



REPUBLIC OF KIRIBATI

Kiribati Country Report to The Conference of Parties (COP) of The Convention on Biological Diversity (CBD)



Prepared by
Environment and Conservation Division
Ministry of Environment, Lands and Agricultural
Development



Foreword

By the Minister of Environment, Lands and Agricultural Development



It is with considerable pleasure that I forward this document to the Conference of the Parties and the United Nations Development Programme. The document represents an important step in the desire of the Republic of Kiribati to protect the biodiversity and promote the sustainable utilization of the marine and terrestrial resources of Kiribati.

I feel this is an appropriate approach to take towards biodiversity conservation in Kiribati.

Conservation of biological diversity and the environment has been part of the life of the I-Kiribati ever since the first settlement of the Kiribati atolls. The new international concept of biodiversity conservation has highlighted the increasing degree of human influence on nature. Most of the damage is caused by the increasing demand for consumed goods and energy which is exacerbated by Kiribati's rapid increase in population.

Conservation is for the people and should be implemented by the people. Community consultations and participatory efforts of local communities have provided invaluable contributions to the formulation of this document. The multi-sectoral composition of the members of the Steering Committee and Planning team, and the collaborative efforts between stakeholders, both public and private, indicates a widespread belief of responsibility towards the conservation of biodiversity.

The involvement of other Government departments and ministries, together with other environmental programs such as the National Biosafety Framework (NBF), Persistent Organic Pollutants (POPs), International Waters Project Kiribati (IWPK) and National Adaptation Plan of Action (NAPA) have enriched the scope of the project in all directions. Their invaluable contributions have made this work possible.

The Ministry of Environment, Lands and Agricultural Development is fully committed to the cause of conservation and management of biodiversity at the national and international levels. It will endeavour to support initiatives that sustain the health of biodiversity.

To conclude, I wish to take this opportunity to extend the sincere thanks of the Republic of Kiribati to the United Nations Development Programme (UNDP) in Suva for their continuous support to the project. I would also like to thank those people on the outer islands who have participated in consultations and contributed their time and ideas to this project. Lastly, special thanks are due to members of the Steering Committee and Technical Team whose enthusiasm and commitment remains the most important ingredient for the compilation of this report and completion of the project.

Te Mauri (Good Health), Te Raoi (Peace) ao Te Tabomoa (Prosperity).

.....
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Nei Akoako



Ngkoo, Ngkoi ao n Tauri Nako
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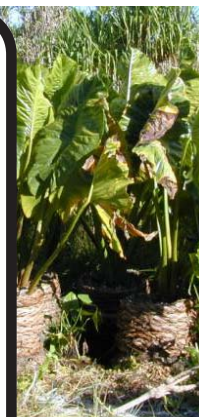
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List of Abbreviations

CBD	Convention on Biological Diversity
CPP	Central Pacific Producers
DSAP	Development of Sustainable Agriculture in the Pacific
EEZ	Exclusive Economic Zone
ECD	Environment and Conservation Division
EDB	Equatorial Doldrum Belt
GEF	Global Environment Facility
ITCZ	Inter Tropical Convergence Zone
KPC	Kiribati Protestant Church
MELAD	Ministry of Environment, Lands and Agriculture Development
MFMRD	Ministry of Fisheries and Marine Resources Development
MFED	Ministry of Finance and Economic Development
NAPA	National Adaptation Program of Actions
NARES	National Agricultural Research and Extension Services
NBF	National Biosafety Framework Project
NBSAP	National Biodiversity Strategy and Action Plan
NDS	National Development Strategies
NEMS	National Environment Management Strategy
NEPO	National Economic and Planning Office
NGO	Non Government Organizations
NTCA	North Tarawa Conservation Area
SOE	State of the Environment
SPBCP	South Pacific Biodiversity Conservation Programme
SPREP	Secretariat of the Pacific Regional Environmental Programme
SPCZ	South Pacific Convergence Zone
UNCED	United Nations Conference on Environment and Development
UNEP	United Nations Environment Programme



Section I
Development Trends and
Implications on Biodiversity
within the Republic
of Kiribati

Part A: Overview and Environmental Setting of Kiribati

1. Introduction

The Government of Republic of Kiribati has recognized the important contribution of biodiversity to the people of Kiribati by ratifying the Convention on Biological Diversity (CBD) on 16th August 1994. In doing this, Kiribati has taken on obligations and commitments to protect and promote the sustainable use of biodiversity.

As a party to the CBD, Kiribati has been able to secure financial assistance from the Global Environment Facility (GEF) to undertake enabling activities through the implementation of the Kiribati National Biodiversity Strategy and Action Plan (NBSAP) project. This project assists Kiribati in identifying strategies and action plans that are geared towards meeting Kiribati's obligations under the CBD at both the national and international levels.

Key objectives of the NBSAP Project are:

- To identify the current status of pressures and options for priority actions for the conservation and sustainable use of national biodiversity by all concerned stakeholders.
- To formulate a Biodiversity Strategy and Action Plan and to produce a national report for submission to the Conference of the Parties to the CBD.
- To compliment, build on and strengthen the National Environment Management Strategy (NEMS) and the National Development Plan, currently known as the National Development Strategy (NDS) 2004- 2007, and other sectoral plans through a participatory process that involves representation from different sectors of society.
- To raise awareness at community and national levels, on sustainable use of biodiversity in outer islands that are not covered by the NEMS project. This would create a wider understanding and greater responsibilities amongst grassroots communities towards biodiversity conservation.
- To expedite the processing of law enforcement mechanisms to safeguard biodiversity in closed areas and to protect rare terrestrial and marine flora and fauna species from over-exploitation and extinction in more accessible ecosystems.
- To develop research projects and activities that would provide useful information for the enhancement and sustainable use of biodiversity particularly on the island of Kiritimati (Christmas Island) in the Line and Phoenix Groups.

The NBSAP Project was executed by Environment and Conservation Division (ECD) of Ministry of Environment, Lands and Agriculture Development (MELAD). The Permanent Secretary is also the focal point of the CBD.

2. Background

The Republic of Kiribati is comprised of three main island groups namely: Gilberts, Line and Phoenix. South Tarawa, located in the Gilbert Group, is the capital island and main administration centre. It is also the main urban centre housing the main centres for medical services, education, employment, commercial activities and entertainment. According to the 2000 census report, Kiribati has a total population of 84,494 and a growth rate of 1.69 (Report on the 2000 Census of Population). Approximately 43% of the population reside on South Tarawa. Population density on South Tarawa is very high at about 2,330 people/km² (Teariki- Ruatu, 2002 p. 5). Kiritimati Island of the Line Group is becoming more like the second capital centre that provides direct services for other inhabited islands of the Line and Phoenix Groups. Unlike other islands, Kiritimati is higher, much larger and has more unique and diverse environment. The total population of Kiritimati Island based on the 2000 census report was approximately 3431. Both South Tarawa and Kiritimati Island are the two main ports of entries in Kiribati in terms of migration and trade movement. In Kiribati, particularly on the capital Island and Kiritimati Island, aspirations and concerns about the natural environment, including the understanding of its importance to human well-being, have increased to some extent.

3. The Environmental Setting

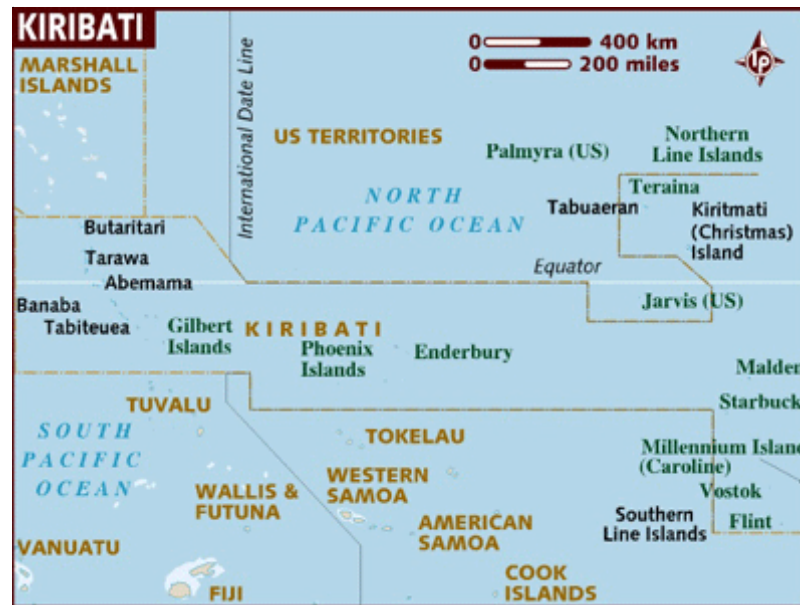
3.1 Geography

The Gilbert Group consists of 17 small atolls and a limestone island. The Phoenix Group consists of 8 atolls that lie to the east of the Gilbert. Most of the islands in this Group are largely





uninhabited. The Line Group lies to the far east of the Gilbert Group and consists of another 8 atolls that include Kiritimati, which contains over half of the total land area of Kiribati (Teariki-Ruatu, 2002 p. 4). Banaba, which is the only uplifted phosphate limestone island, is situated 400 km² to the southwest of Tarawa. Except for Banaba, which has a maximum elevation of approximately 78 metres, Kiribati is a group of small low-lying atolls in the Pacific that are rarely more than 3 metres above mean sea level. Kiribati is mostly ocean and has a total land area of only 823 km² with a total coastline of approximately 1,143 km within an Exclusive Economic Zone (EEZ) of approximately 3.55 million km² (Kiribati National Report for UNCED, 1992 & Kiribati Input: Strategic Action Plan, 1997). Most of the islands are also very narrow. Hence, an atoll nation that is vulnerable to both coastal erosion and to the high spring tides, storm surges, seismic sea waves and the projected sea level rise resulting from global warming.



Map of Kiribati in the Central Pacific

Kiribati is located in the dry belt of the equatorial oceanic climate zone. The climate is influenced by the seasonal movement of the Inter Tropical Convergence Zone (ITCZ), the Equatorial Doldrum Belt (EDB) and to some extent by the South Pacific Convergence Zone (SPCZ) (State of the Environment (SOE) Report, 1994 p. 6). The mean daily temperatures range from 26°C to 32°C with the recorded highs and low being 37°C and 22°C (North Tarawa Conservation Area- SPBCP ppd, 1995 p. v). Annual rainfall is extremely variable both annually and between the islands. The rainfall annual averages in the Gilbert Group range from about 1000 mm for the drier islands (e.g. Arorae & Tamana) to 3000 mm for the wetter islands such as Butaritari in the far north.

The average rainfall in central Tarawa is approximately 2,749 mm. Rainfall in the Line and Phoenix Groups ranges from 700 mm to 4,000 mm in good years. During severe prolonged droughts, which are common on many islands, rainfall can be as little as 200 mm per year.

3.2 Natural Resources Endowment

The natural resources of Kiribati are either extremely limited as in the case of terrestrial, lagoon, and near-shore resources, or extremely vast and difficult to utilise and manage, as in the case of Kiribati's oceanic marine and seafloor resources within its extended EEZ.

Biological diversity (Biodiversity) is defined as the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems¹ Within the environmental context of Kiribati as a small atoll nation, biodiversity includes all terrestrial and marine ecosystems, all plant and animal species and varieties found in these ecosystems and the traditional knowledge, uses and beliefs and local language that people have, in relation to these ecosystems and species. These knowledge systems have enabled

the people to live harmoniously with their environment (on land and at sea) and enabled them to survive in these limiting environment conditions for many generations.



Kiribati has always relied on biodiversity as the only capital available to sustain the people and the country's livelihoods, cultural identity and socio-economic well being. Compared to other island countries, atolls like Kiribati have some of the lowest levels of biodiversity on earth and very few if any endemic species. This low level of biodiversity is, however, the only biodiversity available and both the people and the country rely on it for economic and social survival. Biodiversity is interwoven into the fabric of people's lives as island dwellers. For instance, the sea has provided and continues to provide the people with their only main source of protein fish. Similarly, despite the limitations of land, soil, and water resources, people have developed sophisticated subsistence agricultural systems based on coconut, breadfruit, pandanus, native fig (*Ficus tinctorial*), banana on the wetter islands, and the cultivation of the giant swamp taro (*Cyrtosperma chamissonis*) (Redfern, 2005). Apart from the capital island, the majority of local communities still continue to live simple lifestyles in harmony with nature – and Kiribati needs to enable this to continue.

Sadly a very large percentage of biodiversity in Kiribati is seriously threatened and in need of some form of protection. Similarly, there is a national need to undertake strategic resource management measures that would safeguard the deteriorating status of natural resources for future generations of I-Kiribati. At the same time, it is essential to take into consideration traditional conservation practices, knowledge, skills and ethics that are effective in the day- today utilization and management of the natural resources available.

3.2.1 Soil

Biodiversity on land is extremely limited. Major indigenous staple food crops are coconut trees ('te nii' - *Cocos nucifera*), pandanus trees ('te kaina' - *Pandanus tectorius*), giant swamp taro ('te bwabwai' - *Cyrtosperma chamissonis*) and native fig ('te bero' - *Ficus tinctoria*). The soils are among the poorest and most infertile in the world. Derived from coral limestone, the soils are young, shallow, alkaline, coarse-textured and deficient in most essential nutrients required for plant growth. Activity of soil micro-organisms is limited, soil water-retention capacity is very low due to coarse texture. Soil fertility and productivity are highly dependent on the organic matter and content of the soil². Fertility is highly dependent on organic matter to lower the soil pH, to capture and recycle plant nutrients and to retain water in the excessively fast draining soils. Plant nutrition is dependent on the humus cycle and the maintenance of the vegetation cover. The level of organic matter can be relatively high in undisturbed soils under natural vegetation but this can decrease dramatically as a result of clearance by fire or replacement by monoculture farming of coconut trees and introduced plants (e.g. cucumbers, English cabbage).

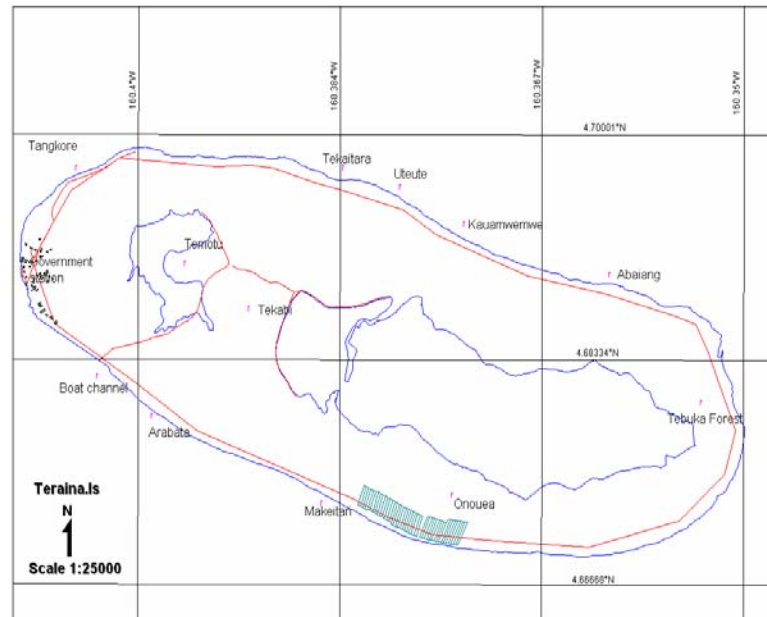
3.2.2 Water Resources

The only permanent freshwater resource available is groundwater in the form of a lens of often slightly brackish freshwater that is often limited in supply. Freshwater lens is hydrostatically floating on the higher density saltwater beneath the island. This is due to the flat topography and the very porous nature of the soils. In many islands, freshwater lenses have formed where





favourable conditions exist. Elevation, shape and width of islets, including the amount of water use and rainfall are important in determining the height of freshwater lens above sea level and the level of salinity.



Map of Teraina or Wahsington Island

The extent and natures of groundwater varies from island to island. There is only one freshwater lake existing on Teraina Island, in the Line Group.

Water is supplied through a combination of groundwater extraction, collection and distribution schemes, rainwater collection and privately owned or communal well (*Christmas (Kiritimati) Island Water Resources Study- Volume 1, 1983 p. 38*). In South Tarawa, groundwater extraction from the two main water reserves existing at Bonriki and Buota, serves the domestic water needs of the growing population. Similarly, Kiritimati Island has existing water reserves specifically created to serve the water needs of people living in the four main villages namely London, Tabwakea, Banana and Poland. Rainwater catchment tanks have been introduced to the islands to further enhance catchment of rain to supplement the limited water supplies.

3.2.3 Vegetation and Flora

The indigenous vegetation and flora of Kiribati are among the poorest on earth due to harsh environmental conditions. Except for the uninhabited islands of the Line and Phoenix Groups, the coastal strand, mangroves and inland atoll forest have been severely modified due to:

- many years of human settlement,
- selective removal of certain plant/ tree species for construction, canoe-building, firewood and other domestic and cultural uses,
- the expansion of villages and mono-cultural planting of coconut groves for copra export, and
- the expansion of coastal settlement as in the case of South Tarawa, that occupy much of the coastline.

In Banaba, opencast phosphate mining had played an important part in the reduction and removal of indigenous plant/tree species.

The terrestrial vegetation associations are limited to coastal strand vegetation, limited areas of mangroves and coastal marsh vegetation; remnant stands of inland atoll forest, and in the case of Banaba, limestone escarpment of pinnacle vegetation. Secondary and cultural associations include coconut palm dominated agricultural areas and giant swamp taro or 'bwabwai' pits, house-yard and churchyard gardens, extensive and variable areas of ruderal vegetation.

The flora of Kiribati consists of approximately 306 species, of which 83 are possibly indigenous. These also include crop genetic resources such as coconuts ('Te nii' - *Cocos nucifera*); pandanus ('Te kaina' - *Pandanus tectorius*); breadfruit ('Te mai' - *Artocarpus altilis*); giant swamp taro ('Te bwabwai' - *Cyrtosperma chamissonis*) including traditional vegetables such as pisonia or the great lettuce tree ('Te buka' - *Pisonia gradis*); beach mulberry ('te non' - *Morinda citrifolia*) and the broad-leaved purslane ('Te boi- *Portulaca lutea*), which have formed the basis of traditional sustenance on the islands. There are no endemic species. Most species found have a variety of life forms such as tree, shrub, herb, vine, grasses and sedges. Most of these species are tolerant of or resistant to salt spray, brackish ground-water and in some cases, although not prolonged, seawater inundation (Natural Resources Inventory Report of Butaritari Island 1st Draft, 2002, p. 11).

However, from immemorial time to date, herbal medicine has been used in Kiribati to keep people healthy and to help them fight against diseases. The majority of trees, shrubs, herbs, vines, grasses and sedges that are not good for people to eat or to drink, are still important resources for making traditional medicine. Traditionally, knowledge of medicinal plants and their use has been transferred orally from generation to generation. Although modern medicine is now available within Ministry of Health and Medical Services, people still have strong cultural beliefs together with the easy availability and long recognized benefits of medicinal plants. A small traditional Medicine Botanical garden is in place in South Tarawa to grow herbal medicine plants and threatened species. Herbal medicine continues to play a major role in health care in many grassroots communities.

It is not surprising that there is a limited diversity of plant genetic resources available in Kiribati due to the existing harsh environment. This is further exacerbated by persistent droughts in some islands as drought also plays an important part in determining the survival of cultivated and wild plants, including major food species such as coconuts, breadfruits and pandanus fruits. The effects of climate change could also play a critical role in determining the diversity and survival of plant genetic resources.

3.2..3.i. Mangroves in Kiribati

The mangrove habitat is a distinct ecosystem that is of critical importance to the people of Kiribati. Mangrove forests are composed of trees, shrubs and ferns, which live half way between the land and the sea (inter-tidal zone). Mangroves include approximately 20 families and approximately 65 species worldwide. These trees have special adaptations that allow them to grow in soft, salty and oxygen-deficient soils, which most other plants cannot do. Mangrove swamps are known to be common in most islands of Kiribati, where these represent 'natural monuments' that depict undisturbed indigenous vegetation types. This is unlike most of the other land habitats in Kiribati that have been heavily modified by human activities.

In Kiribati, there are about 268 hectares of mangroves in the Gilbert Group (Kiribati Mangrove Feasibility Study, 1993). There are 166 hectares of mangroves in Butaritari, 57 hectares in Tarawa, 21 hectares in Maiana and 14 hectares in Aranuka. Tarawa has lost some 70% of its mangroves since the 1940s and only 57 hectares now remains. There are four different species existing and these are:


- Te tongo- red mangrove (*Rhizophora stylosa*)
- Te nikabubuti- white mangrove (*Sonneratia alba*)
- Te tongo buangi- oriental mangrove (*Bruguiera gymnorhiza*) and
- Te aitoa (*Lumnitzera littorea*)



Te Aitoa, *Lumnitzera littorea*
(the last inland mangrove on South Tarawa)

Mangroves are considered as a priceless resource that needs some form of protection. Butaritari hosts the largest mangrove wetlands in the Gilbert Group that also represents Kiribati's most diverse mangrove forest. For instance, red mangrove is the only species found in Tarawa, Maiana





and Aranuka. Other studies have indicated that a single species of 'te aitoa' is found in South Tarawa. In contrast, Butaritari has mixtures of all the four mangrove species indicated above.

3.2.3. ii Ecological and Cultural Importance of Mangroves

The mangrove ecosystem contributes significantly to the productivity of tropical shallow water regions. Mangrove forests have important roles that are not readily seen. Mangroves are highly specialized organisms, which constitute the most productive of inter-tidal regions of the world that are regularly flooded with sea-water. Mangrove forests provide habitats to many birds and aquatic marine life. The submerged roots and trunks and aerial forest provide a sheltered habitat for a diverse array of marine life that also include mosquitoes and are part of the food chain. In summary, the root systems of such unique trees provide ideal breeding, nursery and feeding shelter for a diverse range of aquatic organisms. The leaves fall into the water where they supply food to small organisms, which in turn are eaten by fish.

Mangroves are also important in protecting and building up shorelines, and hence important in preventing beach erosion and people's property along coastal areas. Mangroves growing along the shoreline contribute to beaches that have much finer sand size material and are low energy beaches. Mangroves also act as a buffer zone against upland run-off during heavy rains. They help filter out land-based pollutants (run-offs), hence helping to protect reefs and fisheries from run-off sediments during periods of heavy rainfall.

In Kiribati, beside the ecological importance aforementioned, mangroves are also culturally significant as they are the source of dyeing materials, traditional medicine, magic and sorcery and local timber. They provide habitats to many important food species (e.g. crabs, fish, edible seashells, etc) that have been part of the local diet for many generations.

3.2.3. iii Ecological and cultural utility of Flora

The vegetation and flora of Kiribati constitute a critical component of biodiversity and a substantial ecological and cultural resource (North Tarawa Conservation Area: South Pacific Biodiversity Conservation Programme, 1995, p. 13). Indigenous species such as sea trumpet ('te kanawa'- *Cordia subcordata*); guettarda or wut ('te uri- *Guettarda speciosa*) and alexandrian laurel/punai nut ('te itai'- *Calophyllum inophyllum*) and several others have wide cultural uses within the subsistence economy. The uses of these species represent non-cash income that cannot be replaced, or will be extremely expensive to replace with imported substitutes.

Ecological functions that plants provide include shade, animal and plant habitats, soil improvement, mulching materials, land stabilization, protection from wind, erosion, flood and saltwater incursion and protection from the effects of salt spray.

Other uses of flora include traditional food and beverages, traditional medicines, ornamental uses, general construction, boat-building, fuel-wood, ceremony and rituals, magic and sorcery and body ornamentation.

Cocos nucifera, 'te nii', *Cyrtosperma chamissonis*, 'te bwabwai', *Pandanus tectorius*, 'te kaina' and *Artocarpus altilis* 'te mai' form the basis of Kiribati life. In some outer islands and in particular the capital island of South Tarawa, these traditional foods and beverages have been abandoned for imported foods such as sugar, white rice, flour and flour products, convenient foods (tinned and frozen foods), alcohol and other beverages.

3.2.4 Invasive Alien Species

Invasive species, especially rats and feral cats, are a particular threat to the ecological balance in small islands in the Pacific Islands region. In Kiribati, invasive alien species are one of the greatest threats to Kiribati's island biodiversity, economy and to Kiribati's Pacific way of life. These invasive species also exact a costly toll from human economies that depend on resources and services provided by healthy ecosystems.

Agriculture is still predominantly subsistence based on both traditional and introduced food crops and livestock. Already, prospects for development in the agricultural sector are constrained by the country's natural harsh environment, which is further exacerbated by smallness, fragmentation and

livestock. The presence and persistence of invasive alien species in Kiribati is not helping the national situation, where agriculture development is concerned.

Some examples of invasive alien species currently existing in Kiribati include Pacific or Polynesian rat – *Rattus exulans*; Ship rat – *Rattus rattus*; House mouse – *Mus musculus*; Asian rat – *Rattus tanezumi* (present on McKean Island of the Phoenix Islands Group); Feral cats (*Felis catus*) – present on Kiritimati island; Feral rabbits (*Oryctolagus cuniculus*) – present on Rawaki Island of the Phoenix Group; wedelia - (*Wedelia Trilobata*), and mynah birds (*Acridotheres tristis*).

Wedelia, is a creeping mat-forming perennial herb with fast growing rounded stems up to 40 cm long or longer and grows upward (ascend) when flowering (Thaman, 2002). This species also exists in Kiribati and has been sighted in Tabonuea & Antekana in Butaritari (2001) and in several places around the capital island- South Tarawa. The source of introduction was unknown and although it is highly invasive and pose serious threats to the environment if not eradicated immediately, many people in Kiribati, particularly those in Butaritari and South Tarawa are not aware of it's existence.

Mynah bird, *Acridotheres tristis*, commonly known as the Common or Indian mynah has been found to be one of the invasive species in all continents. They are within the top 100 world's most serious invasive species as determined by the Invasive Species Group of the World Conservation Union (IUCN). Mynah birds found in Kiribati are known as the Common Mynah. They have recently arrived by ship from Lautoka, Fiji. The birds have been identified and found only in three islands in the Gilbert Islands Group namely South Tarawa, North Tabiteuea and Onotoa. The estimated population of the mynah is 300 individuals spread and breeding as determined in May 2003. South Tarawa seems to have the highest population compared with the other two island groups. In Tarawa, the mynah species is concentrated around the KOIL depot in Betio but have been seen to begin populating Bairiki. In North Tabiteuea, they were concentrated around the government station of Utiroa where permanent buildings could be found and in Onotoa, the species were concentrated around the KPC compound of Neebo in the village of Otowae and has been seen to venture further south but seen resident in Otowae.

Although the species has been found in three islands, they could be found in some other islands in the Kiribati group. They could also arrive in the Phoenix group and the Line Islands. In the Phoenix group, mynah birds are a great threat as four of the islands in the group are designated wildlife sanctuaries.

Serious pests in Kiribati include both insects and non-insects (mites, slugs, crabs and rats) Insect pests that have important economic implications in Kiribati include:

- Taro/Bwabwai beetle- *Papuana huebneri*. This is a serious and major pest problem affecting 'te bwabwai' crops, taro and banana on Tarawa;
- Breadfruit/Pandanus Egyptian fluted scale- *Icerya aegyptica*. Occasional serious throughout the country;
- Coconut flat moth- *Agonoxena argaula*. Occasional serious throughout the country;
- Coconut mealybugs- *Pseudococcus oceanicus* and *Palmiculator*. Occasional serious throughout the country;
- Cucumber/ tomato green striped semilooper- *Plusia chalcites*. Serious on leaves and bores into fruits;
- Spiralling white fly- *Aleurodicus dispersus*. Causes serious damage to fruits and leaves of vegetables, breadfruits, coconuts, pawpaw, ornamental plants;
- Mango fruit fly- (*Bactrocera frauenfeldi*). This causes damage to fruits of breadfruits, quava, Indian jujube and mango fruits.

The non-insect pests include the ship rat (*Rattus rattus*), a red spider mite (*Tetranychus cinnabarinus*) and vegetable mite (*Tetranychus spp*). The latter two are very active during dry periods. The recent shift in weather patterns involving Kiribati has the potential to affect populations of insect pests and diseases (e.g. mealeybugs, bwabwai beetle, fungal diseases) and could have adverse





geographic isolation. The genetic resources existed in the country is limited to a few crops and effects on the agro-biodiversity in Kiribati.

Past insect problems that are likely to recur include the bwabwai/sweet potato burrowing cockach (*Pycnoscelots surinamensis*) that became serious in 'bwabwai' crops in the islands of Makin and Nikunau in 1983-1984; a coconut stick insect (*Graeffea crouanii*) that appeared in large numbers on coconut leaves at Kenna, Abemama Island in 1984; and a coconut hole shot borer (*Xyleborus perforans*) that appeared in Teraina in 1994, which damages fresh coconut meat.

The Pacific Pest Info (2002) documented that during the past 15 years coconut production in Kiribati has constantly decreased, resulting in reduced copra production and export earnings. This is attributed to an increased population of rats in coconut plantations and copra storage facilities. Presently, the losses in coconut production are as high as 60-65 percent. Coconut trees played an important role in the traditional livelihoods and local cash incomes of local communities living in the outer islands.

Similarly, in the Line and Phoenix Groups, particularly Kiritimati Island of the Northern Line Islands Group, the proliferation of feral cat and rat populations are detrimental to the seabird populations and sea turtle eggs. Feral cats and Polynesian rats (*Rattus exulans*) are existing invasive alien species in the wilderness areas of Kiritimati Island. These pests have a detrimental effect on bird populations. Fortunately, Kiribati has a strict policy against the importation of female dogs, but this policy is all but impossible to enforce with cats (Jones, 2000 p. 9). Worldwide, cats have been responsible for the extinction of more species of birds than perhaps any other single factor (ibid. p.9). Rats also present a similar problem to the birdlife of Kiritimati. A study conducted in Kiritimati Island by Jones has shown that certain species of birds, such as brown noddies (*Te io' - Anous stolidus*), have been found to incubate hollow eggs that have tiny 3 millimeter wide holes. Often rats could slip underneath an incubating brown noddy, nibble a tiny hole in its egg and suck out its contents while going virtually unnoticed (ibid. p.10). If the population of rats and cats are not controlled in Kiritimati Island, then it will be a matter of time before the birds will be gone, particularly those species that nest on the ground such as the brown noddy.

3.2.5 Terrestrial Fauna

There is only one endemic vertebrate species, the Line Islands Warbler (*Te Bokikokiko- Acrocephalus aequinoctialis*) found only on Washington and Kiritimati (Christmas Island). This species is now extinct on Fanning Island. Polynesian rats (*Rattus exulans*), seabirds, domesticated pigs, ducks, chickens, dogs, cats, including feral cats that are common in Kiritimati, are also of considerable importance to many people in Kiribati. Domesticated pigs, ducks and chickens play a major role in the provision of local meat for home consumption. Cats and dogs are kept as pets. Most of the seabirds found in Kiritimati are also migratory species, where some have found permanent nesting sites to live and breed in the atolls, especially those islands in the Line and Phoenix Groups.

The birdlife of Kiritimati Island is extremely rich, both in the number of species present and their abundance. The atoll's avifauna has national, regional and international significance in supporting the largest breeding colonies of Phoenix Petrel and the Polynesian Storm Petrel which are considered critical to the survival of both species. The Sooty Tern colonies on Kiritimati are (or were) amongst the largest in the world while the colony of Wedge-Tailed Shearwater is reported to be the largest colony in the world. It provides nesting, roosting, feeding and migration sites for over 40 bird species, but it is the 18 species of seabirds and their breeding numbers that are of particular significance (Review of the Status of Avifauna Conservation- Kiritimati Atoll Kiribati., p.i, 1999).

At the national level, Kiritimati is a wildlife sanctuary, where all species of birds and other wildlife are protected by law (Final Environmental Monitoring and Protection Plan HOPE-X Facilities and Operations Christmas (Kiritimati), 2000). It is illegal to hunt, capture or kill any bird on the island. Kiritimati is also the only island in the Line and Phoenix Groups, where the conservation of bird species under the Ordinance is active and currently enforced by the Wildlife Conservation Unit.

In 1997, the Government of Kiribati declared six new Closed Areas in Kiritimati Island, which

comprise some 9,800 ha or approximately 15% of the island area, to provide enhanced protection for vulnerable breeding sites. According to the Wildlife legislation, the original intention of the closed area provision was to provide for the exclusion of people from very sensitive wildlife sites (Review of the Status of Avifauna Conservation- Kiritimati Atoll Kiribati, p. i, 1999).

Table 1: List of protected birds species

Kiribati Name(s)	English Name(s)	Scientific Name
Te Eitei Te Katafa	Great frigatebird	<i>Fregata minor</i>
Te Eitei	Lesser frigatebird	<i>Fregata ariel</i>
Te Taake	Red-tailed tropicbird	<i>Phaethon rubricauda</i>
Te Ngutu	White tailed tropicbird	<i>Phaethon lepturus</i>
Te Mouakena	Masked or Blue-faced booby	<i>Sula dactylatra</i>
Te Kibui	Brown booby	<i>Sula leucogaster</i>
Te Koota Te Makitaba	Red-footed booby	<i>Sula Sula</i>
Te Korobaro	Wedge-tailed shearwater	<i>Puffinus pacificus</i>
Te Tinebu	Christmas Island shearwater	<i>Puffinus nativitatis</i>
Te Nna	Audubon's shearwater	<i>Puffinus iherminieri</i>
Te Tanguoua Te Ruru	Phoenix petrel	<i>Pterodroma alba</i>
-	Bulwer's petrel	<i>Bulweria bulwerii</i>
Te Bewebwe ni marawa	White-throated storm-petrel	<i>Nesofregatta fuliginosa</i>
Te Tiriwenei	Pintail duck	<i>Anas acuta</i>
Te Kaai	Reef Heron	<i>Demigretta sacra</i>
Te Mangkiri Te Takiri	Black noddy White-capped noddy	<i>Anous tenuirostris</i>
Te Kunei/Te lo	Brown noddy	<i>Anous stolidus</i>
-	Blue-grey noddy	<i>Procelsterna cerulea</i>
Te Tarariki Te Kerekere	Sooty tern	<i>Sterna fuscata</i>
Te Tarangongo	Grey-backed tern	<i>Sterna lunata</i>
Te Kiakia	Black-naped tern	<i>Sterna sumatrana</i>
Te Karakara	Greater crested tern	<i>Sterna bergii</i>
Te Matawa	White tern/Fairy tern	<i>Gygis alba</i>
Te Kun	Pacific golden plover	<i>Pluvialis fulva</i>
Te Kitiba/ Te Kolili	Ruddy turnstone	<i>Arenaria interpres</i>
Te Kewe	Bristle-thighed curlew	<i>Numenius tahitensis</i>
Te Kiriri	Wandering tattler	<i>Heteroscelus incanus</i>
Te Kaka	Bar-tailed godwit	<i>Limosa lapponica</i>
Te Kura	Kuhl's lorikeet/ Scarlet-breasted lorikeet	<i>Vini kuhlii</i>
Te Kabanei	Long-tailed koel	<i>Eudynamys taitensis</i>
Te Bokikokiko	Christmas Island warbler	<i>Acrocephalus æquinoctialis</i>

In 1979 the Government declared the following species of birds fully protected throughout Kiribati:

In addition, the Wildlife Conservation Ordinance protects Green Turtles (Te On) on the islands of Birnie, Caroline, Christmas, Flint, Gardne (Nikumaroro), Hull (Orona), Malden, McKean, Phoenix, Star buck, Sydney (Manra) and Vostock (legal notice 24/1977). It also protects any turtle on land.

3.2.6 Wildlife Sanctuaries for Conservation of Birdlife

Under the Wildlife Ordinance, which has direct relevance to the objectives of the NBSAP Project, following are designated as wildlife sanctuary, where all species of birds and other animals are protected by law. Existing wildlife sanctuaries or protected areas include the following islands and atolls of the Line and Phoenix Groups:

Phoenix group:

Phoenix (Rawaki); McKean and Birnie

Southern Line group:

Malden and Starbuck Island

Northern Line group:

Kiritimati Island

The following areas of Kiritimati Island are closed areas, Ngaontetaako, Dojin, Tanguoua, Koil, Toyota, Mouakena, Motu Tabu, Motu Upua and Cook Islet.

3.2.6. Marine Flora and Fauna

Kiribati is a coastal entity and marine and coastal biodiversity is critically important. To date, the majority of the population is still largely dependent on subsistence agriculture and fishing, where the sea has been and continues to provide the only main protein source- fish.

Kiribati's relatively rich marine fauna includes between 300 and 400 finfish species alone. Marine non-fish species of considerable importance include turtles, a wide range of crabs, shrimps, prawns, lobsters and other crustaceans, shellfish including both bivalves and gastropods, and holothurians or beche-de-mer. Kiribati's EEZ has considerable potential for pelagic fisheries development of tuna and flying fish and to a lesser extent, for the increased exploitation of deepwater fish and sharks and harvesting of deepwater corals. The surrounding sea is rich in marine



biodiversity. Commercial fisheries make important contributions to the national economy, while small-scale fisheries are important source of cash income and have important nutritional values and social roles in the subsistence economy.

Due to limited terrestrial protein and carbohydrates, the sea also provides the majority animal protein of the national diet. Fish consumption is among the highest in the world. All non-toxic finfish species over a few centimetres in length and many shellfish and other non-fish marine organisms are eaten, while various shells, teeth and other hard parts are used for handicrafts or other cultural purposes.

Major fisheries resources include pelagic and oceanic species. The pelagic fish resources is centered on tuna fishery, which is dominated by the skipjack ('Te atī' - *Katsuwonus pelamis*), yellowfin ('Te ingimea' - *Thunnus albacares*) and big-eyed tuna (*thunnus obesus*). Foreign fishing vessels are the main exploiters of the tuna resources. More than 26 metric tons of fish are commercially exploited annually. Local fishermen also exploit the fishery resources on a small scale, for consumption and for selling in local markets. Flying fish (*cypselurus fureatus spp*) is fished beyond the reef crest, either by night dip netting with a light or with gillnets that have small mesh sizes. These are often sold on the roadside, where fish costs between AUD\$1-00 to \$1-20 a pound.

At the national level, a range of indigenous marine seaweeds or algae have important nutritional and commercial values to many people in Kiribati. Sea grape (*Caulerpa racemosa*) is an indigenous species, which is also common on all reefs in Kiribati. Two species of eucema seaweed (*Eucema cottonii* and *Eucema spinosum*) are introduced and have increasingly important commercial values to many local seaweed farmers. These seaweeds are aquaculturally grown in most of the lagoons of the Gilbert Group and in some islands in the Line and Phoenix Group. The annual seaweed export for 1998 was approximately 635.3 metric tonnes with a value of AUD\$620,000.00; however the impact of El Nino has affected dry seaweed production in previous years. Since then, seaweed production has declined during 2000 to 2003 due to over-cultivation in some locations and unattractive prices in the world markets (NDS 2004 – 2007).

Bech-de-mer is one of the lucrative exports and according to records 14.4 tones are exported to Asian markets- Korea, China and Japan. Beach-de-mer culture is currently ongoing at the Fisheries Division of Ministry of Natural Resources Development for stock enhancement and economic development. Regeneration of heavily fished beche-de-mer stocks in atoll lagoons with juveniles from the Fisheries Division hatchery has been successfully implemented with no charge to the fishers, who are exploiting the resource (NDS 2004 – 2007).

Shark fin is also another export commodity that is increasingly becoming important in terms of providing source of cash incomes for many people in rural areas.

Similarly, petfish are a major export from Kiritimati Atoll that has been evolving over the last 20 years and is now taking advantage of the growing market for marine ornamentals (Lovell, 2004 p. 6). At the end of 2003, there were approximately 161,436 pet fish from 12 different pet fish families that were being exported per month out of Kiritimati Island to Honolulu pet fish wholesalers in Hawaii (*pers. Comm. Tearo 07/05*). This generated a total income of approximately USD\$756,615.05 for 2003?????. These Pet fish families include: Acanthuridae; Acanthoclinidae; Balistidae; Chaetodontidae; Cirrhitidae; Labridae; Lutjanidae; Mullidae; Pomacanthidae; Pomacentridae; Serranidae and Tetrodontidae (Kiritimati Island Fisheries Division PetFish Monthly export data: 07/05). According to Lovell, the pet fish fishery is characterized by a few abundant unique fish with the main export being the Flame Angelfish (*Centropyge loriculus*) with an average export of 1500 per week or 100,000 fish per year [1500 per week would give 78,000 per year], followed by the Lemonpeel Angelfish (*Centropyge flavissimus*) at 250 fish per week. Exports also include rare deepwater species such as the Declivis Butterflyfish (*Chaetodon declivis*), Griffis Angelfish (*Apolemithus griffis*) and the Red-striped Hogfish (*Bodianus opercularis*) that are high value fish, but are often hazardous to collect, due to the deep diving required. Many of these pet fish have no local names.

In 2003, the monthly summary of fish landed at the Central Pacific Producers (CCP) complex³ in London, Kiritimati Island was as follows:

Black pearl oyster and trochus may become lucrative export commodities in the near future. Like bech-de-mer, pearl oyster culture is currently ongoing at the Fisheries Division of the Ministry of

Natural Resources Development for stock enhancement and economic development. Pearl oysters are being grown successfully on a pilot scale in Abaiang Island in the Gilbert Group (NDS 2004 – 2007).

Table 2: List of fishes landed at CPP, Kiritimati

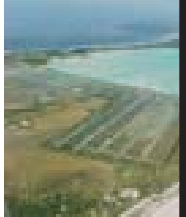
Local Name	Common Name	Scientific Name	Total Weights (lbs)
1. Ingimea	Yellowfin tuna	<i>Thunnus albacores</i>	12,935.5
2. Ati	Skipjack tuna	<i>Katsuwonus pelamis</i>	20.2
3. Bwaara	Wahoo	<i>Acanthocybium solandri</i>	6,312.1
4. Naritakua	Dolphin fish	<i>Coryphaena equiselis</i>	11.0
5. Raku riri/ika	Sail fish	<i>Istiophorus playpterus</i>	701.2
6. Rakuika	Sword fish	<i>Xyphias gladius</i>	266.5
7. Rereba	Trevally	<i>Alectis spp.</i> ; <i>Carangoides spp.</i> , <i>Caranx spp.</i>	1,054.9
8. Nunua	Barracuda	<i>Sphyraena barracuda</i>	211.0
9. Onauti	Flying fish	<i>Cypselurus spp.</i>	64.8
10. Ikabwauea	Sea Pike	<i>Callossphyraena toxeuema</i>	149.4
11. Kamaa	Rainbow runner	<i>Elegatis bipinnulatus</i>	115.1
12. Urua	Great trevally	<i>Caranx ignobilis</i>	1,299.5
15. Kaukanoanimata	Big eye	<i>Thunnus obesus</i>	1,065.0
14. Baneawa	Milkfish (juveniles)	<i>Chanos chanos</i>	61,262.5
11. Ikanaonora	Reef fish	Acanthuridae; Seranidae; Scaridae; Mugilidae; Lethrinidae; Lutjanidae	10,219.0
Total			95,687.5

The first field harvest in August 2003 has produced outstanding results and 5000 shells have been seeded for harvest in 2005 (ibid. p. 15). Bonefish is currently utilized for food consumption by local communities but it also generates revenue to the country through sports-fishing in Kiritimati Island. According to Fisheries Division data¹, the number of bonefish anglers visiting Kiritimati fluctuates between the years 1988 to 2005 but it has generated total revenue of \$425,110.00 [for the whole of the 20 years??? – I heard the value from bone fishers was around 1 mil a year]. However the total number of bonefish anglers ranges from as low as 249 in 2004 to as high as 1,019 in 1999. Beside sport-fishing, there are also visitors visiting Kiritimati for pleasure diving. The number of divers, based on the same data that have been visiting Kiritimati between 1998 to 2004 was 235 and this has generated the total revenue of AUD\$8225-00 [is this just 8 thousand dollars?].

3.2.7.i Coral Reefs in Kiribati

The reefs are in excellent conditions in the Gilbert, Line and Phoenix Groups, except for some damage around South Tarawa and Kiritimati. In Tarawa, the western reef is very much affected by anchoring while patch reefs within the eastern side of the island have been affected by the closure of reef passages with causeways.

Coral reefs are extremely complex systems, consisting of numerous microhabitats. The huge number of species found on coral reefs is a direct reflection of the high number of habitat opportunities afforded by this environment, including thousands of unseen organisms living around the area. Diverse communities live under rocks and dead coral slabs or in the crevices and fissures of the reef. An incredible number of species are associated with live and dead coral heads, whereby a single head may contain more than 100 species of worms and numerous assortments of other organisms.



Coral reefs have many important uses to many people living in Kiribati. Their diverse economic, medical, geological, biological and cultural/traditional values have made them unique and priceless resources, where they exist. For instance, activities on reefs generate employment to many people with both extractive (e.g. fishing and shelling) and non-extractive activities (e.g. eco-tourism and recreation). More than 90% of the animal protein consumed by I-Kiribati comes from marine fish that live around coral reefs. Coral reefs have been a source of good fishing spots to many people in Kiribati. Many people would go to other coral reef areas, once they feel that the fish abundance of their usual fishing spot is depleting. Reef tourism (e.g. scuba diving industry in Buariki, North Tarawa that has been conducted to private house guests residing at Mauri Paradise Motel) has been recently introduced on a commercial but small basis in the capital island- South Tarawa.

Coral reefs (e.g. blue corals) have important pharmaceutical and medicinal values. Whether fringing or barrier coral reefs, they also serve to break up the force of incoming waves before they hit the shore, and hence are essential in minimizing coastal erosion. Large evidence of coastal erosion has become prominent in areas around South Tarawa, where coral mining for either infrastructure development or construction are common. Culturally, coral reefs are also important as a source of food, handicrafts, traditional medicine, magic and sorcery to many people in Kiribati.

Coral reefs, like mangroves are also priceless resources that need some form of protection. They have been a source of subsistence and commercial living to people in Kiribati for many generations. However, with the increase in human population as is experienced in South Tarawa, coral reefs are susceptible to over-exploitation, over-harvesting and eventual death

3.2.7.ii Marine Protected Areas (MPAs)

Protected areas provide a range of goods and ecological services while preserving natural and cultural heritage. The Line and Phoenix Groups of Kiribati, which includes Kiritimati Island, are renowned for their environments that are natural and in near pristine conditions. These islands are also renowned for their global significance, where avifauna and rich marine biodiversity are concerned. It is for these reasons that Kiribati has established a system of protected areas on land that includes off-island conservation areas and marine protected areas that aim to conserve biological diversity in marine and terrestrial areas. Currently there are 12 Marine Protected Areas that are primarily set up for stock enhancement of marine species that have been identified and confirmed as declining in numbers, yet important for people's livelihoods and economic well being. At the local government level, there are 2 seasonal closed and closed marine areas that have been designated in several islands of Kiribati- Butaritari, Marakei, Abaiang, Nonouti and Tabiteuea North in the Gilbert Group and Cook Islet of Kiritimati Island in the Southern Line Group. These areas are for in-situ conservation of populations of marine species targeted for live fish trade (all marine fish including grouper species (honeycomb cod) - 'te kuau' (*epinephelus merra*) and humpheaded wrasse - 'te karon' (*cheilinus unduladus*), and their natural habitats, which are the spawning aggregate sites of such species.

Part B: National Progress toward Achieving Conservation, Sustainable Use and Development of Biodiversity

1. National Commitment to Biodiversity

Kiribati is signed the Cartagena Protocol on Biosafety to the Convention on Biological Diversity (CBD) on 7th September 2000 and ratified the Cartagena Protocol on 20th of April 2004. As a signatory to the Cartagena Protocol, Kiribati was again able to secure financial assistance to undertake the National Biosafety Framework Project at national level. This is also externally funded by the Global Environment Facility (GEF) through United Nations Environment Programme (UNEP).

Kiribati has also ratified the World Heritage Convention in 2000, another international Convention that closely related to biodiversity in terms of the protection and conservation of the cultural and natural heritage (natural resources and environment including our cultural systems that exist in Kiribati).

The aim of this section is to outline the progress of government sectors and grassroots communities over the last 10 years that have played different but closely related roles towards achieving the conservation, sustainable use and development of biodiversity at the national level.

2. Existing National and Regional Projects

In Kiribati, there are existing national and regional projects that target the conservation and sustainable use of land and marine biodiversity, protection from the introduction of certain non-indigenous species, sustainable agriculture, training and research. Key achievements or progress of these existing projects within the country that have direct implications on the conservation, sustainable use and development of biodiversity, will be discussed in detail.

2.1 Kiribati National Biosafety Framework (NBF) Project

The biosafety framework under development in Parties to the Cartagena Protocol on Biosafety to the Convention on Biological Diversity varies from country to country, considering the different stages of economic development and capabilities. However the main elements of the framework are:

- A regulatory system set in place to address safety in the field of modern biotechnology.
- An administrative system to handle requests for permits for certain activities such as the release of Living Modified Organisms (LMOs).
- A decision making system that includes risk assessment and management for the release of LMOs.
- Mechanisms for public participation and information.

Progress

The NBF project ran from July 2003 and was completed towards the end of 2005. The following are some of the major outputs:

- Legal and administrative framework on trans-boundary movement of Living Modified Organisms (LMOs).
- Production of inventories of current use of modern biotechnology as defined in the Cartagena Protocol; existing legislation or legal instrument related to biotechnology/biosafety; and active or planned national projects for capacity building related to the safe use of biotechnology.
- Identification of roster of experts within Kiribati and at the regional level and identification of their experience and expertise so that adequate coverage in all areas of expertise is obtained and potential gaps can be identified.
- Development of a national biosafety database and linkages to the Biosafety Clearing House (BCH).
- Systems for risk assessment and management, including audit, which take into account the national and sub-regional/regional needs.
- Established mechanisms for adequate involvement of all stakeholders, including public and private sectors on issues related to biosafety.





Currently the National Biosafety Framework project has undertaken and completed surveys on the status of modern biotechnology at the national level. A review of relevant legislation has also been undertaken with the aim of developing a legal framework with the context of Kiribati as a small atoll nation to address safety in the field of modern biotechnology.

2.2 North Tarawa Conservation Area (NTCA)

This was one of the South Pacific Biodiversity Conservation Programme (SPBCP) regional projects, which was externally funded by GEF, in which the South Pacific Regional Environmental Programme (SPREP) was the implementing agency. The Project's objective was to promote the conservation and sustainable use of 'biodiversity' within the North Tarawa Conservation Area ((NTCA)¹. Emphasis is placed on participatory planning and community-based strategies of resource use and the maintenance of biodiversity within the NTCA by means of the multi-purpose use of a large variety of species and ecosystems. Through its primary objective, the Project also directly and indirectly addressed issues relating to global warming and associated sea level rise through coastal plant reforestation (re-vegetation/ replanting), mangrove ecosystem protection, coral reef conservation and promotion of the protection and conservation of indigenous vegetation that provide a sink for carbon dioxide (CO₂).

Progress

Some of the major outputs of this project were as follows:

- Awareness raising, through community outreach programmes on the significance of biodiversity conservation on land and at sea. This is in the form of extensive consultations and workshops with local communities of North Tarawa.
- Equipping key stakeholders of North Tarawa (Chief Island Council and village councillors) with necessary information on the importance of conserving natural resources available on land and at sea (for example, bonefish, traditional medicinal plants, etc). Hence, effective participation of these stakeholders in the decision making processes regarding conservation and management of natural resources available within their jurisdiction- North Tarawa For example, a draft byelaw on Bonefish conservation in North Tarawa Conservation Area was formulated, where the three island councils of Tarawa – South Tarawa (Betio Town Council & Tarawa Teinainano Council) and North Tarawa (Eutan Tarawa Council) – were expected to play a key role in its implementation.

2.3 Agriculture Division

Agro-biodiversity is also another major concern to Kiribati. The Agriculture Division of Ministry of Environment, Lands and Agricultural Development (MELAD), continues to develop and implement programmes that will ultimately contribute to improve living standards of the people, particularly those living in the outer islands, where a simple and subsistence economy is still dominantly practised (Redfern, 2005). On South Tarawa, where the population impact has been a major factor in health and economic problems, there was a dramatic increase in the number of vegetable farmers after years of promoting vegetable crops to the public. As a Division, they also provide advisory roles in gardening skills to the general public. ²Home gardening and few small semi-commercial vegetable growers has been successfully established and well coordinated by staff of the Agriculture Division. Thus, there has been an increase in quantity of vegetables produced and consumed locally. Some of the introduced crops that are promoted for home gardening include:

Table 3. List of some introduced crops

Local Names	Common Names	Scientific Names
1. Koon	Corn	<i>Zea mays</i> L. (R)
2. Kukambwa	Cucumber	<i>Cucumis sativus</i>
3. Kabiti	Cabbage	<i>Brassica chinensis</i>
4. Bwabwaia	Papaya	<i>Carica papaya</i>
5. Meron	Water melon	<i>Citrullus lanatus</i>
6. Meron	Rock melon	<i>Cucumis melon</i>
7. Bwaingan	Eggplant	<i>Solanum melongena</i>
8. Tomato	Tomato	<i>Solanum lycopersium</i>
9. Kumara	Sweet potato	<i>Ipomoea batatas</i>
10. Tiaea	Chaya	<i>Cnidioscolus chayamansa</i>

Source: Ioane and Redfern, 2006

The Agriculture Division has undertaken ex-situ conservation (through gene bank collection) of important staple food crops- 'te kaina'- Pandanus- *Pandanus tectorius*, 'te nii' - Coconut trees- *Cocos nucifera*, and 'te mai'- Breadfruit trees- *Artocarpus altilis*. Ex-situ conservation is undertaken mainly to conserve and protect the genetic diversity of important indigenous tree crops to enhance food security. ³With the exception of 'te mai', in which varieties that could grow well on atoll environments are collected from Hawaii, varieties of these tree crops that exist already at national level (both indigenous and introduced) are collected, stored and propagated for public distribution. ⁴Some of the following agricultural development programmes have been undertaken to meet the public demand on agricultural local food supplies and public use of plant/tree species that have cultural and traditional importance, including traditional medicine:

- Coconut replanting and rehabilitation programme.
- Breadfruit varieties collection.
- Dwarf coconut trees collection.
- Pandanus varieties collection.
- Vegetable Production.
- Livestock breeding programme.

Other projects currently implemented by the Agriculture Division that have important contributions towards meeting the objectives of the CBD at the national level include some of the following:

2.3. i Development of Sustainable Agriculture in the Pacific (DSAP)⁵

The DSAP Project aims to increase sustainable agricultural production of target farm families in Kiribati. This is done through a participatory approach with farmers and rural communities in the identification and adoption/adaptation of technologies that solve agricultural problems of farm families. The approach will be problem identification and testing of technologies with farmers to improve the traditional tree crop-based multi-storey agricultural systems. It will include the better integration of livestock into promising technologies such as: improved crop varieties, pest and disease management, land conservation and agro-forestry technologies.

Progress

The Project started in 2003 and is expected to finish by 2006. The Project aims to work with National Agricultural Research and Extension Services (NARES), Non Government Organizations (NGO), farmer groups and the private sector in the use of participatory methods for the identification and adoption of sustainable agricultural technologies. At the end of the Project, there are five key outputs or results expected:

- Farmers' specific production problems and solutions identified that are unique to Kiribati.
- Appropriate technologies identified and verified in on-farm demonstrations.
- Farmer participatory extension methods and technical skills upgraded for National Agricultural Research and Extension Services (NARES) and Non-Government Organizations (NGOs).
- Appropriate technologies promoted and capability in extension communications enhanced.
- DSAP project properly monitored at national and regional levels.

2.3.ii Rat Control Project (2002- 2003)

The Republic of Kiribati restrictions on plant, animal and soil imports are intended to control the introduction of alien (non-indigenous) species, but do not specifically address the inadvertent introduction of reptiles, rats and micro-organisms⁶.

The major objectives of the Rat Control Project were:

- To find relevant methods to reduce rat damage on coconuts.
- To find methods of increasing coconut yield despite rat damage on coconuts by two (2) nuts per palm.

Rat species targeted are mainly those that are introduced to Kiribati such as Polynesian rats/ Pacific rats ('te kimoa' - *Rattus exulans*) and Ship rats ('te kimoa' - *Rattus rattus*). These introduced





species not only damage coconuts and other agricultural crops, but they also pose threats to human health, food, clothing and lifestyles. The project was carried out in selected islands of Kiribati that covered the Northern, Central, Southern islands of the Gilbert Group including Kiritimati and Tabuaeran of the Northern Line Group.

Progress

Below are some of the key progresses made:

- The establishment of a Rat Control Committee, in which members are drawn from government key departments that may address rat problems or issues. Two of the main functions of this Committee are: to raise public awareness of rat species that pose threats to environment, social, economic, health and culture; to assist in identifying and exploring possible funding assistance to ensure continuity of the project into the future.
- Rat control sites include all agricultural areas where rats are present- villages, buildings, stores, etc, including all off-shore islets.
- Reducing the human health hazards posed by rats and increasing the quality of life for people, especially those who live in rat infested dwellings.
- Participatory Research Appraisal (PRA) involvement of different age groups in making decisions, regarding the rat control work undertaken in Abaiang and North Tarawa (training component to local communities).
- Agriculture Division field staff are trained in survey and rat damage assessment methods and in baiting techniques to be utilized for the eradication of rats (training component to concerned key government staff).

3. Fisheries and Marine Resources

At national level, marine environment and resources are critically important concerns to local communities and national government. The fate, utilization and development of marine resources falls in the hands of Ministry of Fisheries and Marine Resources Development (MFMRD), in which the Fisheries Division provides all technical advice and support.

Based on the national workshop conducted in South Tarawa in August 2004, in preparation for the Kiribati National Report for the tenth meeting of the review of the Barbados Program of Actions (BPOA+10), the following have been identified as key progresses, where marine resources are concerned:

- Kiribati has established a system of marine protected areas that aim to conserve marine biological diversity. These areas also serve as ecologically representative networks of protected areas at sea at the national level. Currently there are 12 Marine Protected Areas that are primarily set up for stock enhancement of marine species that have been identified and confirmed as declining in numbers, yet important for our livelihoods and economic well being. Pearl Oyster and beach-de-mer cultures are currently ongoing at the Fisheries Division of Ministry of Natural Resources Development for stock enhancement and economic development.
- Fisheries Division is currently working with local island governments of the host islands to develop a bye-law on these closed areas and seasonal closed areas for appropriate legal back up at both national and island levels.
- Marine pilot projects that are currently implemented in Kiribati are as follows:
 - Sponge farming (for local market- bathing sponge).
 - Pearl oyster farming (pilot projects in Taburao village, Abaiang but now slowly reaching out to include other villages in the island such as Riibono).
 - Beach-de-mer farming.
 - Coral restoration.

Equal access and benefits over marine and coastal resources and areas is currently promoted under the current national government management regime over marine areas and resources.

4. Grassroots/ Local Communities

Local communities/ grassroots people have prominent roles in the protection and conservation of biological diversity both on land and at sea. Through the CBD, enabling activities such as

NBSAP Project and other closely related projects from both Agriculture and Fisheries Divisions as aforementioned, extensive consultations and public awareness have been undertaken with grassroots people on significant problems and issues that affect biological diversity at the national level. The participation of grassroots/local communities along with private sectors and key government sectors has been integrated in the current management structure of the NBSAP Project. This aimed to ensure full ownership of grassroots people over the Project. At the same time, it would ensure that the views and concerns of grassroots people over the conservation, protection and management of the natural environment are considered in all related activities undertaken at national level.





Section II
Constraints to the Conservation
and Sustainable Use of
Biodiversity within the Republic
of Kiribati

PART C: PROBLEMS AND ISSUES AFFECTING THE CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY AT NATIONAL LEVEL

1. INTRODUCTION

Through its national report and their strong representation at the 'Earth Summit' in Rio de Janeiro, the Government and people of Kiribati expressed their strongest support for the principles and objectives of the United Nations Conference on Environment and Development (UNCED) and the promotion of environmentally and culturally sustainable development (Van Trease (ed.) 1993 p. 286). The then Minister of Environment and Natural Resources Development (1991), Ieremia Tabai (who is also the former President of the Republic of Kiribati) defines sustainable development as "the ability to survive on the atolls forever...until the end of the world!" He cautions, however, that:

Our people desire some of the more appropriate modern technologies and social services that will make their life easier, safer, healthier and more enjoyable in today's world. This requires increased cash incomes and foreign cash exchange and changes in lifestyles, which if not pursued in the right manner, could undermine the cultural and traditional resource use systems which have promoted sustainability in the past. (ibid. p. 286-7)

The aim of this section is to outline key problems and issues experienced at the national level that pose challenges to achieving the conservation and sustainable use of biodiversity. These problems and issues have been identified through the various national and inter-island workshops of the NBSAP, community consultations, the BPOA+10 national workshop and the ethno-biodiversity surveys undertaken at the national level.

2. KEY PROBLEMS AND ISSUES IDENTIFIED

The geographic make up of Kiribati which is a group of small islands that are isolated and scattered over the equator poses difficulties in terms of communication, transportation, trading, and implementation costs of viable development projects in Kiribati. In most cases, it is often expensive and costly to undertake community consultations to local communities in either the outer islands within the Gilberts or those living in the Line and Phoenix Groups.

Kiribati is vulnerable to obliteration by long term sea level rise and more immediately exposed to continuing coastal erosion and inundation during high tides and strong winds that cause salinization of the water lens and damage to dwellings and other properties (Asian Development Bank, 2002). Recently, Kiribati has been affected by destructive tropical cyclones, which bring increased rainfall to the Gilbert Group. Recent shifts in weather patterns in the South Pacific in the forms of increased incidence of tropical cyclones, increased rainfall in some areas and prolonged drought in others, have been associated with the occurrence of El Nino Southern Oscillation (ENSO) conditions and associated increasing atmospheric instability over the central equatorial Pacific (UNCED, 1992 cited in Teariki-Ruatu, N. 2002). The shift in weather patterns has the potential to affect populations of insect pests and diseases such as mealybugs, bwabwai beetle, and fungal diseases.

The exposure of Kiribati to extreme weather events is also intensified through rapid urbanization and squatter settlements, degradation of coastal ecosystems such as deforestation of mangrove forest, sand and gravel mining, and rapidly developing infrastructure on coastal areas such as road and causeway constructions on South Tarawa. The practice of monoculture farming practices also has the potential to intensify the exposure of the islands to extreme weather events (Cities, Seas, and Storms: Managing Change in Pacific Island Economies, Volume IV Adapting to Climate Change, 2000. p.1).

Due to the isolated geographical location, Kiribati is still free from most of the destructive agricultural pest. However, the fragility and pristine of the biodiversity existing in the islands makes the risk management difficult. With the increased reliance on few certain import and export trade partners and the improvement of transportation infrastructure between Kiribati and other countries, the islands are increasingly threatened by invasive alien species and this could have economic implications on the small scale farmers and to Kiribati as a small island nation.





Altogether, these problems are exacerbated by limiting natural environmental factors such as small landmasses, periodic droughts, water scarcity and water salinity, soil impoverishment, and endangered plants and animals at the national level.

2.1 Key Issues faced with the implementation of NBSAP Project

- There is no clear policy guideline on the environment that would encompass the importance of biological diversity and other related environmental problems, beside climate change and sea level rise. At the same time, there is no act, other than the Environment Act, that adequately covers biodiversity (terrestrial and marine). Section 3 (d) of Part I of the Environment Act, which states... *'Protecting and conserving the natural resources threatened by human activities particularly those resources of national and ecological significance as may be classified under the categories of terrestrial vegetation, coral, fish and marine life'...* would be further improved, upon the completion of the NBSAP Add On Project in October 2006.
- The protection and conservation of biodiversity is not yet considered a priority environmental concern at national level.
- Biodiversity and other related environment terms are new words that do not have direct translations in the native language (Kiribati translations). This is a big challenge, when it comes to doing consultations with grassroots people, as in many cases, a combination of Kiribati words have to be used for translating a single term.
- The project is operational within a set timeframe with specific budget allocations. Upon the completion of the project, there is a challenge with a turn over of staff.
- The use of local media (such as radio programme and newspaper releases) is not effective as there are still some people living in the outer islands, who do not have radios or do not have easy access to newspapers. There is also another challenge with non-listeners resting amongst those who have radios and those who listen to radio programmes but do not apply what they may have learnt from such programmes to their day to day living.
- There is limited staff. This is compensated by the multi-disciplinary nature of both the Steering Committee and Planning team (a technical team, in which members are drawn from key government departments and the private sector that include representatives from prominent NGOs, USP-Kiribati and FSP-Kiribati.)
- The NBSAP Project is mainly consultative in nature and the designated Biodiversity Strategies and Action Plans that may be formulated from this particular project are not put into action. These strategies and action plans upon completion will be the responsibility of the national government, to implement it at its own cost.
- Lack of coordination or network with local communities. Participation of grassroots people is channelled only through island, inter-islands or national workshops and related follow-up consultations. This is due mainly to lack of funding.
- Lack of community incentives to undertake the conservation and sustainable use of biodiversity at local community and island levels.

2.2 Important problems associated with the conservation and sustainable use of biodiversity

Environment Management Planning:

- Absence or limited environment management planning at the national level

Information and data:

- Lack of knowledge of species and endangerment status
- Lack of data on the natural environment, including data on the trend of environmental changes in Kiribati
- Lack of information sharing and dissemination to wider community by targeted representatives of local communities (grassroots people). This is due to scattered nature of the islands, and hence its very costly to do comprehensive community outreach programs to all outer islands

Research:

- There is a strong need for a strong marriage of traditional practices and new science and management tools over the conservation, protection and management of biological diversity on land and at sea.

Land:

- Land tenure issues
- Isolation and fragmented nature of the islands
- Land clearing through indiscriminate burning or cutting of vegetations or atoll forests
- Decrease abundance and availability of native plants/trees that are important for traditional medicine purposes
- Inundation of low areas of land along the coastline with seawater during storm surges or very high tides

Atoll forests/Vegetation:

- Vegetation and coastal deforestation including deforestation of certain plant species that have significant cultural values and uses (e.g. deforestation of 'te kaina' species and associated varieties)
- Consistent bush fires deliberately induced onto atoll forests and vegetations

Alien Invasive Species:

- Agricultural pests such as rodents, bwabwai beetles, mealeybugs, fire ants, etc and invasive alien species such as wedelia plant and mynah birds, which are recent pests in the islands of South Tarawa, Kiritimati, Tabiteuea and Onotoa in particular.
- Plant and animal quarantine (introduction of alien invasive specie through ballast waters and imported raw materials, e.g. raw timbers, fresh fruits)
- Cultural superstitions regarding rats. Many people voiced their concerns about the traditional beliefs and superstition, where the rat is part of their culture and that once it is disturbed or killed, it would eventually cause more damage to crops and other personal properties- clothing, food stored in houses. This has contributed to insufficient community participation to actively involved in the rat eradication projects that have been undertaken in some outer islands of Kiribati.

Stray animals:

- Pigs, dogs, cats, poultry

Water:

- Water storage and protection (particularly on South Tarawa)
- Enhancement of rainwater catchments capacity
- Drinking unpotable water
- Human and animal waste
- Oil
- Solid waste

Fisheries and Marine Resources:

- Highly mobile nature of species populations (e.g. migratory birds, turtles, pelagic fisheries)
- Petfish Exploitation:
- 2003 – over 160,000 fishes were exported from Kiritimati. This is represented by 50+ Species with more than 50% being the flame angle (*C.Loriculus*)¹
- Petfish Exploitation:
 - 2003 – over 160,000 fishes were exported from Kiritimati. This is represented by 50+ Species. >50% is flame angle (*C.Loriculus*)²
- Depletion of Bonefish (in Kiritimati Island in particular)
- Over-exploitation of significant marine ecosystems:
 - Mangroves.
 - Coral reefs.
 - Sea-grass beds (South Tarawa in particular).
 - Lagoon (South Tarawa in particular)
- Coral reef conservation (coral mining has the potential to increase water depth across reefs and allows for greater wave energy to affect the coast and reduce sediment supply, hence causing coastal erosion)





Threats to Wildlife:

- Insufficient enforcement of closed areas designated for birdlife conservation (particularly on Kiritimati Island and designated wildlife sanctuary)
- Indiscriminate burning and cutting of native vegetations that destroy established atoll vegetation structures, which are important for birds nesting habitats
- Rats infestation on Kiritimati Island, particularly closed areas reserved for birdlife conservation
- Insufficient equipments to carry out effective enforcement on Kiritimati Island as an important birdlife area
 - Lack of proper vehicle to access difficult and rough tracks during general patrolling in the wilderness areas
 - Guns without bullets
- Patrolling
 - General patrolling and monitoring of camp sites for 'te kakai' are carried out on ad hoc basis
 - Slack and lack of odd hours spot check on these camp sites
 - Limited number of Wildlife Unit staff to patrol the vast land area of Kiritimati Island and other wildlife sanctuaries designated in other islands of the Line and Phoenix Groups
- Poaching:
 - Sooty terns, Hatching rate < 1% 2003³
 - Masked Boob, Population is reduced by 40% in 2003⁴
 - Consistent poaching of birds and fish within Wildlife Unit closed areas and Fisheries Division marine closed ponds by tenants of 'te kakai' scheme areas for local consumption
 - Redtailed tropicbird & red footed booby are continuously being poached for fish lures
- 'Te kakai' licensing system in Kiritimati Island:
 - Some applicants moved to their camp areas before they received their license with conditions attached
 - Some applicants moved to their camp areas without their license in their possession
 - Consistent possession of renewed license amongst the group of 10 people who previously applied for 'te kakai' license under one person belonging to the group. This is due to different persons (of the group) who came to office to apply for a new 'kakai' license and pretending that he/she does not previously hold the license under the lead applicant of their group
 - The Wildlife officer who handles payments and issue of the licenses do not go together with Wildlife Assistants who actually meet applicants in their camp sites during the general patrolling
 - Issue of licenses is on ad hoc basis, depending on people who actually came in to office to apply
- 'Te kakai' area camp sites (Kiritimati Island):
 - Overdue stay at camp areas
 - Some applicants possess poultry with them on their camp site
 - Some applicants changed their camp site prior the finishing date of their due license to avoid reminders and subsequent warning to them by Wildlife Unit staff
 - Some applicants disturb the natural camp site by polluting wells utilized for drinking water
 - Applicants often do not want a member of staff from the Wildlife Unit to accompany them in the vehicle hired to drop them off at their camp sites. This often creates difficulty on the part of Wildlife Assistants to know exactly the selected camp sites during the general patrolling
- Kiritimati Island Water Reserve Zones:
 - Some applicants erect their camp site within the 200m zone of the water mark for the water reserve

- Fisheries Division Marine Closed Areas/Ponds (Kiritimati Island):
 - Some applicants erect their camp site along the coast of Fisheries Division marine closed areas. This opens the gate for poaching fish in the marine closed areas
- Lack of planning on designated camp sites for 'te kakai' scheme in Kiritimati Island:
 - Designation and location of camp sites are at applicants preferences
- Accessibility of camp sites during general patrolling (Kiritimati Island):
 - Some applicants chose camp sites that are too difficult to access by truck during the monitoring or general patrolling by Wildlife Unit staff
 - The area that need monitoring for camp sites utilized for 'te kakai' areas is far too vast for the limited number of Wildlife Unit staff
 - Camp sites are often too far away in the wilderness from the main villages where both the Wildlife Unit office and staff are located and live
 - The location of camp sites are often widely distributed and it takes at least half hour to an hour to get from one camp site to another

Incentives:

- Lack of and limited incentives for reforestation/replanting of culturally and economically significant plant/tree species by local communities
- Limited and lack of appreciation of economic and cultural values of terrestrial atoll resources (e.g. trees, shrubs, herbaceous, vines, grasses and sedges that have cultural and economic values including uses for traditional medicine)
- Resource development problems in terms of cash generation (e.g. viable artisanal fisheries development)
- Lack of incentives to plant trees

Community Support and Cooperation:

- Lack of cooperation from local communities (contradict traditional ownership over land and marine resources)
- Attitude problem towards biodiversity resources. This is reflected in negative behaviours resulting in loss of biodiversity and degradation of the natural environment
- Limited conservation measures at the local community level
 - Poaching birds, bird eggs
 - Fisheries management
 - Pet fish over exploitation

Capacity Building:

- Local communities do not have adequate capacity to finance and operate conservation areas (closed areas and marine protected areas) due to heavy reliance on national government
- There is a strong need to recognize the need to effectively build the capacity of our local communities to effectively manage their natural environment and resources
- Lack or limited capacity of local government in outer islands (institutional and human resources). There is a strong need to put resources to enhance the capacity of local governments to be able to undertake other required responsibilities from all sectors of government- (Fisheries, Agriculture, Environment, etc) that are lacking in most outer islands

Traditional Knowledge/Changing lifestyles:

- Breakdown or discontinuity of traditional knowledge systems due to changing lifestyles
- Breakdown of subsistence production systems (deterioration of traditional food systems)
- Preference of imported foodstuffs over traditional foods that often come with increased generation of wastes from consumption and a decreased lifespan amongst many people
- Heavy dependence on imported foodstuffs
- Loss of cultural values, for example: dancing practice, undervalue of traditional foods over imported foodstuffs, traditional skills and knowledge
- Breakdown of traditional communal management systems of natural resources
- Breakdown of communal decision making under 'te mwaneaba', especially on South





Tarawa. Nowadays, the majority of people tend to strongly associate themselves with their own church and tend to be more active in church fundraising activities than those activities communally decided under 'te mwaneaba'

- Traditional conservation practices and knowledge have been narrowly focused on certain species that are culturally significant to society

Public awareness and information:

- Limited public understanding on the significance of biodiversity
- Insufficient community supports towards national government's initiatives on the conservation and sustainable use of biodiversity
- Community outreach programs (formal and informal) to raise public awareness and understanding on issues affecting the natural environment are restricted to the capital island (South Tarawa) and North Tarawa islands. This is due to high transportation costs between the capital island and outer islands, due to the isolation and remote nature of the islands in Kiribati
- The need to improve the ability and confidence of primary school teachers to use resource materials effectively in environmental education
- Non-inclusion of environmental science in subjects for examination under the Common Entrance Examination in all but a few schools is a disincentive to teaching it at primary school level
- Lack of appropriate resource materials on the environment and in the case of junior levels in non-government schools, there is acute shortage of any environmental materials at all
- Lack of accountability for the effects of one's actions on the environment

Wastes and Pollution:

- Land and sea pollution
- Littering - land and water
- Generation of waste
- Uncontained solid waste disposal contaminating coastal zones and freshwater lens, particularly on South Tarawa
- Inadequate waste management
 - Rubbish collection
 - Sanitation
- Coastal water pollution
 - Sinking Ships
 - Discharge from ships (oils, ballast waters)

Human Impacts:

- Destructive human activities (boat channel construction, causeway construction, destructive fishing methods (e.g. splash or 'te ororo', etc)
- Coastal erosion due to poorly designed or constructed seawalls and causeways, reef blasting for boat channel construction, sand/ gravel/ and aggregate mining and deforestation of mangroves
- Population increase
- Increased number of squatter and private homes that are often not connected to the local sewerage system and do not have proper toilet facilities as in the case of South Tarawa. Many people from these homes have alternatively used the beach and bush areas for toileting purposes

Legislations:

- Lack of appropriate legal instruments to support designated specific areas for biodiversity conservation (both on land and at sea). Hence, a need to develop appropriate laws on biodiversity- development of such laws need to be fully participatory in nature and should integrate traditional management practices of both the natural environment and resources

2.3 Important problems associated with Agro-biodiversity

- Small land mass
- Limited crop and livestock genetic species
- Low rainfall
- Limited freshwater supply
- Water salinity
- Prolonged drought
- Low soil fertility
- High infiltration rate soil
- High pH of the soil
- High vulnerability of the islands to the impacts of winds, salt water incursion and coastal erosion
- There is no legal framework or back up for the development and establishment of the designated closed marine areas and seasonal closed areas. The designation and establishment of these potential marine areas for in-situ conservation is not considered in the Fisheries Act 1988
- Lack or limited institutional and human resources capacity of local government in outer islands. There is a strong need to put resources to enhance the capacity of local governments to be able to undertake other required responsibilities from all sectors of government- (Fisheries, Agriculture, Environment, etc)
- Lack of cooperation from local communities (contradict traditional ownership over land and marine resources)
- Restrictions on the use of agricultural fertilizers to enhance soil for agricultural productivity due to possibility of creating agricultural runoff to the sea and freshwater lens underneath and subsequently resulting in water pollution. This is exacerbated by the natural porosity of atoll soils

2.4 Important problems associated with Marine environment and resources

Open Access Fisheries:

- Tragedy of the commons in terms of exploiting and harvesting of marine resources important for both subsistence and cash-based economies. This often relates to open access fishery nature in Kiribati

Over-exploitation:

- Over-exploitation of inshore fisheries and shellfish (South Tarawa in particular)
- Over-harvesting of certain marine species such as giant clams, sardine or 'te tarabuti' (*Sardinella*), including important subsistence and commercial values shellfish- 'te bun' on South Tarawa in particular)

Management and Planning:

- Need for improved management of Kiribati's EEZ
- Absence or limited marine resources management planning at the national level
- Excess by-catch/discards

Finance:

- Insufficient funds for marine research

Marine Research:

- The need to undertake feasibility studies on marine tenure as a basis for the establishment of community based conservation initiatives

Data and Information:

- Lack of databases and information on in-depth scientific research undertaken on marine resources available in Kiribati's waters.
- Lack of technical database and information on natural resources in terms of the status of each of the major resources, the pressures they are under, and the sustainable yield and alternatives





Capacity Building:

- Limited technical human resources to deal effectively with marine resource issues

Wastes and Pollution:

- Bacterial contamination in the near-shore waters of Tarawa lagoon (specific problem to Tarawa)
- Nuclear pollution and the disposal of hazardous waste by industrial nations in the shared oceanic environment
- Introduction of non-indigenous species (e.g. introduction of 'Cat-fish' from ballast waters)
- Major reclaimed areas that are developed as landfill areas for waste disposal in South Tarawa are owned by national and local governments

Fishing Practices/Methods:

- Frequent uses of destructive fishing methods (mostly in-shore): e.g. splash or 'te ororo', use of small mesh nets in subsistence fishing, fishing bonefish during spawning period, use of explosives and bleaching to stun fish, particularly in South Tarawa
- Fishing practices that have implications on marine environment and resources such as:
 - Leaving nets out
 - Cleaning beche-de-mere in water
 - Small mesh fishing nets

Human Impacts:

- Causeway construction
- Boat channel construction
- Coastal erosion due to poorly designed or constructed seawalls and causeways, reef blasting for boat channel construction, sand/ gravel/ and aggregate mining and deforestation of mangroves

Tenure System:

- Marine tenure system in Kiribati
- Conflict over ownership of foreshores and customary fishing grounds and reefs between landowners and the Government
- The British administrative system has been super-imposed on traditional marine tenure system- this has affected the ownership of foreshore and mudflats by local people, particularly to those living in South Tarawa, where mining of sands, gravels and aggregates are increasingly seen as a source of income

Legislations:

- The need to define the boundary of coastal waters in related marine and land legislations

Community Supports:

- Absence of community initiatives to undertake marine protected areas of important marine ecosystems that are vital for their subsistence and cash-based economies
- Absence and limited cooperation and co-management between national government and local communities in areas of community-based conservation and management of natural resources

Impacts of Population Increases:

- Encroachment of reclaimed areas into the lagoon or ocean to extend land space for residential purposes (to built houses on)

Section III
Responses and Priorities for
Promoting the Conservation
and Sustainable Use of
Biodiversity within the
Republic of Kiribati





PART D: RESPONSES AND PRIORITIES FOR PROMOTING THE CONSERVATION AND SUSTAINABLE USE OF BIODIVERSITY

1. INTRODUCTION

The area of utmost concern in relation to future economic development is the sustainability of production of key marine resources. The lagoons, reefs and EEZ are the capital inheritance on which the people of Kiribati and the country largely depends on for subsistence, sustenance and cash-based economy (Van Trease (ed.) 1993 p. 296- 7).

The objectives of the Convention on Biological Diversity are “the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources” (Article 1- Handbook of the Convention on Biological Diversity). These three objectives are translated into binding commitments in the provisions contained in Articles 6 to 20 (Johnston & Barber, 2004 p. 5). The central purpose of the CBD is to promote sustainable development, and the underlying principles of the Convention are consistent with those of the other “Rio Agreements” (Agenda 21 and the Framework Convention on Climate Change). The CBD stresses that the conservation of biological diversity is a common concern of humankind, but recognizes that nations have sovereign rights over their own biological resources, and will need to address the overriding priorities of economic and social development and the eradication of poverty (ibid. 2004 p.5).

The aim of this section is to outline responses and priorities, identified through the various NBSAP Project national and inter-island workshops, community consultations, BPOA+10 national workshop and the ethno-biodiversity surveys undertaken at the national level, that could play significant roles in the promotion of the conservation and sustainable use of biodiversity in Kiribati.

2. ENVIRONMENT MANAGEMENT TOOLS

At the national level, key existing tools for improving the management of the natural environment include some of the following:

- Education and awareness
- Government policies
- Mobilization of community involvement
- Incentives
- Laws

These tools have been applied individually or collectively by government sectors such as Ministry of Environment, Lands and Agricultural Development, in an effort to improve the management of the natural environment at the national level.

2.1 Laws

Laws are regulating activities at the national level. ¹Two common methods of regulation in environmental matters are:

- The prohibition of particular activities or
- Requirement that permission be obtained before particular activities are undertaken. This:
 - allows the activity to be restricted
 - Provides information to government and
 - Can require activities to be done in the most environmentally friendly way

Existing environmental laws that play significant roles in the management of the natural environment include:

- Environment Act 1999
 - Controls development and pollution
- Wildlife Conservation Ordinance
 - Protects listed areas and listed species
- Recreational Reserves Act 1996
 - Manages recreational reserves
- Special Fund (Waste Material Recovery) Act 2004
 - Encourages recycling through a deposit system

Other important laws related to the Environment, but would not be discussed in this report, include:

- Customs Act 2004
- Fisheries Ordinance
- Foreshore and Land Reclamation Ordinance
- Plant and Animal Quarantine Ordinances
- Land Planning Ordinance
- Local Council bye-laws

2.1.i Environment Act 1999

The Environment Act 1999 covers the control of development and pollution but has major drawbacks in the area of biodiversity conservation. The main objectives of the Environment Act are:

- To provide for and establish integrated systems of development control, environmental impact assessment and pollution control
- To prevent, control and monitor pollution
- To reduce risks to human health and prevent the degradation of the environment by all practical means
 - Regulating the discharge of pollutions to the air, water and land
 - Regulating the transport, treatment, storage and disposal of wastes
 - Promoting recycling, re-use, reduction, composting and recovery of materials in an economically viable manner; and
 - To comply with and give effect to regional and international conventions and obligations relating to the environment
- Protecting and conserving the natural resources threatened by human activities, particularly those resources of national and ecological significances as may be classified under the categories of terrestrial vegetation, coral, fish and marine life

However there are little substantive provisions in the act that allow for the protection and sustainable use of biodiversity, or giving effect to international obligations.

Possible amendments to the Environment Act are being considered to more fully cover environmental issues relevant in Kiribati and also making the practical, enforceable and manageable. In this way both Environment and Conservation Division of Ministry of Environment, Lands and Agriculture Development and people will have a greater understanding of, what they can and cannot do (Hipkins, 2005).

It is important to note that 'biodiversity' by definition is complex and poses challenges in terms of setting what needs to be done legally in the context of a small atoll nation, to address issues that undermine the conservation and sustainable use of the biodiversity at national level.

2.1.ii Environment Bill 2005

Though in draft form, it is worth mentioning that the Bill combines the Environment Act 1999; the Wildlife Conservation Ordinance and Recreational Reserves Act 1996. Under the Environment Bill, sections considered include: Environment Protocols; Environment Plans; Strategic Environmental Assessments; Wildlife; Protected Areas; World Heritage; Development; Pollution; Biodiversity; Environment Licenses; Enforcement; Private Court Actions and Establishment of an Environmental Trust Fund. Of concern to the objectives and implementation of the NBSAP Project in Kiribati are Sections of the Environment Bill as follows:

Wildlife

- Which allows the Minister to protect species of plants and animals
- Any change to the status of a marine species requires the consent of the Minister for fisheries

Protected Areas

- Which allows the Minister, on advice from Cabinet, to protect areas

World Heritage

- Protects the world heritage values of areas in Kiribati on the World Heritage List





Biodiversity:

- Prevents damage to reefs, mangroves and seagrass beds without a licence
- Prevents burning of any living vegetation without a licence
- Prevents damage to trees with trunks wider than 2 metres without a licence
- Prevents clearing of more than 100 square metres of vegetation without a licence

It is important to note that 'biodiversity' by definition is complex and pose challenges in terms of setting what needs to be done legally in the context of a small atoll nation, to address issues that undermine the conservation and sustainable use of the biodiversity at national level. In this Bill, the foundation that forms the basis of what can and cannot be done under the Biodiversity Section is what have been identified to be important by people and need government's intervention in the form of putting in appropriate legal instruments, based on the outcomes of the NBSAP Project's ethno-biodiversity surveys, national and inter-island workshops including formal and informal consultations and discussions with grassroots communities. The Biodiversity Section is also concentrated on prominent issues that have been confirmed by grassroots communities to be threatening the conservation and sustainable use of biodiversity on land and at sea in terms of livelihoods and sustenance needs at the community level. However, at this stage, issues affecting marine biodiversity are covered to a limited extent, pending the need for proper consultations with Fisheries Division of Ministry of Fisheries and Marine Resources Development.

2.1.iii Wildlife Ordinance

The Wildlife Ordinance was made in 1938, revised in 1975 and further revised again in 1977. Under the Ordinance, the following islands of the Line and Phoenix Groups are declared as protected areas for wildlife sanctuaries:

Phoenix group

Phoenix (Rawaki); McKean and Birnie

Southern Line group:

Malden and Starbuck Island

Northern Line group:

Kiritimati Island

The following areas of Kiritimati Island are closed areas: Ngaontetaake; Dojin; Tanguoua; Koil; Toyota; Mouakena; Motu Tabu; Motu Upua and Cook Islet.

The main aim of this Ordinance was focused on enforcing the protection of seabirds, marine and wild turtles and some land birds. The Ordinance cannot be used to protect plants or fish.

2.2 Government Policy.

Environment issues that include the promotion of the conservation and sustainable use of biodiversity are addressed under individual policy statements that fall under the portfolios of different government Ministries (per. Comm. Tong- Director for National Economic and Planning Office (NEPO), MFED, 2004). However, there is no specific government policy on the environment. The National Development Strategies (NDS) 2004 -2007 is a strategic plan for sustained growth in the income and welfare of the people of Kiribati (NDS 2004 - 2007). In a planning framework, the NDS aims to express the Government policy statement:

'Enhancing and ensuring the equitable distribution of development benefits to the people of Kiribati according to principles of good governance' (ibid. p.8).

The achievement of this aim would come from the combined efforts of all sectors of Kiribati's society and economy, which include, amongst others, the sustainable use of Kiribati's natural resources and physical assets, which is also one of the government key policy areas in the NDS. However, under this policy area there are still issues that pose challenges and could undermine its achievements, which include some of the following:

Issue 1: Potential social and economic impact of climate change is costly and dangerous

Issue 2: Responsibilities for policies and actions affecting the environment are fragmented

Issue 3: Urban local governments lack capacity and motivation to perform required roles

Issue 4: Public open spaces in South Tarawa are among the worst kept in the Pacific

Issue 5: Need to maximize sustainable economic benefits from the tuna resource

Issue 6: Need to conserve stocks of vulnerable species to meet the increasing demand for food and cash incomes

2.3 Education and Awareness

Education and awareness raising are instrumental in meeting the objectives of the CBD at the national level. If there is information and awareness, then national environmental issues can be translated into simple messages that will enable the general public to understand the subsequent full implications on their welfare and livelihoods. This would lead to gaining both public and political support to address these issues in a coordinated and effective way.

Currently, public awareness and education programs are developed to meet the different levels and needs of communities, adults and children to a certain extent. However, there is still a strong need to incorporate existing national environmental issues in national curriculum development programme. This will enable information sharing and dissemination on the need to protect the natural environment to primary, junior secondary and high schools in Kiribati.

Education and awareness programs are currently undertaken on a quarterly basis throughout the year through the Environment and Conservation Division. Other sectors of government related to the Environment also carry out their own awareness and education programs, but often these programs are carried out independently of those from the Environment and Conservation Division. Ad hoc education and awareness programs are still carried out to meet special dates of promotions for international world environment celebrations such as 'International Day of Biological Diversity', 'World Clean Up Day', 'Mangrove World Day', 'World Water Day'.

Education and awareness programs currently engaged at the national level include:

- Newsletter releases through Te Uekera (government newspaper), Te Mauri, Newstar and Tarakai
- Radio programs
- Community consultations
- National and inter-island workshops
- School visits
- Environmental Day Promotions (this could be a one day or a one week promotion depending on the nature of the promotion and availability of financial support to fund the promotion)
- Poster developments and dissemination

2.4 Mobilization of community involvements/Incentives

At large, many of the traditional ruling systems such as 'te mwaneaba' and 'te unimwane' ruling systems have deteriorated to some extent, particularly in South Tarawa. Many people now have strong associations with their church groups, which also form the basis of their identity within their communities. At the national level, there is always the challenge of getting participatory involvements of local communities in undertaking voluntary works, where the management of the natural environment and resources are concerned. Many people still expect the government to spoon feed them in addressing the environmental issues that occur as a result of the 'tragedy of the commons' in terms of exploiting what is available for subsistence and cash-based economies.

However, there are now established systems in place carried out on ad hoc basis, where the involvement of local communities in addressing issues related to the management of the natural environment is concerned. The Government often provides incentives to enhance the participation of local communities in environmental activities, particularly during the promotions of international world environment days as aforementioned and during national days such as Kiribati Independence Day. These systems involve the establishment of a multi-disciplinary committees, where members are drawn from key government, non government organizations and church groups that always represent local communities. These Committees are often empowered to make decisions and implement appropriate programs to achieve what is required. However these Committees would cease to exist and operate upon the completion of the environment promotional days. The NBSAP Project provides a good example where a multi-disciplinary Steering





Committee has been established and is currently empowered to scrutinize and endorse all Project activities and financial costs related to the Projects implementation. This is also one of the existing platforms in terms of communicating and sharing information between the NBSAP Project and key stakeholders on every progress made on the Project.

Another good example is the private sector engagement existing in Kiribati which ECD could tap and collaborate with. This includes the Kiritimati Island Pet Fish Association and the development of the Marine Aquarium Council (MAC) Certification. This certification process, once finalized, is a way towards sustainability and helps the resource owners (Kiritimati Island Pet Fish Association) to manage their reefs so that reefs are kept healthy. It will also encourage pet fish collection to be done with the least damage to the environment and subsequently allow genetic pet fisheries and pet fish industry in Kiritimati Island to flourish. It is a process that takes time but results in improvements to the exploitation and sustainable management of pet fish species. MAC Certification process is purely the initiative and undertaking of Kiritimati Island Pet Fish Association at their own expense, in an effort to sustainably harvest pet fish in the long-term. This is important to Kiribati in terms of exploitation of genetic fishery resources (tuna resources, grouper species and pet fish) that are increasingly exploited by both local and overseas companies, the majority of which are also private sectors, through foreign fishing licenses (in the case of overseas companies). It is especially important because government can then collaborate and draw, where necessary, on the private sectors existing capacities including their financial and technical resources available that the national level, to support CBD objectives, where their interests are concerned.

Section IV

**Kiribati Plants and Fish
Names Based on 'Ethno-
Biodiversity Surveys' with
Local Communities in the
Republic of Kiribati**





1. INTRODUCTION

The list of Plants and Fish Names presented below came from the results of the ethno-biodiversity surveys undertaken with local communities in selected islands of the Gilbert and Line Groups (Butaritari Island for the Northern Part; Nonouti for the Central Part and Nikunau Island for the Southern Part of the Gilbert Group and Kiritimati for the Line and Phoenix Groups). The list presented does not fully represent the approximate 306 species for Kiribati as aforementioned. Most of the species identified have been confirmed by local communities as important for sustenance, subsistence and cash-based economies including uses in traditional medicine and in need of some form of protection to ensure their sustainability and viability for many generations of Kiribati to enjoy.

2. KIRIBATI PLANT NAMES

Table 4. List of Kiribati Plants.

Local Name	Common Name	Scientific Name
1. Aitoa Mangrove	<i>Lumnitzera</i>	<i>littorea</i>
2. Akanta- binke	Pink bougainvillea	<i>Bougainvillea spp.</i>
3. Akanta- uraura	Purple bougainvillea	<i>Bougainvillea spectabilis</i>
4. Ang	Life plant	<i>Kalanchoe pinnata</i>
5. Ango	Premna	<i>Premna serratifolia</i> -L., syn. <i>P. obtusifolia</i> R.B.; <i>P. tintensis</i> Schauer (l)
6. Aoa aua - babobo	Four oclock	<i>Mirabilis Jalapa</i>
7. Aoa aua - mainaina	Four oclock	<i>Mirabilis Jalapa</i>
8. Aoa aua- uraura	Four oclock	<i>Mirabilis jalapa</i> Linn.
9. Aronga	Acalypha tree	<i>Acalypha wilkensisiana</i>
10. Aroma	Silver pipturus	<i>Pipturus argenteus</i>
11. Aroua	-	-
12. Baireati	Fish poison tree	<i>Barringtonia asiatica</i>
13. Banana umumum	Banana	<i>Musa (ABB group) 'Bluggoe'</i>
14. Banana	Cavendish banana	<i>Musa (AAA Group) 'Robusta'</i>
15. Ba nana-oraora	Lady's finger	<i>Musa (AAB group) "Ney Poovan", Simmonds</i>
16. Beneka	Long cayenne chilli	<i>Capsicum annum</i> L.
17. Beneka	Tobasco, perennial chilli	<i>Capsicum frutescens</i>
18. Beneka/Nion	Chillie	<i>Annuum sp.</i>
19. Bero	Wild fig	<i>Ficus tinctoria</i> Forst.f.
20. Biku	Common fig	<i>Ficus caria</i>
21. Bingbing	Lantern tree	<i>Hernandia nymphaeifolia</i> (Presl.) Kubr.
22. Boi	Broad-leaved purslane	<i>Portulaca lutea</i> Sol. syn. <i>P. oleracea</i>
23. Boi	Pigweed	<i>Portulaca oleracea</i>
24. Boi	Wild purslane	<i>Portulaca tuberosa</i>
25. Buka	Pisonia/ great lettuce tree	<i>Pisonia grandis</i> R. Brown
26. Bumorimori	Giant milkweed, crownflower	<i>Calatropis gigantean</i>
27. Buraroti	Pink periwinkle/Madagascar	<i>Catharanthus roseus</i> (Linn.) G. Don.
28. Buraroti	White	<i>Catharanthus roseus</i>
29. Buraroti	Light purple	<i>Catharanthus roseus</i>
30. Burukam	Ironwood, she-oak, beefwood tree	<i>Casuarina eqiseifolia</i> L.
31. Bwabwai	Giant swamp taro	<i>Cyrtosperma chamissonis</i> (Schott.) Merr. (A)
32. Bwabwaia	Pawpaw	<i>Carica papaya</i> L. (R)
33. Bwaingan	Eggplant	<i>Solanum melongena</i>
34. Bwaukin	Pumkin	<i>Cucurbita pepo</i> L. (R)
35. Iamaii	Bicolor false eranthemum	<i>Pseuderanthemum laxiflorum</i> (Gray) Hubb.
36. Iaroo	Purple false eranthemum/ false face	<i>Pseuderanthemum carruthersii</i> (Seem.) Guill. Var. <i>atropurpureum</i> (Bull) Fosb.
37. Ibi	Pacific chestnut	<i>Inocarpus fagifer</i>
38. Inato	Privet	<i>Clerodendrum inerme</i> (Linn.) Gaertn
39. Itai	Alexandrian laurel/punai nut	<i>Calophyllum inophyllum</i> Linn.
40. Kabekau	Wild poinsettia/ Painted lady	<i>Euphorbia cyathophora</i> Murray syn. <i>E. heterophylla</i>
41. Kabiti n IMatang	English cabbage	<i>Brassica oleracea</i>
42. Kabiti n Tiaina	Chiness Cabbage	<i>Brassica chinensis</i>
43. Kai maiu	False primrose	<i>Ludwigia octovalvis</i> (Jacq.)
44. Kai te tua	Leucaena	<i>Leucaena leucocephala</i> (Lam.) DeWitt; syn. <i>L. glauca</i> (L.) Benth.

Local Name	Common Name	Scientific Name
45. Kaibakoa	Ellington curse / Soring aroma	<i>Acacia farneesiana</i> (Linn)
46. Kaibingao		<i>Hedyotis biflora</i>
47. Kaiboia	Native hop bush	<i>Dodonea viscosa</i>
48. Kaibuaka	Lantana	<i>Lantana camara</i> L. var. <i>camara</i>
49. Kaibwabwa	Bamboo	<i>Bambusa vulgaris</i>
50. Kaibwaun	Firecracker flower/coral plant	<i>Russelia equisetiformis</i> Cha. & Schlecht. Syn. <i>R. juncea</i> Zucc.
51. Kaikare	Stinking fleabane	<i>Pluchea symphytifolia</i>
52. Kaimatu	Sleeping plant; silver bush	<i>Phyllanthus amarus</i> Schum. & Thonn.
53. Kaina	Pandanus; screw pine	<i>Pandanus tectorius</i> Park.
54. Kaitioka	Sugarcane	<i>Saccharum officinarum</i>
55. Kaituru	Case's ixora/ Flame of the forest	<i>Ixora casei</i> Hance syn. <i>Ixora carolinensis</i> (Val.)
56. Kakainea	Yellow alder/ sage rose	<i>Turnera ulmifolia</i> L.
57. Kanawa	Sea trumpet	<i>Cordia subcordata</i> Lam.(I)
58. Kaura	Golden mallow/ilima (Hawaiian)	<i>Sida fallax</i> Walp.
59. Kaura ni Banaba	Abutilon	<i>Abutilon indicum</i>
60. Keang ni makin	Scented fern/ lawai fern	<i>Phymatosorus scolopendria</i> Burm.
61. Kiaiai	Beach bibiscus	<i>Hibiscus tiliaceus</i> L. var. <i>tiliaceus</i>
62. Kiaou	Beach burr	<i>Triumfetta procumbens</i> Forst.f. (I)
63. Kiebu	Queen Emma lily	<i>Crinum augustum</i>
64. Kiebu/ te ruru n aine	Crinum lily	<i>Crinum asiaticum</i> Linn.
65. Kiebu/ te ruru n aine	Crimum lily	<i>Crinum pedunculatum</i>
66. Koon	Corn	<i>Zea mays</i> L. (R)
67. Kumara	Sweet potato	<i>Ipomoea batatas</i> (L.) Lam (R)
68. Kunikun/ntarine	Sea almond; Pacific almond	<i>Terminalia catappa</i> Linn.
69. Mai Breadfruit		<i>Artocarpus altilis</i> (Park.) Fosb. (A)
70. Mai- Bukiraro	Breadfruit	<i>Artocarpus altilis</i> (Park.) Foab.(A)
71. Mai kora/mai tarika	Breadfruit	<i>Artocarpus mariannensis</i> Trec (A)
72. Mai- Motiniwae	Breadfruit	<i>Artocarpus mariannensis</i> Trec (A)
73. Mai- Te nnanako	Breadfruit	<i>Artocarpus altilis</i>
74. Mai- Teinukuntaake	Breadfruit	<i>Artocarpus altilis</i>
75. Mai-Bokeke	Breadfruit	<i>Artocarpus altilis</i>
76. Maikeang	Breadfruit	<i>Artocarpus altilis</i> (Park.) Fosb. (A) syn. <i>A. incisa</i> Thumb.
77. Makemake	Polynesian arrowroot	<i>Tacca leontopetaloides</i> (Linn.) Merrill.
78. Mangko	Mango	<i>Mangifera indica</i>
79. Mao	Salt bush	<i>Scaevola sericea</i> Vahl
80. Marou	Sweet basil	<i>Ocimum basilicum</i>
81. Maukinikin	Puncture vine	<i>Tribulus cistoides</i>
82. Meri	Sacred basil	<i>Ocimum sanctum</i>
83. Meria - Bingke	Pink frangipani	<i>Plumeria acuminata</i>
84. Meria - Mainaina	White frangipani	<i>Plumeria obtuse</i> L. (R.)
85. Meria- babobo	Yellow frangipani	<i>Plumeria</i>
86. Meria- uraura	Red frangipani	<i>Plumeria</i>
87. Meron	Water melon	<i>Citrullus lanatus</i>
88. Meron	Rock melon	<i>Cucumis melo</i>
89. Mota	Spleen amaranth	<i>Amaranthus dubius</i> Mart.
90. Mota	Slender amaranth	<i>Amaranthus viridis</i>
91. Mtea	Purslane	<i>Portulaca quadrifida</i> Linn. Syn.- <i>P. samoensis</i> Von Poelnitz sensu anehira non Linn.
92. Ngea	Ironwood, pemphis	<i>Pemphis acidula</i> Forst. (I)
93. Ni	Coconut	<i>Cocos nucifera</i> L.
94. Nii - Te ari uaai	Coconut	<i>Cocos nucifera</i>
95. Nii bubura-te nii n ibu	Coconut	<i>Cocos nucifera</i>
96. Nii bunia	Coconut C	<i>ocos nucifera</i>
97. Nii bwaam	Sago/Cycad /Palm tree	<i>Cycas circinalis</i> (L.)
98. Nii- Nei Tibee	Coconut	<i>Cocos nucifera</i>
99. Nii ni benu	Coconut	<i>Cocos nucifera</i>
100. Nii ni ngaun	Coconut	<i>Cocos nucifera</i>
101. Nii rinano	Coconut	<i>Cocos nucifera</i>
102. Nii roro	Coconut	<i>Cocos nucifera</i>





Local Name	Common Name	Scientific Name
103. Nii- Te tina n nii	Coconut	<i>Cocos nucifera</i>
104. Nii uraura	Coconut	<i>Cocos nucifera</i>
105. Nii wae	Coconut	<i>Cocos nucifera</i>
106. Nii-Nei Mori	Coconut	<i>Cocos nucifera</i>
107. Nikabubuti	White mangrove	<i>Sonneratia alba</i>
108. Nikarairai	Yellow elder, yellow bells	<i>Tecoma stans</i> (L.) Juss. Ex HBK.j. syn <i>Stenolobium stans</i> (L.) D. Don (R) <i>Hernandia ovigera</i> Linn. Syn. <i>H. sonora</i> Linn.
109. Nimareburebu		
110. Nimatore	Macaranga tree	<i>Macaranga carolinensis</i>
111. Non	Beach mulberry	<i>Morinda citrifolia</i> L. (I)
112. Ntanini	Beach dodder	<i>Cassytha filiformis</i> Linn.
113. Orion	Oleander	<i>Nerium oleander</i> Linn. <i>Messerschmidia argentea</i> L. F. Johnst.
114. Raim	Lime tree	<i>Citrus aurantifolia</i>
115. Remon	Lemon tree	<i>Citrus limon</i>
116. Ren	Tree heliotrope	<i>Tournefortia samoensis</i>
117. Ren uarereke	Beach heliotrope	<i>Tournefortia argentea</i>
118. Robu		<i>Agave rigida</i>
119. Roti	Red hibiscus	<i>Hibiscus Rosa-sinensis</i>
120. Roti-binke	Pink hibiscus	<i>Hibiscus</i>
121. Ruku	Moon flower	<i>Ipomea tuba</i> (Schlecht) G. Don. Syn.- I. <i>grandiflora</i> (Choisy) Hallier f. non Lamarck
122. Ruku	Beach bean	<i>Vigna marina</i> (Burm. F.) Merr. Syn.- V. <i>lutea</i> (Swartz) A. Gray.
123. Ruku ni maeao	Beach morning glory/ goat's foot convolvulus	<i>Ipomea pes-caprae</i> (Linn.) R. Br. Syn.- I. <i>brasiliensis</i> (Linn.) Sweet
124. Tabioka	Cassava	<i>Manihot esculenta</i> Crantz
125. Taraai	Poinsettia	<i>Euphorbia pulcherrima</i> Willd. (also <i>Poinsettia pulcherrima</i> Graham)
126. Taraai	Spurge, beach spurge	<i>Chamaesyce atoto</i> .
127. Taraai	Wild spurge	<i>Euphorbia geniculata</i> Ortega
128. Taraai	Surge	<i>Euphorbia glomerifera</i>
129. Taraai	Surge, asthma plant	<i>Euphorbia hirta</i>
130. Taraai	Prostrate spurge	<i>Euphorbia prostrata</i>
131. Taraai	Thyme leave spurge	<i>Euphorbia rubricunda</i>
132. Taraai	Beach surge	<i>Euphorbia chammissonis</i>
133. Tiaea	Chaya	<i>Cnidioscolus chayamansa</i>
134. Toara	Panax, hedge panax	<i>Polycias gradifolia</i> Volkens
135. Toara mwangkongko	Panax/ Cup plant	<i>Polycias scutellaria</i> (Burm.f.) Fosb. syn. <i>Polycias balfouriana</i> (Sander ex André)
136. Tomato	Tomato	<i>Solonum lycopersium</i>
137. Tongo	Red Mangrove	<i>Rhizophora mucronata</i>
138. Tongo buangi	Oriental mangrove	<i>Bruguiera gymnorrhiza</i>
139. Ukin	Beach almond	<i>Terminalia samoensis</i> Rech. Syn.- T. <i>littoralis</i> Seemann.
140. Uri maran	Guettarda; wut	<i>Guettarda speciosa</i> L. (I)
141. Uri rara	Guettarda; wut	<i>Guettarda speciosa</i> L. (I)
142. Uri rereba	Guettarda; wut	<i>Guettarda speciosa</i> L. (I)
143. Uri tabuki	Guettarda; wut	<i>Guettarda speciosa</i> L. (I)
144. Uteute	Finger grass	<i>Chloria petraea</i>
145. Uteute	Finger grass	<i>Chloris inflata</i> link.
146. Uteute	Four finger grass	<i>Dactyloctenium aegyptium</i>
147. Uteute- anti	Burr grass/ sand burr	<i>Cenchrus echinatus</i> Linn.
148. Uteute- kanteaoti		<i>Lepturus repens</i>
149. Uteute ni mwane	Beach sedge	<i>Fimbristylis cymosa</i> R. Br.; syn.
150. Uteute- te maunei	Sedge	<i>Cyperus laevigatus</i>
151. Uteute- te ritanin	Sedge/ Marsh sedge	<i>Cyperaceae javanicus</i> Houtt.

Local Name	Common Name	Scientific Name
152. Uteute- te titania	Sedge	<i>Cyperus polystachyos</i> (Rottb.) (I)
153. Uti	Jamaican vervain	<i>Stachytarpheta jamaicensis</i>
154. Wao	Pigweed	<i>Boerhavia diffusa</i> Linn.
155. Wao n anti	Pigweed	<i>Boerhavia tetrandra</i>
156. Wekeweke		

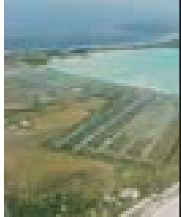
Source: National workshop, 2005

2.1. LIST OF DOCUMENTED CULTIVARS OF 'TE KAINA' (PANDANUS TREE) BASED ON THE ETHNO-BIODIVERSITY SURVEYS

During the surveys, almost consistently 'te kaina' and cultivars identified have been confirmed to be threatened, rare or decrease in availability hence increasingly difficult to find in the wilderness areas, for utilization by local communities. Many people interviewed have expressed a strong need to conserve and sustainably use this tree, which has more than ten different cultural uses.

Table 5: List of Pandanus, Kiribati Is:

Local Species Name	Status	Local Species Name	Status
Anibwannakoi	Threatened	Animonamona	Threatened
Anibwannakoi	Threatened	Aniwaentang	Threatened
Anikabokaa	Threatened	Annabanaba	Threatened
Anikabokia	Threatened	Annabanabanuotaea	Threatened
Anikaierua	Threatened	Annarua	Threatened
Anikairinano	Threatened	Anneibati	Threatened
Anikomuri	Threatened	Anneiriri/ Riki ni iri	Threatened
Anikorobuangi	Threatened	Anneitoka	Threatened
Annibai	Threatened	Aramarieta	Threatened
Antabakia	Threatened	Aramaru	Rare
Antabutonii	Threatened	Aramatang	Threatened
Antabwearake	Threatened	Aramboia	Rare
Antinakarawa	Threatened	Aramron	Rare
Antinakarawe	Threatened	Aramumun	Threatened
Arabaikiaro	Threatened	Aramwaerere	Rare
Arabaitara	Threatened	Aramwakemwake	Threatened
Arabakioba	Threatened	Aramwanunu	Threatened
Arabanuuri	Threatened	Arangaua	Threatened
Arabaua	Threatened	Arantebwe	Threatened
Arabeka	Threatened	Arantebwe	Threatened
Arabukitaba	Threatened	Araoanimaai	Threatened
Arabunonmon	Threatened	Arareei	Threatened
Arabuota	Threatened	Arataborio	Threatened
Arabutannanna	Threatened	Aratabukitokia	Threatened
Arabwauti	Threatened	Arataira	Extinct (Nooto)
Arakaiboboki	Threatened	Arataitara	Rare
Arakairiki	Rare	Aratangana	Rare
Arakakaia	Threatened	Arateaang	Rare



Local Species Name	Status	Local Species Name	Status
Arakatau	Threatened	Aratebe	Threatened
Arakauki	Threatened	Aratebwai	Threatened
Arakeang	Rare	Aratekenna	Threatened
Arakoinawa	Rare	Aratekura	Rare
Arakomma	Threatened	Aratemam	Threatened
Aramaeka	Threatened	Aratenawa	Threatened
Aramaeriniiai	Threatened	Aratenneia	Threatened
Aramaiaki	Threatened	Aratetongo	Threatened
Aramaibiniben	Threatened	Aratoae	Threatened
Aramakeke	Threatened	Aratokotoko	Threatened
Aramaon	Threatened	Aratuubwere	Threatened
Aramarawa	Rare	Arauakitoa/ Arakiritoa	Threatened
Arauanou	Threatened	Irininwatiare	Threatened
Arauarea	Rare (Nooto)	Irirongo	Threatened
Araumwaumwa	Threatened	Iritawatawa	Rare
Arauneitira	Rare	Iritebun	Rare
Araurabono	Threatened	Iritokotoko	Threatened
Arauriamwaere	Threatened	Iroro	Threatened
Arauritaria	Rare	Kamweara	Rare
Arauruaki	Threatened	Kaureiko/ Raeraeti	Threatened
Arautaon	Extinct (Nooto)	Mangataro	Threatened
Arauteeko	Extinct (Nooto)	Nikorokoro	Threatened
Arawaentongo	Threatened	Ntinatina	Threatened
Arawaibeba	Threatened	Rikiniri	Threatened
Bakororo	Threatened	Tina	Threatened
Iribiongo	Threatened	Tina maran	Threatened
Iribubura	Threatened	Tina ni karawa	Threatened
Irininwaiana	Threatened	Utongau	Threatened

3. Kiribati Fish Names:

3.1 Small Marine Fin-Fish

The different species of small marine finfish identified in the table below, indicate what has been reported to be sold by people and other important stakeholders in local communities for cash income.

Table 6: List of Small Marine Finfish, Kiribati.

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
	Coris wrasse	
	Declivis butterflyfish	<i>Centropyge shepardi</i>
Anaa	Long billed garfish	<i>Rynchorhamphus georgi</i>
Arinai	Bird wrasse	<i>Gomphosus varius</i>
Aua	Mullet (adult)	<i>Mugilidae</i>
Baneawa	Milkfish (juveniles)	<i>Chanos chanos</i>
Bukinawanawa	Clown triggerfish	<i>Balistoides conspicillum</i>
Bukitaakeiaiu	Blue spotted sea-perch	<i>Plectropomus leopardus</i>
Buni	Butterfish	<i>Arothron hispidus</i>
Bureinawa	Violet squirrel fish	<i>Holocentrus violaceus</i>
Bwaua	Blue-spot mullet	<i>Valamugil seheli</i>
Bwawe	Red margined sea-perch	<i>Lutjanus fulvus</i>
Ibwabwa	Griffis angelfish	<i>Apolemichthys griffisi</i>
Ibwabwa	Golden flec angelfish, golden angelfish	<i>Centropyge aurantius</i>
Ibwabwa	Emperor angelfish	<i>Pomacanthus imperator</i>
Ikamatoa	Long-faced emperor	<i>Lethrinus miniatus</i>
Ikanibong	Hump-back red-snapper/Jobfish	<i>Lutjanus argentimaculatus</i>
Ikari	Bonefish	<i>Albula neoguinaica</i> (<i>A. vulpes</i>)
Inai	Blue-barred orange parrot-fish	<i>Callyodon ghobban</i>
Ingo	Mangrove red snapper	<i>Lutjanus argentimaculatus</i>
Kabubu	Garfish	<i>Hyporhamphus laticeps</i>
Kia-n-anera	Flame angelfish	<i>Centropyge loriculus</i>
Koinawa	Convict surgeon fish	<i>Acanthulus triostegus</i>
Kuau	Honeycomb rock-cod	<i>Epinephelus merra</i>
Maebo	Bar-tailed goatfish	<i>Upeneus taenopterus</i>
Mako	Ring-tail surgeonfish	<i>Acanthurus xanthopterus</i>
Mon	Holcentridae Orangelined soldierfish	<i>Myripristis berndti</i>
Newekabane	Dragon wrasse	<i>Novaculichthys taeniourus</i>
Nikoro	Strawberry hind	<i>Cephalopholis spiloparaea</i>
Nimanang	Peacock rock-cod	<i>Cephalopholis argus</i>
Ntaremwa	Gobies	<i>Gobiidae spp.</i>
Okaoka	Orange-stripped emperor	<i>Lethrinus obsoletus</i>
Onauti	Flying fish	<i>Cypselurus spp.</i>
Reibu	Threespot dascyllus	<i>Dascyllus trimaculatus</i>
Reibu	Damselfish	<i>Pomacentrus spp.</i>
Remon	Lemon peel angelfish	<i>Centropyge flavissimus</i>
Rereba (baiwere)	Blue fin travelly	<i>Carangoides laticaudis</i>
Rou	Emperor fish	<i>L. miniatus</i>
Taa	Scarlet squirrel fish	<i>Holocentrus spinifer</i>
Takabe	Bluelined snapper	<i>L. spp</i>
Tewe	Goat fish	<i>Mulloidis spp.</i>

3.2 LARGE MARINE FINFISH

The different species of large marine finfish identified in the table below, indicate what has been reported to be sold by people and other important stakeholders in local communities for cash income.



Table 7: List of Large Marine Finfish:

LOCAL NAME	COMMON NAME	SCIENTIFIC NAME
Aong	Black trevally	<i>Caranx lugubris</i>
Ati	Skipjack tuna	<i>Katsuwonus pelamis</i>
Awai	Green jobfish	<i>Aprion virescens</i>
Awatai	Adult milkfish	<i>Chanos chanos</i>
Bakati	Grouper	<i>Promicrops lanceolatus</i>
Bakati, Teuannati, Teikatuai	Grouper	<i>Epinephelus fuscoguttatus; Plectropomus areolatus; Promicrops lanceolatus</i>
Bakoa	Shark, large general	<i>Ginglymostoma ferrugineum</i>
Bukitakeiau	Lyretail grouper	<i>Variola albimarginata; V. louti</i>
Bwaara	Wahoo	<i>Acanthocybium solandri</i>
Bwaru	Purple rock-cod	<i>Ephinephelus flavocaeruleus</i>
Ikabwaeua	Foster's sea-pike	<i>Callossphyraena toxema</i>
Ikamaawa	Parrotfish	<i>Scarus frontalis</i>
Ikanibeka/Ikanenea	Castor-oil fish	<i>Ruvettus pretiosus</i>
Ikanibong	Hump-back red-snapper/Jobfish	<i>Lutjanus argentimaculatus</i>
Ikarii	Bonefish	<i>Albula neoguinaica</i>
Ingimea	Yellow fin tuna	<i>Thunnus albacores</i>
Ingo	Mangrove red snapper	<i>Lutjanus argentimaculatus</i>
Kamaa	Rainbow runner	<i>Elegatis bipinnulatus</i>
Kamauti	Parrotfish	<i>Scarus spp.</i>
Karon	Humpheaded wrasses	<i>Cheilinus undulatus</i>
Kuaunorua	Curve banded grouper	<i>Epinephelus morrhua</i>
Maneku	Rockcod	<i>Epinephelus spp.</i>
Miniata	Red grouper family	
Nimwanang	Peacock rock-cod	<i>Cephalopholis argus</i>
Nunua	Barracuda	<i>Sphyraena barracuda</i>
Nuonuo	Triggerfish	<i>Pseudobalisties</i>
Raku	Blackmarlin	<i>Makaira indica</i>
Rereba	Blue fin travelly	<i>Carangoides laticaudis</i>
Rou baneawa	Variiegated emperor	<i>Lethrinus variegatus</i>
Urua	Great travelly	<i>Caranx ignobilis</i>

3.3 SHARKS/RAYS

Sharks usually have high monetary values in terms of scaled fins, which are quite expensive in local markets. The table below indicate the list of species of sharks and rays that have been reported to be sold by people and other key stakeholders in local communities, to earn cash incomes.

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Anoi	Scalloped hammerhead	<i>Shyra leweni</i>
Aumeang/mbawia	Nurse shark (six gills)	<i>Nebrius concolour</i>
Babu	Hammerhead shark	<i>Carcharhinus dussumieri</i>
Baiburoburo	Black tipped shark	<i>Carcharhinus melanopterus</i>
Baimanu/baik	Devilheaded manta rays	<i>Mobula spp.</i>
Bakoa	Grey reef shark	<i>Carcharhinus amblyrhynchos</i>
Bakoa	White tip shark	<i>Triaenodon obesus</i>
Iku	Leather skin ray	<i>Rhinoraja longicauda</i>
Itei	Eagle rays	<i>Aetobatus narinari</i>
Kimoa	Leopard shark	<i>Stegostoma fasciatum</i>
Rokea	Tiger shark	<i>Galeocerda cuvieri</i>
Tababa	Whaler shark	<i>Aprionodon brevipinna</i>
Unun	Whitetip reef shark	<i>Triaenodon obesus</i>

Table 8: List of Sharks (Bakoa)/ Rays (Baiku):

3.4 EELS

In many islands, eels are considered as local delicacies but there are also cases where the consumption is not allowed by certain families due to family taboos. The table below indicates a list of species of marine eels that have been reported to be sold by people and other important stakeholders in local communities to earn cash income.

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Kaibike		
Kairoro	Leopard moray	<i>Cymnothorax flavimarginatus</i>
Kaitura	Red moray eel	
Manrabono		
Mauti		
Ngabingabi	Moray eel	<i>Gymnothorax melagris</i>
Ngabingabi	Moray eel	<i>Gymnothorax spp.</i>
Nimaninaba	Sand eel	<i>Muraenesox bagio</i>
Rabono mai/te kaimai	Greyface moray eel	<i>Siderea thyrsoides (prosopeion)</i>
Tuna	Giant mottled eel	<i>Anguilla marmorata</i>
Witae	Moray eel	<i>Gymnothorax undulatus</i>

Table 9: List of Eels, Kiribati:

3.5. MARINE SHELLFISH:

Many of the non-toxic marine shellfish are consumed. With the increase shift from subsistence to a cash-based economy, people have started to sell marine shellfish to earn cash incomes. The table below lists the different species of marine shellfish that are reported to be sold by people and other important stakeholders in local communities for cash income, hence have commercial importance.

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
	Helmet shells	<i>Cassis cornuta</i>
Ang	Horned shell	<i>Strombus gibberulus</i>
Baraitoa		
Bun	Ark shell	<i>Anadara anitquata</i>
Buro	Egg cowries (Ovula ovum)	<i>Gastropoda Orthogastropoda Cypraeoidea</i>
Buu	Stromb	<i>Strombus canarium</i>
Buuroo	Cowry	<i>Cypraea moneta</i>
Bwere/katati	Penshell	<i>Pinna bicolor</i>
Kaban, kabwau	Tiger cowry	<i>Cypraea tigris</i>
Katura		
Kima	Giant clam	<i>Tridacna gigas</i>
Koikoi	Cardita clam	<i>Trachycardium</i>
Koumara	Shellfish	<i>Gafrarium pectinatum</i>
Neitoro	Clam	<i>Hippopus hippopus</i>
Nikatona/nikabibi	Venus shell	<i>Periglypta reticulata</i>
Nimatarin	Shutter shell	<i>Turbo setosus</i>
Nouo	Lipped shromp	<i>Strombus luhuanus</i>
Roroko		
Tauu	Trumpet triton shell	<i>Charonia tritonis</i>
Tunara	Moon shell	<i>Polinices pyriformis</i>
Were	Rugose giant clam	<i>Tridacna maxima</i>



Table 10: List of Marine Shellfish, Kiribati:

3.6 CRUSTACEANS

Crabs, prawns, lobsters and other edible crustaceans are also considered as local delicacies that often require special traditional fishing skills to fish them. The table below indicates the list of species of crabs, prawns, lobsters, or other crustaceans that are reported to be sold by people and other important stakeholders in local communities, for cash incomes.

Table 11: List of Crustaceans, Kiribati:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
	Crawfish	
	Spiny crayfish	<i>Cherax</i>
Ang	Spider shell, horned shell	<i>Lambis chiragan; Strombus gibberulus</i>
Buroon	Banded prawn	<i>Lysiosquilla maculata</i>
Kamakama	Shore crab	<i>Grapsus albolineatus</i>
Kauki	Ghost crab	<i>Ocypode ceratohyalma</i>
Kourataake/nnonon	Porcelain crayfish	<i>Panurilus versicolor</i>
Manai	Land crab	<i>Cardisoma carnifex</i>
Manai meri	Land crab	<i>Cardisoma spp.</i>
Mnawa	Slipper lobster	<i>Parribacus caledonicus</i>
Mwakauro n taari	Hermit crab	<i>Planaxes sulcatus</i>
Mwakauro wiura	Hermit crab	<i>Coenobita perlatus</i>
Nnewe	Crayfish; Lobster	<i>Panurilus spp.;</i>
Nnewe mainaina	Lobster	<i>Panularus pencillatus</i>
Nnewe uraura	Lobster	<i>Panulirus versicolors</i>
Ntabena	Swimmer crab	<i>Thalamita crenata</i>
Ntabwabwa	Red spot crab	<i>Capillius maculatus</i>
Waro	Mantis shrimp	<i>Lysiosquilla spp.</i>
Were	Rugose gaint clam	<i>Tridacna maxima</i>

3.7 HOLOTHURIANS

Of particular importance is the beche-de-mer. Traditionally, species of beche-de-mer have never been consumed but are frequently used in magic and sorcery by several people. Monetary values associated with beche-de-mer are never recognized until recently, with the emerging beche-de-mer industry in the early 1980s. The table below indicates the list of species of beche-de-mer that are identified by people and key stakeholders in local communities as commercially important.

Table 12: List of Holothurians, Kiribati:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Buraerae	Prickly redfish	<i>Theleanata ananas</i>
Kanimnim	Sand fish	<i>Holothuria scabra</i>
Kiriin	Greenfish	<i>Stichopus cholornatus</i>
Mmamma mai	White teatfish	<i>Holothuria fuscogilna</i>
Nautoonga	Blackfish	<i>Actinopyga militaris</i>
Ntabanebane	Lolly fish	<i>Holothuria nobilis</i>
Ro mmamma	Black teatfish	<i>Holothuria nobilis</i>
Taika/te kuentaika	Tiger leopard	<i>Bohadschia argus</i>
Uraura	Red surf	<i>Actinopyga mauritiana</i>
Waeura	Surf redfish	<i>Actinopyrga mauritiana</i>

3.8 SEaweEDS

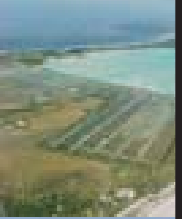
There are three main species of seaweed or sea plants identified that have important values to local people and key stakeholders in local communities and indicated in the table below. Of these, the brown seaweed (*Kappaphrus alvarezii*) have important monetary values to people and key stakeholders in local communities in terms of generating cash incomes. These species are introduced to the waters of Kiribati, hence not indigenous.

Table 13: List of Seaweeds, Kiribati:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Tiwiita	Tamblang	
Tiwiita buraun	Brown seaweed	<i>Kappaphrus alvarezii</i>
Tiwiita kiriin	Green seaweed	<i>Eucheuma denticulatum</i>

Other important Marine species that have important monetary values, cultural and economic importance are listed in Appendix 2





Appendix Section

Appendix 1:

3.9 Other Important Marine Species (not including Finfish, Shellfish, Crabs, Lobsters, Prawns, Beche-de-mer or Seaweeds) that have important monetary values.

Table 14: List of Important Marine species that have Monetary Values:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Ane	Coral	<i>Scleractinia</i>
Ang	Horned shell; Spider shell	<i>Strombus gibberulus</i> ; <i>Lambis chiragan</i>
Anga		
Aubunga/te kima	Giant clam	<i>Tridacna gigas</i>
Bentirantari		
Bu	Stromb	<i>Strombus canarium</i>
Buki kakang	Auger shell	<i>Terebra maculata</i>
Buribangaki	Olive shell	<i>Oliva erythrostoma</i>
Buuroo	Cowry	<i>Cypraea miliaris</i>
Bwaeao	Pearl shell	<i>Pinctada spp.</i>
Bwere/katati	Penshell	<i>Pinna bicolor</i>
Kabatinou	Sea urchin	<i>Diadema savignyi</i>
Kabwaau / kabwan	Tiger cowry	<i>Cypraea tigris</i>
Kamakama	Crab	<i>Crapsus maculatus</i>
Kika	Octopus	<i>Octopus spp.</i>
Kimarawa		
Nimwakaka		<i>Thais hippocastanum?</i>
Ningoningo		
Tauu		
Tumara	Moon snail	<i>Polinices mammilla</i>
Ubaraniiti		
Waro	Mantis shrimp	<i>Lysiosquilla spp.</i>



4.0 Marine Species of particular cultural or economic importance that are increasingly difficult to catch (not abundant as used to be) by local communities.

4.0.1 Small Reef, Lagoon or Nearshore Finfish

Table 15: List of Small Reef, Lagoon or Nearshore Finfish:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Ana	Longbilled garfish	<i>Rhynchorhampus georgi</i>
Aua tabaa	Diamond scale mullet	<i>Liza vaigiensis</i>
Aua, bwauamaran	Silverbelly mullet, Yellowtail mullet, Large-scale mullet	<i>Liza macrolepis; Liza vaigiensis</i>
Awatai	Milkfish (adult)	<i>Chanos chanos</i>
Baneawa	Milkfish (juveniles)	<i>Chanos chanos</i>
Bubu	Triggerfish	<i>Abalistes spp.; Odonus spp.; Rhinecanthus spp.; Sufflamen spp.;</i>
Bukibuki	Sergeant major	<i>Abudefduf septemfasciatus</i>
Bunii	Pufferfish	<i>Arothron spp.</i>
Bureinawa	Violet squirrel fish	<i>Holocentrus violaceus</i>
Ewatua	Puffer	<i>Canthigaster spp.</i>
Ewaua, auamaran	Bluespot mulle	<i>Valamugil seheli</i>
Bwawe	Red margined sea-perch	<i>Lutjanus fulvus</i>
Ikakoa	Jobfish	<i>Aphareus spp.</i>
Ikamaawa	Parrotfish	<i>Scarus frontalis</i>
Ikamatoa	Longnose emperor fish	<i>Lethrinus elongatus</i>
Ikamarina	Small spotted pompano, Silver pompano, Snubnose pompano	<i>Trachinotus bailloni; Trachinotus blochii</i>
Ikaniabong	Humpback red-snapper/paddletail	<i>Lutjanus gibbus</i>
Ikari	Bone fish	<i>Albula neoguinaica (A.vulpes)</i>
Ikari / Kaariri	Small bonefish	<i>Albula neoguinaica spp</i>
Inai	Five-banded parrotfish	<i>Scarus venosus</i>
Koinawa	Convict surgeon fish	<i>Acanthulus triostegus</i>
Koinene/koinawa	Convict surgeonfish	<i>Acanthurus triostegus</i>
Ku	Scarlet squirrel; squirrelfish	<i>Sargocentron spp.; Adionyx spp.?</i>
Kuau	Honeycomb rock-cod	<i>Epinephelus merra</i>
Kuau	Honeycomb rock cod	<i>Epinephelus merra.</i>
Maangoo	Medium Mullet	
Maebo	Goatfish	<i>Upeneus spp.</i>
Mako	Eye-stripe surgeonfish; Ring-tail surgeonfish; Yellowfin surgeonfish	<i>Acanthurus dussumieri; Acanthurus xanthopterus</i>
Mon	Soldierfish	<i>Myripristis spp.; Plectrypops spp.;</i>
Morikoi	Spangled emperorfish	<i>Lethrinus nebulosus</i>
Mwake	Garfish	<i>Strongylura leiura</i>
Nari	Queenfish	<i>Scomberoides lysan</i>
Nikoro	Orange-red pigmy grouper; Strawberry hind	<i>Cephalopholis spiloparaea</i>
Nimako	Flagtail rockcod	<i>Cephalopholis urodeta</i>
Nimwanang	Peacock rock-cod	<i>Cephalopholis argus</i>
Ntibetibe	Diamond travelly, Threadfin pompano	<i>Alectis spp.; Monodactylus spp.; Platax spp.;</i>
Reiati	Hawkfish	<i>Amblycirrhites spp.; Cirrhitichthys spp.; Cirrhites spp.; Neocirrhites spp.; Oxycirrhites spp.; Paracirrhites spp.</i>
Rereba, Tekona, Kona	Blue travelly, Bar jack	<i>Carangoides laticaudis (ferdau)</i>
Riba	Surgeonfish	<i>Acanthurus spp.; Ctenochaetus spp.; Zebrasoma spp.</i>
Rou	Emperor fish	<i>Lethrinus miniatus</i>
Taa	Scarlet squirrel fish	<i>Holocentrus spinifer</i>
Takabe	Bluelined snapper	<i>Lutjanus spp.</i>
Te taawa	Juvenile milkfish	<i>Chanos chanos</i>
Tewe	Goat fish	<i>Mulloidides spp.; Mulloidichthys spp.</i>
Tintin	Dark-margined flagtail	<i>Kuhlia marginata</i>
Urua	Great travelly	<i>Caranx ignobilis</i>

4.0.2 Large Reef, Lagoon or Nearshore Finfish

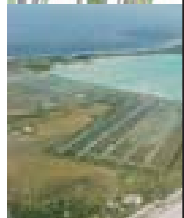
Table 16: List of Large Reef, Lagoon or Nearshore Finfish:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Atiburu	Skipjack tuna (adult)	<i>Katsuwonus pelamis</i>
Aua	Mullet (adult)	<i>Mugilidae</i>
Aumeang	Nurse shark	<i>Nebrius concolour</i>
Awai	Green jobfish	<i>Aprion virescens</i>
Awatai	Adult milkfish	<i>Chanos chanos</i>
Baiburoburo	Black tip reef shark	<i>Carcharhinus melanopterus</i>
Baiku	Stingray	<i>Himantura spp.</i>
Bakati	Grouper	<i>Promicrops lanceolatus, Epinephelus fuscoguttatus; Plectopomus areolatus</i>
Bakoa	Grey reef shark	<i>Carcharhinus amblyrhynchos</i>
Bakoa	Reef Shark	<i>Carcharhinus spp.; Galeocerdo spp.; Isurus spp.; Nebrius spp.; Rhincodon spp.; Rhizoprionodon spp.; Sphyrna spp.; Stegostoma spp.; Triacodon spp.</i>
Bukinrin	Jobfish	<i>Pristipomoides filamentosus</i>
Bukitakeiau	Blue spotted sea-perch	<i>Plectropomus leopardus</i>
Ewaara	Wahoo	<i>Acanthocybium solandri</i>
Ikamatoa	Longnose emperorfish	<i>Lethrinus elongatus</i>
Ikamawa	Parrotfish	<i>Scarus frontalis</i>
Ikanubeka/ikanenea	Castor-oil fish	<i>Ruvettus pretiosus</i>
Ikanubong	Hump-back red snapper	<i>Lutjanus argentimaculatus</i>
Inai	Five-banded parrotfish	<i>Scarus venosus</i>
Ingimea	Yellow fin tuna	<i>Thunnus albacores</i>
Ingo	Mangrove red snapper	<i>Lutjanus argentimaculatus</i>
Ingo	Mangrove red snapper	<i>Lutjanus bohar</i>
Kamaa	Rainbow runner	<i>Elegatis bipinnulatus</i>
Kamauti	Parrotfish	<i>Scarus spp.</i>
Karon	Humphead wrasse	<i>Chelinus undulatus</i>
Kauoto	Seven banded grouper	<i>Epinephelus septemfasciatus</i>
Koinawa	Convict surgeonfish	<i>Acanthurus triostegus</i>
Kuau	Honey combed rockcod	<i>Epinephelus merra</i>
Maebo	goatfish	<i>Upeneus spp.</i>
Mako	Ringtailed surgeonfish	<i>Acanthurus xanthopterus</i>
Maneku	Rockcod	<i>Epinephelus spp.</i>
Mawa	Goatfish, wrasse	<i>Parupeneus spp; thalassoma spp; upeneus tragula, wetmorella nigropinnata, xyrichtys spp</i>
Mon	Bigeye fish; soldierfish	<i>Priacanthus spp.; Mypristis spp.</i>
Nimwanang	Peacock rock-cod	<i>Cephalopholis argus</i>
Nnokunoku	Green rough-backed puffer	<i>Lagocephalus lunaris (cf)</i>
Nrekereke	Bluespotted hind, Bluespotted rock-cod	<i>Cephalopholis cyanostigma</i>
Nunua	Barracuda	<i>Sphyrnaena barracuda</i>
Nuonuo	Trigger fish	<i>Arothron hispidus</i>
Nuonuo	Triggerfish titan	<i>Balistoides viridescens</i>
Raku	Blackmarlin	<i>Makaira indica</i>
Rereba	Blue fin travelly	<i>Carangoides laticaudis</i>
Rou	Emperorfish	<i>Lethrinus miniatus</i>
Rou baneawa	Variiegated emperorfish	<i>Lethrinus variegatus</i>
Takua	Dolphin fish	<i>Coryphaena hippurus</i>
Buroro		
Tinantawa	Humphead parrotfish	<i>Bolbometopon muricatum</i>
Urua	Giant travelly	<i>Caranx ignobilis</i>
Wari (buni)	Seven banded grouper, giant grouper	<i>Promicrops lanceolatus</i>

4.0.3 Small Deep-sea or Open-ocean Finfish

Table 17: List of Small Deep Sea or Open-Ocean Finfish:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Anaa	Longbilled garfish	<i>Rhynchorhampus georgi</i>
Aong	Black trevally	<i>Caranx lugubris</i>
Ati	Skip jack tuna	<i>Katsuwonus pelamis</i>
Bakati	Grouper	<i>Epinephelus lanceolatus</i> , <i>Epinephelus fuscoguttatus</i> ; <i>Plectropomus areolatus</i>
Bubu	Triggerfish	<i>Abalistes spp.</i> ; <i>Odonus spp.</i> ; <i>Rhinecanthus spp.</i> ; <i>Sufflamen spp.</i> ;
Bukitakeiau	Blue spotted sea-perch	<i>Plectropomus leopardus</i>
Ikabwauea	Seapike; Bigeye barracuda	<i>Sphyrnaena forsteri</i> ; <i>Callossphyrnaena toxema</i>
Ikarubong	Hump-back red-snapper/ Jobfish	<i>Lutjanus argentimaculatus</i>
Ingo	Mangrove red snapper	<i>Lutjanus argentimaculatus</i>
Kamaa	Curve banded grouper	<i>Elegatis bipinnulatus</i>
Karabaibai		
Kimokimo	Shark mackerel; King mackerel	<i>Grammatoryncus bicarinatus</i> ; <i>Scomberomorus commerson</i>
Kuau	Honey combed rockcod	<i>Epinephelus merra</i>
Maneku	Rockcod	<i>Ephinephelus spp.</i>
Matakore	Large-eyed bream; Humpnose big-eye	<i>Monotaxis grandoculis</i>
Mawa	Goatfish; wrasse	<i>Parupeneus spp.</i> ; <i>Thalassoma spp.</i> ; <i>Upeneus tragula</i> ; <i>Wetmorella nigropinnata</i> ; <i>Xyrichtys spp.</i>
Mon	Bigeye fish; soldierfish	<i>Priacanthus spp.</i> ; <i>Mypristis spp.</i>
Nari	Queenfish	<i>Scomberoides lysan</i>
Nikoro	Orange-red pigmy grouper; Strawberry hind	<i>Cephalopholis spiloparaea</i>
Nimanang	Peacock rock-cod	<i>Cephalopholis argus</i>
Ntauniman		
Onauti	Flying fish	<i>Cypselurus spp.</i>
Rou	Emperorfish	<i>Lethrinus variegatus</i>
Takabe	Bluelined snapper	<i>Lutjanus spp.</i>



4.0.4 Large Deep-sea or Open-ocean Finfish

Table 18: List of Large Deep Sea or Open-Ocean Finfish:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Aong	Black treveally	<i>Caranx lugubris</i>
Ati / Atiburu	Skipjack tuna	<i>Katsuwonus pelamis</i>
Aumeang	Nurse shark	<i>Nebrius concolour</i>
Awai	Green jobfish	<i>Aprion virescens</i>
Bakoa	Oceanic shark	<i>Alopias spp.; Carcharhinus spp.; Isistius spp.; Prionace spp.</i>
Baru	Speckled blue grouper	<i>Epinephelus cyanopodus</i>
Bukinrin	Jobfish	<i>Pristiopomoides filamentosus</i>
Bwaara	Wahoo	<i>Acanthocybium solandri</i>
Ikabwauea	Seapike	<i>Sphyræna forsteri</i>
Ikakoa	Jobfish	<i>Aphareus spp.</i>
Ikanubeka/te ikanenea	Castor oil fish	<i>Ruvettus pretiosus</i>
Ingimea	Yellow fin tuna	<i>Thunnus albacores</i>
Ingo	Red sea bass	<i>Lutjanus bohar</i>
Kamaa	Rainbow runner	<i>Elegatis bipinnulatus</i>
Karon	Humpheaded wrasses	<i>Cheilinus unduladus</i>
Katou mata		
Kauoto	Seven banded grouper	<i>Epinephelus septemfasciatus</i>
Kuaumourua	Curve banded grouper	<i>Epinephelus morrhua</i>
Natiati	Dogtooth tuna	<i>Gymnosarda unicolor</i>
Nunua, baninua	Barracuda	<i>Sphyræna barracuda</i>
Raku	Striped marlin	<i>Tetrapturus audax</i>
Raku riri/ika	Pacific Sailfish	<i>Istiophorus playpterus</i>
Tarabamara		



4.0.5 Marine Eels caught and commonly fished by locals

Table 19: List of Marine Eels caught and commonly fished by locals:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Bukikororo		
Kaibike		
Kairoro	Moray eel	<i>Gymnothorax flavimarginatus</i>
Kaiura		
Maninnaba	Arabian eelpike	<i>Muraenesox cinerus</i>
Maninnaba	Arabian eelpike	<i>Muraenesox cinerus</i>
Rabonomai/te kaimai	Moray eel	<i>Siderea thyrsoidea (prosopeion)</i>
Teimoone	Spotted snake eel	<i>Myricthus maculosus</i>
Tuna/ten taningabae	Freshwater eel	<i>Anguilla marmorata</i>
Witae	Fimbriated moray	<i>Gymnothorax fimbriatus</i>

4.0.6 Important Shark species fished by locals

Table 20: List of Important Shark species fished by locals:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Anoi	Scalloped hammerhead shark	<i>Shyra leweni</i>
Aumeang	Nurse shark	<i>Nebrius concolour</i>
Baiburoburo	Black tip reef shark	<i>Carcharhinus melanopeterus</i>
Bakoa	Grey reef shark	<i>Carcharhinus amblyrhynchos</i>
Bakoa	Lemon shark	<i>Negaprion acutidens (cf)</i>
Bakoa	White tip reef shark	<i>Triaenodon obesus</i>
Bakoa - kimoa	Common thresher shark	<i>Alopias vulpinus</i>
Bokea	Tiger shark	<i>Galeocerda cuvieri</i>
Bwabu	Hammerhead shark	<i>Carcharhinus dussumieri</i>
Kiboa	Oceanic shark	<i>Alopias hispidus</i>
Ngareei	Oceanic whitetip shark	<i>Carcharhinus longimanus</i>
Tababa	Whaler shark; whale shark	<i>Aprionodon brevipinna;</i> <i>Rhincodon typus</i>
Unun	Reef whitetip shark	<i>Triaenodon obesus</i>

4.0.7 IMPORTANT RAY SPECIES FISHED BY LOCALS:

Table 21: List of Important Ray species fished by Locals:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Baiku	Stingray	<i>Taeniura meyeni</i> (<i>melanospilos</i>)
Baimanu	Devil headed manta ray	<i>Mobula spp.</i>
Iku	Leatherskin ray	<i>Rhinoraja longicauda</i>
Itei	Eagle stingray	<i>Aetobatus narinari</i>
Maii	Pink whipray	<i>Himantura fai</i>
Tantan		
Ten atu uoua	Eagle stingray	<i>Aetobatus narinari</i>

4.0.8 Important Species of Whales/ Dolphins known by locals

Table 22: List of Important species of Whales/Dolphins known by locals:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
	Mellon head whale	
Ato ni marawa		
Karo ni kua		
Kua	Whale	Cetacea
Kuakewe	Dolphin	<i>Dolpinus delphis</i> ; <i>Coryphaena hippuris</i>
Kuakewe	Porpoise	<i>Phocoena phocoena</i>
Kuakewe	Long snouted Spinner whale	<i>Stella longirostris</i>
Kuakewe	Bottlenose whale	<i>Tursiops truncatus</i>
Ntokitoki		
Tibeema; Te kua	Sperm whale	<i>Physeter catodon</i> ; <i>P. macrocephalus</i>

4.0.8 Important Species of Turtles known by locals

Table 23: List of Important species of Turtles known by locals:

Local Name	Common Name	Scientific Name
Kabi n waa	Leatherback turtle	<i>Dermochelys coriacea</i>
On	Green turtle	<i>Chelonia mydas</i>
On kabinoa		
On mron	Olive ridley turtle (Pacific Ridley)	<i>Lepidochelys olivacea</i>
On n ae	Loggerhead turtle	<i>Caretta caretta</i>
Tabakea, Te borauea	Hawksbill turtle	<i>Eretmochelys imbricata</i>
Tantanomaing		

4.1.10 Important Shellfish species for subsistence use

Table 24: List of Important Shellfish species collected for subsistence use

Local Name	Common Name	Scientific Name
	Triton trumpet	
	Helmet shells	
	Egg cowries	
	Tiger cowries	
Anga		
Bun	Ark shell	<i>Anadara antiquata</i>
Buu		
Bwaeao	Pearl shell	<i>Pinctada spp.</i>
Bwaraitoa	Conical shell	<i>Troque aigu</i>
Bwere /Katati		
Kabwan		
Katura	Surf clam	<i>Atactodea striata</i>
Kima/te aubunga	Giant clam	<i>Tridacna gigas</i>
Koikoi		
Koikoi n anti	Shellfish	<i>Spodylus squamosus</i>
Kounwara	Shellfish	<i>Gafrarium pectinatum</i>
Makaka/te nimakaaka	Shellfish	
Makauro n tari	Hermit crab	<i>Planaxes sulcstus</i>
Neang	Horned shell	<i>Strombus gibberulus</i>
Nei nikuton		
Neitoro		
Newenewe		
Nikatona	Shellfish	
Nimatatin	Shutter shell	<i>Turbo setosus</i>
Nouo	Lipped stromb	<i>Strombus gibberulus</i>
Raun		
Roroko		
Tauu		
Tumara	Moon snail	
Were	Rugose giant clam	<i>Tridacna maxima</i>

4.1.11 Important Deepwater Shellfish species fished by locals

Table 25: List of Important Deepwater Shellfish species fished by locals:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Buu		
Bwaeao	Pearl shell	<i>Pinctada margaritifera</i>
Bwaraitoa	Conical shell	<i>Troque aigu</i>
Kima	Giant clam	<i>Tridacan gigas</i>
Tauu		

4.1.12 Important Species of Crabs fished by locals

Table 26: List of Important species of Crabs fished by Locals:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
*Aaii	Coconut crab	<i>Birgus latro</i>
Batinana		
Kakawa	Fiddler crab, reef crab	<i>Carpilius maculatus</i>
Kamakama	Crab	<i>Crapsus maculatus</i>
Kauki	Ghost crab	<i>Ocypode cerathopthalma</i>
Kauki renren		
Manai	Land crab	<i>Cardisoma carnifex</i>
Mwakauro	White crab	
Mwakauro n taari	Hermit crab	<i>Planaxes sulcstus</i>
Mwanai meri	Land crab	<i>Cardisoma spp.</i>
Nnonnon	Box crab	<i>Callapa hepatica</i>
Ntabena	Swimmer crab	<i>Thalamita crenata</i>
Ntabwabwa	Red spot crab	<i>Capilius maculatus</i>
Tiarianna		
Wi manga		

4.1.13 Important Species of Lobsters fished by locals

Table 27: List of Important species of Lobsters fished by locals:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
	Flipper lobster	
	Slipper lobster	<i>Arctides regalis</i>
		<i>Parribacus antarcticus</i>
		<i>Scyllarides haani</i>
Bobaraki		
Kourataake	Porcelain crayfish	<i>Panulirus versicolour</i>
Nnawa/mnaawa/mnao		
Nnewe	Crayfish; Lobster	<i>Panurilus spp.;</i>
Nnewe mainaina	Red rock lobster	<i>Panulirus pencillatus</i>
Nnewe uraura / Ura	Painted lobster	<i>Panulirus versicolor</i>
Wae ro		
Waro	Mantis shrimp	<i>Lysiosquilla maculata</i>

4.1.14 Species of Beche-de-mer caught by locals

Table 28: List of Species of Beche-de-mer caught by Locals:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Aintoa		
Buraerae	Prickly redfish	<i>Thelenota ananas</i>
Kanimnim	Brown sandfish	<i>Bohadscia marmorata (vitiensis)</i>
Karee	Curryfish	<i>Stichopus variegatus</i>
Kiriin	Greenfish	<i>Stichopus chloronatus</i>
Mai mmamma	White teatfish	<i>Holothuria fuscogilva</i>
Nautoonga	Blackfish	<i>Actinopyga miliaris</i>
Ntabanebane	Lolly fish	<i>Holothuria atra</i>
Rebanti	Elephant's trunk fish	<i>Holothuria fuscopunctata</i>
Ro mmamma	Black teatfish	<i>Holothuria nobilis</i>
Taika/kuntaika	Sand fish	<i>Holothuria scabra</i>
Waeura	Surf redfish	<i>Actinopyrga mauritiana</i>

4.1.15 Species of Octopus/Squids caught by locals

Table 29: List of Species of Octopus/Squids caught by Locals:

LOCAL NAMES	COMMON NAMES	SCIENTIFIC NAMES
Kao/kikao/kaonako	Octopus	<i>Octopus spp.</i>
Kiika		<i>Octopus cyanea</i>
Kiika	Octopus	<i>Octopus spp.</i>
Kikakika		
Riro	Squid	<i>Speioteuthis spp.</i>



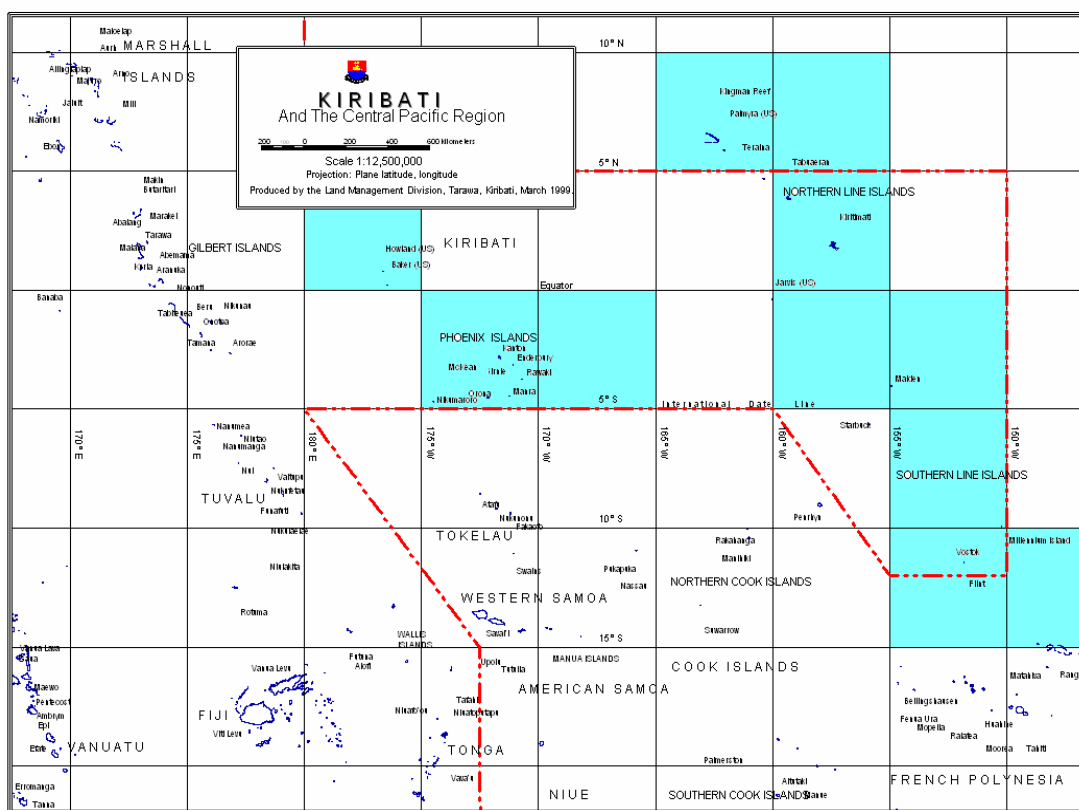
Appendix 2: Complete Map of Designated Protected Areas as Wildlife Sanctuaries and Closed Areas including Animals that are FULLY Protected in certain areas under the Wildlife Conservation Act:

1. Animal that fully Protected in Certain Areas under Schedule 2:

<i>Local Name</i>	<i>English Name</i>	<i>Scientific Name</i>
Te On	Green turtle	<i>Chelonia mydas</i>

2. Areas in which Animals are FULLY Protected under Schedule 2:

Island Name	Other or English Name	Island Group
Malden Island	Malden Island	Line
Vostock Island	Vostock Island	Line
Millenium Island	Caroline Island	Line
Starbuck Island	Starbuck Island	Line
Flint Island	Flint Island	Line
Kiritimati Island	Christmas Island	Line
Birnie Island	Birnie Island	Phoenix
Nikumaroro Island	Gardner Island	Phoenix
Orona Island	Hull Island	Phoenix
McKean Island	McKean Island	Phoenix
Manra Island	Sydney Island	Phoenix
Phoenix Island	Phoenix Island	Phoenix



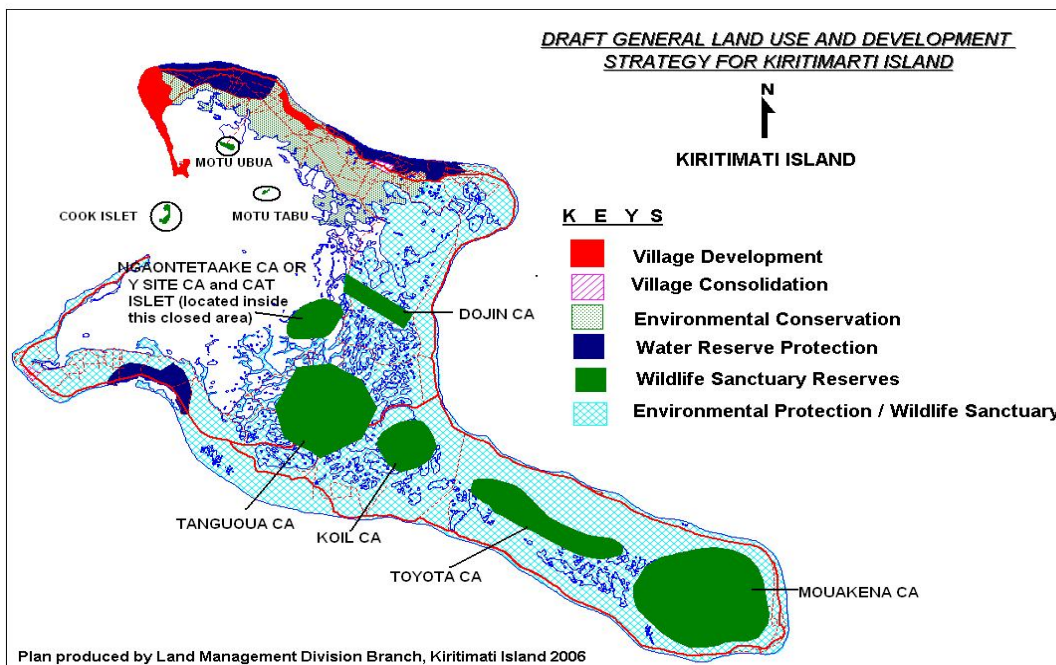
Map of Kiribati - highlighted (in blue) the Line and Phoenix Islands in which Animals are Fully Protected and at certain areas under Schedule 2 of the Wildlife Conservation Act.

3. Declared Wildlife Sanctuaries and Closed Areas under Section 8 (1) of Wildlife Conservation Act

Island Name	Other or English Name	Island Group
Malden Island	Malden Island	Line
Starbuck Island	Starbuck Island	Line
Kiritimati Island	Christmas Island	Line
Birnie Island	Birnie Island	Phoenix
McKean Island	McKean Island	Phoenix
Phoenix Island	Phoenix Island	Phoenix

Kiritimati (Christmas) Island Wildlife Sanctuary:

Cook Island	Cook Island
Motu Tabu	Motu Tabu
Motu Opua	Motu Opua



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