

# LAND ZONE DEFINITIONS FOR RAROTONGA

Prepared for the Government of the Cook Islands  
and the Land Resources Division,  
Secretariat of the Pacific Community

by  
Dave Leslie  
Land Resources and Media Services Ltd

## 1 BACKGROUND

The primary goal of this project is to promote sustainable land use by involving the communities in the formulation, implementation, monitoring and evaluation of the land zoning plan for Rarotonga.

Rarotongans are dependent on land for their livelihoods. However, land is in limited supply. It is becoming increasingly scarce as a result of the ever-increasing human population and their needs. The demands for housing, food production, tourism, etc. are greater than the land resources available. The way land is used must change in order to accommodate the increasing population and meet new demands, particularly from the tourism sector. It means land should be used wisely and sustainably. The sustainable use of land will have two general advantages. Firstly, it will help the present generation to produce sufficient food and lead sustainable livelihoods. Secondly, it safeguards the rights of the next generation by protecting the natural resource base. It is against this background that land zoning and land use planning come into the picture. Both aim to:

- optimize the actual land use,
- resolve conflicts arising between competing uses and between the needs of different interest groups,
- choose sustainable options that best meet identified needs,
- rehabilitate and conserve natural resources,
- support the general development process for all sectors, and
- raise awareness concerning environmental problems and processes among the population and authorities.

All land is Customary or Native Land and the Land Court and the Leases Approval Committee are the sole adjudicators for administering the complex land tenure system.

Given increasing development pressure and tourism growth on Rarotonga, land is becoming a valuable commodity. In addition there is no land use planning or zoning policies established which leads to confusion regarding the use of land for residential, commercial, industrial and agricultural purposes. Extensive ribbon development along the coastal strip of Rarotonga continues resulting in the island becoming less attractive for tourists and locals.

The Cook Islands National Environment Services, in support of and in line with the Rarotonga Environment Act 1994-95, identified five (5) zoning areas for 'Activities of Concern'. The zones reflect the areas protected under the 1994-95 Act and they establish criteria and standards for the protection, conservation and preservation of flora and fauna, and common property resources such as land, water and air, where the natural resources have been threatened by human activity. It was intended that the criteria and standards established by the zoning of designated areas reflect and express a sense of community and cultural values towards Rarotonga's physical environment.

The five (5) Zoning Districts are as follows:

Zone A	Rarotonga Waters
Zone B	Foreshore
Zone C	Streams and Internal Waters

- Zone D Wetlands
- Zone E Sloping Lands

The purpose of this zoning exercise was to establish standards, procedures, and minimum and maximum guidelines to achieve the following intentions embodied in the Tu'anga Taporoporo Manual:

- Develop guidelines appropriate to the environment of Rarotonga for developmental activities;
- Develop minimum and maximum guidelines appropriate to the environment of Rarotonga for developmental activities;
- Establish regulatory procedures and standards for review and approval of all proposed development on the Island;
- Adopt a development review process.

### Three Components

The Rarotonga land zoning project has three (3) main components. This report (**component one**) provides draft discussion on land zoning concepts and objectives to accompany the draft land zone plan (map) and legend of Rarotonga

The **second component** will apply an environmental economics assessment of the draft land zone plan through analyzing the economic costs of land degradation and the benefits of sustainable land management. The outputs from this component will:

- raise awareness on the impacts of land degradation,
- facilitate decision making and land use planning by providing information on the full costs and benefits of land use options, and
- provide insight in how the costs and benefits of land use options accrue to different communities and stakeholders.

The **third component** overlaps with components one and two and through the entire implementation period. This component intends to identify and involve all communities in a series of ongoing collaborative activities, with targeted rural communities as the centre of focus. Rural communities will be encouraged to outline their needs using a facilitation, rather than a planned intervention, approach. It will be important that this concept of facilitation and resource support is similarly shared by all the stakeholders involved in the project – from the outset.

The participatory planning would be conducted at 4 levels of intensity as follows:

- information sharing,
- consultation (with rural communities),
- decision making (by rural communities), and
- initiating action (on behalf of and in consultation with the rural communities).

The strength in using the participatory planning approach lies in the process being flexible, adaptive and bottom-up.

## 2 LAND ZONING CONCEPTS AND OBJECTIVES

### 2.1 Land zones and land zoning

Land zoning, in the context of national and island planning involves the grouping together of units with similar properties and management requirements so that the protection or use of those units may be undertaken in a controlled and sustainable manner.

*Land zoning is therefore a process which is used to identify parcels of land (Land Zones) which have similar properties with respect to land use, to determine the way in which those lands might be managed and used in a sustainable manner and to formulate procedures to ensure that the use of such lands is determined in accordance with the principles of sound land management.*

#### 2.1.1 Land zones

Land zones are unique areas of land where a specified single resource utilisation or a combination of resource uses may be undertaken in accordance with the management guidelines and resource use policies as defined. In general terms the definition of a land zone is:

*An area of land where the predominant and agreed land uses are compatible with the capability of the land to support those land uses in a sustainable manner in accordance with sound land management practices, and in accordance with national land use policy as defined in respect to the need for development and for conservation.*

#### 2.1.2 Land zoning

The process of land zoning involves the identification, definition and spatial presentation of land zones and the establishment of procedures to manage the land uses which may take place.

Land zoning must take account of:

- the suitability of the land to support and sustain productivity or lifestyle through the application of sound land management and land and biotic resource conservation practices;
- National policy in respect to land rights and priorities for conservation and development;
- the current land use pattern whether officially sanctioned through land allocations, traditional rights or illegal occupation; and
- the social and cultural customs and customary land tenure rights of the land owners and their communities.

## 2.2 Objectives of land zoning

### 2.2.1 The purpose of land zoning

Land zoning is carried out in most countries as a means of ensuring that land resources are used in a controlled and sustainable manner. The purpose of land zoning then is:

*to group together lands of similar capability and therefore similar management requirements in order to lay down specific guidelines as to use of that land in order to maintain the quality and character of the land.*

### 2.2.2 Requirements for land zoning

For land zoning to be effective the following actions need to be implemented:

- the range of uses to which the land may be put must be listed and agreed;
- evaluation of the suitability of the land, in relation to specified management systems, for each of these land uses.
- formulation of a land use policy with respect to:
  - *priorities for land use,*
  - *compatibility between land uses, and*
  - *resolution of land use conflicts*
- a procedure for enforcing conformity with the land use policy formulated and the resultant zonation.

## 2.3 Products of land zoning

### 2.3.1 Land zoning materials

Land zoning does *not* produce a land use plan. Land zoning:

*identifies those areas which are best used for a single or range of compatible uses on the basis of the suitability of the land for those uses, the management practices to be adopted and the national policy on land use.*

The approach to land zoning as proposed for Rarotonga will produce:

- a map (at a scale of 1:10,000) showing the recommended distribution of land zones;
- maps at a similar scale showing the distribution of land for which there may be a need for some form of environmental protection, or where there is a potential risk to the land and the uses to which that land may be put (and hence investment);
- maps indicating proposed future land policy options and areas where some form of intervention is needed to resolve current land use conflicts; and
- a document detailing the purpose for which each land zone has been developed and the land use activities which may occur within that zone.

### 2.3.2 Assistance to national planning from land zoning

Land zoning is designed to support the evaluation of land suitability for particular purposes. Additional benefits of land zoning might include:

- provision of a strong land suitability base for upgrading current land and soil resources information;
- a base for the location of future developments and an indicative range of the development options acceptable within the areas identified;
- confirmation of the boundaries of protection areas and indication of the need to make boundary adjustment based on land suitability, land use and environmental sensitivity;
- an indication of the data needs to support more detailed future planning; and
- a basis for the formulation of rules/policy for land management and the legislation to enforce that policy.

### 2.4 Land zoning methodology

The steps in developing the land zoning map for Rarotonga and the associated zone guidelines are as follows:

- Collation/compilation of the biophysical spatial data sets;
- MoW provide boundaries of the Rau, administrative districts and the marine zones within the lagoon;
- Develop the land zone categories and legend for Rarotonga;
- Using the high resolution Quickbird satellite imagery as the base map (1 : 10,000 scale) plot the land zones according to the legend; and
- Develop the descriptive guidelines for each land zone and include these into a report for public scrutiny and discussion.

The draft legend for the Rarotonga land zoning map is given in Table 1.

## TABLE 1: LEGEND - Rarotonga land zoning map

1. Quarrying
  - Approved for coral sand mining (to come)
  - Approved for rock aggregate exploitation (to come)
2. Urban Areas
  - Commercial use and multi-purpose development
  - Light industrial development
  - Moderate density residential
  - Nucleated settlement areas in rural zones
3. Tourism
  - Commercial development (hotels, motels, etc.)
  - Recreational tourism
  - Cultural, historic and sacred sites
4. Agricultural lands
  - Small holder commercial cropping
  - Wetland taro production
5. Water conservation and biodiversity
6. Inland areas protected for limited and approved land uses (includ. areas for nature conservation)
7. Forestry
  - Exotic plantations
  - Reforestation
8. Protected areas
  - High mountains
  - Lagoon (include. Motus)
  - Coastal foreshore
  - Coastal high hazard areas
  - Rauí
  - Marine areas within the lagoon

## 3 ZONE DEFINITIONS AND GUIDELINES

### 3.1 Quarrying

The major quarrying activities are identified on the basis of their potential environmental impact.

#### 3.1.1 Coral Sand Mining

Increasing demand for coralline sand mined from the relict beach strand for concrete and construction purposes. There are no regulations to control exploitation of sand on private land and this is an arrangement between the contractor and the land owner to mine sand. The excavated site is commonly used for solid waste disposal. Sand mining directly from beaches ceased in 1997, the exception being the removal of coral cobbles and boulders from the northern coast foreshore for septic tank soak pits. In the absence of regulation, sand mining cannot be zoned, other than that sand mining is not permitted landward within 30m of mean high water mark (Environment Act 2002).

#### 3.1.2 Aggregate Mining

Exploitation of basic volcanic rock aggregate resources from the ground for hard aggregate after crushing. Quarry sites require access and sufficient area for deposition of overburden.

Quarrying activities are subject to the EIA process and, given approval by Environmental Services, require a management plan that would be executed under the Environmental Act 2002.

### 3.2 Urban Areas

The intent of urban zoning is to demarcate existing urban areas comprising housing, village settlements and supporting commercial and infrastructure and make provision for growth and future development.

#### 3.2.1 Commercial Use and Multi-purpose Development

Privately owned or operated facility or place of business open to the public for sale of goods and services. Examples include: restaurants, taverns, offices, retail stores, and car parks. Public facilities offering similar goods and services are also defined as commercial use. Avarua is the only urban centre of note and is the business, economic and governmental hub. Small nodes of development occur at Nikao, Arorangi, Titikaveka, Ngatangiia and Matavera. These also function as social and business sub-centres for the island.

#### 3.2.2 Light Industrial Development

This category includes multi-purpose and light industrial activity. It does not include factories that are associated with individual, isolated agro-industrial (e.g. noni factory) enterprises in rural areas, nor does it include small cottage industries. These small and medium scale

operations are considered to have minimum adverse effect on the environment. The primary industrial estate is located at the east end of the Airport.

The economic link that ties Rarotonga and the nation to the rest of the world is through the International Airport and the harbour at Avatiu. It is logical for the designated industrial area to abut the Airport and Avatiu port. This category also includes areas set aside for solid waste disposal and areas for disposal and treatment of urban waste.

### **3.2.3 Moderate Density Residential**

The lower regions circumscribing the entire island are shown to be entirely moderate density, that is to say that single-family detached housing will still be virtually the only dwelling unit being built, as well as a patchwork quilt of other land use types at all sorts of intensity levels. The single family home on its 1000m<sup>2</sup> lot has been the preferred housing type on Rarotonga.

### **3.2.4 Nucleated Settlement Areas in Rural Areas**

This zone provides for new residential communities in accordance with approved building ordinances. Inland Rarotonga is primarily steeply sloping land. Residential development can occur in this area on parcels of land with slopes less than 11°. It is envisaged that these areas would be developed by a single developer – laying on all the infrastructure (roading, sewerage and utilities). It provides for a different type of residential growth and might see nucleated settlements of up to 20 residencies.

## **3.3 Tourism Activities**

### **3.3.1 Commercial Development (hotels, motels, etc.)**

This activity includes existing tourist accommodation and related service areas and recreational facilities that are normally either located adjacent to existing tourist areas or in areas with special aesthetic/scenic interest or with high recreational potential. It also recognizes land for commercial tourism that would take place in areas to be set aside for expansion or new development.

Development would include the construction of hotels and resorts and related facilities for foreign tourists. Major recreational developments such as golf courses and other sports and leisure facilities would be included where the areas proposed are not immediately adjacent to established urban areas.

One of the primary reasons for defining a commercial tourism development zone is to control the social impacts of tourism. Existing commercial facilities need to be identified and mapped then a development zone for future growth designated.

The Tourism Master Plan recommends the adoption of an internationally recognized environmental accreditation scheme for use in the Cook Islands. Elements in this scheme, designed to provide practical assistance to tourism operators, include: use of alternative sources of energy; conserving energy (including electricity and liquid fuels); applying water conservation and recycling techniques; and minimizing production of solid wastes.

Tourism also plans to develop enforceable mechanisms to control land use including: protection of the inland areas; coastal protection (both in terms of building within 30m of high water mark and the construction of structures); hazard zone management; vegetation

protection; landscape standards; hillside development standards; protection of wetlands; and enforce appropriate sewage treatment and discharge standards.

### **3.3.2 Recreational Tourism**

The pattern of land ownership in the Cook Islands means there is very little land held in public ownership for conservation or recreation purposes. This activity has been established to preserve and provide for open space and recreational amenities and to allow for tourists to enjoy the natural and cultural heritage of the country. This activity should be confined to regions of high aesthetic/scenic interest or with special recreational character and which will sustain temporary pressure from small tourist groups but are not suitable for the establishment of permanent facilities other than vehicle parking and toilet facilities. Future planning might be given to identifying potential nature reserves and making provision for a national park.

These areas may overlap into areas designated as conservation.

The Tourism Masterplan recommends that outstanding natural resources are protected and public access is secured. A transfer of ownership is considered not to be needed to provide long-term protection as this could be organized through a range of mechanisms including the purchase of easements, promotion of covenants, etc.

Tourism seeks to develop a network of national parks and reserves including a Rarotonga Cloud Zone Park, Manuae, Suwarro and Takutea; secure public access to the beaches and lagoons by the establishment of reserves and access points at prime locations; protect traditional access ways to beaches, in particular easements between properties; and secure the rights of public access to the inland tracks.

### **3.3.3 Cultural, Historic and Sacred Sites**

It is important that all known cultural, historic and sacred sites are identified and mapped so as to form an integral part of the Rarotonga land zoning map. These sites, buildings, structures and artefacts need to be protected and preserved. Guidelines for the protection and management of these sites should be prepared. Development activities should not disturb these identified sites and any development that potentially affects a site, the developer shall bear the cost of mitigating measures.

## **3.4 Agricultural Lands**

These lands are designated preferred agricultural use.

### **3.4.1 Smallholder Commercial Cropping**

Includes all forms of cropping which do not depend on irrigation. Included is the production of rained food crops and commercial agriculture.

This activity includes small holder commercial farms, mainly growing field crops (corn); vegetables (root crops, brassicas, cucurbits); fruit trees (citrus sp, papaya, noni); other fruits (banana, pineapple, melons); and subsistence tree crops (coconut, breadfruit) with free ranging chickens and small piggeries. Farmer groups may help with input supplies, marketing and simple processing techniques. Production is for local consumption and sale in local markets. Government involvement is in the form of research and extension services.

These lands include the following soil series – Avana, Takuvaine, Matavera, Pouara, Tikioki, Arorangi (Leslie, 1980) and are defined in the USDA Soil Capability Classification System as Soil Capability class I, II and III (Soil Survey Staff, 1951).

### **3.4.2 Wetland Taro Production**

This land use category involves the cropping of natural wetlands supplemented with irrigation and/or drainage techniques.

This activity includes labour intensive production of taro in areas of wetland that circle Rarotonga between the beach strand and the inland terrace and fan systems. There are also restricted areas of terraced irrigated taro on low angle fans.

These wetlands act as natural filters of runoff from the interior. Described as Vaikai soils (Leslie, 1980), they are very poorly drained with a high water table and slow surface runoff. They are an effective buffer zone reducing silt and clay from entering the lagoon system during times of prolonged flooding. Wetlands are defined in The Environment Act 2002 and described further for management purposes in the Environmental Policy for the Wetlands (NES, 2002).

## **3.5 Water Conservation and Biodiversity**

This zone is established primarily to prevent accelerated erosion and stabilise soils on steep slopes in order to protect sources of water for domestic, agricultural or industrial uses and reducing flooding and siltation in downstream areas. The designated zone covers all the watershed land above the water intakes. Potable water supplies for Rarotonga come from these watersheds. The water intakes connect to the island's water reticulation system supplying the residences, business as well as growers.

There are three major catchments on Rarotonga – Avana, Takavaine and Avatiu – with a catchment area of 16km<sup>2</sup> of 37% of the sloping land. Also, three smaller catchments – Turangi, Tupapa and Papua – with a total catchment area of 8km<sup>2</sup> or 18% of the sloping land and a further 18 smaller catchments that are drained by as many streams on the island.

Included in the zone are lands that are environmentally sensitive, naturally or culturally unique, or have any other attributes that should be considered for protection from any activity that would significantly alter their environmental integrity, balance or function.

Clearly there is a need to preserve these ecosystems in order to protect: rare or endangered species; and acceptable level of biodiversity; and areas of outstanding scenic beauty. The Takitimu Conservation District is an example of a designated protected area to manage the endangered Kakerori or Rarotonga's flycatcher. Similarly, the active protection given the seabirds on the uninhabited islands of Tukutea and Suwarrow. The people of Atiu have protected Tukutea over the last 100 years and Suwarrow has been a national park since 1978.

## **3.6 Protected for Limited and Approved Land Uses (incl. areas for nature conservation)**

This zone covers the remaining interior sloping lands that are not designated as water supply catchments (5.1 above). The landscape and vegetative cover is similar and these areas must

be managed with care. There has been uncontrolled development in recent years with sediment derived from these areas discharging into the lagoon during flood events, often destroying corals and marine life. Proposed land uses should be subject to EIAs and approval given by the NES.

## 3.7 Forestry

Approximately 60% of the total land area of the Cook Islands is covered by forest. This is a relatively high coverage. However over the years there has been progressive removal of forest.

In this category the activities relate to the planting of forest trees either for eventual timber production or with the objective or re-establishing an effective cover to control land degradation.

### 3.7.1 Timber Plantations

This zone includes the establishment of commercially viable timber plantations for eventual harvesting. Included are areas where afforestation has taken place with a short term rotation cycle. The tree species involved are predominantly *Pinus caribaea* with some areas of Eucalyptus species. The viability of harvest, logging timetable and timber use is yet to be determined.

### 3.7.2 Reforestation

This zone comprises afforestation or reforestation (replanting) where the primary purposes are conservation of critical lands. Again the same exotic species have been used. While the harvesting of the crop is uncertain (due to not having a tanalising facility in the country) the canopy will provide a suitable nursery environment for native species to establish and eventually take over.

## 3.8 Protected Areas

### 3.8.1 High Mountains

The development of a Rarotonga Cloud Zone Park has intrinsic merit in terms of formal protection of outstanding landscape features and extrinsic benefits in terms of developing geotourism attractions. The question is what area of land to zone? Proposals for a Rarotonga Highlands Park were made by the Water Authority and ADB in 1995, as well as a similar recommendation from the Land Commission in 1996. These proposals involved an area of 2,500ha and took in all land above 150m above sea level.

In 1998 a NZODA proposal proposed an area of 120ha above 400m above sea level which featured some of the highest peaks in the central island region. These lands are under Native Customary Ownership but vested in the Crown.

### 3.8.2 Lagoon (includ. motus)

The boundaries of the lagoon extend from the foreshore mean high water mark with its seaward limit the outer edge of the reef at low tide. The zone comprises 17.3% (14km<sup>2</sup>) of the

total area of Rarotonga. The marine ecology has been described as having degraded over the last 50 years. The lagoon is of crucial importance. It provides a source of food, recreation and also indirectly provides employment through jobs in the tourism industry.

Protection and management required strict controls on lagoon activities such as the removal of materials, building of inappropriate structures and disposal of waste. More importantly, sustainable land management practices should be implemented with strict controls over land-based activities that affect the quality of water that discharges into the lagoon. The motus at Muri, as part of the lagoon system, must be protected and could be enhanced through planting of appropriate native species.

### **3.8.3 Coastal Foreshore**

Comprising only an estimated 3.1% (2.5km<sup>2</sup>) of the total area of Rarotonga, the foreshore comprises all the beach areas of the island. Most developmental activities are found in the proximity of the foreshore. On the exposed northern coast (Te-Au-o-Tonga Vaka to Ngatangiia) the foreshore areas have high coastal ridges and are characterized by coarse coral boulders, cobbles and gravels. This reflects high seas caused by cyclones and tropical storms.

On the west and southern coasts, i.e. Puaikura Vaka and the rest of Takitumu Vaka, the coral particles are well sorted sands and wider, gentler sloping beaches.

The foreshore is defined as the area between the mean high water mark to a landward distance of 30m.

The foreshore now has very high real estate value. With the continuing importance the tourist industry places on the foreshore, the rate of hotel/motel development has greatly increased. As a recreational asset, it provides for most of the private sector employment in the tourism sector. All the major tourist resorts are found in the foreshore area.

Thus, the foreshore is a crucial natural resource asset and must be conserved and managed in a sustainable manner protecting the landscape features, its natural geological functions, recreational assets, etc. Foreshore management objectives would be to protect beaches/ecosystems from further erosion and degradation and preserve the natural aesthetic values of the foreshore.

### **3.8.4 Coastal High Hazard Areas**

These areas are subject to high velocity waters including, but not limited to, storm surges related to cyclonic events or tsunamis. An accurate map which identifies areas that are vulnerable from the impacts of these natural disasters.

### **3.8.5 Raui Areas**

MoW to provide boundaries.

### **3.8.6 Marine Areas within the Lagoon**

Health/Marine Resources to provide boundaries.