+	
• crop decision		+	
• nursery preparation		+	
• watering the plants		+	+
• mulching with leaves	+	+	
• weed removal and pest control		+	
• harvesting	+	+	+
<b>Post harvest</b>			
• transport of harvest	+	+	
• sorting for seed		+	
• sale within island		+	
• sale to Male'	+		
• seed storage		+	

Seed selection is performed by women. Table 14 illustrates seed selection and storage techniques used by women on Kela Island. The Ministry of Fisheries and Agriculture distributes imported seeds from neighbouring countries from its outlets on the atolls. On the islands, families exchange seeds among themselves, usually at the time of fruit selection. Pests, low productivity and poor fertility of seeds are common problems expressed by farmers. Manure is not applied to crops; farmers believe that the remaining ash is sufficient for the growth of new crops. Mulching is carried out by women and men, using coconut fronds, banana and papaya leaves. Men are responsible for the construction of small covered enclosures to protect chilli plants. Women have responsibility for the maintenance of the chilli crop within these enclosures. For instance, women apply a paste of soap and garlic to plants infected by pests.

### Figure 6. Mixed Farming in a Typical Family Plot



Women have responsibility for pest control. The MoFA is promoting the use of local techniques in pest control. In this context, several workshops have been organised to educate women about the identification and control of specific pests. Most of the harvesting is carried out by women. Tubers, vegetables and spices are harvested as needed. Fruits are picked according to the schedule of market days. Both women and men are involved in transporting harvested crops. Cane baskets are used to transport crops to the house or jetty when the quantity is small, and wheelbarrows when the harvest is large.

**Table 14. Seed Selection and Storage Techniques for Selected Crops on Kela Island**

Crop	Seed Selection	Seed Storage
Pumpkin	• select a good size fruit	• hang fruit under high ceiling in shade
Eggplant	• choose a healthy plant and good coloured fruit	• allow fruit to ripen, remove and dry seeds, store seeds in glass bottle for few months
Papaya	• select a large size fruit	• extract seeds and plant immediately since seeds loose fertility rapidly
Watermelon	• keep aside best fruit	• extract and dry seeds, store in glass jar after mixing with house ash
Millet	• choose cobs with good grains	• dry cobs between coconut mat layers, collect grains when dry, store in tin boxes or cloth bag and hang under a high ceiling

Source: Women Farmers of Kela

#### 4.4 Home Gardens, Biodiversity and Household Food Security

Home gardening is important in the Maldives, not least for its contribution to enhanced household nutrition. In general, family plots are divided into two evenly sized areas; one is used for housing and the other is converted into a garden. Home gardens typically vary in size from



100–500 sq. m. Crops cultivated include chillies, eggplants, tapioca, Different varieties of the same crop are grown in home gardens in an attempt to control pests. This also contributes to the maintenance of biodiversity. beans, spices and a few fruit trees. Figure 7 depicts two sample home gardens on the Island of Kela, illustrating the distribution of plants, water sources, etc.<sup>19</sup>

**Indeed, most home gardens can be regarded as mini plant genetic resource centres.** A home garden may contain up to ten different crops types, and a total of 25 to 30 plant varieties. For instance, three to four varieties of banana, coconut, eggplant and chillies may be planted in the same garden. Given that new plants varieties have been introduced to the Maldives ever since trade links were first initiated with Sri Lanka and India, original and foreign varieties have merged, and locals are no longer able to distinguish original plant stock.

Women play a dominant role in all activities related to nurturing and maintaining home gardens. Men play an important role in harvesting fruits, especially papaya, banana, coconut, areca nut and bread fruit. While child care was traditionally, and continues to be, the responsibility of women, both men and women understand the value of balanced diet. With this in mind, families tend to grow a variety of crops in their home gardens. Women and men have knowledge about plant varieties and their nutritional content. For instance, drumstick leaves are eaten for their high iron content and form an important part of the diet of pregnant women; bilimbi is eaten to protect against the common cold given its high vitamin C content. Banana varieties containing most nutrients are given to children.

## 4.5 Commercial Crop Production and Gender Differences

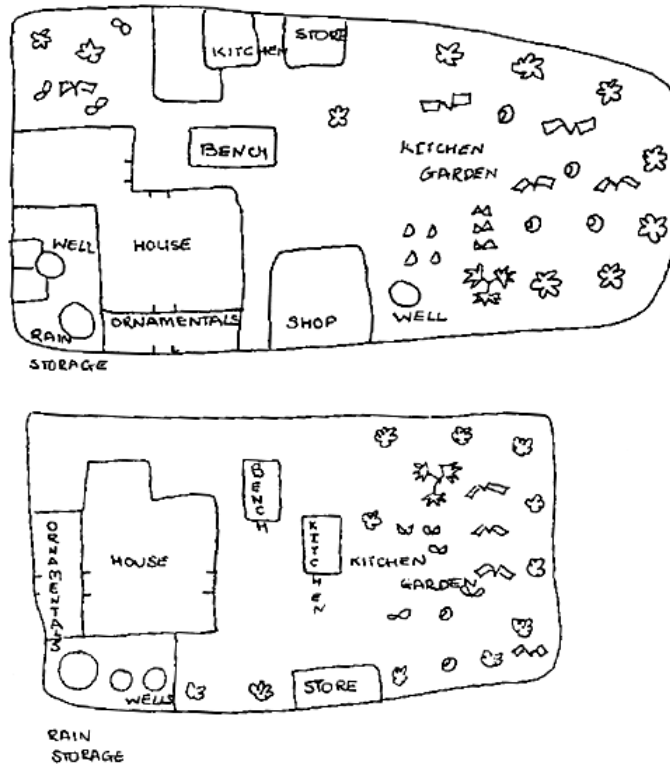
A few uninhabited islands have been leased by the government for large-scale commercial agriculture. While demand exists for women to work on these farms as paid labour, for instance in harvesting, seed selection, fish processing, etc. women do not normally leave their homes to seek longer-term work on other islands. In general, women have mainly travel to commercial agriculture islands to clear wilderness and collect fuel wood.

Coconut is an important commercial crop in the Maldives. Coconuts and coconut products form an integral part of the Maldivian diet and coconut timber is widely used for boat-building and construction purposes. Coconut palms are grown in home gardens, on community and government land, and on uninhabited islands. Some of these islands are leased from the government for commercial coconut production. Revenues are based on the number of coconut palms and bread fruit trees on the island. Coconut harvesting is a complex business. A *dhoni* is hired, including a crew which contains some men specialised in coconut harvesting, the coconut are harvested from morning until evening, the harvest is collected and loaded into the *dhoni*, and the harvest is taken to market. Women play no role in any part of coconut harvesting, mainly because of the need to climb palms and undertake long journeys in *dhonis*. Women are, however, involved in coconut processing activities, including dehusking, grating, drying, milling for oil<sup>20</sup>, etc. Manufacturing coir rope is undertaken jointly by women and men. Women also make brooms from the fibrous husk of coconuts.

<sup>19</sup> These diagrams were drawn by farming women visited on Kela Island during research visits for this study.

<sup>20</sup> Demand for coconut oil is decreasing. Substitutes such as groundnut oil and sunflower oil are now imported and more readily available.

### Figure 7. Illustrations of Home Gardens on Kela Island



## 4.6 Medicinal Plants and Traditional Practitioners

Traditional medicine is important in the Maldives and some islands are famous for treating certain ailments such as setting broken bones or curing skin diseases. Medicinal practitioners collect medicinal plants and herbs from the wilderness. These plants are not cultivated and plants do not exist to domesticate them. For instance, practitioners in Male' travel to other islands in the North Male' Atoll to gather medicinal plants as they are no longer found on the island of Male'.

Both women and men practice traditional medicine. The practice is family-based and passed on from one generation to the next. Charmers, usually men, also exist in villages. Charmers offer their blessing before they depart on fishing trips, normally at the beginning of a season. The 'Fanditha' (holy man or women) places a 'taweez' (sacred locket) containing a prayer on the recipient. A greater number of *Fanditha* are men rather than women.

## 4.7 Wildlife Management

Although wild birds are rarely eaten, they are caught alive and sold as pets in Male' as Eco Care's survey has demonstrated (see Box 5). Men are responsible for trapping wild birds. Similarly, trade in wild birds is the domain of men. Despite the damage caused by bats to crops, they are not normally killed.

## 4.8 Gender Roles in Harvesting Marine Resources and Post-harvest Activities

The people of the Maldives have historically had open access to the country's oceanic resources. Yet given that Maldivians have traditionally harvested limited fish resources for sustenance or trade, the islands' marine resources have not been placed under serious pressure. For instance, today's tuna catch is lower than the sustainable level of extraction of the Indian Ocean's stocks. Similarly, restrictions on the time spent at sea, or on the harvesting of different fishing areas have never existed.

Prior to the introduction of mechanised *dhonis* in the mid 1970s, sailing boats were used for fishing. This seriously restricted the distance fishermen could travel for tuna fishing and the time they could stay at sea since fishermen sought to remain within sight of land and fished only during good weather. These limitations on movement served as conservation measures which helped to protect fisheries resources from overexploitation. Today, however, larger and mechanised fishing vessels are used. Travelling between atolls, these boats can cover great distances, and fishing is possible all year round (see Box 6). Yet, while mechanisation has opened up large new areas for fishing, contributing to an increased tuna catch, traditional means of conserving tuna and other marine resources have been lost.

### Maldivian Gender Roles in Fisheries Harvest and Post-Harvest

**Oceanside Fish Catch and Cleaning**



**Sun Drying Tuna Fillets  
Preparing for Market**

**Marketing Fish in City**



### Box 6: Mechanisation of Traditional Fishing Boats and Family Food Security

Since 1974, a major mechanisation program of the country's pole and line fishing vessels was started by the Government. Engines were installed in *dhonis* under a Government-sponsored credit scheme. By October 1992, there were 1,663 mechanised fishing vessels. The mechanised vessels have proved much more versatile and productive. They are capable of travelling further and catching at least 30 tons of fish per year compared to the average 10 ton yield of the non-mechanised *dhonis* (Official Government Website). Mechanised vessels are also better suited to supply fresh fish to the mobile collector vessels. Thus, mechanisation has proved to be an important factor in facilitating the export of fresh frozen fish. It also allowed for fishermen to travel beyond the pre-existent fishing boundaries.

Yet, some have argued that mechanisation has not necessarily brought equal prosperity to all those involved in fishing. Since most of the catch is sold to collector vessels rather than being transported back to the islands for processing and marketing, in practice there are usually fewer fish to take home. The share of the catch allocated to the crew has decreased as a result of mechanisation. In this context, some women believe that less fish is available to them to make dried fish, fish soup and fish paste (a concentrated form of fish soup), the staples of the Maldivian diet, and concerns exist about the nutritional well-being of children.

Gender roles exist in the harvesting and processing of marine resources in the Maldives as illustrated in Table 15.

**Table 15. Gender Roles in Fisheries Harvesting and Post-harvesting Activities**

Activity	Men	Women	Children
<b><i>Shark fin</i></b>			
• Landing	+		
• Removal of fins	+		
• Drying in sun		+	+
<b><i>Salted products (tuna, sharks, reef fish)</i></b>			
• Cleaning and washing	+	+	
• Applying salt and storing in brine tank		+	
• Washing		+	
• Sun drying		+	+
<b><i>Sea cucumber</i></b>			
• Collection	+		
• Sorting	+	+	
• Pre-boiling, burying in sand	+	+	
• Cleaning	+	+	
• Boiling		+	
• Smoking		+	
• Sun drying		+	+
<b><i>Walhoa mas (soft-dried products) and Hikimas (hard-dried products)</i></b>			
• Filleting	+	+	
• Boiling		+	
• Smoking		+	
• Drying		+	+
• Storing		+	+
<b><i>Marketing</i></b>			
• in the local area	+	+	
• in Male'	+		

Fishing activities and the harvesting of marine life in the oceans, lagoons or reef flats are performed exclusively by men. Though Maldivian fishermen have developed many fishing techniques to catch different species as illustrated in Table 16, fishing using a pole and line remains most common. Some pre-harvesting activities including mending hooks and nets, cleaning and oiling boats, etc. are also dominated by men. Post-harvesting activities aimed at adding value, such as salting and drying fish, are the domain of women. Unlike India or Sri Lanka, where women are actively involved in collecting seaweed, molluscs, small fish, bivalves, oysters, etc. women in the Maldives are not involved in harvesting such resources from the lagoons. Post-harvesting activities are time consuming and usually take women from 4 to 7 hours. For instance, women frequently work from seven in the evening to past midnight, smoking the fish caught that day. Though men do not generally participate at the post-harvest stage, on occasions when the catch is so large that the women are unable to clean all the fish on their own, male family members help with filleting.

**Table 16. Fish Harvesting Techniques in the Maldives**

Method	Catch
<b>Hook and line</b>	
• pole and line	tuna, big eye scads, goat fish
• hand line	reef fish, flying fish, little tuna, mullets, etc.
• long line	oceanic shark
• trolling	tuna, wahoo, barracuda, marlin
• set line	tiger shark, six gilled shark
<b>Nets</b>	
• gill net	shark species
• lift nets	bait fish
• cast net	uniya, ori, kalhgu oh, landa
• surrounding net	uniya, ori, kalhgu oh, landa, mekunu, kiruihiya mas
• seining	all reef fish
<b>Miscellaneous</b>	
• hand gathering	sea cucumbers, giant clams, lobsters
• turtle Jigging	turtles
• wounding	wahoo, sailfish
• trap	reef fish
• fishing for whale shark	whale shark

*Source: Catalogue of Fishing Gear of the Maldives. Marine Research Section, MoFA.*

Most post-harvesting activities take place in the courtyard or a separate hut in the courtyard known as the 'fish kitchen'. Construction and maintenance of this hut is the responsibility of men. The stove is made of clay or tin. Women boil fish on a stove, constructed of clay or tin, a process which takes 2 to 3 hours depending on the size of catch. Wooden racks, normally above the stove, are used by women to smoke the fish. Following the smoking process which takes 5 to 6 hours, women, sometimes helped by children, place the fish outside to dry in the sun. These activities require large quantities of fuel wood. As a result, women engaged in post-harvesting activities have to gather fuel wood and bring it home in a wheelbarrow three times a week, compared to once a week for normal household needs.

Marketing the catch is the responsibility of both women and men. In general, however, men play a larger role in marketing given their greater ability to leave their home on the atolls to travel to Male', a boat journey which can take 5 to 12 hours. Women's involvement in marketing is restricted to selling fish locally. As a result of the division of labour, women have extensive knowledge about post-harvesting and particular processing techniques, such as smoking and drying. Men have superior knowledge of fishing techniques and equipment. In addition to being a male dominated occupation, an increasing number of fishermen are older men. One study estimates that between 23–32 percent of all fishermen are above 50 years, and predicts a significant fall in the total number of fishermen over the next 20–25 years (Ramsay, 1987).

Women and men are both involved in lime making using dead corals that washed ashore. Men dig a pit on the beach, and corals and wood (breadfruit tree and *Scaevola*) are placed inside in

layers. The pit is set alight and left to burn out, a process which transforms the coral into soft lime which is subsequently removed. Women assist in the lime making process by delivering wood and, when male help is not available, removing and transporting the lime. Women also collect beach sand for use in the home. Although house reef corals are protected by law, some illicit quarrying also takes place for building. In the past, whole houses were constructed of coral stones and cement of coral origin. Now, coral is only legally allowed to be used for construction of the boundary walls. Other threats to the lagoon's corals come from significant organic pollution that causes silting, and land reclamation in response to growing demands for space. For instance, parts of the island of Male' which have been reclaimed from its reef flat have suffered severe flooding during storms.

## 4.9 Emerging Gender Concerns in Bio-resource Management

Changes are underway in traditional gender roles in the Maldives. For instance, one survey of 16 islands carried out in 1987 found that two-thirds of households spent less time processing fish at home as a direct result of more of the catch being sold to collector vessels (Ramsay 1987). According to this survey, fishermen prefer a more relaxed home atmosphere, made possible when most of the catch is sold to collector vessels. This survey also reported that there is periodic storage of *rihakaru* (fish paste). Despite increased 'free' time for women accompanying the reduction in home processing, possible changes in women's status in the household which have resulted from the loss of an income generating activity have not been studied. In addition, while this survey has existed for more than a decade, it has not been widely recognised in official circles.

Women are responsible for on-farm conservation of agricultural resources. In the Maldives, women's activities are limited by the presence of the lagoon. While women are completely independent on the island on which they live, they are restricted in their ability to access to other islands. This form of isolation has been increased by the government's policy not to permit families to move to resort islands in cases where men take up employment.<sup>21</sup>

<sup>21</sup> During research for this study, the author met some qualified teachers and nurses who had been forced to give up employment on resort islands, in order to move to their home island to adequately care for their family and land.

### Maldivian Gender Roles in Bio-resource Management

#### Multiple Roles of Maldivian Women



Courtyard Domestic



#### Committee Participation



## Tasks



Inter-atoll and inter-island trade is virtually absent among women, and ocean and sea-based activities tend to be dominated by men. On the other hand, land-based activities are the domain of women with minimal inputs from men. For instance, intra-island trade is primarily the responsibility of women. Women also play a major role in agriculture, child care and housekeeping. These roles have encouraged women to work in activities near their home and on their own island. Women play no role in shipping and fishing; however, with the advent of innovations in ship building (such as fibreglass boats which are easier to handle) some people believe women will play a role in the water-based transport sector in the future. Thus, over time, men and women have developed distinct roles in biodiversity management. In the future, however, it will be important to seek to integrate their separate efforts and roles in order to enhance the conservation of terrestrial and marine biodiversity.



## 5. Conclusions and Recommendations

The Maldives archipelago provides a unique example of an island nation that is trying to simultaneously balance developmental and environmental concerns. The creation of resorts on uninhabited islands, accounting for just 20 percent of the country's total land area, illustrates the government's attempt to move from commercial tourism on a large scale towards a more managed and environmentally sustainable form of ecotourism. Similarly, the people of the Maldivian atolls have traditionally demonstrated their concern for all life forms. While they have depended for their survival on their country's natural resources, particularly its marine assets, they have traditionally harvested and managed these resources using community-based practices which have their own integrated conservation mechanisms.

Challenges and trends at both the international and national levels have, however, increased the need to strengthen existing mechanisms aimed at the sustainable management and use of natural resources in the Maldives. Global threats related to increasing greenhouse gases and an associated rise in sea level are real issues of concern to an island nation like the Maldives where most of the population lives on land with a negligible height above mean sea level. On a national level, increased population pressures and growing demands for space in the form of reclaimed land threaten the lagoons and reefs on which so much of the country's economic survival depends. Increased pollution silting up lagoons and human activities like illicit coral quarrying, are further damaging the country's natural wealth. As well as strengthening existing mechanisms, these challenges demand new efforts and initiatives in order to ensure the sustainability of the country's terrestrial and marine-based resources, and to enhance resource management. Furthermore, in seeking to strengthen and expand these mechanisms, it will be crucial to consider, and to take into account, gender roles. The following paragraphs provide some recommendations in support of measures aimed at achieving enhanced biodiversity management in the Maldives.

The Maldives possesses almost 3 000 species of animal and plant life, both marine and terrestrial. Yet most of these life forms have never been surveyed or documented. For instance, a floral survey has never been carried out. Existing surveys of land-based fauna are based on occasional visits made by external experts and are, for the most part, far from adequate. Information currently available on the island's species diversity has generally been compiled during the last decade. Institutional experience related to marine and environmental research is therefore limited, and there are wide gaps in knowledge. Closing these gaps will be extremely important. Particularly, given the significant likelihood of identifying several endemic sub-species owing to the position of the Maldives as an island nation. **A national campaign to inventory the floral and fauna wealth of the Maldivian Islands is therefore essential. The atoll-based women's community organizations can make important contribution to this effort.**

Development in the Maldives has been accompanied by an erosion of knowledge about, and the practice of, traditional forms of natural resource management. Steps should be taken to document this knowledge at the atoll level. Given the large numbers of young people forced out of schooling after the secondary level, one option could be to use these existing human resources to identify and record each island's natural wealth. **People's Biodiversity Registers could be used to catalogue the biological diversity of the individual islands and to illustrate how resources are utilised and conserved by local people. They could also be used to identify and highlight gender roles in natural resource use and management.** Such catalogues would be of enormous value to the future management of the country's biological diversity. Yet the inputs required to create the proposed registers are minimal. A few

months of training on species identification, rural interviewing techniques, etc. would equip these young people with the necessary skills to prepare an inventory of their island's biodiversity and indigenous knowledge systems. A framework for the compilation of a People's Biodiversity Registers at the island level is included in Annex 1.

The NGO sector in the Maldives is in its early phase of emergence and not activist in nature. **Nevertheless, the strength and reach of existing NGOs should be harnessed.** NGOs could be used to support the incorporation of biodiversity related topics in school curriculum, to lobby government and influence national policies in support of sustainable development, to highlight the contribution of women in the manufacturing sector, and to seek to increase women's roles in senior decision making positions in all sectors of employment. **The government's distance education programme could also play an important role in disseminating knowledge about the national bio-resource heritage to people living in atolls.**

Research indicates that women in the Maldives depend on environments which are rich in diversity in order to ensure household survival, especially in times of crisis. Biodiversity constitutes an important component of women's coping mechanisms to deal with environmental hazards. Recognising the importance of biodiversity, women have become 'curators' of diversity and strive endlessly to maintain it. Yet while women have historically played an important and central role in producing food and managing the environment, especially in the conservation and enhancement of genetic resources, this work often remains hidden and is not acknowledged. Similarly, women's contribution to household sustenance and livelihoods is not recognised in national statistics. Consequently women's problems remain unheard. For instance, all household activities are usually grouped under the heading "manufacturing" which also contains a number of male-dominated activities such as fish hook production, carpentry, electrical small industry, etc. Similarly, agriculture and fisheries statistics fail to highlight the contribution of men and women in different activities. Gender analysis of women's and men's participation in manufacturing and agricultural activities is, therefore, urgently required. **A first step in this direction may be to incorporate and differentiate between women's and men's activities in national statistics produced for the manufacturing and agriculture sectors.**

With the advent of mechanisation in fishing, women's roles in post-harvest activities have diminished and women now have more leisure time. The government is seeking to find ways to rehabilitate women in alternative occupations, such as tailoring, in which they could operate their own business. For instance, following training in sewing, sewing machines are distributed to women along with a certain amount of garments for stitching and it is intended that these trainees will develop their own businesses. As yet, women do not, however, receive training in accounting and book keeping which is essential to operate a viable business and to manage bank loans. **Business management training for women should therefore also be part of any atoll based vocational training programme.**

Women engaged in agriculture face a number of constraints including a shortage of good seeds and pest problems. Although the government has established nurseries and placed extension officers on many atolls, a shortage of trained staff hampers the efficiency of extension programmes. **One option could be to train three women from each island in integrated pest management and give them responsibility for nursery management on a rotational basis.** A programme of this nature could be implemented through the existing island-based women's committees.

The concept of applying manure to agricultural land is non-existent in the Maldives. Ashing does not, however, provide enough nutrients for crops since all the nutrients in the ash percolate to the ground water during the first rains. It is believed that manuring would delay the release of nutrients and decrease the alkalinity of the soil. **A trial should be carried out on the application of manure on agricultural crops and home gardens. Women's committees should propose women to receive training on composting methods used in producing manure and briquettes.** FAO could facilitate the provision of training in integrated pest management and integrated soil health care for women and men in the Maldives. The farm school approach and/or agriculture and allied production education through radio could also be promoted.

Commercialisation of agriculture has brought to the fore many of the problems that previously received no hearing. For instance, the poor quality of seeds in local markets and the dependency of farmers on the market in Male' or MoFA extension services for seeds; or the prevalence of pests and their resilience against traditional forms of pest management. Increasing moves to replace traditional crops with commercially viable crops has compounded these problems related to seeds. In this context, it is essential to promote and strengthen the cultivation of traditional crops. For instance, rewarding farmers who have maintained traditional crops and their seeds may provide an incentive to cultivate traditional crops, and help to inculcate a sense of pride about farming as an occupation among farmers. **A programme aimed at the revitalisation of earlier traditions related to the conservation and use of a wide range of 'minor' crops should be initiated.**

Most of the government's programmes are focused on the promotion of new planting materials. The Maldives has been flooded with seeds from India, Sri Lanka and other Southeast Asian countries. As a result, seeds of traditional crops can currently only be found on very remote islands. **The government should promote the establishment of seed gardens or seed farms within home plots in order to increase farmer's self-sufficiency in seeds.**

On the atolls, heavy workloads normally leave women with very little time to participate in remunerated employment outside the home. Women have expressed needs for small devices and technologies capable of reducing the time they spend on domestic and farm chores, thereby enabling them to take up other forms of employment. **The introduction of technology to reduce the number of hours Maldivian women spend working on burdensome domestic tasks and add to the economic value of each hour of their work is urgently required in order to improve productivity, both in economic and social values.**

Commercialisation of traditional agriculture has not benefited women. Commercial farms often use expatriate male labour to carry out activities about which Maldivian women have sound knowledge. These farms do not encourage families to settle in the commercial farm area, acting as a non-incentive for women to leave their home island and family responsibilities to seek external employment. The owners of commercial enterprises tend to be men. The harvested crop is sent to the Male' market where it competes with the produce of small farmers, often women.

Local knowledge systems are geared to deal with the diversity of both the natural and social environment. Knowledge is developed and managed by the local community, and is freely accessible to members of the community. Since spheres of work are gender specific, knowledge and skills related to particular activities can also be defined along gender lines. That is, women's knowledge and skills differ from those of men. In the Maldives, both men and

women are knowledgeable about the land-based natural resources, though their ability or skill to extract these resources varies (men for example harvest coconuts). Women have developed capacities to use in a balanced manner the interwoven ecosystems of forests, farms, home gardens and livestock production. Women's collection of fuel and other forest materials, coupled with their farm and home production activities, play an essential part in helping to balance resource flows and maintain local economic systems in a sustainable fashion. On the other hand, knowledge related to marine resources and fishing has traditionally been the domain of men. **Given the value of these local knowledge systems, it will be important to recognise the intellectual property rights of islanders responsible for the conservation and enhancement of biological diversity over time.**

As the Maldives becomes more and more dependent on imported food stuffs, demand for traditional crops and foods is declining in favour of foods such as rice which cannot be produced economically locally. At the same time, employment opportunities for women to produce these traditional foods are decreasing. Increased dependence on imported foods is likely to reduce local agro-biodiversity in the long-term. At the same time, certain processing skills are also likely to disappear with the older generation of women. **Renewed attempts are, therefore, required to educate people about the nutritional value of traditional crops which can be produced locally.**

Given the unique ecosystem of the Maldives, international efforts should be extended to support the government's focus on biodiversity management and environmental conservation. **For instance, selected islands of the Maldivian archipelago could be designated as "Global Reserves of Diversity" to ensure their sustainable management and protection from tourism, industrialisation, pollution, etc.** At the same time, the whole reef system should receive high-level protection in order to safeguard the livelihoods of its people and protect its natural resources and biodiversity.

The Maldivian economy is expanding rapidly. This expansion is accompanied by increased construction, urbanisation and tourism and rising pressures on the country's precious coral reefs and the great diversity of species they harbour. Despite these trends, an educated and informed populace coupled with the existence of strong environmental laws and good implementation, have so far prevented over-exploitation of these valuable reef resources. Nevertheless, continued and increased efforts will be required to ensure that the richness of the biodiversity of the Maldives can be sustainably used and managed well into the next millennium. Traditional natural resource management practices can and should play a crucial role in this regard. Valuing and incorporating these tried and tested practices into the legal framework for natural resource use and management is likely to provide a strong foundation on which to protect the country's natural wealth and biodiversity.

The Maldives is entering an exciting phase, in which development is seen not merely as a tool for economic growth but also for the conservation of natural resources. In this context, opportunities exist for the Maldives to demonstrate to the world exactly what is meant by environmentally, socially and economically sustainable development.

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## Annex .1

# Framework for the Preparation of a People's Biodiversity Register for the Maldives

A People's Biodiversity Register (PBR) is intended to act as a chronicle or catalogue of the biological resources of Maldives. It represents a depository or store of knowledge and information on these resources.

It is proposed that a separate People's Biodiversity Register should be compiled for each island of the Maldives and updated annually or biannually. Under the overall responsibility and guidance of the Island Committee, young people, men and women, could be employed to prepare these registers. Following appropriate training in interview techniques, data collection and species identification, these young people would be able to conduct interviews with the elders of the islands, and to survey and document the islands' natural resources.

In order to enhance the success of these efforts, island communities should be introduced to the concept and importance of biodiversity registers before field research or interviews commence. Village meetings could be used for this purpose. At the end of the process, all the resource persons contributing to the preparation of island registers should be acknowledged.

A range of techniques could be used to gather information, including island strolls, local resource mapping, user group teams, individual interviews, etc. In order to ensure accuracy, plant and animal samples should be cross-checked by an expert from the MPHRE or MoFA. Separate sheets containing passport data of the plant or animal could be developed. Micro flora and micro fauna could be included wherever possible.

The People's Biodiversity Register should be divided into the following chapters:

1. **Island Profile:** An introduction to the island, including its landscape units, resources, population and developmental activities.
2. **User Groups:** Groups of people who use the islands' resources, in addition to what, why and how they use these resources. This section should be subdivided into:
  - primary users
  - secondary users
3. **Age and Gender Dimensions of User Group Activities:** For each user group or resource, the age and gender dimensions affecting resource use should be identified.
4. **Knowledge Base of Island:** People (men and women) possessing specific knowledge regarding the use of resources available to them, such as artisans, carpenters, boat builders, charmers, medicinal practitioners, farmers etc. should be listed, together with information on ways in which they are using their knowledge to maintain or increase resource diversity on their island.
5. **Biodiversity Wealth:** Domesticated and wild plant and animals known to local people should be listed, and information gathered on their local names, uses, seasonality extent or spread, etc. In cases where information is considered secret, sources should be mentioned without specific details.

### ***Terrestrial***

- **Plant Wealth:** A checklist of all plants on the island, including a list of the uses of these plants. This list could be subdivided into wild and domesticated plant wealth and should differentiate among plants according to their status, that is common, rare or endangered.
- **Animal Wealth:** A checklist of all animal life on the island, including their habits, behaviour, interaction with island people, etc. should be compiled. Differentiation should be made according to whether animals are common, rare or endangered.

### ***Marine***

- **Animal Wealth:** A checklist of all animals found in the island's house lagoon should be compiled, identifying animals harvested for food or trade, in addition to rare, endemic or pest species if existing. Trends in marine animal populations should be included where information is available from fishermen.
  - **Micro-organisms:** Inventories of terrestrial and marine micro-organisms should be prepared wherever possible.
6. **Priority Animals and Plants of the Island:** Certain categories of animals and plants should be highlighted including those that are harvested in larger than normal quantities, that have relatively small populations, or that are held in high regard by island people. Information on the location and status of these plants and animals should be included.
  7. **Development Aspiration:** This chapter should list all development projects currently being implemented. It should also identify particular aspirations held by islanders and explore what these developments mean in terms of biological diversity.
  8. **Conflicts:** Conflicts which exist on the island or with another island should be identified with the assistance of user groups. Gender-related areas of collaboration and/or conflicts in resource management should be described.
  9. **Conservation Plan:** This plan should include components related to protection, extraction, elimination, trading, monitoring, financing and conflict resolution. For each item, the island should identify a particular area and resource, and subsequently decide who is responsible for monitoring the activity, and how the activity can be carried out to ensure minimal environmental impact.
  10. **Threats to Biodiversity:** Both human and natural threats to terrestrial and marine ecosystems should be identified. Local perceptions of the cause and mitigation of threats should be understood and recorded.

The information gathered in biodiversity registers should be maintained in the Atoll Office under a **Biodiversity Trust** for each atoll, and be available to the public. It will be important to ensure transparent access in order to help share the benefits of the resource conservation. All transfers of information and/or materials contained in the biodiversity register should be recorded by the Biodiversity Trust. Certain types of information, such as details on medicinal plants, agricultural plants, seed sources, fish stocks, etc. could be sold to interested individuals for a fee. The source of the original information should always be provided rather than specific details which could be obtained by contacting the relevant islanders.



