



PERIODIC REPORT
ON THE APPLICATION OF THE WORLD HERITAGE
CONVENTION

SECTION II

State of Conservation of specific World Heritage properties

State Party: AUSTRALIA
Property Name: Wet Tropics of Queensland

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II.1. INTRODUCTION

a. State Party

Australia.

b. Name of World Heritage property

Wet Tropics of Queensland.

c. Geographical coordinates to the nearest second

Between latitudes 15 degrees 39 minutes south and 19 degrees 17 minutes south, and longitudes 144 degrees 58 minutes east and 146 degrees and 27 minutes east.

d. Date of inscription on the World Heritage List

9 December 1988.

e. Organization(s) or entity(ies) responsible for the preparation of the report

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f. Date of report

g. Signature on behalf of State Party

II.2. STATEMENT OF SIGNIFICANCE

a. Criteria

The Wet Tropics of Queensland met all four World Heritage criteria for a natural property. The criteria current at the time of listing (1988) and specified in the nomination [1] were:

1. Outstanding examples representing the major stages of the earth's evolutionary history
2. Outstanding examples representing significant ongoing geological processes, biological evolution and man's interaction with his natural environment
3. Superlative natural phenomena, formations or features or areas of exceptional natural beauty
4. The most important and significant natural habitats where threatened species of plants and animals of outstanding universal value from the point of view of science and conservation still survive.

b. Statement of Significance

A summary 'statement of significance' was not included at the time of the Wet Tropics of Queensland nomination [1].

The Wet Tropics of Queensland contains one of the most complete and diverse living records of the major stages in the evolution of land plants, from the very first land plants to the pteridophytes, gymnosperms and angiosperms. The Wet Tropics of Queensland contains most of the relicts that exist on Earth of the flora of the forests which were part of the super continent Gondwana. The rainforests which constitute about 80% of the Property have more taxa with primitive characteristics than any other area on Earth. One of the outstanding features of the Wet Tropics of Queensland is that it contains a high diversity of ancient taxa representing long evolutionary lineages which preserve a greater degree of evolutionary heritage than places with a similar number of species but containing a succession of closely allied forms.

The Wet Tropics of Queensland provides an unparalleled living record of the ecological and evolutionary processes that shaped the flora and fauna of Australia over the past 415 million years when first it was part of the Pangaeian landmass, then the ancient continent Gondwana, and for the past 50 million years an island continent. During this 415 million years of evolution, the processes of speciation, extinction and adaptation have been determined by history, particularly continental drift and cycles of climatic change. The Wet Tropics of Queensland contains a unique record of a mixing of two continental floras and faunas. This mixing occurred following the collision of the Australian and Asian continental plates about 15 million years ago. This collision was a unique event in that it mixed two evolutionary streams of both flora and fauna, in some cases of common origin, that had been largely separated for at least 80 million years. As a centre of endemism, the Wet Tropics of Queensland provides fundamental insights into evolutionary patterns both in isolation from, and in interaction with, other rainforests.

The ancestry of all of Australia's unique marsupials and most of its other animals originated in rainforest ecosystems of which the Wet Tropics of Queensland still contains many of the closest surviving members. The Wet Tropics of Queensland contains one of the most important living records of the history of marsupials and songbirds. The Riversleigh fossil deposits (Australian Fossil Mammal Sites (Riversleigh/Naracoorte) World Heritage Area) are rich in marsupial fossil taxa closely related to those still living in the rainforests of the Wet Tropics of Queensland which represent the best surviving equivalent of the Oligo-Miocene rainforests of Riversleigh.

The Wet Tropics of Queensland is one of the most significant regional ecosystems in the world, with outstanding features of natural beauty and magnificent sweeping landscapes. Within the boundaries of the Property are some superlative scenic features highlighted by extensive sweeping forest vistas, wild rivers, waterfalls, rugged gorges and coastal scenery. The site also provides a terrestrial continuum with the Great Barrier Reef.

The Wet Tropics of Queensland holds an intact flora and fauna with hundreds locally endemic species restricted within its boundaries and provides the only habitat for numerous rare or threatened species of plants and animals.

c. Justification for listing

(i) *Update of original nomination dossier*

At the time of listing of the Wet Tropics of Queensland the wording and emphasis of the Criteria for nomination differed from the current natural value Criteria. Attachment 1 updates the information provided in the original nomination dossier [1] based on the present version of the Criteria and supported by more recent research findings. In this report the Wet Tropics of Queensland World Heritage area is referred to as the Property, while the broader biogeographic region of which the Property is part, is referred to as the Wet Tropics or the region.

(ii) *Comparison with other areas*

The rainforests of the Property are small in size when compared to the rainforests of other parts of the world. On a world scale the Wet Tropics rainforests have affinities from a topographical and climatic basis with upland tropical forest localities in the upper reaches of the Amazon and Congo basins and in the uplands of the east coast of Madagascar, Brazil and New Guinea [2]. The Property contains tropical forests at their latitudinal and climatic limits and are thus floristically and structurally less diverse and less species rich than those found in the large Indomalayan and Amazonian blocks. Unlike most other tropical evergreen equatorial forests, the Wet Tropics is subject to a short dry season which is another unique factor which influences its composition and structure.

The Wet Tropics is distinct from other tropical forests in that it has a strong Gondwanic element with a large number of plant and animal taxa with primitive characteristics (most notably amongst the angiosperms). In an evolutionary context, the Wet Tropics of Queensland is a living floral and faunal museum - a relict of the Gondwana era of 100 million years ago. Although some of these elements also occur in New Caledonia and to a smaller extent in New Guinea, the Wet Tropics are of greater significance on this score and also display a co-evolution with related sclerophyll floras.

Much of the world's humid tropics is of recent origin, and although many areas possess exceptional species richness their level of endemism is generally quite low. The long-isolated ancient floras of New Caledonia, Madagascar and the Wet Tropics of Queensland, however, have exceptionally high levels of endemism. The Wet Tropics, as a centre of endemism, is unique being part of an ancient continental as opposed to island landscape. The Wet Tropics is second only to New Caledonia in the number of endemic rainforest plant genera conserved per unit area (43 genera and 500 species). Of the endemic genera, 75 per cent are monotypic and none contain more than a few species. The Wet Tropics is the only habitat for about 350 species of plant and over 80 species of vertebrate animal that are regarded as rare, vulnerable or endangered.

The setting of the Wet Tropics adjacent to a fringing reef is another unique feature found only in a few Pacific Islands, in Indonesia and Belize [2]. In no other case would there be the prospect of protected tropical forest World Heritage site alongside a major marine/reef World Heritage site.

Table 1 indicates how the size of the Property (894,420 ha) compares to other World Heritage tropical rainforest areas.

Table 1. Size comparisons of World Heritage tropical rainforest properties.

Major rainforest type	Country	Size (ha)
<i>Lowland rainforest</i>		
Salonga National Park	Zaire	3,600,000
Lorentz	Indonesia	2,500,000
Okapi Faunal Reserve	Zaire	1,372,625
Wet Tropics of Queensland	Australia	894,420
Virunga National Park	Zaire	790,000
Thungyai-Huai Kha Khaeng	Thailand	622,200
Kahuzi-Biega National Park	Zaire	600,000
Sian Ka'an	Mexico	528,000
Dja Faunal Reserve	Cameroon	526,000
Rio Platano Biosphere Reserve	Honduras	500,000
Tai National Park	Cote d'Ivoire	330,000
Ujung Kulon National Park	Indonesia	78,359
Los Katios National Park	Colombia	72,000
Tikai National Park	Guatemala	57,600
Sinharaja Forest Reserve	Sri Lanka	8,864
<i>Montane rainforest</i>		
Canaima National Park	Venezuela	3,000,000
Talamanca/Amistad	Costa Rica/Panama	791,592
Sangay National Park	Equador	271,925
Machu Picchu	Peru	32,592
Mount Nimba Reserves	Cote d'Ivoire	18,000
Mome Trois Pitons	Dominica	6,857
<i>Sub-montane rainforest</i>		
Manu National Park	Peru	1,532,806
Darien National Park	Panama	597,000
Rio Abiseo National Park	Peru	274,520

The size of the Wet Tropics of Queensland World Heritage Area is well above the size range postulated by Zuidema *et al* [77] as being ecologically viable in the medium term.

Within the Australian context, the Wet Tropics region is a very distinctive bioclimatic/landform unit. Specifically, unlike much of continental Australia, the region has exceptionally steep environmental gradients and patterns and has the country's greatest variation in topographical relief. Compared to the sub-tropical and temperate forests found to the south in New South Wales, Tasmania and southern Queensland, the Wet Tropics contains a strong Indomalayan component and comprises a greater diversity of families, genera and species. The Wet Tropics region, although accounting for only 0.26 percent of the total area of the Australian continent, conserves a large proportion of Australia's biodiversity [3] (**Table 2**).

Table 2. Importance of the Wet Tropics to Australia's biodiversity

Taxonomic group	Percentage of Australia's total
Plants	
fern species	65
cycad species	21
conifer species	37
orchid species	30
vascular plant species	26
Animals	
mammal species including:	35
• marsupials	30
• bats	58
• rodents	25
bird species	40
frog species	29
reptile species	20
freshwater fish species	42
butterfly species	58

Within the Property there are over 2,800 known species of vascular plants, representing at least 1,037 genera and 221 families. Seventy-five genera are endemic to Australia and 43 are restricted to the Wet Tropics. Over 700 species are restricted to the Property [3]. The Wet Tropics possesses 41% of all Queensland's vascular plant species in slightly over 1% of the State's land area [3]

All these are indicators of the biological uniqueness of the area which sets it apart within the Australian and world context.

d. Additional information on significance since listing

(i) Natural Heritage

Additional or updated information on the natural values for which the Property was listed has been incorporated in the nomination update (Attachment 1).

(ii) Cultural Heritage

Although the Property was not listed for its cultural values the area between Cooktown and Cardwell contains the only recognised existing Australian Aboriginal rainforest culture. The oral pre-history of the surviving Aboriginal rainforest culture is the oldest known for any indigenous people without a written language [4].

Rainforest Aboriginal people have indicated they wish to have the Property recognised as a living cultural landscape. The Aboriginal view is that the natural values and cultural values cannot be separated. Cultural values include the living, continuous traditions of the Aboriginal peoples who are associated with the Wet Tropics. For this reason, Aboriginal people see their involvement in land management as essential to maintaining their culture.

Aboriginal occupation of the Wet Tropics of Queensland is thought to date back to at least 40,000 years ago [5]. The northern tribes (Barrineans) are considered to represent the first wave of the Aboriginal occupation of Australia, making theirs the oldest rainforest culture in the world [1]. Rainforest culture differed markedly from that of most other Australian Aboriginal tribes, with its heavy dependence on arboreal skills, everyday use of toxic plants and unique weapons [6]. Archaeological studies in Jiyer Cave in the Russell river valley have suggested occupation as far back as 5,000 years and the valley is believed to hold records dating back more than 10,000 years [7].

The Rainforest CRC is presently collating information and undertaking research into cultural values that will inform the case for a renomination of the Property, in whole or part, on cultural grounds.

II.3. STATEMENT OF AUTHENTICITY/INTEGRITY

a. Integrity

At the time of inscription, the condition of the Property ranged from pristine to various stages of regeneration resulting from a range of human activities. Human impact in the wider Wet Tropics region is relatively low compared to other tropical forest regions, with a large proportion of the region's forest cover originally present at the time of first European settlement remaining. The majority of the region's lowland and basalt tableland forest cover, however, has been cleared for agricultural purposes and large parts of the Property have been affected by selective logging [2].

Early timber cutters commenced the exploitation of red cedar (*Toona ciliata*) and kauri pine (*Agathis* spp) in the region from 1874 and some of the more accessible parts of the Property would have been affected. Following the establishment of the Department of Forestry in the 1930s a structured timber industry was established based on the selective removal of commercial timber species. At one time or another about 160 of the region's rainforest species have been milled. Long-term average yields from the Property prior to listing were 63,000 cubic metres of timber per annum from a productive area of 158,000 hectares. Up until listing, therefore, parts of the Property had been available to a 70 year history of selective logging of varying intensity [8]. Nevertheless, much of the Property is in a virgin condition having been inaccessible to logging [2].

At the time of inscription, clearings within the Property totalled 7,538 ha most of which were associated with the provision of community infrastructure [3] (**Table 3**). Linear service corridor clearings accounted for over half this total (4,475 ha) of which 2,406 ha are still maintained for the provision of community and management access and electricity distribution. Patch clearings accounted for a further 2,733 ha, the largest contributor (2,129 ha) being three artificial dams and impoundments (Paluma Dam, Koombooloomba Dam and Copperlode Falls Dam) which were present prior to listing. Edge anomaly clearings include narrow slivers of agricultural land which were included in the nomination primarily to produce a sensible management boundary. These clearings and disturbances affect natural integrity through internal fragmentation and edge effect impacts. Other disturbances to integrity include incursions by exotic plants, animals and diseases.

Table 3. Extent of habitat loss within the Property at the time of listing.

Clearing Type	Total Area (ha)
Linear service corridor clearings	
powerlines	772
roads	3679
railways	22
cableways	2
total linear clearings	4,475
Patch clearings	
quarries	43
inundation (dams)	2129
recreation areas	45
settlements	120
communication facilities	3
fire degraded hill slopes	105
other	288
total patch clearings	2733
Edge anomaly clearings	
paddocks	197
sugarcane	65
pine plantations	36
orchards & plantations	32
total edge anomaly clearings	330

For further details of contemporary pressures on the integrity of the Property refer Section II.5 (Factors Affecting the Property)

b. Maintenance and enhancement of values

Logging has been a prohibited activity in the Property since 1987 and infrastructure associated with this industry has been phased-out, including the closing of over 6,500 km of unformed logging roads and snigging tracks which had a combined cleared area footprint of approximately 2,070 ha.

There have been no clearings associated with new powerline or road construction within the Property since listing (refer to Sections II.5c (iii), (iv) for more details).

There has been a progressive conversion of land tenures within the Property to national park (eg from 14% at time of listing [2] to 32% in 2002) and a progressive reduction in the area of various lease tenures (refer to Section II.4e for more details)

A statutory management plan for the Property has been in place since 1998. The Plan has identified 461,620 ha as being remote from human disturbances and zoned to ensure its protection. A further 414,372 ha has been identified as in a mostly natural state and has been zoned to promote its restoration wherever practical or opportunities arise. A further 18,259 ha has been identified which accommodates existing infrastructure needed for community services. Such areas have been zoned and regulated to ensure that the impact of activities associated with community services is managed to minimise the effect on the integrity of the Property (refer to Section II.4a (i) for more details).

In the Daintree section of the Property a strategic freehold land acquisition program has been implemented. The program objective was to secure protection of World Heritage values adjacent the Property and protect habitat connectivity. Approximately 2,500 hectares of land has been procured through voluntary surrender agreements or direct purchase. This program, initiated in 1994, has involved the expenditure of over \$22 million (refer also Section II.4g; **Fig. 2**). Other significant parcels of land have been identified in the Daintree Futures Study [9] and will continue to be targeted for purchase or conservation covenanting through other government and private sector funding initiatives.

Conservation management agreements with land-holders are designed to ensure that activities on private land are sympathetic with maintaining important habitat and afford protection for wildlife (refer to Section II.4b,e for more details). Other significant conservation measures have included recovery programs for the endangered southern cassowary, stream dwelling frogs, mahogany glider, northern bettong and spotted-tailed quoll (refer to Sections II.5c (xii), (xiii) for more details) and pest control programs (refer to Section II.5c (vii), (viii) for more details).

There is an active program of rainforest rehabilitation occurring within the region supported or encouraged by the Authority (refer to Section II.5c (i), (ii) for more details).

c. Boundaries review

No formal revision of the boundary has occurred since the Property was listed. The Authority has indicated that a review of the boundary might be considered appropriate at the time that the Wet Tropics Management Plan is due for review in 2005.

d. Buffer zone/mechanisms

There are more than 2500 individual blocks of land adjoining the Property's 3000 kilometre boundary. Both Queensland's *Wet Tropics World Heritage Protection and Management Act 1993* [10] (Wet Tropics Act) and the statutory *Wet Tropics Management Plan 1998* [11] (Wet Tropics Plan) apply only to lands within the boundaries of the World Heritage Area and not to neighbouring properties. However, a co-operative approach to management is being actively pursued with neighbours in an attempt to maximise the benefits and minimise any negative impacts (both for neighbours and the Property). This includes co-operative approaches to management issues such as control of feral pigs, weeds and fire management.

The Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) [12] has provisions to control activities that occur outside the boundaries of the World Heritage properties which have the potential to significantly impact upon World Heritage values (refer to Section II.4a(i) for more details).

Co-operative management agreements are also actively canvassed with land holders, Aboriginal peoples and other parties both within and outside the Property as a means of achieving sympathetic management of lands adjoining the Property (refer to Section II.4a(i), II.4c(iv) for more details).

The Wet Tropics Management Authority provides advice to local government planning processes in accordance with the *Integrated Planning Act 1997* [14] as well as regional planning exercises (refer to Sections II.4a(ii), II.4b(ii) for more details).

In response to the findings of a comprehensive survey of landholders within or neighbouring the Property in 1999 (refer to Section II.6b for more details) the Authority has instigated a good neighbour program including the formation of a Landholder and Neighbour Liaison Group chaired by an Authority Board member to promote communication and cooperation.

All of the above mechanisms can be viewed as providing a level of 'buffering' and protection for the Property's World Heritage values which may be impacted from activities adjacent the Property.

II.4. MANAGEMENT

a. Statutory protective measures

(i) World Heritage legislation

Commonwealth legislation

The Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) [12] establishes management principles intended to promote national standards of management, planning, environmental impact assessment, community involvement, and monitoring for all of Australia's World Heritage properties. The EPBC Act regulates actions that will, or are likely to have, a significant impact on the world heritage values of a declared world heritage property. This includes actions that occur outside the boundaries of a world heritage property. Actions which are taken in contravention of the EPBC Act may attract a civil penalty of up to \$5.5 million, or a criminal penalty of up to \$46,200 or, in extreme cases, up to 7 years imprisonment. An 'action' includes a project, development, undertaking or any activity or series of activities.

State legislation

The *Wet Tropics World Heritage Protection and Management Act 1993* [10] together with its subordinate statute, the *Wet Tropics Management Plan 1998* [11] provide the legal framework and statutory mechanisms for management of the Property. In general, the legislation regulates activities within the Property that have the potential to impact on World Heritage values including destruction or disturbance to native vegetation, watercourses or earth [16].

Wet Tropics Management Plan

The regulatory aspect of the Plan is based on five broad approaches:

- zoning the area according to the relative integrity of localities;
- prohibiting a range of activities which could potentially impact on the Property, in particular activities which destroy vegetation, result in land degradation or affect streams;
- the Plan provides a limited relaxation of this general prohibition by conditionally allowing some specified activities;
- it regulates other activities through a permit system;

- the Plan also provides for negotiated agreements which may enable activities which might otherwise be prohibited to be undertaken provided the agreement ensures that there is some contribution to the achievement of the Primary Goal of management of the Property.

Four key components of the statutory Plan include:

- a zoning scheme (**Table 4**),
- a permit system,
- assessment guidelines and codes of practice
- co-operative management agreements.

The Plan divides the Property into four management zones, based on a “distance from disturbance” model

Table 4. Zoning scheme summary

	Zone A	Zone B	Zone C	Zone D
Physical condition	Remote from disturbance and in a mostly natural state.	Not remote from disturbance but still in a mostly natural state.	Land on which or adjacent to which there is existing infrastructure needed for community services.	Land on which there are, or are proposed to be, significant developed facilities to enable visitors to appreciate and enjoy the Property.
Physical and social setting	A natural area remote from disturbances associated with modern technological society. Visitors may expect opportunities for solitude and self reliance without an obvious management presence.	A natural area, which may be undergoing recovery or rehabilitation towards its natural state. An area where a visitor may expect opportunities for solitude and self reliance with a limited management presence.	An area with some disturbance by activities associated with modern technological society. A visitor may expect low key opportunities for nature appreciation and social interaction in a natural setting. Management presence may be obvious.	A mostly natural area with visitor facilities integrated into the surrounding landscape. Visitors may expect many opportunities to appreciate and enjoy the Property in a natural setting. A management presence may be obvious.
Management intent	To protect land in its natural state. If land is disturbed, to remove disturbance and restore land to its natural state.	To restore land to its natural state wherever practical, by relocating disturbances to land where they will have less impact, or to rehabilitate the land over time where opportunities arise.	To accommodate community services. To ensure that the impact of activities associated with community services is managed to minimise the effect on the integrity of the Property.	To accommodate developed visitor facilities to enable visitors to appreciate and enjoy the Property. To ensure that the impact of visitor infrastructure is managed to minimise the effect on the integrity of the Property.
Total Area	461,620 ha	414,372 ha	18,259 ha	168 ha

Assessment guidelines and codes of practice have been prepared which are relevant to decision making under the Plan. Once a guideline is approved by the Board decision makers must have regard to the information in them, when issuing a permit or other activity.

Co-operative management agreements are voluntary agreements negotiated with landholders who are willing to manage their land in a way that will help the World Heritage Area. In return, they receive assistance from the Authority. The result is a cooperative partnership with mutually satisfying outcomes.

The Plan is administered by the Wet Tropics Management Authority but it also establishes other agencies such as QPWS as permit issuing bodies.

(ii) Other relevant State legislation

Under the *Nature Conservation Act 1992* [17] the Queensland Parks and Wildlife Service (QPWS), has primary responsibility for nature conservation in Queensland including:

- dedication and declaration of protected areas;
- protection of native wildlife and habitats;
- regulation of the use of protected wildlife;
- managing protected areas;

- managing commercial tour operations (including permit issue); and
- maintaining infrastructure and public contact in areas under its management.

The *Vegetation Management Act 1999* [19] together with the *Vegetation Management Regulation 2000* [20], makes vegetation clearing on freehold land assessable under the *Integrated Planning Act 1997* [21] while the *Land Act 1994* [22] and its associated regulation [23] governs vegetation management on leasehold and other state land. The Queensland Government has begun implementing vegetation clearing controls [18] on lands outside the boundaries of the Property. Although there is no blanket ban on clearing in the region, landholders now require approval in most cases to clear native vegetation on freehold land and leasehold land. This will aid in the buffering and protection of the Property's natural values.

The *Integrated Planning Act 1997* (IPA) [14] establishes an 'integrated development assessment system' (IDAS). IDAS is a framework that establishes a common statutory system for making, assessing and deciding development applications. The Authority is referred to for advice regarding any reconfiguration of a lot, or a material change of use on land adjacent the Property where the local government considers the development is not of a minor nature.

b. Planning policies and strategies

(i) Specific World Heritage strategies

Protection through partnerships

The Authority operates under a policy document, *Protection Through Partnerships* [24], which outlines policies, guidelines and actions for achieving desired management outcomes. **Table 5** lists the key policy areas covered in this document. In addition, as the need arises, the Wet Tropics Board produces policy statements to guide and clarify decision making.

Table 5. Key components of *Protection Through Partnerships*

Management Processes	Conservation Practice and Land Protection	Presentation, Visitor Management and Enjoyment	Managing Resource Use
<ul style="list-style-type: none"> • management partnerships • codes of practice • Aboriginal interests • co-ordinated planning • land tenure • boundary management 	<ul style="list-style-type: none"> • flora and fauna conservation • feral animals • weeds and diseases • rehabilitation • fire • scenic management • cultural heritage 	<ul style="list-style-type: none"> • presentation, information and interpretation • visitor research • walking opportunities 	<ul style="list-style-type: none"> • collecting plants and animals • private land use • defence use • communication facilities • grazing • beekeeping • farming • water storage, diversion and extraction • electricity infrastructure • roads and access

Nature Based Tourism Strategy

In August 2000 the Authority released a Nature Based Tourism Strategy to provide the basis for tourism development and management in the Property. The Strategy divides the Property into 12 tourism precincts according to their distinctive features and tourism focus. The Strategy encourages cooperative partnerships between the tourism industry, managing agencies, indigenous people, conservation groups and the community.

Wet Tropics Walking Strategy

In November 2001 the Authority released the Wet Tropics Walking Strategy. The strategy identifies over 170 different walks in the region and aims to provide a coordinated approach to the management and development of an integrated walking trail system throughout the World Heritage area.

Conservation Strategy

In 2001 the Authority commenced development of a Wet Tropics Conservation Strategy for the Property. The Strategy will identify priority conservation measures required as a focus for directing management resources to address key conservation issues. The Strategy is scheduled for completion in 2003.

(ii) Other relevant strategies and plans

Local government planning

The Property falls within 14 local government jurisdictions. Local government is responsible for preparing and implementing local government planning schemes under IPA [21] and making decisions on development applications under associated Integrated Development Assessment Schemes. Local government also prepares local laws under the *Local Government Act 1993* [26].

Where there is inconsistency between a management plan prepared under the *Wet Tropics World Heritage Protection and Management Act 1993* and a local government planning scheme, the Wet Tropics Plan prevails over the planning scheme to the extent of the inconsistency.

All local government jurisdictions within the region have developed Pest Management Plans which identify and target the major environmental and agricultural weeds and pest animals found within different sections of the region.

As local government is the principal regulator of development (refer also section II.4a(ii) for more detail), it has an increasingly important role to play in promoting the conservation of native vegetation on private land surrounding the Property. In addition to the regulatory role delivered under IPA through land use planning, zoning and approval processes, a range of financial incentives and market-based mechanisms are becoming important means by which some local authorities in the region are supporting vegetation conservation outcomes on private lands outside the Property, through voluntary participation of landholders in conservation activities. A range of initiatives and activities are being undertaken by several local government authorities in the region which promote the conservation of native vegetation on freehold land within their jurisdictions. The councils of Johnstone Shire, Douglas Shire and Cairns City, in particular, have been developing innovative, positive, solutions which contribute to the retention of native vegetation.

Market-based incentives include the adoption of offset schemes which allow for increased use-rights on previously cleared portions of a property in exchange for protection of the vegetation on the remainder of the property.

Financial incentives such as rate deferral agreements are being used by a number of local government councils, as are conservation covenants which are contracts or legally binding agreements which restrict activities considered harmful to the conservation of the natural vegetation on a property.

These incentive initiatives have only been operating for a short period, and to date, the uptake by landholders has not been high, however these schemes and mechanisms do provide a financial contribution and share the costs of remnant native vegetation conservation and provide a powerful symbol and public recognition that landholders are undertaking activities that are in the community's interest.

FNQ 2010 Regional Plan

The non-statutory FNQ 2010 Regional Planning Process [25] was a co-operative, whole-of-government exercise involving Commonwealth, State and Local Governments, as well as business, tourism, environment, development, primary production, human services and Aboriginal and Torres Strait Islander groups. The resulting *FNQ Regional Plan* [25] provides a strategic framework to guide growth and development in the Wet Tropics region with due consideration given to environmental, social and economic opportunities and constraints. The *FNQ Regional Plan* and process has a pivotal role in guiding regional planning decisions under the *Integrated Planning Act 1997*, and provided a significant opportunity for World Heritage management interests to be properly considered within a regional context. Key initiatives of the *FNQ Regional Plan* include:

- a regional growth management strategy
- identification of priority biodiversity and rehabilitation areas within the region
- regional level studies with respect to water infrastructure demands and road access.

The Authority is represented on the FNQ 2010 Implementation Coordination Group.

Wet Tropics Natural Resource Management Plan (NRMP)

Preparation of the NRMP commenced in 2002. The plan will build on existing studies such as those produced as part of the FNQ 2010 Regional Planning Process (above). The NRMP will identify key natural resource management priorities within the region which in turn will form the basis for allocation of Commonwealth

funding under the Natural Heritage Trust. The Authority is represented in the NRMP process to ensure World Heritage issues and conservation priorities as espoused in the Conservation Strategy are properly recognised.

c. Aboriginal Interests

Aboriginal communities comprising over 25 Aboriginal language groups have associations with the Property. Aboriginal traditional owners have custodial responsibilities for managing their cultural heritage, which includes the natural environment. The preamble of the *Wet Tropics World Heritage Protection and Management Act 1993* states: “It is also the intention of the Parliament to acknowledge the significant contribution that Aboriginal people can make to the future management of cultural and natural heritage within the Property, particularly through joint management agreements”. The Act further requires the Authority to perform its functions, as far as practicable, in consultation and co-operation with Aboriginal peoples.

Mechanisms for achieving recognition of Native Title rights and greater Aboriginal involvement in management are provided under legislation such as the *Aboriginal Land Act (Queensland) 1991* [28], the *Native Title Act (Commonwealth) 1993*, the *Native Title (Qld) Act 1993* [29] and the *Wet Tropics Management Plan 1998*.

The Authority’s Aboriginal Resource Management Program (ARM) is responsible for facilitating agreements and partnerships with Rainforest Aboriginal peoples in relation to their involvement in the management of the Property. The program liaises closely with Aboriginal representative organisations such as ATSIC (Aboriginal and Torres Strait Islander Commission), relevant Native Title representative bodies and key tribal organisations such as Giringun Elders and Reference Group, Djabugay Tribal Aboriginal Corporation and the Burungu Aboriginal Corporation. The Authority has secured the services of three Aboriginal community liaison officers (CLOs) to work with the ARM program to facilitate the liaison between Rainforest Aboriginal people and the Authority.

(i) Review

A review of Aboriginal involvement in the management of the Property entitled ‘*Which Way Our Cultural Survival*’ [30] was completed in 1998. The process was directed by an all-Aboriginal steering committee. The Review presents a commentary on current approaches to Aboriginal involvement in the Wet Tropics World Heritage Area and provides a series of recommendations regarding ways of more effectively meeting land management needs and the aspirations of Rainforest Aboriginal people.

(ii) Interim Negotiating Forum

A key recommendation of the Review was to establish an Interim Negotiating Forum (INF) between Rainforest Aboriginal people, the Authority, QPWS, the Department of Natural Resources and Mines (DNRM), Environment Australia (EA) and Premiers and Cabinet (P&C) to negotiate solutions to complex management issues and recommendations identified in the Review.

The INF is seen as the starting point to a regional agreement between management agencies and Rainforest Aboriginal people. The key issues being discussed within the INF are:

- recognition of the cultural values of the World Heritage Area;
- native title and World Heritage management;
- Aboriginal involvement in policy, planning, and management;
- the development of meaningful management agreements; and
- traditional resource use, and the use of ecological knowledge.

(iii) Native Title

Approximately 80% of the Property is considered potentially claimable under the *Native Title Act 1993* [29]. Currently, 16 native title claims have been lodged with the National Native Title Tribunal over land in the World Heritage Area, though none have yet reached the final determination stage. Presently 282,966 ha or 32% of the Property is under claim. The Authority views negotiated management agreements with native title interests as the preferred method of resolving competing land and resource use issues. The Authority is part of a Queensland Government’s negotiation team involved in Indigenous Land Use Agreement negotiations with relevant Native Title Representative Bodies representing claimant interests.

(iv) Management Agreements

The *Wet Tropics Management Plan* is designed to support negotiated management agreements with Aboriginal interests under Part 3 Division 5 ‘Negotiations and variation of controls under agreements’. The first

management agreement, under Division 5, occurred in 2001 with the Djabugay Tribal Aboriginal Corporation regarding the Mona Mona Aboriginal Reserve.

(v) Protocols

The Authority has developed protocols for engaging Rainforest Aboriginal people. The protocols relate to consultation and negotiation with Aboriginal people during the planning and carrying out of projects within the Property. These include strategic planning initiatives such as walking track strategies, infrastructure projects, management planning and prescribed burning, feral animal and weed control programs and Authority-supported scientific research projects. The protocols are also designed to ensure that Aboriginal people are properly consulted about activities which require a permit under the Plan [31].

d. Administrative and contractual arrangements

The Commonwealth *Wet Tropics of Queensland World Heritage Area Conservation Act 1994* [15] gives effect to the 1990 State-Commonwealth World Heritage Area Management Scheme. The scheme outlines broad structural and funding arrangements for the management of the Property.

The Wet Tropics Management Authority is a body corporate with statutory powers defined under the *Wet Tropics World Heritage Protection and Management Act 1993*. A board of 6 directors with specified functions and powers is also set up under this Act. The executive director of the Authority is a non-voting director of the Board. The Authority falls within the portfolio of the Queensland Minister for Environment, and as part of the Queensland public sector, the Authority is subject to established public sector legislation, regulations, standards and guidelines governing its administrative functions and arrangements [32].

The Authority's functions are defined under s.10 of the Act and include regulatory, planning, coordinating, funding and monitoring functions and in ensuring that management activities are complementary and contribute to achieving the Primary Goal (to ensure the protection, conservation, presentation, rehabilitation, and transmission to future generations, of the natural heritage of the Wet Tropics of Queensland World Heritage property). The Authority does not have day-to-day field management responsibilities. Field-based management of the Property is primarily the responsibility of land managers such as the Queensland Parks and Wildlife Service (QPWS).

In addition to its two statutory advisory committees - the Community Consultative Committee and the Scientific Advisory Committee, the Authority has also established three key stakeholder liaison groups - Landholders and Neighbours, Tourism Industry and the Conservation Sector Liaison Groups.

e. Changes in Land Ownership and/or Legal Status

The Property comprises a variety of land tenures including freehold, leasehold, unallocated state land, state forest, timber reserve, forest reserve and national park. A corresponding range of government agencies and private land holders have responsibilities for managing these tenures under a range of legislation. World Heritage listing of this Property does not affect land ownership.

Under the *Wet Tropics Management Plan 1998*, landholders may have certain special rights (subject to certain conditions). These rights apply to:

- freehold title holders
- native title holders
- government landholders

Freehold and native title rights include:

- building a residence
- building an access
- establishing a garden or orchard
- extracting water for domestic use.

Special rights for government landholders include operation of community infrastructure.

Transfer of ownership of leasehold or privately-owned land is not restricted. However, the Authority's general policy is to support the conversion of land tenure within the Property to achieve a higher order of protection

where opportunities arise. The outcome of this policy has seen the area of national park increase by 35,878 ha between 1992 and 2000, state forests also increased by 26,510 ha over this period while the total area of leases and freehold land has been reduced by 53,055 ha (**Tables 6 & 7**). During 2001/02 a program of conversion of State Forests within the Property to the protected area estate commenced. Approximately 288,400 ha of State Forest within the Property has been transferred under the *Nature Conservation Act 1992* to Forest Reserve, of which 259,382 ha is unencumbered by leases. This tenure conversion which occurred in 2001 involved 32% of the World Heritage Area, with further staged transfers scheduled over the next few years.

Table 6. Trends in areas of different land tenures in the Wet Tropics World Heritage Area [3].

Tenure	Area (ha)							
	1992	1995	1996	1997	1998	1999	2000	2002
National parks	249,866	250,318	266,588	266,707	269,827	269,827	285,744	286,214
Forest reserve	-	-	-	-	-	-	-	259,382
State forests	320,790	331,215	339,937	339,931	348,049	348,049	347,300	89,442
Timber reserves	84,280	73,822	73,951	73,949	73,949	73,949	74,163	62,610
Various reserves & dams	10,707	10,566	10,202	10,207	10,207	10,207	10,207	10,207
Unallocated State Land	58,162	65,980	56,224	70,330	70,501	70,501	60,515	60,515
Leasehold	143,140	135,749	120,708	106,872	95,363	95,243	90,146	90,146
Freehold & similar	17,402	17,560	17,614	17,401	17,499	17,629	17,341	17,341
Roads, Esplanades	5,903	5,903	5,889	5,716	5,718	5,718	5,696	5,696
Rivers	3,307	3,307	3,307	3,307	3,307	3,307	3 308	3,308
Total	894,420	894,420	894,420	894,420	894,420	894,420	894,420	894,420

Table 7. Proportional trends in land tenure in the Wet Tropics World Heritage Area [3].

Tenure	Percentage of WHA						
	1992	1995	1997	1998	1999	2000	2002
National parks	28	28	30	30	30	32	32
Forest reserve	-	-	-	-	-	-	29
State forests	36	38	38	38	38	39	10
Timber reserves	9	8	8	8	8	8	7
Various reserves & dams	1	1	1	1	1	1	1
Unallocated State Land	7	7	8	8	8	7	7
Leasehold	16	15	12	12	12	10	11
Freehold & similar	2	2	2	2	2	2	2
Rivers, roads, esplanades	1	1	1	1	1	1	1
Total	100	100	100	100	100	100	100

f. Contact details of manager

Executive Director
 Wet Tropics Management Authority
 PO Box 2050
 CAIRNS Queensland 4870
<http://www.wettropics.gov.au>

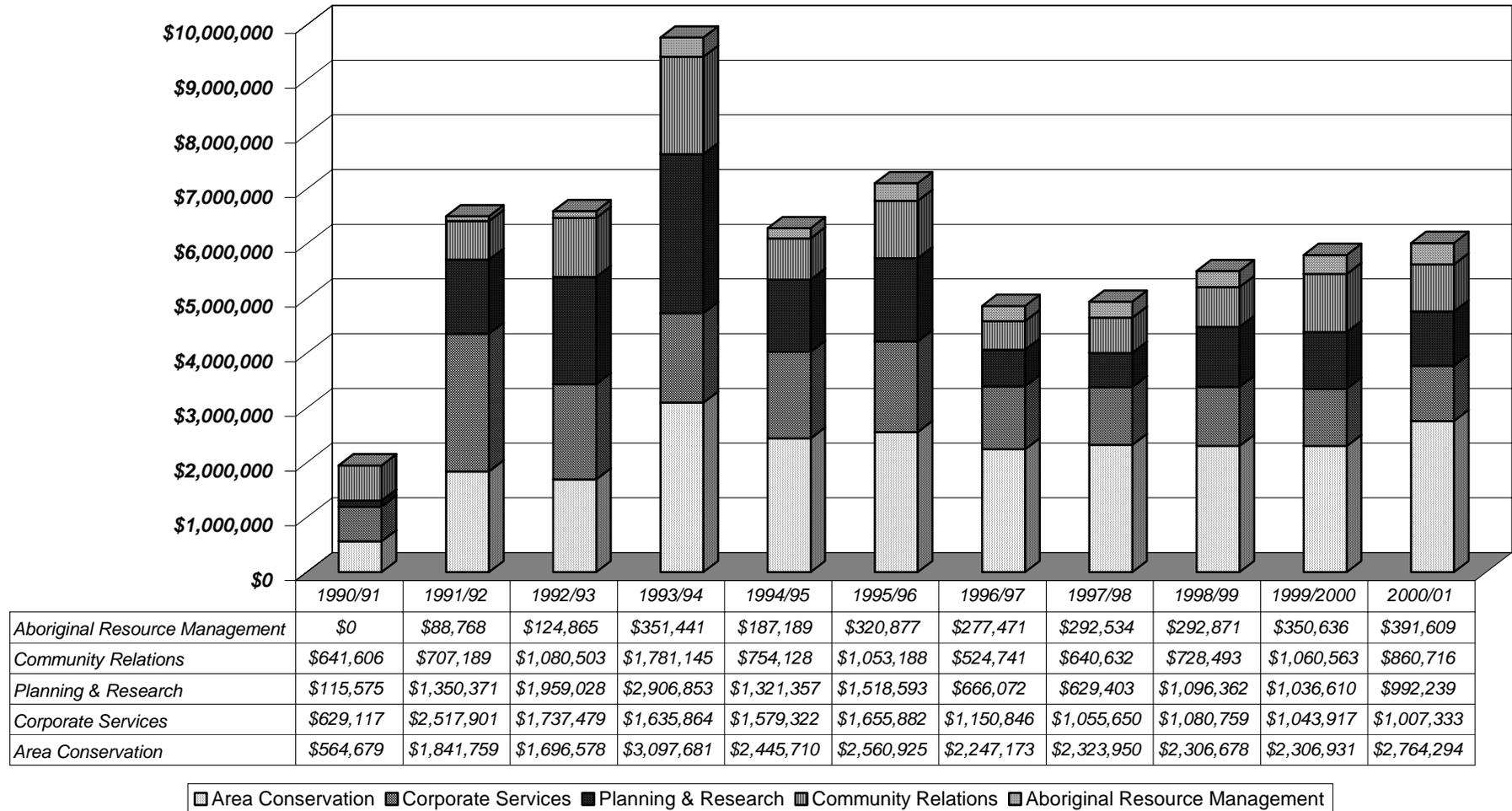
g. Staffing, financial and training resources

The Wet Tropics Management Authority has 30 permanent staff positions divided between 5 delivery programs with total operational and capital expenditure of \$6.18 million for 2000/2001 (**Figures 1 & 2**). Annual operational expenditure for the 10 year period, 1991-2001 has ranged between \$4.9 million and \$9.8 million, with an average annual expenditure of \$6.3 million (**Figure 1**). In addition to this recurrent operational expenditure, the Authority has also had varying amounts allocated to capital items, land acquisition and to a Daintree Rescue Package (refer also section II.3b for more details) (**Figure 2**). Funding is provided to the Authority by the Commonwealth and Queensland governments. A significant proportion of the Authority's budget supports field-based government land management agencies such as the Queensland Parks and Wildlife Service. The Authority supplies funding to these land management agencies to enhance the standard of management and for special World Heritage projects, over and above normal or routine operational expenses. Therefore, routine operational expenses and other resources of QPWS are additional to the financial data presented in these figures and their associated tables.

The Authority's expenditure for staff training and development increased from \$44,000 in 1999/2000 to \$50,000 in 2000/2001. In addition, in-house training was provided to authority staff in a range of areas including workforce diversity, cross cultural awareness and technical skills such as GIS. **Table 8** provides data available since the 1993-1994 financial year.

Figure 1.

Operational Expenses - 1990-2001



The *Area Conservation* section of the Authority is responsible for the implementation of Plan regulations and the coordination of field operations.

The *Corporate Services* section of the Authority is responsible for policy coordination, financial services, human resource management and office services.

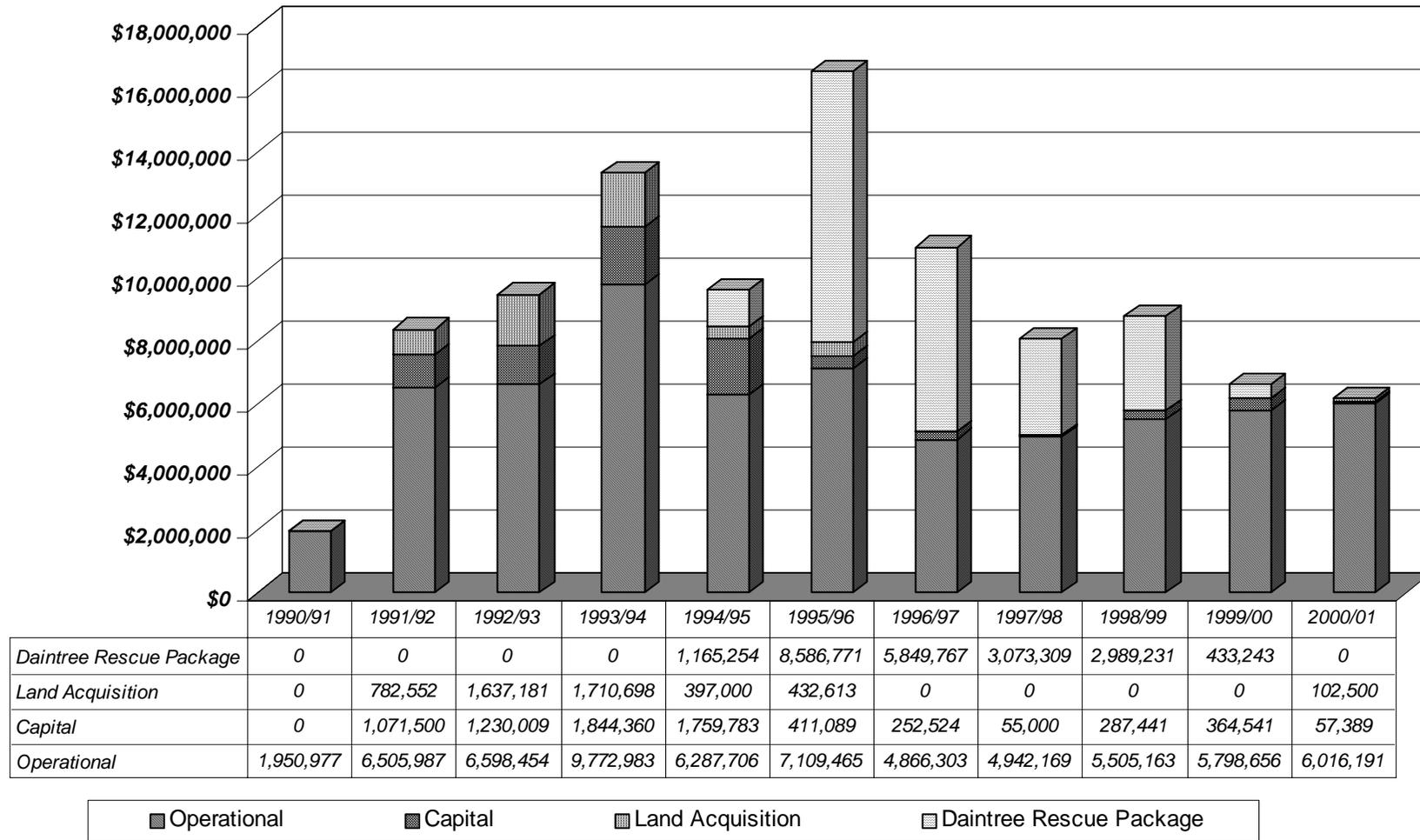
The *Planning & Research* section of the Authority is responsible for management planning, coordination of research, reporting, mapping and data management.

The *Community Relations* section of the Authority is responsible for public relations, community liaison, education, promotion & interpretation.

The *Aboriginal Resource Management* section of the Authority is responsible for facilitating communication and liaison between the Authority and Aboriginal interests.

Figure 2.

Total Expenditure by Category



Total Expenditure (A\$)

1990/91	1991/92	1992/93	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01
1,950,977	8,360,039	9,465,644	13,328,041	9,609,743	16,539,938	10,968,594	8,070,478	8,781,835	6,596,440	6,176,080

Table 8. Expenditure on Wet Tropics Management Authority staff training and development

	Financial Year							
	1993/94	1994/95	1995/96	1996/97	1997/98	1998/99	1999/00	2000/01
Expenditure (\$)	53,000	52,030	75,300	12,750	22,600	28,050	44,000	50,000
Number of permanent staff	19	19	18	23	30	30	30	30

h. Scientific and technical studies

The *Wet Tropics Research and Information Needs Report* [33] (RAIN Report) was produced by the Authority in association with its land management partners. The report identifies priority research areas and key information knowledge gaps needed to assist informed decision making about key forces affecting change on the Property.

In 1993 the Commonwealth Government, Wet Tropics Management Authority, James Cook University, Griffith University, the University of Queensland and the CSIRO formed the Rainforest CRC (Cooperative Research Centre for Tropical Rainforest Ecology and Management) [34] as a national centre for understanding rainforest ecology and management. The Centre, located in Cairns, brings together the capabilities and facilities of the nation's leading rainforest research organisations.

In 1999 the Rainforest CRC received funding commitments for a further seven years, with a Commonwealth contribution of \$16 million together with \$3 million in cash and \$40 million in-kind from the CRC's partners. It now features a wider partnership base with the inclusion of the tourism industry, Aboriginal interests, and other government land management agencies.

The seven research programs of the current term of the Rainforest CRC (1999 to 2006) include:

1. Environmental planning and management in tropical rainforests
2. Functional ecology: evaluating ecosystem goods and services in a dynamic landscape
3. Rainforest visitation and business
4. Rainforest access: managing and monitoring impacts
5. Rehabilitation and restoration
6. Conservation principles and management
7. Aboriginal and collaborative management

The outcomes of the Rainforest CRC's research programs are being progressively utilised and incorporated into planning and management. The *RAIN Report* is being used as a key component in promoting World Heritage research priorities within the Rainforest CRC and with other research organisations. Examples of research outputs from the Rainforest CRC are available through their web site [76].

The arrangement with the Rainforest CRC is resulting in a very large scientific research effort being directed specifically at assisting and improving the management capability of the Property and the broader region. The Authority is represented on both the Governing Board and the Executive of the Rainforest CRC. The Authority is represented on all Program Support Groups and commits an average of \$150,000 annually to support the research of the centre.

The Authority has commissioned a major vegetation and geology mapping project which began in late 1997 and is due for completion by 2004. This updated and detailed mapping covers the whole Wet Tropics region and will provide a consistent base for management, planning, scientific research and statutory protection.

The statutory Scientific Advisory Committee (SAC) advises the Board on scientific matters. Members of the scientific community nominate for the committee and are appointed by the Board every three years. The role of the SAC includes the identification and evaluation of research needs in all areas of science including the social, biological and physical sciences. The committee also evaluates the effectiveness of the Authority's management and is called upon to examine and advise on development proposals and perceived threats to the Property.

i. Visitation

The Wet Tropics region has experienced substantial increases in both domestic (**Figure 3**) and international (**Figure 4**) visitors over the past two decades. The major tourist destination at present is the Great Barrier Reef, but substantial numbers also visit the Property. Between 1985 and 1995 the annual number of visitors to the region increased from 840,000 to around 2 million [35]. Visitor trends and projections (**Table 9**) forecast in the *FNQ Regional Plan* [25] predict a linear rate of increase resulting in an almost doubling of total visitors to the region by 2016 with an increasing trend in the numbers of international visitors being a major contributing factor.

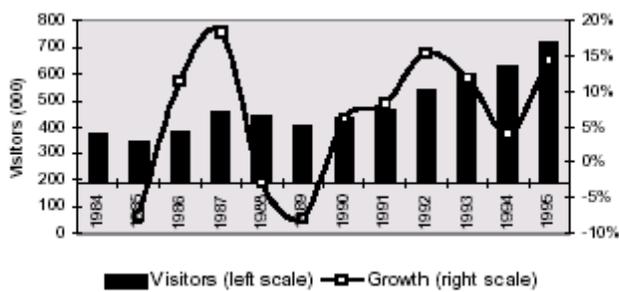


Figure 3. Domestic visitors to the Wet Tropics region [35]

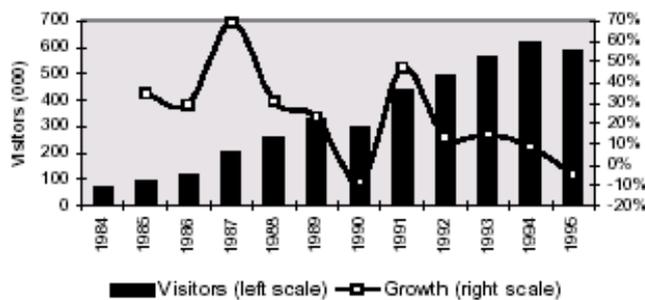


Figure 4. International visitors to the Wet Tropics region [35].

Table 9. Wet Tropics visitor trends and projections between 1993 –2016 [35]

Visitor Details	Trends			Projections			
	1993	1996	1999	2001	2006	2011	2016
<i>Domestic</i>							
Number ('000)	1,456	1,640	1,773	1,900	2,180	2,450	2,700
Average per day	19,147	20,219	21,859	23,425	26,877	30,205	33,288
<i>International</i>							
Number ('000)	541	642	837	940	1,250	1,550	1,850
Average per day	10,375	11,611	1,405	16,740	22,260	27,630	32,945
<i>Total visitors ('000)</i>							
Number ('000)	1,997	2,292	2,610	2,840	3,430	4,000	4,550
Average per day	29,523	31,830	36,764	40,164	49,137	57,808	66,233

A survey of visitors to the region revealed nearly half the respondents (45.6%) nominated rainforest experiences as one of their three main reasons for visiting the region [36]. In 1998, over 48% of Queensland's nature based

tourism operators were based in the region and over 100 companies had permits to visit the Property [73]. The only detailed source of information on visitor numbers to the Property was a 1993 survey which estimated 4.77 million visits (3.4 million visitor days) were made to 180 sites in the World Heritage Area [36]. A similar survey was conducted in 2002 but the results are not yet available.

j. Fostering a role of the Property in the life of the community

(i) Involvement of the community in management

The following committees, groups and processes have been established by the Authority to promote community engagement and liaison in matters associated with the Property.

Community Consultative Committee

The Community Consultative Committee is a statutory committee under the Act which is appointed by the Board. Its function is to provide advice on the views of the regional community on specific management issues of concern or interest to the community. Members of the Committee are selected from a broad range of stakeholders including conservation, education, tourism, rural, scientific, recreation and local government interests.

Landholders and Neighbours Liaison Group

This group acts as a conduit for a two-way flow of information between the Authority, land managers and landholders and neighbours of the Property. The Property has more than 300 freehold and leasehold properties within its boundaries and more than 2,500 immediate neighbours.

Tourism Industry Liaison Group

This group provides a regular forum for the tourism industry, the Authority and land management agencies to discuss and liaise about tourism issues related to the Property. Members are nominated by key tourism industry groups.

Conservation Sector Liaison Group

The Conservation Sector Liaison Group provides a regular forum for conservation groups, the Authority and land managers to identify and discuss conservation issues relating to the Property. Members are nominated by relevant conservation groups.

Management Plan consultation process

An extensive community consultation program was implemented during the development of the Wet Tropics Management Plan [24], including:

- three community attitudes surveys undertaken in 1992, 1994 and 1996;
- a questionnaire distributed throughout the region in 1992 seeking identification and rating, by the public, of the issues perceived to be most important in managing the Property;
- 48 regional and special interest workshops were undertaken;
- a public comment program throughout the initial *Wet Tropics Strategic Directions* phase of planning, involving public workshops, a free telephone service, invitations to provide comments and suggestions and a free postal comment form;
- release for public comment of the Draft Wet Tropics Plan in 1995 with public meetings and workshops, a free telephone service, invitations to provide comments and suggestions and a free postal comment form. The Draft Plan remained on public exhibition for over six months; and
- following the close of public exhibition in April 1996 a detailed submissions report was prepared. Further intensive rounds of consultation and negotiation took place with representative bodies of major community sectors as well as government land management agencies, continuing up to the time of finalisation of the Plan in 1998.

Nature Based Tourism and Walking Strategy consultation process

The Authority established a steering committee involving a broad range of stakeholder interests to provide direction for developing the strategies. Many public workshops were conducted as well as a public release of the drafts inviting submissions.

Volunteers

A network of Wet Tropics volunteers has been set up throughout the region with coordination provided by local QPWS officers. Volunteer activities are diverse and include bird counts, revegetation, cleanups, walking track maintenance, interpretative activities and displays, children's activities, production of newsletters and leaflets, helping customers at information counters and public education. QPWS provides the volunteers with year-round training in guiding walks, wildlife handling and care, front counter skills and First Aid.

Other community groups assist in the management and maintenance of the Property through initiatives such as community reforestation projects and cassowary conservation initiatives.

Australian Wet Tropics Rainforest Foundation

The Australian Wet Tropics Rainforest Foundation [37] is a charitable organisation created to facilitate and promote involvement of Australian corporations in the conservation and management of the Property. The Foundation is a not-for-profit company with an independent Board of Directors recruited from the business community.

(ii) Education, interpretation and awareness raising

The Authority produces a range of educational and interpretive materials to inform locals and visitors about the Property. They range from statutory documents like the Annual Report and State of the Wet Tropics Report, to leaflets which explain issues such as the management arrangements and research results.

Website

The Wet Tropics website [38] was launched in late 1999 and attracts more than 4,000 sessions per month.

Newspaper

Two editions of the Wet Tropics Newspaper are published each year. This paper is inserted into regional newspapers and is available from over 30 visitor centres and QPWS offices throughout the Wet Tropics.

Wet Tropics Update

This newsletter focuses on the latest in policy decisions, management initiatives and on-the-ground activities undertaken by the Authority.

Rainforest Aboriginal News

This newsletter is produced biannually by the Aboriginal Resource Management Program of the Authority and is distributed to all Rainforest Aboriginal tribal groups and community corporations in the region. The newsletter has seven broad aims:

- to showcase achievements of Rainforest Aboriginal people and groups;
- to highlight key management issues and processes that require Rainforest Aboriginal feedback/involvement;
- to inform Rainforest Aboriginal communities about key management issues and processes;
- to connect Rainforest Aboriginal communities to useful resources;
- to promote the Wet Tropics World Heritage Area's Rainforest Aboriginal cultural values and people;
- to teach government and the mainstream about Rainforest Aboriginal cultural values; and
- to provide a forum to debate topical issues.

Living with Cassowaries

Local Councils and the Cassowary Advisory Group have produced a range of brochures for residents in known cassowary habitat areas. The brochures offer advice on dog control, driving in cassowary areas, planting cassowary food trees and cassowary-friendly fencing. Other awareness raising products include vehicle stickers encouraging traffic to slow down in cassowary areas and the design of attention grabbing road signage and traffic calming devices.

Neighbours Newsletter

To improve communication with its 3000 immediate neighbours, the Authority produces a regular newsletter to inform neighbouring landowners of issues of particular relevance to them.

Public Contact Rangers

The Authority funds a number of QPWS public contact ranger positions in Townsville, Cardwell, Lake Eacham, Innisfail and Cairns.

Wet Tropics Visitor Centres

There are many visitor centres throughout the region which provide information on the Property. **Table 10** includes the 14 centres which have received funding and/or support from the Authority.

Table 10. Visitor Centres that have received funding and/or support from the Authority [39].

Centre	Type	Year Established	Staff	2001 Visitor numbers
C4	Interpretive	1993	Volunteers	18,570
Frosty Mango	Information	1994	Staff	N/A
Hinchinbrook	Information	1994	Council & volunteers	25,991
TEL-Stuart	Information	1994	Volunteers	29,921
Daintree Environment Centre	Interpretive	1995	Staff	33,000
Habitat	Information	1995	Staff	130,000
Lake Morris	Information	1995	Staff	N/A
Malanda	Interpretive	1995	Council & volunteers	11,000
Mareeba	Information	1995	Council & volunteers	29,782
Mission Beach	Information	1995	Volunteers	26,276
Cardwell	Interpretive	1996	QPWS & volunteers	18,000
Ravenshoe	Interpretive	1997	Volunteers	13,000
Lake Barrine	Information	1998	Staff	>120,000
Cooktown	Interpretive	2000	Staff & volunteers	N/A

Annual Cassowary Awards

To mark the 10th anniversary of the Property's World Heritage listing, the Board initiated the 'Cassowary Awards' to recognise those community members making outstanding contributions to the Property in terms of its management, protection, presentation and research. Presentation of these awards is now an annual event.

k. Cultural and social effects

The World Heritage listing of the Property undoubtedly precipitated wide-ranging social impacts within the region. In 1987 it was anticipated that listing of the Property would result in the almost complete collapse of the region's timber industry. It was also expected that such a dramatic contraction of a core regional industry would result in marked negative social impacts in those communities most heavily dependent upon the timber industry. Two social impact assessments (SIA) were conducted one in 1987 prior to listing with the other conducted four years later to assess the effectiveness of strategies implemented to address anticipated listing-related social impacts [40].

The initial SIA was used as the basis of a compensation package designed to ensure forcibly retrenched timber workers would not be unfairly disadvantaged and that the costs associated with preserving the Property could be borne by the wider Australian community. In early 1988 the Commonwealth Government began implementing a Structural Adjustment Package (SAP) in order to address the potential negative social problems identified from the 1987 studies. The three components of the SAP were job creation, business compensation and financial assistance for forcibly displaced timber workers. A sum of \$75.3 million was allocated for the SAP, comprising \$50.9 million for employment-related programs and \$24.4 million for business compensation. The job creation component comprised public works projects, tree planting projects, private sector initiatives and local community initiatives. Assistance for displaced workers included a dislocation allowance, an early retirement package, a retraining subsidy and a relocation allowance.

All logging within the Property had ceased by 1988 and by 1991 there were only two licensed timber mills still operating in the Atherton and Ingham forestry districts, whereas prior to listing there were 12 mills in operation employing 486 timber workers. By 1991, 413 of these timber mill workers had been made redundant. In the same period, the number of independent timber logging contractors declined from 48 to 13, and the number of special purpose sawmillers declined from 16 to 10.

The town of Ravenshoe, in particular, was identified as being especially susceptible to negative social impacts due to the combined factors of heavy dependency on the timber industry, a high proportion of single parent families, high unemployment and the highest proportion of young people employed in the timber industry. In 1987, the general expectation in Ravenshoe was that listing would signal the 'death' of the community. However, in 1990 Ravenshoe was found to be experiencing a population increase and new businesses had opened [40]. This unexpected finding was found to be largely uninfluenced by the SAP but greatly influenced by the perception that Ravenshoe was in such dire straits that land values fell dramatically, resulting in large tracts

of land being subdivided and sold as cheap ‘house and land packages’. These packages attracted an influx of new residents and businesses and stimulated associated economic growth in the district [40].

The 1991 study concluded that the SAP was flawed in that it was short-term in its effects. The early retirement assistance was not well accepted with many recipients believing the maximum payout of \$30,000 did not represent fair compensation for the premature termination of a working life. The Public Sector projects, which essentially entailed local councils employing displaced timber workers was more successful [40].

While listing certainly caused significant social impacts at the individual level, at the community level any impacts appear to have been overshadowed by changes in other areas of the regional economic base (see also Economic Effects section below).

1. Economic effects

A number of socio economic analyses were commissioned by the Queensland Government, the timber industry and the Commonwealth Government to assess the possible social and economic dislocation that might result from the World Heritage listing of the Wet Tropics.

The timber industry had been a major contributor to the Wet Tropics regional economy since settlement, and the effects of this industry permeated many aspects of regional activity including production, income, employment, land and house prices, taxation levels, income redistribution, retail and wholesale trade amongst others. A major result of listing of the Wet Tropics as a World Heritage Area was the prohibition of logging. Consequently, this caused a major disruption to the timber industry and to the economies of several communities reliant on this industry for their livelihoods.

At the time of listing, the gross value of sales of timber from the region was around \$26 million. Driml [36] converted this value to the 1994 dollar equivalents of \$34 million in order to make post-listing comparisons between tourism and logging to the regional economy. This figure of \$34 million is directly comparable with the gross expenditure on tourism of \$443 million (**Table 11**). These figures indicate that the gross expenditure on tourism is around ten times the gross value of logging and timber production in the year logging ceased in the Property.

The tourism industry contributes significantly to the economy at both a local and regional scale. Direct tourism use of the Property was estimated to generate over \$179 million in 1993, based on expenditure associated with commercial tours, hire cars and running costs for private vehicles (**Table 11**). Total gross expenditure for the region (which includes flow-on effects to the local economy) is estimated to be \$753 million [36].

Table 11. Gross expenditure in Wet Tropics region by visitors to the Property [36]

Expenditure	\$ million
Gross expenditure on visits to the Property	179
Gross expenditure on accommodation etc	264
Total gross expenditure (output)	443
Direct and indirect output contribution with 1.7 multiplier	753

At the regional level, the growth in tourism since listing has more than offset the negative economic impacts resulting from the cessation of logging [41]. It must be acknowledged, however, that tourism did not provide an alternative for many individuals and some communities previously dependent on the timber industry.

II.5. FACTORS AFFECTING THE PROPERTY

a. Global environmental pressures on the Property

(i) *Global warming*

Climatic conditions in the Wet Tropics are subject to a degree of natural variability with cyclic phenomena like El Nino exerting an important influence. Nevertheless, the build up of greenhouse gases from human activities is contributing to the present accelerated rate of climate change observed over the last 100 years with greenhouse gases currently at levels unprecedented in at least the last 400,000 years [47].

The anticipated changes in global climate are expected to occur at a rate too fast for evolutionary processes, such as natural selection, to keep pace. In addition, landscape fragmentation related to human activities will markedly limit the opportunity for some species to migrate. Predicted warming for coastal north east Queensland is 1.4 to 5.8°C by 2100, relative to 1990 with +4% to –10% changes in rainfall per degree of warming [48]. More El Nino-like conditions and greater tropical cyclone frequency and intensity are anticipated [49]. Computer simulations suggest that the relative humidity surface will shift upwards on tropical mountains by hundreds of metres during the winter dry season [50]. This suggests that the Property's upland nodes of endemism are likely to be particularly susceptible to climate change effects in the near future [51].

Due to this predicted rapid climate change and the increasing frequency of severe climatic events such as cyclones, floods and droughts, the biodiversity and locally endemic and spatially restricted species that are keystone elements of the Property's World Heritage values are predicted to be under severe pressure over the next few decades. Research suggest that the rainforests of the Wet Tropics are extremely sensitive to climate change [52] with preliminary modelling results suggesting that up to 66% of all the Wet Tropics endemic vertebrate faunal species may be lost over the next 50 to 100 years as a consequence (D. Hilbert & S. Williams *pers com*).

Examples of recent actions addressing the issue of global warming

At present we do not know the full extent of what might be threatened by rapid climate change, where the threats might be greatest, the long term effects of these threats, how climate change might interact with other threats such as regional clearing and fragmentation patterns, fire, weeds and feral animals, and whether or where some areas may provide continued habitat or new areas of habitat in the future. The Rainforest CRC has commenced a program of research to help answer some of these questions and assist in determining feasible regional-scale management options to anticipate predicted change.

b. Regional development pressure

(i) Regional population growth

The Wet Tropics region is the most populated of northern tropical Australia with most inhabitants living within 50km of the Property's boundaries in the major cities of Cairns and Townsville, smaller coastal towns and the closely settled farming areas of the Atherton Tableland. As an indicator of trends in population growth, data for the subregion covering the seven local government areas (LGAs) of Cairns, Atherton, Cardwell, Douglas, Eacham, Johnstone and Mareeba is provided. This subregion covers most of the major population centres surrounding the Property.

As at 30 June 1999, there were 197,066 persons usually resident in the subregion of which 120,895 were resident in Cairns City (**Table 12**). Between June 1994 and June 1999, the annual average growth rate was 2.4 per cent reducing to 1.5 per cent in 1998-99 [42].

Table 12. Recent population trends in the major subregion of the Wet Tropics [42]

Local government area	Area km ²	Estimated resident population			Average annual change per cent	
		1994	1998	1999	1994-99	1998-99
Atherton	621	9,659	10,386	10,469	1.6	0.8
Cairns	1,846	104,458	118,735	120,895	3.0	1.8
Cardwell	3,056	8,594	9,491	9,661	2.4	1.8
Douglas	2,447	8,842	10,318	10,499	3.5	1.8
Eacham	1,123	6,166	6,414	6,451	0.9	0.6
Johnstone	1,635	19,081	20,185	20,302	1.2	0.6
Mareeba	53,457	17,805	18,627	18,789	1.1	0.9
Total	64,185	174,605	194,156	197,066	2.4	1.5

Census data show that the population of the subregion has increased from 60,620 persons in 1947 to 208,637 persons in 1996. Most growth has occurred since the early 1970s (**Figure 5**). Between 1947 and 1971 the population increased by 32,980 persons, while between 1971 and 1996 the population more than doubled.

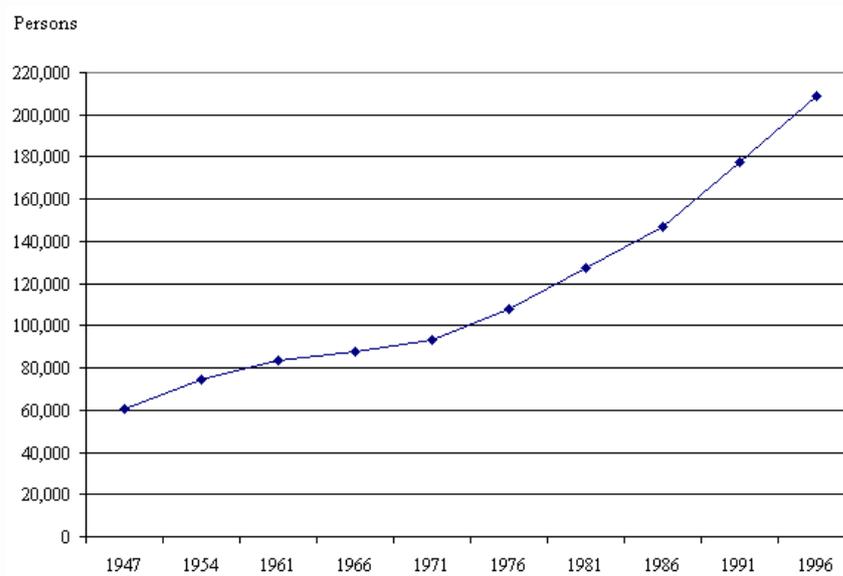


Figure 5. Cairns subregion location census population counts from 1947 to 1996 [42].

By the year 2016, it is projected that the population will increase to 263,890 persons (**Table 13**). Cairns City is projected to remain the most populous local government area with a projected population of 171,440 persons by 2016. Cairns' share of the population is expected to increase from 60.8 per cent in 1996 to 65.0 per cent in 2016.

Table 13. Population projections by local government area (LGA), 1996 to 2016 [42]

LGA	1996	2001	2006	2011	2016	Average annual change 1996-2016 (%)
Atherton	10,130	10,900	11,540	12,140	12,720	1.1
Cairns	113,510	126,510	141,580	156,550	171,440	2.1
Cardwell	9,110	10,380	11,320	12,190	13,020	1.8
Douglas	9,700	11,180	12,540	13,940	15,370	2.3
Eacham	6,290	6,580	6,810	7,000	7,170	0.7
Johnstone	19,780	20,840	21,670	22,370	22,970	0.8
Mareeba	18,220	19,160	19,880	20,570	21,200	0.8
Subregion	186,740	205,550	225,340	244,760	263,890	1.7

Development associated with a rapidly increasing regional population is leading to greater pressures being placed on the Property. These pressures include demands for energy supplies and distribution corridors, telecommunication facilities, the upgrading and duplication of transport corridors and increased demands for water supplies for domestic, agricultural and industrial uses.

(ii) Tenure within World Heritage Area

The Property includes within its 3,125 km boundaries almost 730 separate parcels of land, including freehold land, national parks, forest reserves, state forests, and a range of leases and reserves (**Tables 6 & 7**; refer also Section II.4e). Use rights and responsibilities associated with different tenures have significant implications for management of the Property especially with respect to freehold and leasehold tenures and with respect to native title rights (refer also Section II.4c(iii)(iv)).

Table 14 provides a measure of land subject to formal tenure associated with Aboriginal interests or subject to agreements under various statutes.

Table 14. Land (ha) formally under Indigenous management

Form of management	October 1992	June 2000	June 2001
Deed of Grant in Trust	8,055	8,055	8,055
Leasehold/Trusteeship*	5,011	16,791	16,791
Determined Native Title	0	7	7
Cooperative Management Agreements	0	0	1,600
TOTAL	13,066	24,853	26,453

* Note the trusteeship incorporates Reserves under Aboriginal Trustee

(iii) Regional Clearing Patterns

Most of the coastal lowlands below the 80 metre contour in the region, is freehold agricultural land which was extensively cleared in the past for crops such as sugar cane. Similarly, the fertile soils and gentle terrain of the basalt tablelands, led to widespread selective clearing of this landform from the time of European settlement of the region.

The Statewide Landcover and Trees Study (SLATS) monitors vegetation clearing over Queensland using satellite imagery [43]. For the period 1991 to 1995 the clearing rate for the entire Wet Tropics region averaged 3,583 ha per year (**Table 15**) reducing very substantially for the period 1997 to 1999 where the average clearing rate was almost a third of the 1991-95 rate.

Table 15. Average annual rates of clearing in Wet Tropics between 1991 and 1999 [43], [44].

1991 - 1995		1997 - 1999	
Clearing rate (ha/yr)	% region area/year	Clearing rate (ha/yr)	% region area/year
3,583	0.2	1,275	<0.1

An overall summary of the pattern and intensity of clearing within the Wet Tropics region for the period 1997-99 is provided in **Table 16** [43].

Table 16. Summary of regional forest conversion for the 1997-1999 period (km² per year)

Pasture	Crops	Infrastructure	Settlement	Total
4.48	7.23	0.78	0.27	12.75

All of the above clearing data relate to areas external to the Property, however regional patterns and trends in clearing, land uses and the array of associated impacts originating from the region surrounding the Property are underlying threats to the overall long-term integrity of the Property. Some of the associated impacts include fragmentation of habitat, severing of wildlife corridors, reduction in habitat refuges, increased demand for water, reduced water quality, changing water tables and introductions and spread of pest plants, animals and diseases.

(iv) Regional landuse

Landuses of the area surrounding the Property are predominantly agricultural (**Table 17**). In coastal areas the main crops have been, and remain, sugarcane and bananas. Agricultural landuses on the Atherton Tableland are rapidly changing especially the expansion of irrigated crops such as sugarcane [45]. Some crops, like tobacco and navy beans, are currently declining in importance but many other high value crops, including mango, avocado, macadamias, longans, lychees, custard apple, cut flowers and rare fruits, are increasing in suitable parts of the region [45]. Most clearing within the region is associated with agricultural expansion, and most demand for new or expanded water impoundments or increased subterranean water pumping is due to changing agricultural landuses and practices.

Table 17. Value of agricultural production in the Wet Tropics [46]

Agricultural commodity	Value to Wet Tropics region \$m
Sugar cane	232.8
Bananas	149.9
Milk	41.3
Tobacco	24.4
Cattle and calves slaughtered	21.8
Mangoes	20.4
Nurseries	12.0
Poultry slaughtered	10.1
Avocados	8.8
Potatoes	7.8
Total	567.8

The total gross value of agricultural production in the region for the year ended March 1998 was \$567.8 million, representing 9.8 per cent of the Queensland total. Sugar cane production (\$232.8 million) accounted for 41.0 per

cent of the value of agricultural production in the region, and 19.6 per cent of Queensland's production of this commodity while 94.2 per cent of Queensland's banana production comes from the region [46].

The increasing regional population is also manifested in an expansion and intensification of urban development and urban clearing with increased demand for associated infrastructure. A number of the areas identified in the FNQ 2010 regional planning process as priority biodiversity areas such as the Daintree-Cape Tribulation coastal strip and the Mission Beach and Kuranda areas are all parts of the region undergoing rapid urban growth.

c. Direct environmental pressures on the Property

There are several categories of contemporary human activities occurring within the Property which have been identified as having the potential to impact negatively on the condition of World Heritage values, including:

- clearing and fragmentation;
- altered drainage patterns and flow regimes;
- environmental pests; and
- undesirable habitat alteration/degradation [33], [75].

(i) Clearing and fragmentation

Prior to the commencement of the *Wet Tropics Management Plan* approximately 15ha of forested freehold land within the Property was cleared and converted to sugar cane. A further 69ha of freehold native forest was converted to pasture. Two small clearings totalling 1 ha have also been recorded in the Daintree lowlands section of the Property. The expansion of the Herberton water supply resulted in the inundation of 5ha of open eucalypt forest and a further 1ha was cleared in upgrading the South Mission Beach water supply pipeline.

Most pre-listing clearings within the Property were associated with networks of community infrastructure such as powerline easements, roads, water pipelines, water impoundments and weirs, all of which cause internal habitat fragmentation to forest blocks and watercourses. The length and cleared area associated with linear community infrastructure is presented elsewhere in this report (refer Section II.3a for more details).

Although there have been no clearings associated with new roads in the Property since listing, there have been several road upgrades and emergency repairs which have resulted in the removal of some trees and an increased road footprint, contributing to increased fragmentation of habitat (the fragmentation impact is probably of greater ecological concern than the loss of trees *per se*). Additional passing lanes have been constructed on the Cook, Kennedy and Gillies Highways. Corners and sharp curves have been straightened to allow passage of B-Double road transports on the Rex and Kennedy Highways. A major upgrade of the Tully-Mission Beach Road has been completed. Cyclone, flood, landslip and slumping damage has resulted in small sections of major repair works being undertaken on the Palmerston, Kennedy and Gillies Highways, the Alexander Range Road, 'Southedge' management road and many more minor access roads within the Property. It is estimated that the combined post-listing clearing resulting from road upgrades and major repairs amount to less than 10ha.

Examples of recent actions addressing the issue of clearing and fragmentation

Natural recovery and regrowth is the main approach being relied upon by the Authority to restore integrity to previously logged parts of the Property and to progressively enhance connectivity and ecological processes to other areas of disturbance within the Property. The Authority also actively supports and promotes strategic tree planting and other environmental restoration approaches within degraded parts of the Property and adjoining lands [53]. There are a range of rehabilitation initiatives and many thousands of trees that have been planted since listing both within and adjacent to the Property.

The Authority's priorities for rehabilitation are focussed on the re-establishment of ecologically functional wildlife corridors, the decommissioning of obsolete infrastructure especially roads, tracks, powerline clearings and old mine sites and the stabilisation of other disturbed sites. The Authority is also concerned with tree planting hygiene issues to avoid the possibility of introducing weeds and diseases into the Property and has assisted the QPWS' Centre for Tropical Restoration attain nursery accreditation and to develop strict field work protocols.

There is a large-scale research effort by the Rainforest CRC aimed at improving the ecological outcomes of tree planting activities in the region. Researchers have completed a detailed audit and assessment of a very large

number of tree plantings, undertaken for a wide variety of purposes, using a wide variety of techniques. This audit in conjunction with specific research studies will also:

- increase our understanding of the basic biology of ecosystems to design more effective restoration strategies;
- by comparing results across a range of sites, determine which restoration strategies are most generally useful; and
- determine where best to allocate efforts in large-scale restoration projects.

A successful prosecution (with a penalty of 12 months imprisonment) for illegal removal of 23 logs from the Property occurred in 2001 (refer Section II.5e for more details).

(ii) Community Services Infrastructure

Essential services supplied by community infrastructure are important for regional development but the construction and maintenance of infrastructure also detracts from the overall integrity of the Property. One of the most significant impacts associated with infrastructure corridors, particularly through rainforests, is their array of habitat fragmentation effects.

Within the Property are an assortment of electricity supply facilities including three hydro-electric schemes with power stations and associated dams, tunnels and other works, 222 km of power transmission lines, 98 km of power distribution lines, 1 substation, and various ancillary facilities such as roads, buildings, houses and workshops.

The habitat fragmentation impacts of road infrastructure can be amplified by road use resulting in noise, vibration, movement, dust, emissions, and lights which can interfere with wildlife activities and behaviour. Road use can also be a significant source of mortality for wildlife.

A summary of the length and purpose of roads and access tracks within the Property which remain available for use under the *Wet Tropics Management Plan 1998* is provided in **Table 18**.

Table 18. Extent, types and purpose of maintained roads in the Property

Road class and purpose	Length (km)
State controlled roads (roads which form part of the State's road network)	101
Community access roads (local community transport roads)	150
Presentation unrestricted (roads which provide vehicle-based presentation opportunities)	230
Presentation restricted (roads where public access may be restricted and a permit is required)	234
Landholder access (provide legal access to properties in or adjacent to the Property)	153
Management (provide access for management activities including the service of public utilities)	345
Total	1213

Examples of recent actions addressing the issue of community infrastructure

Codes of Practice

Under the *Wet Tropics Management Plan 1998* [11] infrastructure agencies require a permit to undertake maintenance activities which have the potential to impact on the Property [16]. One tool employed by the Authority and infrastructure agencies to mitigate impacts is the use of environmental Codes of Practice. These codes are also applied as a condition of Wet Tropics permits. Codes of Practice have been produced for road [54], electricity [55] and water [56] infrastructure.

Environmental Management Plans

As well as these general Code of Practice provisions, the Authority also requires Environmental Management Plans (EMP) be developed as an additional condition of some permits to allow more explicit compliance monitoring. For example, EMPs are now a requirement for permits associated with the maintenance of all major powerline easements and roads within the Property. The intention of these EMPs is to provide detailed

prevention, minimisation and mitigation strategies for controlling environmental impacts of powerline easement and road maintenance activities at specific sites. Their purpose is to identify and map both environmental values and potential maintenance activity impacts to those values; to specify mitigation strategies together with appropriate monitoring; and if an undesirable or unforeseen level of impact occurs, specify the appropriate corrective action.

Powerlines

Several initiatives have been introduced to reduce ecological impacts associated with powerlines including:

- Production of the Queensland Electricity Supply Industry Environmental Code of Practice [55].
- The Rex Range alignment of the upgraded Turkinje-Port Douglas line was designed to straddle a narrow section of the Property thereby avoiding any need for clearing within the Property.
- The route for the upgraded 275 KV Chalumbin-Woree line although utilising an existing powerline corridor clearing through the Property, has been designed using very high towers. These very high towers negate the requirement for any clearing under the line being maintained, so that rainforest canopy connectivity will be allowed to re-establish. The towers have also been designed so that they can be maintained by helicopter, thereby eventually eliminating the need for associated maintenance roads through the Property. Cleared areas associated with the construction of the tall towers on ridge lines have been rehabilitated through a program of tree planting, and significant connectivity has been allowed to re-establish naturally in the intervening gully areas.
- The testing of a range of rehabilitation techniques along powerline easements in the South Johnstone/Palmerston area by the QPWS Centre for Tropical Restoration. Associated with these rehabilitation trials, the Rainforest CRC has established a monitoring program to assess the relative success of the methods being employed.
- The Rainforest CRC also has several other research projects directed at assessing and quantifying the ecological impacts associated with powerline clearings through rainforests, and the relative success of actions being taken to avoid or reduce these impacts.

Roads

- The commencement of the *Wet Tropics Management Plan* saw the prohibition of vehicle use of approximately 6,535 km of vehicle tracks in the Property. The majority of these were unformed logging tracks previously used by the timber industry.
- The Queensland Department of Main Roads (DMR) collaborated with the Authority in preparing a best practice manual on the planning, design, construction, maintenance and operation of roads (both sealed and unsealed) in the Wet Tropics region, with an emphasis on the minimisation of environmental harm [54].
- The Authority was closely involved with setting the terms of reference and with reviewing the Integrated Transport Study for the Kuranda Range Impact Assessment Study. This is the major transport link between Cairns and the Atherton Tablelands and has been identified in the *FNQ Regional Plan* as inadequate for projected regional growth needs.
- The Rainforest CRC has been undertaking a range of research aimed at identifying and separating the impacts of roads and their associated edge effects on wildlife from the impacts of traffic volume, noise and pollutants on wildlife [57].
- The Rainforest CRC has also been involved in establishing baseline data and a monitoring program to test the success of specially designed faunal underpasses, other engineering techniques and strategic revegetation works which have been incorporated into the design of a major upgrade to the East Evelyn Road near Millaa Millaa.
- The negative impacts of roads on the conservation of the cassowary is a major concern in the Mission Beach section of the Property, in particular. Studies were commissioned by DMR to assist in determining management options for the El Arish-Mission Beach and Tully-Mission Beach Roads [58]. A range of mitigation strategies have been developed and implemented, as part of the permit conditions imposed by the Authority, and are currently being assessed for their effectiveness.

- In the Palmerston area, QPWS have completed trials on a range of techniques to rehabilitate wide, badly grass-degraded road verges. The aim is to incorporate some of these techniques into routine unsealed forest road maintenance schedules.

(iii) Altered drainage patterns and flow regimes

Rainfall over the region, although the highest in Australia, is highly seasonal, with more than 90% of annual totals falling between November and April creating a need for water storages. Demand on the region's water resources is increasing as agricultural, urban and industrial needs expand in line with population growth and changing land-uses.

There are three dams in the Property: Copperlode Falls Dam, Paluma Dam and Koombooloomba Dam. The first two supply the urban water requirements of the Cairns and Townsville regions while Koombooloomba provides a water source for hydroelectric power generation. Eight local authorities have 22 intakes within the Property, each with associated pipelines, access roads and powerlines [3].

Dams, weirs and culverts are major landscape modifiers resulting in the direct loss of both terrestrial and aquatic habitats through drowning, in the introduction of water barriers to terrestrial fauna movement and acting as barriers to the upstream or downstream movement of fishes and aquatic invertebrates. Such barriers may also interfere with successful reproduction or recruitment of juveniles into adult habitats. Streams below impoundments often become choked with sediments due to altered flow dynamics.

Although there has been no increase in the number of impoundments on watercourses inside the Property since listing, there have been the following changes:

- 5ha enlargement to the Herberton water supply and
- increases in the off-take capacity for the Mossman, Cairns, Mission Beach, Cardwell and Crystal Creek water supplies.

There are also many impacts on stream flows originating from outside the Property which affect the condition of watercourses in the Property.

Examples of recent actions addressing the issue of altered drainage and flow regimes

- The Authority commissioned the preparation of a water infrastructure environmental code of practice and maintenance assessment guidelines [59] to mitigate potential impacts while establishing consistent and transparent permit assessment processes for development and maintenance activities.
- The Authority actively participates in the FNQ 2010 regional water infrastructure planning processes to ensure World Heritage interests are properly considered. Since 2000 the focus of options being considered for additional water supplies to meet agricultural and urban demands in the Atherton-Barron-Cairns areas has now moved away from the Property.
- The Rainforest CRC has several projects examining a range of freshwater management issues including environmental flow requirements, visitor use impacts on water quality and ecology, stream biodiversity, stream health and riparian zone requirements, environmentally sensitive infrastructure design and the environmental goods and services provided by natural waterways. Of particular note is current research on culvert design aimed at reducing the fragmenting impact of traditional culvert designs on aquatic ecosystems.

(iv) Environmental Pests

The Wet Tropics is seen as particularly vulnerable to the threat of invasive pest species. For millions of years natural ocean barriers provided the isolation essential for the Wet Tropics' unique species and ecosystems to evolve. In just over a hundred years this natural barrier has been rendered partially ineffective and millions of years of biological isolation has inadvertently come to an end.

In the Property most pest invasions are closely related to human activity disturbances, particularly clearings associated with service corridors such as powerline easements and roads which act as both habitats and conduits for pest dispersal.

Pest Plants

Within the Wet Tropics region, 508 exotic plant taxa have been identified as having become naturalised [60], which amounts to almost 11% of the region's native flora and represents almost 39% of Queensland's naturalised alien plant species total [3]. About 40 of these regional naturalisations are currently considered environmental weeds within the Property.

The rate and magnitude of invasive plant naturalisation within the Wet Tropics over the last century is illustrated in **Figure 6**.

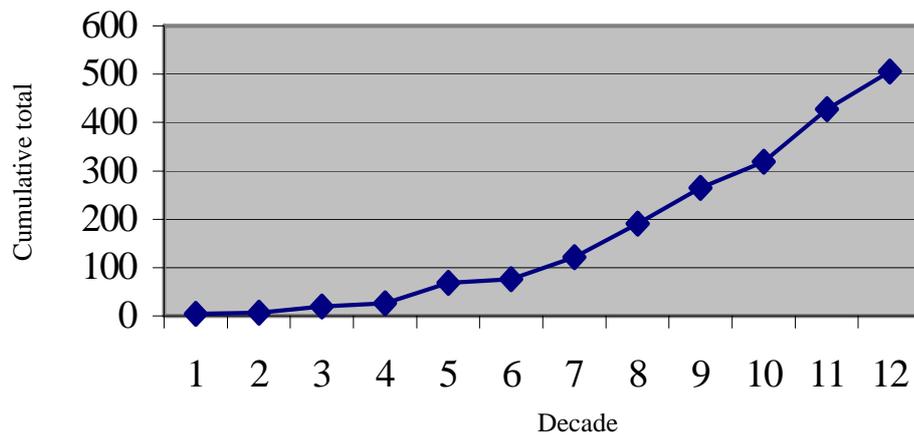


Figure 6. The total number of alien plant species recorded as naturalised in the Wet Tropics region during 10 year increments where Decade: 1 = pre 1900; 2 = 1900-09; 3 = 1910-19; 4 = 1920-29; 5 = 1930-39; 6 = 1940-49; 7 = 1950-59; 8 = 1960-69; 9 = 1970-79; 10 = 1980-89; 11 = 1990-99; 12 = unofficial records for the region compiled by Werren (2001).

Pest animals

Although the number of vertebrate pest species has remained stable for several years, their population numbers, distribution and ecological impacts are poorly understood. Harrison & Congdon [61] assessed the status of the 28 naturalised vertebrate species within the region and found that the current major vertebrate pests are the pig, cat, cane toad and dog/dingo. These species ranked high primarily due to their current levels of ecological impacts and because of the current lack of feasible control options. Pest species with substantial future impact potential include the fox and six exotic freshwater fish species. The translocation of large predatory native fish outside their natural range as part of regional recreational fish stocking projects is an emerging concern. In recent years deer have escaped from a number of deer farming operations and have established a number of breeding feral populations, notably in the Palmerston, Mena Creek and Bingal Bay sections of the region. The apparent rapid rate of population increase and spread of these feral deer populations and their potential to invade parts of the Property is also of concern.

Examples of recent actions addressing the issue of environmental pests

The Authority recognises the problem of invasive pest species and the risks associated with potential introductions of new species, as a Key Force of Change [33] and a priority for increased research and control effort.

Pest plants

- The Rainforest CRC was commissioned by the Authority to develop an environmental weed 'risk assessment system' (RAS) for the Wet Tropics region [60] designed to gauge the potential impact of weeds on World Heritage values. The system will be used to assist in focussing efforts on a small proportion of the enormous pool of potential weeds, determine the Authority's immediate to medium-term weed management priorities and funding needs and provide the decision-making framework for on-going management of the weed problem. The Authority's weed control efforts for the past decade have been focussed on the two environmental weeds: pond apple and harungana which had been identified in two studies as requiring the most urgent control. At present, after 14 years investment in control activities, it would appear that control of these two weeds are beyond the current resources available to the Authority.

- The Wet Tropics Road Maintenance Code of Practice [54] also attempts to improve road verge and associated roadside weed management. Similarly, the Code of Practice and Environmental Management Plans for the electricity supply industry [55] also aims to minimise the impact and spread of undesirable weeds.
- All local government jurisdictions within the region have developed Pest Management Plans under the *Rural Lands Protection Act 1985*, which identify and target the major environmental and agricultural weeds found within their section of the region. Declaration of a pest imposes legal responsibilities on all landholders, local governments and state government agencies to control the pest on lands under their jurisdiction.
- The Rainforest CRC is undertaking a program of research into the biology, ecology, and control methods of several major environmental weeds aimed at improving our knowledge of weeds, their effect on the environment, and the effect of weed treatments on these environments. The research is currently focussed on pond apple, harungana, hymenachne, siam weed and tobacco weed.
- The Authority in collaboration with the Far North Queensland Local Government Pest Plan Advisory Committee and the Department of Natural Resources and Mines, and with financial assistance from the Natural Heritage Trust, produced a plain English *Weed Pocket Guide* for the region [62] to aid weed identification and awareness by the general public. Copies of the Guide have been distributed to all landowners within the Property and copies are available through each local government authority in the region. This guide is into its second printing due to a higher than anticipated demand.

Pest animals

- The Rainforest CRC has developed a Wet Tropics Vertebrate Pest Risk Assessment Scheme [61]. The objective of the scheme is to assist the Authority in making informed decisions on where to allocate and focus its pest animal management resources. The scheme was confined to exotic species and did not consider the translocation of native species outside their natural geographic range. In 2002 the Authority commissioned a report on fish stockings and translocations in the Wet Tropics [63] and as a result the Authority is developing a policy on these activities.
- In 2001 the feral pig was listed as a nationally threatening process. It has been estimated that there are in the vicinity of 27,000 feral pigs in the region (J. Mitchell *pers. com*). Control of the pig population within the Property is very difficult because of rugged terrain and major accessibility problems. Several studies by CSIRO and DNR have found that trapping is the safest and most effective control option at present, pending the development of biological control. Since 1993 the Authority has supported a coordinated regional feral pig trapping program which has resulted in a total of 6,500 pigs being trapped and destroyed between 1994 and 1999. The aim of the program is to reduce the impacts of feral pigs on the conservation values of the Property and upon the Property's neighbours and to encourage the adoption of humane techniques. The Authority also funded the construction of a pig enclosure fence to protect the only known population of the endangered tree, *Endiandra cooperana*, whose entire seed crop was being consumed by feral pigs.
- The Rainforest CRC has been undertaking several years of intensive research into the ecological impacts of feral pigs to natural communities. The proceedings of a Wet Tropics feral pig conference and workshop have been published by the Rainforest CRC [64]. The Vertebrate Pest CRC has begun researching novel approaches to pig control including bait-delivered immunocontraception.
- Recent escapes of deer from a farm in the Palmerston area, in particular, have raised concerns regarding their potential for establishing feral populations. It is feared that if these feral populations were to become established in the west of the Property, they could be major destructive pests. The Authority has allocated funds to conduct an initial survey of the extent of this regional problem.

(v) Undesirable habitat alteration/degradation

Two processes with the potential to cause widespread habitat alteration in the Property include changes to historic fire regimes in non-rainforest ecosystems and forest dieback in the region's rainforests.

Fire

Most of the Wet Tropic's non-rainforest ecosystems evolved under the influence of fire and rely on particular fire regimes for their long-term persistence. Post-European alterations to fire regimes appear to be having an array of ecological impacts however, interpreting appropriate fire regimes to protect World Heritage values is proving difficult because of:

- the difficulties in determining pre-European fire regimes,
- the lack of scientific information on the effects of fire intensity, frequency and timing, or
- the impact of introduced species altering fuel loads and burning characteristics.

Examples of recent actions addressing the issue of fire

- QPWS is responsible for fire management over the majority of the Property. QPWS drafted a state-wide fire policy in mid 2000 and fire management plans are being drawn up for individual protected areas. The protection of ecological systems is one of the two main purposes for these fire management plans, the other being the safeguarding of life and property. The Authority has provided input into plans for the Wet Tropics region to ensure ecological aspects associated with protection and conservation of the Property are addressed.
- Draft fire management coordination arrangements have been developed involving the establishment of regional planning groups including Aboriginal representatives. On-ground land managers' fire plans are being progressively implemented.
- Specific fire management plans and detailed monitoring programs are also a component of the Northern Bettong Recovery Plan process [65].

Forest Dieback

The Authority's ongoing vegetation mapping program (see also Section II.4h for more details) located numerous patches of rainforest dieback across parts of the Property. Species of *Phytophthora*, including *P. cinnamomi*, have been isolated from dieback patches throughout the Wet Tropics by researchers from the Rainforest CRC [66]. The effects of *P. cinnamomi* on the region's rainforests vary from no visible impact to slight loss of canopy leaves in susceptible species to the death of all plants in virulent outbreaks. The association of *P. cinnamomi* with patches of rainforest death in Wet Tropics represents a potentially serious problem, and a management issue of some concern. Where virulent outbreaks occur the anticipated consequences include:

- major disruptions to ecological community structure
- local extinctions of populations of some plant species
- a massive reductions in primary productivity
- loss or degradation of habitats for dependent plants and animals.

Over 200 patches of dead rainforest have so far been identified in the Mount Lewis, Lamb Range and Tully Falls areas. Based on preliminary findings, approximately 14 percent of the World Heritage Area may be susceptible and at risk from rainforest dieback [66]. At least five species of *Phytophthora* have been identified from dieback sites: *P. cinnamomi*, *P. heveae*, *P. katsuurae*, *P. palmivora* and another, as yet unidentified species.

Examples of recent actions addressing the issue of forest dieback

- The extent of threat of *Phytophthora* to Australia's native species and ecosystems is recognised in the 1996 National Strategy for the Conservation of Australia's Biodiversity, where it is the only pathogenic taxon specifically cited. The Commonwealth EPBC Act also lists the disease caused by *Phytophthora* as a key threatening process subject to a national threat abatement plan [67].
- The Authority has commissioned the Rainforest CRC to undertake a range of integrated research activities investigating the dieback outbreaks so that informed management decisions can be made. The Rainforest CRC research program has been designed to:
 - assess the long term ecological effects of past outbreaks
 - determine the impacts of the present outbreak
 - determine the extent, map current range of outbreaks and monitor their spread
 - establish whether there is any relationship with past or present roads or other human infrastructure or activity
 - recommend practical strategic planning and management options.

(vi) Threatened species

Many species in the Wet Tropics, particularly rainforest species, are naturally rare. Relative rarity is influenced by several factors that may influence a species total potential population size such as its geographic range, its local abundance, and its ubiquity of occurrence within its range. It is often the case that species with small geographic ranges also have low local abundance, and are often patchily distributed within their ranges. These characteristics, either independently or in combination, increase the potential for extinction and make such species sensitive to environmental change/disturbance.

In the tables that follow, the legal status of plants and animals are based on the lists contained within Queensland's wildlife legislation (*Nature Conservation (Wildlife) Regulation 1994*) [68].

Rare & threatened plants

Queensland's Wet Tropics has a total of 351 officially listed rare or threatened plant species (**Table 19**) [3]. Of the 29 recognised recent plant extinctions in Queensland [68], 17 were formally endemic to the Wet Tropics [3]. The presumed extinct species, in general, have not been recorded for over 50 years. The high proportion of the State's presumed extinct, endangered and vulnerable plants coming from the Wet Tropics highlights the vulnerability, small population size and restricted distribution of many of the region's plants and the pattern and extent of past habitat clearing.

Table 19. Rare and threatened Wet Tropics plants [68], [3].

Status	Class	No. of species
Presumed Extinct (X)	fork ferns	1
	tassel ferns	2
	true ferns	5
	cycads	0
	conifers	0
	monocots	3
	dicots	6
	<i>subtotal</i>	<i>17</i>
Endangered (E)	Fork ferns	0
	tassel ferns	4
	true ferns	3
	cycads	0
	conifers	0
	monocots	16
	dicots	19
	<i>subtotal</i>	<i>42</i>
Vulnerable (V)	green algae	0
	fork ferns	0
	tassel ferns	4
	true ferns	8
	cycads	1
	conifers	0
	monocots	12
dicots	29	
	<i>subtotal</i>	<i>54</i>
Rare (R)	fork ferns	0
	tassel ferns	1
	true ferns	27
	cycads	0
	conifers	3
	monocots	37
	dicots	170
	<i>subtotal</i>	<i>238</i>
TOTAL		351

Rare & threatened animals

The Wet Tropics has a total of 98 animal species officially listed as either rare or threatened. Endangered fauna recorded from the Property include seven frog species, three marsupials and one bird (**Tables 20**). A further 16 vertebrate species found within the Property are classified as vulnerable [3].

Table 20. Rare and threatened Wet Tropics animals [68] [3].

Status	Mammals	Birds	Reptiles	Frogs	Fish	Total
Presumed Extinct	0	0	0	0	0	0
Endangered	3	1	0	7	0	11
Vulnerable	6	7	3	0	0	16
Rare	16	9	15	10	0	50
Total	25	17	18	17	0	82

Examples of recent actions addressing the issue of threatened species

- State-listed rare and threatened species (*Nature Conservation (Wildlife) Regulation 1994*) [68] are afforded statutory protection under the *Nature Conservation Act 1992* [17].
- The Commonwealth's EPBC Act [12] lists nationally threatened species and provides for the development and implementation of species recovery plans. Environment Australia's Endangered Species Program is implemented through parallel programs run by the State. QPWS is the lead agency with respect to species recovery planning within Queensland. Recovery Plans comprehensively describe, schedule and cost actions assessed as necessary to support the recovery of threatened species. Recovery plans are presently in place for the following Wet Tropics species:
 - frogs (seven species) [69],
 - northern bettong [65],
 - mahogany glider [70]
 - cassowary [71]

A draft Spotted-tailed Quoll Recovery Plan has also been prepared, but is not yet approved. The Authority is represented on the frogs, spotted tailed quoll and northern bettong Recovery Teams.

- The Cassowary Advisory Group is a community-based group provided with administrative support by the Authority. The group's focus has been in the three cassowary hotspots of Mission Beach, the Daintree lowlands and Kuranda. Intensive field surveys have been completed in these areas which have identified individual cassowaries and specific threats, if any, to each individual. The findings of these detailed surveys have formed the basis for a range of on-ground recovery actions implemented to minimise identified threats.
- The Rainforest CRC in collaboration with James Cook University, Environment Australia, WWF and several government bodies hosted a conference and workshop on amphibian diseases in August 2000. This conference brought together the world's leading authorities on this topic. Several very practical outcomes resulted including agreed and documented management strategies aimed at decreasing the risks to frogs due to communicable diseases [72]. These strategies have been adopted as acceptable field protocols for all researchers involved in handling stream-dwelling frogs in the Property.
- A range of road design (see Section II.5c (iv) for more details), land acquisition initiatives particularly in relation to the mahogany glider and the cassowary, Cooperative Management Agreements (eg Section II.4a(i) for more details), education, interpretation and awareness raising (eg Section II.4j(ii) for more details) are also targeting the conservation management of threatened species.

d. Visitor/tourism pressure

The tourism industry is recognised as a major presenter of World Heritage attributes. To improve communication with the industry, the Authority has established a Tourism Industry Liaison Group with representatives drawn from regional tourism associations. In August 2000 the Authority released *The Wet Tropics Nature Based Tourism Strategy* [73] to provide the basis for tourism management in the World Heritage Area. The Strategy divides the World Heritage Area into 12 tourism precincts according to their distinctive features and tourism focus. The overall aim is to encourage a dynamic, sustainable and professional nature-based tourism industry in the Wet Tropics. In November 2001 the Authority released the Wet Tropics Walking

Strategy [74]. The strategy identifies over 170 different walks in the region and aims to provide a coordinated network of walking tracks throughout the Property.

The Authority undertook a major study in collaboration with the tourism industry to develop a Marketing Action Plan which established a new brand for the Property and a framework to ensure appropriate and accurate images and text are used by tourism operators using the Property. A style manual, logo specifications and a range of approved images and text have been distributed to tourism operators in the region. Aboriginal people have been involved in commenting on appropriate images and text.

Increases in the resident and tourist population is placing greater demands on the Property for recreation and tourism pursuits particularly with regards road access, walking tracks, more developed visitor sites, camping grounds, picnic areas, lookouts and other visitor facilities. The Nature Based Tourism Strategy and the Walking Strategy attempt to address such issues in a structured way. Where feasible, areas previously used for timber industry access purposes are utilised to provide these opportunities.

In 2002 the Authority commissioned the Rainforest CRC to develop a *Wet Tropics Visitor Monitoring System*. The system will include a range of monitoring approaches at regional and site scales and is involving researchers, QPWS, the tourism industry, Aboriginal interests and the Authority. The monitoring system has been designed to assess both biophysical and psycho-social impacts and trends, as well as monitor the effectiveness of management and tourism industry in matching visitor expectations and behaviour with opportunities provided.

e. Litigation

The first litigation under the EPBC Act was the *Booth v Bosworth & Anor* (the Flying Fox Case). The case concerned the electrocuting of thousands of spectacled flying foxes in the Wet Tropics, but outside of the Property, by a lychee farmer. The farmer used a series of 14 electric grids to protect his crop. When flying foxes collided with the grids they were electrocuted. It was reported that 300-500 spectacled flying foxes were killed per night on the grid. As a consequence of the court case, electric grid control of flying foxes is no longer allowed in Queensland. This case involved a number of key issues for the protection of World Heritage, including establishing that an action taken outside a World Heritage area can be regulated if it causes a significant impact on World Heritage values (in this case the spectacled flying fox and its ecological processes). The case also highlighted the importance of public interest litigation.

f. Illegal activity

In the largest illegal logging operation in the Property since listing, 23 logs were removed from the Herberton State Forest section of the Property in January 2001. The offender was charged under the *Wet Tropics World Heritage Protection and Management Act 1993* and in December 2001 was sentenced to two concurrent periods of 12 months imprisonment. The judge in his closing statement recognised both the criminal acts performed and the significant environmental harm caused to rainforest of international significance.

II.6. MONITORING

a. Current monitoring program

The Authority's major monitoring program is linked to its annual reporting requirements. State of the Wet Tropics reporting is a statutory requirement under the *Wet Tropics World Heritage Protection and Management Act 1993*. A set of key reporting themes were approved by the Board in 1999 [75] from which landscape scale indicators have been developed. The core indicators relate solely to measuring changes in natural values. Role in the life of the community socio-economic and cultural indicators are currently being developed in collaboration with the Rainforest CRC.

The generalised core reporting themes presently being employed by the Authority are summarised in **Table 21**.

Table 21. Summary of core reporting themes employed in annual State of the Wet Tropics Reporting

Status of natural values	Factors affecting natural values	Management of factors affecting natural values
<p>Biodiversity</p> <ul style="list-style-type: none"> ecological communities plant species vertebrate species invertebrate species rare & threatened ecosystems rare & threatened plants rare & threatened animals 	<p>Clearing</p> <ul style="list-style-type: none"> regional clearing external to Property clearing within Property <p>Fragmentation</p> <ul style="list-style-type: none"> external fragmentation (of Property isolates) internal fragmentation (within Property) <p>Habitat alteration/degradation</p> <ul style="list-style-type: none"> forest dieback altered fire regimes <p>Pests</p> <ul style="list-style-type: none"> environmental weeds vertebrate pests invertebrate pests exotic diseases <p>Altered flow regimes</p> <ul style="list-style-type: none"> impoundments water extraction <p>Community infrastructure</p> <ul style="list-style-type: none"> powerlines roads telecommunications <p>Tourism & recreation</p> <ul style="list-style-type: none"> visitor numbers economics of visitation <p>Regional demographics</p> <ul style="list-style-type: none"> subregional population patterns and trends 	<p>Statutes</p> <ul style="list-style-type: none"> State & Commonwealth Acts subordinate legislation <p>Policy</p> <ul style="list-style-type: none"> plans guidelines codes <p>Land ownership</p> <ul style="list-style-type: none"> State tenures protected area categories <p>Aboriginal interests in land</p> <ul style="list-style-type: none"> claims Aboriginal land ownership joint management <p>Rehabilitation</p> <ul style="list-style-type: none"> tree planting/landscape restoration species recovery programs

At the site level, the Authority in collaboration with the Rainforest CRC has designed, and is currently trialling, a visitor monitoring system incorporating both biophysical and psycho-social components.

b. Results of current monitoring program and of key indicator measurement

The following are some of the key issues and findings selected from the 2001-2002 State of the Wet Tropics Report which highlight some of the more significant and current issues or pressures affecting protection and management of the Property [3].

Regional population growth

Regional population growth is 1.5% which is greater than the national average. The annual population growth for the region over the next decade has been forecast at 1.9%. Between 1971 and 1996 the regional population more than doubled to 208,637 persons.

Tenure trends within Property

There has been a progressive conversion of land tenures within the Property to national park (eg from 14% at listing in 1988 to 32% in 2002) and a progressive reduction in the area of various lease tenures from 143,140 ha in 1992 to 90,146 ha in 2002. In November 2001 a further 259,382 ha of State Forest within the Property was converted to Forest Reserve, a protected area holding tenure before eventual conversion to national park. In addition, about 32,000 ha of state forest contiguous with, but adjacent to, the World Heritage boundary was also involved in this stage 1 tenure conversion.

The increase in higher order land protection within the Property has been significant since listing with an average increasing trend over the past eight years of 4,500 ha per year being added to the national park estate. Over this same period there was an average 3,300 ha per year increase in the area of state forests unencumbered by leases and an average reduction of 6,600 ha per year in the area of leases and freehold land within the Property.

In the Daintree section of the region a strategic freehold land acquisition program (Daintree Rescue Program) has been implemented. 2,500 hectares of land within and adjacent to the Property has been procured through voluntary surrender agreements or direct purchase.

The Authority has also been instrumental in the voluntary acquisition and conversion to national park of other strategically important parcels of land within the region in accordance with Board endorsed guidelines (notably in the Graham Range, Cardwell Gap, Tully-Murray and Brampton Beach areas).

The Australian Wet Tropics Rainforest Foundation is also involved in land purchases adjacent to the Property which benefit the management and/or integrity of the Property.

Aboriginal interests and management agreements

Currently a total of 282,966 ha of the 894,000 ha Property is under claim. Land formally under indigenous management presently totals 26,453 ha.

The first management agreement with Aboriginal peoples in the Property was signed in 2000 with the Djabugay Tribal Aboriginal Corporation under section 42 of the *Wet Tropics Management Plan 1998*.

Visitation and tourism

Based on 1997 figures, tourism directly attributable to the Property, is estimated to generate over \$750 million each year.

The total number of visitors to the region is presently around 2.8 million per year. Visitor projections forecast an increase in total visitors to 4.5 million by 2016 with the increasing trend in the numbers of international visitors being a major contributing factor. 45.6% of visitors nominated rainforest experiences as one of their three main reasons for visiting the region.

In 1993 the number of visitors to 180 sites in the Property was 4.77 million visits (3.4 million visitor days). Of this, 1.5 million visits (32%) were by people on commercial tours. 48% of visits were made by local residents.

A survey of 6,917 visitors to the Property in 1993 indicated that 42% of visitors were 'extremely satisfied', only 0.1% were 'very unsatisfied', with the mean level of satisfaction being 'very satisfied' with their experience.

Clearing, fragmentation and landuse

Clearing of native vegetation outside the Property but within the Wet Tropics region remains a concern, however it has slowed from an average rate of 3,583ha per year between 1991-95 to 1,275ha per year between 1997-99. The largest areas cleared between 1997 and 1999 were on the upland tablelands as a consequence of expanding use of land for irrigated sugar cane production.

With the introduction of the *Wet Tropics Management Plan 1998* any clearing within the Property without a Wet Tropics Permit is now prohibited. Most existing clearings within the Property are related to activities and infrastructure which were in place at the time of listing. There are currently 2,406 ha of maintained linear clearings in the Property providing vehicle access and electricity distribution. A further 2,129 ha of clearing is due to artificial dams and impoundments which were present prior to World Heritage listing. Since listing there has been a total of 101 ha of new clearings, 85 ha on freehold land prior to the commencement of the Plan, with the remaining 16 ha associated with community infrastructure.

Community infrastructure

Ecological fragmentation associated with community service infrastructure is one of the major ecological impacts originating from within the Property. Electricity supply infrastructure is having the most significant fragmentation impact.

Logging has been a prohibited activity in the Property since 1987 and infrastructure associated with this industry has been phased-out, including the closing of over 6,500 km of logging roads and snigging tracks which had a combined cleared area footprint of approximately 2,070 ha.

There have been no clearings associated with new powerline or road construction within the Property since listing. Powerline upgrades have been designed to either straddle the Property or have been constructed on very tall towers negating the need for maintenance clearing under the line, while allowing for the re-establishment of canopy connectivity across existing clearings.

An environmental impact study into the feasibility and environmental impacts of alternate routes for the upgrading of the Tully-Innisfail powerline has been undertaken and is presently at the public consultation stage. A coastal route avoiding the Property appears to be a prudent and feasible option, however it is apparent there is a degree of local community opposition to this option. The coastal route option would result in the eventual decommissioning and rehabilitation of at least 35km of an existing 132KV transmission line and its associated 60 metre wide swathe clearing which presently dissects the Palmerston section of the Property. This would be a major gain for the management of the Property, especially with respect to reduced ecological fragmentation.

The Flaggy Creek and Davies Creek water storage proposals which had direct impact implications for the Property have been rejected from further consideration in favour of more prudent and feasible alternatives remote from the Property. However the trend for increased water demand and consumption resulting from expanded irrigation on the Tablelands and increase in population of Cairns remains a concern if it results in impacts on the ecology of waterways within the Property.

Codes of practice have been prepared for management and maintenance of road, electricity and water infrastructure in the Property. These codes of practice generally appear to be successfully achieving their desired outcome.

Pest species

The rapid increase in naturalised plant species in the Wet Tropics region is of concern. In the past decade the number of recorded naturalised species has increased from 320 to over 500. A risk assessment has identified 27 terrestrial and 7 aquatic introduced plant species which are considered to be of particular concern to the ecological integrity of the Property.

The number of vertebrate pest species has remained stable for several years. Population numbers, distribution and ecological impacts of these 28 species are very poorly understood. The feral pig, cat, dog and cane toad are the current major threats. Non-native species with substantial future impact potential include the fox and six exotic freshwater fish species. The translocation of large predatory native fish outside their natural range as part of recreational fish stocking projects is an emerging management concern. The Authority supported regional feral pig trapping program destroyed a total of 6,500 pigs between 1994 and 1999. It has been estimated that there are in the vicinity of 27,000 feral pigs in the region.

In addition to the feral pig problem, the Authority is developing policies and determining appropriate responses to native fish translocations, cattle grazing and feral deer.

Rainforest dieback

Rainforest dieback, attributable to *Phytophthora cinnamomi* now appears to be much more widespread than previously expected. Over 200 patches of rainforest dieback have so far been mapped. Although individual dieback patches are small in area (eg. generally <1ha in areal extent), preliminary findings suggest that up to 14 percent of the Property may be at risk.

Threatened species

Although covering only about 1 percent of Queensland, the Wet Tropics region was home to 59% of the State's presumed extinct plants, and is presently the habitat for 28% of Queensland's endangered plants, 19% of its vulnerable plants and 34% of its rare plants. The Property has a total of 98 animal species listed as rare or threatened, including seven endangered frog species, and the endangered cassowary, mahogany glider, northern bettong, spotted tail quoll and two butterflies. A further 16 vertebrate species are classified as vulnerable.

Of the endangered species, recovery plans are currently being implemented for seven frog species, the northern bettong, mahogany glider and cassowary. A draft spotted-tail quoll Recovery Plan has also been prepared. The Authority is represented on the frog, spotted tailed quoll and northern bettong recovery teams.

Of particular concern is the dramatic decline in population numbers of seven species of frogs over recent years. These frogs are endemic to the Wet Tropics and have disappeared from streams above 450 metres altitude in seemingly pristine environments over the last two decades. Recent research findings attribute the decline to the amphibian fungus, *Batrachochytrium dendrobatidis*. Agreement on management strategies aimed at decreasing the risk of communicable diseases to amphibians was one of the practical outcomes of a recent conference on amphibian diseases.

Population numbers of the Southern Cassowary also appear to be in decline with estimates of fewer than 1,500 adult cassowaries remaining in the Wet Tropics region. A recent study in the Mission Beach area identified a total of 110 cassowaries (49 adults) with an average loss of 2% of the adult population per year since 1988. Of these deaths, one bird was shot, six died from disease, 13 were killed by dogs and 42 died in collisions with vehicles on the roads. An additional pressure is loss of habitat, with the estimated clearing of 18% of available cassowary habitat in the Mission Beach district between 1992-1998.

There is concern that the spectacled flying fox (*Pteropus conspicillatus*), found in and around the rainforests of the Property is in serious decline, with recent field surveys estimating the total number of spectacled flying foxes to have declined from 113,960 in November 1998 and to only 79,980 in November 2000 with anecdotal evidence suggesting that total numbers may have declined from 800,000 during the 1980s.

Community attitudes survey

A repeat community attitude survey is presently being undertaken (2002), the results of which are not currently available. The only previous surveys were conducted in 1992, one year after the establishment of the Wet Tropics Management Authority and 1993, of both the regional community and in three of Australia's largest cities, Sydney, Melbourne and Brisbane. Some of the findings from the early surveys were:

- Awareness of the Property as a World Heritage listed area rose significantly both regionally and in the cities. Regionally awareness increased from 71% in 1992 to 87% in 1993. The cities showed a 12% increase, from 31 to 43%.
- Only 45% were satisfied with information provided on the Property, however this was an increase from 35% in 1992.
- Support for World Heritage listing of the Property remained stable in the cities, from 70% support in 1992 to 72% in 1993. Regionally, support rose from 74% to 80% indicating an increasing trend in support for listing
- Attracting tourists and environmental protection were seen as the primary benefits of listing.
- Loss of jobs and losses to the timber industry were the most cited disadvantage of listing.
- One third of residents in the region believed listing would mean a positive effect in their community, however the largest proportion believed that it would not have any effects on their communities.
- Satisfaction with progress in decision making was low, but increased from 31% in 1992 to 37% in 1993.

Landholders and neighbours survey

In August 1999 the Authority commissioned an independent survey of immediate neighbours of the Property. The telephone survey involved 500 neighbours. The results showed 66% were satisfied with being an immediate neighbour with just 15% dissatisfied. Those less likely to be satisfied or supportive included the owners of properties larger than 40ha (52% support), owners of multiple properties (55%), non-resident property owners (52%), primary producers (47%), owners of properties for more than 20 years (52%) and those over 55 years of age (56%). The groups most supportive included owners of properties of less than 4ha (77%), owners of the property for less than 10 years (75%), less than 55 years old (70% for 18-39 years, 74% for 40-54 years), female (76%) and owners of residential land (78%).

c. Report on outcomes of World Heritage Committee or Bureau State of Conservation Reports

Refer to Section II.6.d. below.

d. Report on outcome of ACIUCN Reactive Monitoring reports

In November 2000, the World Heritage Bureau noted the ACIUCN Report on the state of conservation of the Property. The report identified four priority action areas:

- (i) the need to support site management, particularly to ensure adequate resources to effectively implement the Wet Tropics Management Plan and the Authority's Strategic Plan;
- (ii) the need to closely monitor the management of native and introduced species, in particular the control of feral and exotic species;
- (iii) the need to ensure complementary management of land use and human impacts within and beyond the boundaries of the World Heritage area. ACIUCN recommended a particular focus on industrial and tourism developments, as well as the need to carefully assess electricity options in the region, which may impact the World Heritage area, and
- (iv) consideration of a number of strategic issues, including indigenous involvement on management, the recognition of cultural values in any review of boundaries to enhance site management.

The Australian Government has transmitted for review its response to the priority action areas described in the ACIUCN Report, to the UNESCO World Heritage Centre and IUCN (Attachment 2). The response report was reviewed by the Bureau's 24th extraordinary session in June 2001. ACIUCN received a copy of the state party response at its 12-13 September 2001 meeting.

II.7. CONCLUSIONS AND RECOMMENDED ACTION

a. Main conclusions regarding the state of the World Heritage values of the Property (see items II.2. and II.3. above)

Improved knowledge of the significance and values of the Property has increased markedly since listing due largely to a concerted scientific research effort by the Rainforest CRC, an earlier Authority funded research grants scheme and annual information collection and collation for State of the Wet Tropics reporting.

Overall it is concluded that the state of the Property's World Heritage values have been maintained since listing and that a wide range of management activities have been implemented to achieve progressive enhancement of these values in the longer-term.

Logging and associated forestry operations was the only major extractive industry in the Property at the time of listing but has been prohibited since 1987. Infrastructure, such as roads, associated with this industry has been progressively phased out resulting in reduced impacts through their use and maintenance. There has also been improvements in canopy connectivity associated with infrastructure corridors resulting from the closure of forestry roads and improved design and maintenance of electricity supply lines straddling the Property.

A statutory management plan for the Property is in place which strictly regulates activities within the Property including improved management and maintenance practices of community infrastructure resulting in reduced environmental impacts.

Significant gains have been achieved in the Daintree lowlands in complementary habitat protection and consolidation through a large-scale voluntary freehold land acquisition program. This has seen 2,500 ha of land adjacent to the Property procured.

Recovery plans are being progressively implemented for the most threatened species of fauna in the Property.

b. Main conclusions regarding the management and factors affecting the Property (see Items II.4 and II.5. above)

Specific statutory protective measures for the Property are now in place. The *Wet Tropics World Heritage Protection and Management Act 1993* together with its subordinate statute, the *Wet Tropics Management Plan 1998* provide the legal framework and statutory mechanisms for management of the Property by regulating activities within the Property that have the potential to impact on World Heritage values. A range of other legislation and regional planning instruments is assisting in conservation management in areas surrounding the Property.

Three major management strategies undertaken by the Authority complement the Wet Tropics Management Plan: a) *Nature Based Tourism Strategy* (implementation phase), b) *Walking Strategy* (implementation phase) and c) *Conservation Strategy* (development phase). The Authority's *Research and Information Needs* report complements these strategies by identifying key research priorities in these management areas. These strategies will assist in determining relative management priorities and allocations of resources.

The proportion of the Property in protected area tenures has increased significantly, while the area of leasehold and freehold has been reduced.

Native title and Indigenous land use negotiations will continue to emerge as a major area of management focus with 80% of the Property potentially claimable under the *Native Title Act 1993*.

The establishment of the Rainforest CRC as a national centre for understanding rainforest ecology and management, and its partnership arrangements with the Authority, has resulted in a major increase in applied research effort being directed at management issues.

The substantial increases in tourism since listing is a major contributor to the regional economy. Management partnerships, which have been developed with the tourism industry, recognise the important role the industry can play in presenting the values of the Property. The *Nature Based Tourism Strategy* and visitor monitoring system are attempts to maximise the benefits while minimising the impacts associated with visitation.

A wide range of initiatives have been developed aimed at fostering a role of the Property in the life of the community - ranging from actual involvement of the community in management, the establishment of stakeholder advisory and liaison groups, to the production and distribution of educational, interpretative and awareness raising materials.

Ultimately, regional growth, development and population increase will be a major causal agent of direct and indirect pressures on the Property. The rapid growth rate of the regional population surrounding the Property has led to clearing for urban and agricultural expansions, greater demands for energy supplies and their distribution, the upgrading and duplication of transport corridors, increased demands for high quality water supplies for domestic, agricultural and industrial uses, increases in the number and spread of pest species and greater demands for recreation and tourism facilities.

Internal fragmentation (and its array of impacts on ecological integrity, ecosystems and evolutionary processes) is considered a major threatening process to the World Heritage values of the Property. In recognition of this, wherever feasible and opportunities arise, obsolete infrastructure has been phased-out, and considerable efforts have been invested in improving management and maintenance practices through the use of codes of environmental practice and detailed environmental management plans. The Rainforest CRC is undertaking adaptive management research designed to test current management practices; to provide the baseline data necessary for designing robust monitoring systems; and to provide prescriptions for improved management.

The other major potential pervasive threats to the Property include global warming and invasive plant, animal and disease species.

Preliminary research suggests that the rainforests of the Wet Tropics are extremely sensitive to rapid climate change, with predictions of up to 66% of all the Property's endemic vertebrate faunal species being at extreme risk of extinction over the next 50 to 100 years. The impacts of internal fragmentation as barriers to movement and migration are expected to exacerbate this impact in addition to assisting accelerated pest invasions and providing conduits for increases in fire risk. Management strategies to deal with the threat of global warming at the regional or Property scale have not as yet been determined.

The threat posed by invasive plants, animals and diseases is considered to be greater now than at the time of listing. The rate of increase in the naturalisation of introduced species within the region is a concern. Several invasive environmental pest species, such as pond apple, harungana, several grasses, feral pigs, cats and cane toads, are already beyond our management capacity to effectively and sustainably control given present resources and knowledge.

The health of some areas of rainforest within the Property has been affected to varying degrees by *Phytophthora* induced canopy dieback. The cause or trigger of these recent outbreaks is presently unknown.

Limited financial resources may severely hamper the rate of implementation of strategies designed to address these issues.

c. Proposed future action/actions

The Authority will continue to seek a review of the Commonwealth-State Intergovernmental Agreement (including financial arrangements) regarding the management of the Property.

Following completion of the Wet Tropics Management Plan, the development, completion and implementation of specific management strategies has been an Authority priority. The *Wet Tropics Nature Based Tourism and Walking Strategies* are at the implementation stage. The *Wet Tropics Conservation Strategy* is under development and will be used as the framework for developing strategic approaches to the management of issues such as pests, climate change, fragmentation and rehabilitation.

Negotiated outcomes with Aboriginal peoples associated with the Property through processes such as the Interim Negotiating Forum and management agreements will continue to be a priority for the Authority.

The finalisation of the Authority's long-term regional vegetation and geology mapping project is due for completion in 2004.

The establishment of the Australian Tropical Forest Institute (ATFI) is a high priority. The institute would enable a continuation of the applied management research presently provided by the Rainforest CRC whose funding only continues until 2006. The ATFI concept is to establish an institute that brings tropical forest management and scientific expertise together, with opportunities to also integrate with Aboriginal knowledge and traditional expertise.

d. Responsible implementing agency/agencies

All of the above actions are the responsibility of the Wet Tropics Management Authority. ATFI is a joint initiative between the Authority, Rainforest CRC, James Cook University and a number of commercial partners.

e. Timeframe for implementation

Priority initiatives identified in the Authority's management strategies will be introduced over the term of this Periodic Report subject to adequate resourcing.

f. Needs for international assistance. N/A

g. Experience relevant to other states parties

Development of rule-based management zoning schemes, and the use of GIS as a tool in decision making.

Cooperative approaches to management with research institutions, Indigenous communities, infrastructure agencies and stakeholder groups.

Commitment to the development of better on-ground practices by infrastructure agencies.

Commitment to coordinated planning and land management on a whole of region basis.

ATTACHMENTS

- Attachment 1: Update of original 1987 nomination dossier
Attachment 2: Response Report: ACIUCN Recommendations WTWHA, October 2000

REFERENCES

- [1] DASETT (1987). *Nomination of the Wet Tropical Rainforests of North-east Australia by the Government of Australia for Inclusion in the World Heritage List*. Department of Arts, Sport, the Environment, Tourism and Territories. Canberra. December 1987.
- [2] IUCN (1988). World Heritage Nomination – IUCN Technical Evaluation of 486 Wet Tropical Rainforests of North-east Australia.
- [3] WTMA (2002). *State of Wet Tropics Report 2001-02*. Wet Tropics Management Authority, Cairns (<http://www.wettropics.gov.au/docs/2001-annual-report.pdf>).
- [4] Bottoms, T. (2000). Bama country – Aboriginal homelands. In: McDonald, G. & Lane, M. (eds). *Securing the Wet Tropics?* Federation Press. Pp32-47.
- [5] Sluiter, I.R. & Kershaw, A.P. (1982). The nature of late tertiary vegetation in Australia. *Alcheringa* 6: 211-222.
- [6] Horsfall, N. (1984). The prehistoric occupation of Australian rainforests. In Werren, G.L. & Kershaw, A.P. (eds). *The Rainforest Legacy: Australian national rainforests study Volume 3*. Australian Government Publishing Service Canberra
- [7] Toyne, P. (1994). *The Reluctant Nation: Environmental law and politics in Australia*. Australian Broadcasting Corporation, Sydney.
- [8] Gould, K. (2000). An historic perspective on forestry management. . In: McDonald, G. & Lane, M. (eds). *Securing the Wet Tropics?* Federation Press. Pp85-102.
- [9] Daintree Futures Study <http://www.rainforest-crc.jcu.edu.au/functions/research.asp?rnd=48&action=itemdisplay&context=PUB&linkpath=Pubs/ProReports/DaintreeFutures>
- [10] *Wet Tropics World Heritage Protection and Management Act 1993*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WetTropicsA93_03B.pdf
- [11] *Wet Tropics Management Plan 1998*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/W/WetTropMgmtPlan98_01_.pdf
- [12] *Environment Protection and Biodiversity Conservation Act 1999*
<http://www.ea.gov.au/epbc/about/index.html>
- [13] *Local Government Act 1990*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/L/LocGovA93_07A_020701.pdf
- [14] *Integrated Planning Act 1997*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/I/IntegPlanA97_04D.pdf
- [15] *Wet Tropics of Queensland World Heritage Area Conservation Act 1994*
<http://scaleplus.law.gov.au/html/pasteact/2/1151/top.htm>

- [16] Activities regulated by the *Wet Tropics Management Plan 1998*
http://www.wettropics.gov.au/mlr/laws_protecting.htm
- [17] *Nature Conservation Act 1992*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/N/NatureConA92_03_.pdf
- [18] Queensland's vegetation clearing controls
http://www.nrm.qld.gov.au/resourcenet/veg/veg_management/index.html
- [19] *Vegetation Management Act 1999*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/V/VegetManA99_01A.pdf
- [20] *Vegetation Management Regulation 2000*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/V/VegetManR00_002.pdf
- [21] *Integrated Planning Act 1997*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/I/IntegPlanA97_04B.pdf
- [22] *Land Act 1994* http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/L/LandA94_05B.pdf
- [23] *Land Act regulation 1995*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/L/LandR95_03B.pdf
- [24] WTMA (1997). *Protection Through Partnerships*. Policies for implementation of the Wet Tropics Plan. Wet Tropics Management Authority, Cairns.
- [25] FNQ 2010 Regional Planning Process
<http://www.dlqp.qld.gov.au/internet/corporate/publications/planning/projects/#fnqstratrep>
- Far North Queensland Regional Planning Advisory Committee (2000). *Far North Queensland Regional Plan*. Queensland Department of Communication and Information, Local Government, Planning and Sport.
- [26] *Local Government Act 1993*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/L/LocGovA93_07A_020701.pdf
- [27] *Community Services (Aborigines) Act 1984*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/C/CommunSrvAba84_03E.pdf
- [28] *Aboriginal Land Act 1991*,
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/A/AborLandA91_04C.pdf
- [29] *Native Title (Qld) Act 1993*,
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/N/NativeTitleQA93_01_.pdf
- [30] WTMA (1998). *Which Way Our Cultural Survival?* The Review Of Aboriginal Involvement in the Management of the Wet Tropics World Heritage Area by the Review Steering Committee, Wet Tropics Management Authority, Cairns.
- [31] Permit requirements under the Wet Tropics Management Plan
<http://www.wettropics.gov.au/mlr/permits.htm>
- [32] Roles and functions of the Wet Tropics Management Authority
http://www.wettropics.gov.au/mlr/what_is_WT_management.htm
- [33] *Wet Tropics Research and Information Needs Report*
<http://www.wettropics.gov.au/mlr/pdf/Information%20Needs%202000.pdf>
- [34] Rainforest CRC (Cooperative Research Centre for Tropical Rainforest Ecology and Management)
<http://www.rainforest-crc.jcu.edu.au/>

- [35] FNQ Regional Plan - Supporting Technical Document - Tourism
- [36] Driml, S. (1997). *Towards Sustainable Tourism in the Wet Tropics World Heritage Area*. Report to the Wet Tropics Management Authority.
- [37] The Australian Wet Tropics Rainforest Foundation
http://www.wettropics.gov.au/mlr/WT_foundation.htm
- [38] The Wet Tropics Management Authority website <http://www.wettropics.gov.au>
- [39] Barron, F. (2002). *Visitor Centre Audit Report*. Wet Tropics Management Authority, Cairns.
- [40] Lynch, M. (2000). The social impacts of World Heritage listing In: McDonald, G. & Lane, M. (eds). *Securing the Wet Tropics?* Federation Press. Pp117-131.
- [41] Driml, S. (2000). Ecotourism – opportunities and threats. In: McDonald, G. & Lane, M. (eds). *Securing the Wet Tropics?* Federation Press. Pp200-218.
- [42] Regional Population Growth, 1998-99. http://www.oesr.qld.gov.au/views/regional/qrsis/qrsis_fs.htm
Population Projections for Queensland. http://www.oesr.qld.gov.au/views/regional/qrsis/qrsis_fs.htm
Censuses of Population and Housing, 1947 to 1996.
http://www.oesr.qld.gov.au/views/regional/qrsis/qrsis_fs.htm
- [43] DNR (2000). The Statewide Landcover and Trees Study (SLATS).
<http://www.nrm.qld.gov.au/slats/pdf/slats9799.pdf>
- [44] EPA (1999). *State of Environment Queensland 1999*. <http://www.env.qld.gov.au/cgi-bin/w3-msql/environment/science/environment/msqlwelcome.html?page=frhome.html>
- [45] DPI (2000). *An Agricultural Profile of the Atherton Tablelands*. Department of Primary Industries Queensland. Mareeba.
- [46] Agricultural Commodity Survey. http://www.oesr.qld.gov.au/views/regional/qrsis/qrsis_fs.htm
- [47] Intergovernmental Panel on Climate Change [IPCC], Third Assessment Report (2001).
<http://www.ipcc.ch/>
- [48] Walsh, K., Hennessy, K., Jones, R., Pittock, B., Rotstayn, L., Suppiah, R. & Whetton, P. (2000). *Climate Change in Queensland Under Enhanced Greenhouse Conditions*. Second Annual Report. CSIRO Atmospheric Research, Melbourne.
- [49] Walsh, K.J.E. & Ryan, B.F. (2000). Tropical cyclone intensity near Australia as a result of climate change. *J. Climate* 13: 3029-3036.
- [50] Still, C.J., Foster, P.N. & Schneider, S.H. (1999). Simulating the effects of climate change on tropical montane cloud forests. *Nature* 398: 608-610.
- [51] Foster, P. (2001). The potential negative impacts of global climate change on tropical montane cloud forests. *Earth Science Reviews* 55: 73-106
- [52] Hilbert, D.W., Ostendorf, B. & Hopkins, M. (2001). Sensitivity of tropical forests to climate change in the humid tropics of North Queensland. *Austral Ecology* 26: 590-603.
- [53] Goosem, S. & Tucker, N.I.J. (1995). *Repairing the Rainforest: Theory and practice of rainforest re-establishment in north Queensland's Wet Tropics*. Cassowary Publication. Wet Tropics Management Authority, Cairns.

- [54] *Roads in the Wet Tropics: Planning, Design, Construction, Maintenance and Operation Best Practice Manual*
- [55] *The Queensland Electricity Supply Industry Environmental Code of Practice in the Wet Tropics World Heritage Area (QESI Code)*
- [56] NRA (1999). *Codes of Practice for Water Extraction in the Wet Tropics World Heritage Area*. Natural Resource Assessments, Cairns.
- [57] Goosem, M.W. & Turton, S.M. (2000). *Impacts of Roads and Powerlines on the Wet Tropics World Heritage Area. Stage II*. Rainforest CRC, Cairns.
- [58] Moore, L.A. & Moore, N.J. (1999). *Cassowary Conservation Roads: A cassowary management strategy and road upgrade assessment for El Arish and Tully-Mission Beach Roads, Mission Beach*. Report to Department of Main Roads, Cairns.
- [59] Water infrastructure package comprises 3 parts:
- NRA (1999). *Codes of Practice for Water Extraction in the Wet Tropics World Heritage Area*. Natural Resource Assessments, Cairns.
- NRA (1999). *Conservation Values of Waterways in the Wet Tropics World Heritage Area*. Natural Resource Assessments, Cairns.
- NRA (1999). *Environmental Assessment Guide: Development and Maintenance of Water Extraction Infrastructure in the Wet Tropics World Heritage Area*. Natural Resource Assessments, Cairns.
- [60] Werren, G. (2001). *Environmental Weeds of the Wet Tropics Bioregion: Risk Assessment and Priority Ranking*. Rainforest CRC, Cairns.
- [61] Harrison, D.A. & Congdon, B.C. (2001). *Wet Tropics Vertebrate Pest Risk Assessment Scheme*. Rainforest CRC & School of Tropical Biology, James Cook University, Cairns
- [62] Ward, D., Goosem, S. & Werren, G. (2001). *Weed Pocket Guide. Agricultural and Environmental Weeds of Far North Queensland*. Department of Natural Resources and Mines, Queensland Government.
- [63] Burrows, D. (2002). *Fish Stocking and the Distribution and Potential Impact of Translocated Fishes in Streams of the Wet Tropics Region, Northern Queensland*. Report to the Wet Tropics Management Authority ACTFR Report No. 02/04.
- [64] Johnson, C.N. (ed). (2001). *Feral Pigs: Pest Status and Prospects for Control*. Proceedings of a Feral Pig Workshop, James Cook University, Cairns, March 1999. Rainforest CRC, Cairns.
- [65] Recovery plan for the northern bettong (*Bettongia tropica*) 2000 – 2004.
<http://www.ea.gov.au/biodiversity/threatened/recovery/northern-bettong/index.html>
- [66] Gadek, P., Gillieson, D., Edwards, W., Landsberg, J. & Price, J. (2001). *Rainforest Dieback Mapping and Assessment in the Wet Tropics World Heritage Area*. James Cook University & Rainforest CRC, Cairns.
- [67] Environment Protection and Biodiversity Conservation Act 1999: Listed Key Threatening Processes.
<http://www.ea.gov.au/cgi-bin/sprat/public/publicgetkeythreats.pl>
- Threat Abatement Plan for Dieback Caused by the Root-rot Fungus *Phytophthora cinnamomi*.
<http://www.ea.gov.au/biodiversity/threatened/tap/phytophthora/index.html>
- [68] Queensland's *Nature Conservation (Wildlife) Regulation 1994*
http://www.legislation.qld.gov.au/LEGISLTN/CURRENT/N/NatureConWilR94_02C.pdf

- [69] Stream-dwelling rainforest frogs of the wet tropics biogeographic region of north-east Queensland Recovery plan 2000 – 2004. <http://www.ea.gov.au/biodiversity/threatened/recovery/rainforest-frogs/index.html>
- Recovery plan for the magnificent broodfrog *Pseudophryne covacevichae* 2000-2004. <http://www.ea.gov.au/biodiversity/threatened/recovery/magnificent-broodfrog/index.html>
- [70] Mahogany glider recovery plan 2000-2004. <http://www.ea.gov.au/biodiversity/threatened/recovery/mahogany-glider/index.html>
- [71] Recovery plan for the southern cassowary *Casuarius casuarius johnsonii* 2001-2005. <http://www.ea.gov.au/biodiversity/threatened/recovery/southern-cassowary/index.html>
- [72] Speare, R. (2001). *Developing Management Strategies to Control Amphibian Diseases: decreasing the risks due to communicable diseases*. School of Public Health and Tropical Medicine, James Cook University, Townsville.
- [73] WTMA (2000). *Wet Tropics Nature Based Tourism Strategy*. <http://www.wettropics.gov.au/mlr/nature.pdf>
- [74] WTMA (2001). *Wet Tropics Walking Strategy*. http://www.wettropics.gov.au/docs/walking_strategy.doc
- [75] WTMA (1999). *Measuring Changes in the State of the Wet Tropics of Queensland World Heritage Area I*. The development of a set of core indicators for measuring changes in natural values. Wet Tropics Management Authority, Cairns.
- [76] Examples of Wet Tropics research publications by Rainforest CRC <http://www.rainforest-crc.jcu.edu.au/functions/research.asp?action=activity&item=36>
- [77] Zuidema, P.A., Sayer, J.A. & Dijkman, W. (1997). Forest fragmentation and biodiversity: The case for intermediate-sized conservation areas. *Environmental Conservation* 23: 290-297.