RESEARCH REPORT

Rainforest Restoration Activities in Australia's Tropics and Subtropics

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Rainforest CRC

Cooperative Research Centre for Tropical Rainforest Ecology and Management

RAINFOREST RESTORATION ACTIVITIES IN AUSTRALIA'S TROPICS AND SUBTROPICS

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(*Top*) Restoration practitioners, North Queensland (photograph courtesy of John Kanowski).
(*Centre*) Aerial view of extensively cleared landscape (photograph courtesy of John Kanowski).
(*Bottom*) Viewing a seven year-old Wet Tropics Tree Planting Scheme plantation at Pelican Point (photograph courtesy of Heather Proctor).

Layout by B. Kuehn and S. Hogan

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This report is dedicated to the memories of Geoff Tracey, the pioneer of rainforest restoration in Australia; Brad Dorrington, who supported the early vision of a Wet Tropics regional inventory; and Garry Werren, who worked tirelessly to disseminate knowledge of degradation and restoration in Australia's tropical rainforests.

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ABSTRACT

Large areas of Australian rainforest were converted by European settlers to pasture and cropland, with undesirable environmental consequences. This report describes the nature of efforts to restore rainforest cover to the eastern tropics and subtropics, where the largest rainforest areas were found. Since around 1990, a complex array of government-sponsored schemes has provided financial subsidies to encourage and assist restoration. A striking feature has been the high level of community involvement. Most projects targeted the banks of creeks and rivers, and were less than five hectares in area. Total areas reforested region-wide were modest (less than 1% of the area of past clearing). The unit cost of vegetation reinstatement was around AU$20,000 / ha, but costs of projects below 2.0 ha in area often greatly exceeded this. The value of such small-scale projects may be in community engagement, whereas good ecological outcomes are more likely with larger-scale projects. The cost of reinstatement is also related to the need to achieve a closed tree canopy as rapidly as possible, which requires closely spaced plantings. Achieving a substantial increase in rainforest cover will require reforestation over much larger aggregate land areas than have been replanted to date. The scale of current funding budgets is insufficient for this goal. To reinstate forest over larger areas at lower unit cost, the management of naturally established (autogenic) regrowth deserves further consideration. The future development of revegetation strategies requires soundly designed, quantitative and well-documented monitoring of the outcomes of different types of project, together with centralised and stable record-keeping, and collaboration between scientific researchers and the broader community in experimental management.

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EXECUTIVE SUMMARY

1. This report is concerned with the changing balance between the loss and gain of rainforest on the Australian continent. During the nineteenth and twentieth centuries, the European settlers cleared large areas of rainforest from most level and fertile areas, which were converted for use as pasture and cropland. Here we describe the nature of efforts to restore rainforest cover to such areas, with a focus on the eastern tropics and subtropics, where the largest rainforest areas are found. The specific aims of this report are to:
   - Provide an overview of the need for rainforest restoration and revegetation in Australia, and the nature of achievements to date;
   - Present the findings of two studies, which collated information on rainforest reforestation activities: the site-based Reforestation Audit, which contained information about 807 sites in the tropics and subtropics up to 1999; and the project-based Wet Tropics Regional Directory database, which included a comprehensive record of 87 projects focused on vegetation outcomes that were funded by the NHT1 scheme (1997-2002);
   - Use this information to assess the nature and cost of NHT-sponsored rainforest restoration projects; and
   - Consider the implications of these findings for future restoration and revegetation activities in rainforest landscapes.

2. Restoration of rainforest may involve either the reversal of degradation ("repair") within existing remnant forest patches or the revegetation of formerly cleared land. Many activities can be subsumed under one of three major categories:
   - Protection of existing remnant vegetation;
   - Enhancement of existing remnant vegetation which has become degraded (for example, previous canopy damage and weed invasion may be repaired by planting and weed control); and
   - Reforestation, which is the development of new forest on areas that were previously cleared, and where there may have been decades of use for pasture or cropland. Reforestation commonly takes places through one of three pathways: reinstatement of rainforest-like vegetation (also termed "ecological restoration", which commonly involves planting a high density and diversity of indigenous rainforest tree seedlings); plantation forestry (plantings of tree seedlings of species of known timber value, with subsequent management to maximise wood production); and regrowth (self-organised dispersal, establishment and growth of tree seedlings in cleared areas, sometimes including a substantial proportion of exotic invasive plants).

3. Since around 1990 a complex array of government-sponsored schemes has provided financial subsidies to encourage and assist rainforest restoration. This has included support from Commonwealth, State and local governments. Much activity has involved collaboration across tiers of government, or between government and community groups. Private landholders and government departments have also provided funds for revegetation works undertaken by private contractors. This report provides details of the organisations and schemes involved.

4. A striking feature of these efforts has been the high level of community involvement in rainforest restoration. Community-based reforestation efforts comprised around two-thirds of all on-ground projects identified in this report. More than forty different landcare,

conservation, catchment management, school-based and other groups undertook rainforest restoration projects on both private and public land.

5. Most reforestation activities have occurred since 1990, and reinstatement (ecological restoration) of rainforest on cleared land is a more recent activity than either enhancement of existing remnants or planting rainforest trees for timber. Reforestation activities were substantially boosted by the NHT1 scheme.

6. Major foci of both past rainforest clearing and current restoration in the tropics were the upland Atherton Tablelands and lowlands of the Barron, Johnstone, Tully-Murray and Herbert river systems. In the subtropics, they were the uplands (Maleny plateau) and lowlands of the Mary River in southern Queensland and the entire Richmond River catchment (the former "Big Scrub" region) in northern New South Wales. Within particular landscapes, reinstatement projects especially targeted the banks of creeks and rivers (riparian zones).

7. The scale of individual projects was small; most were less than 5.0 ha in area. Based on proponents' estimates, these figures may over-estimate the sizes of projects. Total areas reforested were modest, relative to the extent of past clearing. In the tropics the overall area of cleared land on which vegetation was actively reinstated up to 2002 would be in the order of 1,000 ha. This is equivalent to 0.5% of the 180,000 ha of rainforest that is estimated to have been cleared from the region. In the subtropics, the area reinstated may be in the order of 1,500 ha; equivalent to 0.3% of the 500,000 ha of rainforest estimated to have been cleared from the region. To these totals could be added around 1,500 ha from farm forestry or mixed-purpose plantings in the tropics, and perhaps a few thousand in the subtropics (although these often may not create a rainforest-like habitat).

8. During the NHT1 scheme in the tropics, reinstatement projects had an overall unit cost of $25,600 / ha, of which $9,200 / ha was derived from NHT grants. Enhancement projects had an overall unit cost of $9,100 / ha, of which $3,300 / ha was from NHT grants; lower because works took place in a smaller part of a patch, whose total area was used in calculations. These costs broadly agree with independent estimates by practitioners in both tropics and subtropics. Variation in the unit costs of reinstatement projects was in part explained by the project area: some projects below 2.0 ha had very high unit costs, whereas above 5.0 ha, costs stabilised at a lower value. Reinstatement projects of 2-5 ha in size cost $19,000 / ha on average, of which 34% consisted of NHT funds. Larger-scale projects also have ecological advantages, and would have a better capacity to sustain forest-dependent fauna and flora. However, for schemes designed to foster community engagement and education, many small projects may be more desirable than fewer but larger projects. Different scales of project (community engagement versus ecological outcomes) may suit different objectives.

9. Vegetation reinstatement through ecological replanting aims to develop a closed tree canopy. After canopy closure, a shady and litter-covered ground layer suppresses grass and herb growth, favours the survival and growth of rainforest seedlings, attracts fruit-eating rainforest birds which carry in the seeds of rainforest plants, and helps provide a cool and humid microclimate. A high planting density (1-2 m spacing) of rainforest trees helps to achieve this, but contributes to high costs per unit area. Research has shown that a range of rainforest-dependent plants and animals use ecological restoration plantings, but fewer use the more open-canopied timber plantations. Therefore, the substantial unit cost of restoration plantings does seem to pay off in terms of improved local biodiversity outcomes.

10. Achieving a substantial increase in rainforest cover will require reforestation over much larger aggregate land areas than have been achieved by active revegetation to date. For example, replanting rainforest over even 10% of the previously-denuded subtropical Big Scrub rainforest (once 75,000 ha) would require $143 million; by contrast the NHT1 Bushcare and Landcare schemes together accounted for $515 million across the whole Australian continent. Therefore, if land is to be reforested at an ecologically meaningful scale, there needs either to be a revolutionary change in the way in which funds are allocated, or a greater focus on methods of reinstating forest over larger areas at lower unit cost. It has been suggested that establishing timber plantations on cleared land may be a cost-effective catalyst of rainforest regeneration. However, many factors, including the timber harvest itself, act to limit the likely biodiversity value of such plantations. The management of naturally established (autogenic) regrowth offers another opportunity for large-scale reforestation. In both the tropics and subtropics, land that was previously used intensively for production is increasingly being abandoned because of economic factors. Considerable areas of regrowth are appearing in such areas. Carefully targeted management actions may be able to influence the rates and pathways of succession within these regrowth forests.

11. Even though it is clear that ecological restoration plantings give the best short-term, local results for biodiversity, more work is needed to identify effective longer-term and broader-scale revegetation techniques. In spite of some individual projects, which showed outstanding local successes, the NHT1 scheme in the Wet Tropics has fallen short of its stated goals of extensive revegetation and biodiversity conservation. The future development of revegetation strategies requires soundly designed, quantitative and well-documented monitoring of the outcomes of different types of project. Monitoring the outcomes of revegetation projects requires the time and energy of suitably skilled people, as well as continuity of involvement and data custodianship over long periods of time, which severely limit the capacity of most community groups to monitor their own revegetation sites. Centralised, stable, and publicly accessible, record-keeping is important to allow the fate of projects to be tracked over a time-span of decades. Collaboration between scientific researchers and the broader community in experimental management is needed to provide the new knowledge that could lead to improvements in “best-practice” reforestation.

ABBREVIATIONS USED IN THIS REPORT

CCC.....Catchment Coordinating Committee

CMA .....Catchment Management Authority

CRC.....Cooperative Research Centre

CRRP .....Community Rainforest Reafforestation Program

CTR.....Centre for Tropical Restoration

DPI .....Queensland Department of Primary Industries

EA.....Environment Australia

EPA .....Queensland Environmental Protection Agency (includes Queensland Parks and Wildlife Service)

FNQ NRM Ltd.....Far North Queensland Natural Resource Management Limited

ICM.....Integrated Catchment Management

LGA .....Local Government Authority (i.e. Shire or City)

NHT .....Natural Heritage Trust

NHT1 .....Natural Heritage Trust (1997-2001)

NHT2 .....Natural Heritage Trust Extension (2002 onwards)

NSW NPWS .....New South Wales National Parks and Wildlife Service

NQAA .....North Queensland Afforestation Association

NRM .....Natural resource management

QDNR&M .....Queensland Department of Natural Resources and Mines[1]

QDNR, DNR .....See QDNR&M above. Minor variations reflect name changes and restructuring within the Department.

QFRI.....Queensland Forest Research Institute

QPWS .....Queensland Parks and Wildlife Service

STNSW .....Sub Tropical New South Wales

STSEQ .....Sub Tropical South East Queensland

TKMG.....Tree Kangaroo and Mammal Group

TREAT.....Trees for the Evelyn and Atherton Tablelands

WTMA .....Wet Tropics Management Authority

WTNQ .....Wet Tropics of North Queensland

WTTPS.....Wet Tropics Tree Planting Scheme

$ .....Australian Dollar ($AUD). All dollar values in Australian currency.

[1] At the time of publication, the Department had been renamed to Queensland Department of Natural Resources, Mines and Water.

1. INTRODUCTION

Preamble

This report is concerned with the changing balance between the loss and gain of rainforest on the Australian continent. In particular, while there have been large losses in the past two centuries, we are here concerned with the nature of efforts to regain rainforest cover in areas previously cleared for pasture or agriculture. We also focus particularly on the eastern tropics and subtropics, where the largest rainforest areas are found. By way of introduction, we first consider the nature and distribution of rainforests in Australia, how their extent has changed over time, and the historical development of revegetation initiatives.

Rainforest in Australia: Past, Present and Future

In the ancient past, Australia was largely covered by rainforest (Adam 1994). As the global climate changed and the continent dried out, most of the continent's vegetation has been converted to more open, sclerophyll-leaved formations, often dominated by *Eucalyptus* or *Acacia* species. By the time European settlers arrived in the eighteenth century, rainforest on the Australian mainland had mostly contracted in extent to a few major blocks in the higher-rainfall parts of the east coast, although many tiny patches also remained along stream banks, in moist gullies, on sheltered hillsides, or other places protected from fire (Webb and Tracey 1981; Bowman 2000) in both coastal and inland areas. For at least the past 40,000 years, Aboriginal people coexisted with, and made use of, rainforests. An overview of the ancient and recent history of rainforest in Australia was given by Catterall *et al.* (2004).

Thus, rainforests in Australia occur naturally in fragments, large and small, scattered amongst other native vegetation types. Most are concentrated within a narrow strip close to the eastern coastline. Australian "rainforest landscapes" or "rainforest regions" contain rainforest as part of such a mosaic. The most extensive rainforest regions on the Australian mainland lie in the "Wet Tropics" (Far North Queensland, from Townsville to Cooktown) and subtropics (southeast Queensland and northeast New South Wales, from Bundaberg to Grafton). The Wet Tropics rainforests comprise the largest, most extensive concentrations of continuous rainforest. In contrast, rainforests in the subtropics consist of smaller patches interspersed with drier forest types, over a wider area (Bowman 2000; Cofinas and Creighton 2001). Temperate rainforests are also spatially patchy, occurring mainly in Tasmania.

Recent estimates of pre-European vegetation cover suggest that around AD 1700, Australia contained some four million hectares of rainforest (Cofinas and Creighton 2001) – around 0.3% of the continent's total land area (Adam 1994). This area has been estimated to contain around half of Australia's terrestrial biota (Adam 1994). Because of their environmental values, parts of Australia's major rainforest regions have been granted World Heritage status: the Central Eastern Rainforest Reserves World Heritage Area (1986, extended 1994) incorporates the largest remaining rainforest tracts in the subtropics; the Wet Tropics World Heritage Area (1988) does so for the tropics. In broad terms, Australia's tropical and subtropical rainforests are generally distinguished by a closed canopy of broad-leaved trees in combination with the presence of a high diversity of genera and species from a variety of characteristic plant families, including the Lauraceae, Moraceae, Myrtaceae, Rutaceae and Sapindaceae (Adam 1994; Bowman 2000). But these rainforests vary greatly in both the types of plants that are present and their physical structure. This variation is associated with soil type, temperature, moisture, topography, elevation and latitude (Webb and Tracey 1981; Adam 1994).

Rainforests were cut down by the European settlers because they often occurred on moist, fertile soils associated with basalt flows and alluvial plains (Bowman 2000). About 20% of the Wet Tropics rainforests have been cleared since 1880, with about 750,000 ha remaining; and about 60% of the subtropical rainforests have been cleared since 1860, with around 340,000 ha remaining (Kanowski *et al*. 2003; see also Wilson *et al*. 2002). However, within particular subregions and catchments, the effect has been far more extreme than is suggested by these regional averages, because clearing has selectively targeted the most level and fertile areas. Even the World Heritage rainforests are largely confined to steep mountain slopes and relatively infertile soils.

In the Wet Tropics, both the upland rainforests of the Atherton and Evelyn Tablelands and the lowland floodplains have been extensively cleared, leaving only the mountain ranges and some northern lowlands (Winter *et al*. 1987, 1991; Collins 1994; Goosem *et al*. 1999; McDonald and Weston 2004a,b). In subtropical southeast Queensland, rainforest has been almost entirely cleared from the Gympie region, the Maleny Plateau, and many parts of the coastal lowlands and Brisbane River valley, leaving only remnant areas associated with mountain ranges (Young and McDonald 1987; Watson 1988; McDonald *et al*. 1998; Catterall and Kingston 1993; Rowston and Catterall 2004; Young and Dilleward 1999). The situation is similar in northeast New South Wales, where large lowland rainforest tracts associated with the Tweed and Richmond Rivers (the latter known as the “Big Scrub”) have been almost entirely cleared (Frith 1977; Floyd 1990; Lott and Duggin 1993). The selective clearing means that certain rainforest types (e.g. Araucarian vine forest, complex notophyll vine forest) have been particularly impacted and are most likely to be classed as “endangered” (less than 10% of pre-European area remaining, Sattler and Williams 1999).

This rapid clearing of rainforest from most level and fertile areas, and its wholesale conversion to pasture and cropland by European settlers, has been one of the sorriest chapters in Australia's environmental history (Webb 1966; Frith 1977). This is not only because of the ensuing loss of biodiversity (Adam 1994), but also because of subsequent land degradation, silting-up of waterways, disruptions to catchment processes, and other environmental consequences.

The conservation of rainforest was the subject of intense and vigorous public debate during much of the twentieth century. Conservationists pressed for protection from clearing and from unsustainable timber harvesting practices (see for example Webb 1966; Frawley 1991; Cassells *et al*. 1988; Adam 1994; McDonald and Lane 2000; and Lamb *et al*. 2001). The rate of rainforest clearing has declined in recent decades in both the subtropics and tropics (Catterall and Kingston 1993; Erskine 2002). Most of the larger rainforest areas are now within conservation reserves. However, smaller areas outside of reserves are also ecologically significant. Consequently, forests outside of reserves have been increasingly protected from clearing through regulation by State and local governments. For example, the *Queensland Vegetation Management Act 1999* regulates vegetation clearing on privately owned land, although its effectiveness remains largely untested (Erskine 2002; McDonald and Weston 2004b).

As the protection of remaining rainforest areas from clearing is improved, attention is turning towards managing other forms of threat to these areas, and towards restoring a greater rainforest cover in over-cleared regions (see, for example, McDonald and Weston 2004b). Threats include the impacts of fragmentation on small isolated areas (e.g. Laurance and Bierregaard 1997; Horton 1999), associated invasions by exotic species (e.g. Dunphy 1991; Werren and Arthington 2002), and climate change (e.g. Krockenberger *et al*. 2003). Remnant rainforest patches within highly cleared regions may need restorative actions to remove or reduce the effects of fragmentation (e.g. Horton 1999). Furthermore, to avoid further, ongoing, degradation requires a rapid and substantial reconversion of land cover from production (or neglect) to rainforest (Catterall *et al*. 2004). Restoration of riparian forest,

in particular, has been considered a priority action for improving waterway and coastal health, (e.g. NQ Joint Board 1997). Rainforest restoration may also bring economic benefits for adjacent farms (Ward *et al*. 2003; Tucker *et al*. 2004).

The late twentieth century, and early twenty-first century, is a time of shift in focus. During the 1990s, a range of private and government initiatives to restore rainforest began to develop. At the same time, the initiatives to protect remaining areas of native vegetation throughout the landscape (irrespective of land tenure) were in their infancy. This resulted in an incongruous situation in which government-funded re-planting of rainforest trees was occurring in the same landscapes where high-quality remnant rainforest was also being legally cleared (Erskine 2002; Catterall *et al*. 2004). By 2005, a situation where the rate of gain of rainforest cover exceeds its rate of loss seems almost possible.

Restoration and Revegetation of Australian Rainforests

Restoration of rainforest may involve either the control of degradation and threatening processes within existing remnant forest patches (e.g. Phillips 1991; Horton 1999), or the revegetation of formerly cleared land with a rainforest-like structure and species mix (e.g. Goosem and Tucker 1995; Kooyman 1996; Lamb *et al*. 1997; Lamb and Gilmour 2003; Tucker *et al*. 2004). Common attempts to "rescue" remnant rainforest patches have involved weed control (e.g. Dunphy 1991; Harden *et al.* 2004), planting to fill gaps or increase a remnant's area (e.g. Nagle 1991), and planting to establish corridor linkages to other rainforest (e.g. Tucker 2000). Sometimes, these and other actions may be aimed specifically at restoring relationships between animals and plants, such as those involved in pollination, seed dispersal and herbivore impacts on plants, because these interactions are important to the functioning of rainforest ecosystems (Kanowski *et al*. 2004).

The revegetation of formerly cleared land can take place through several different pathways. Table 1.1 shows major characteristics of the three major pathways of rainforest restoration and revegetation (see also Catterall *et al*. 2004, 2005; Erskine *et al*. in press): "ecological restoration" (reinstatement of diverse native rainforest), "farm forestry" (trees planted mainly for timber production), and "regrowth" (which may be managed or unmanaged). There is a large amount of variation within specific projects, and the different categories intergrade.

Since around 1990 a complex array of government-sponsored schemes has provided financial subsidies to encourage and assist efforts to restore and revegetate, both in rainforest landscapes and elsewhere in Australia. The Commonwealth government has provided funds to local governments and regional bodies; whereas State and local governments have contributed to the development of techniques and the establishment of trial projects, often through the work of particular employees. Much of the activity has involved collaboration across tiers of government, or between government and community groups. Private landholders and government departments (such as the Wet Tropics Management Agency, and Main Roads departments) have also provided funds for revegetation works undertaken by private contractors.

Following the 1988 declaration of the Wet Tropics World Heritage Area, two reforestation schemes were created in the region: the Wet Tropics Tree Planting Scheme (WTTPS) in 1989, and the Community Rainforest Reafforestation Program (CRRP) in 1992. Both were supported by Commonwealth funding in collaboration with local government. An aim of both schemes was to provide alternative employment for retrenched forestry workers. In 1994 the WTTPS was transferred to a consortium of ten local governments, previously formed to encourage tree planting (North Queensland Afforestation Association Inc. (NQAA), Freebody and Vize 1999). The WTTPS was subsequently refunded by NHT (1997-2001; see below) under the name of the Wet Tropics Vegetation Management Program (WTVMP). A community group (Trees for the Evelyn and Atherton Tablelands, TREAT) has also been

active in the Wet Tropics region since 1982 (Tucker *et al*. 2004). Many WTTPS and TREAT projects aimed to restore strips and corridors of riparian rainforest (e.g. Tucker 2000). The CRRP scheme was established with mixed-species timber planting as a main focus (Lamb *et al*. 1997; Erskine *et al*. 2005). Most CRRP planting ceased in 1996.

Table 1.1: Common forms of restoration and revegetation of Australian rainforests (see also references cited above; categories may intergrade in practice).

	Repair of remnants ("enhancement")	Revegetation		
		(a) Reinstatement[1]	(b) Plantation Forestry	(c) Regrowth
Source of tree cover	Existing, perhaps supplemented locally by planting or sowing.	Seedlings or seeds planted / sown.	Seedlings planted.	Colonisation through natural dispersal (e.g. wind, birds, mammals).
Plant species and diversity	Existing, high diversity of locally native spp.	High diversity of (usually) locally native spp.	Few species; often includes eucalypts, or non-local spp.	Often initially few species unless close to rainforest; may be mostly introduced spp.
Tree density	High (native rainforests).	High (ca. 3 - 6,000 / ha).	Lower (ca. 400 -1,000 / ha).	Variable.
Management	Selective weed control, fencing, local "spot" or buffer re-plantings.	Planting, mulching, early weed control, fencing.	Planting, silvicultural management (e.g. pruning, thinning, herbicides). Grazing stock may occur.	None. Grazing stock may be present.
Descriptions	Phillips (1991); Horton (1999); Harden *et al*. (2004).	Goosem and Tucker (1995) – tropics; Kooyman (1991, 1996, 1999) – subtropics.	Erskine *et al*. (2005, in press).	Woodford (2000).

[1] Also termed "ecological restoration".

Around this time, the nationwide "One Billion Trees" scheme was established by the Commonwealth Government, in conjunction with the first Landcare initiative in 1989. In the subtropics, this scheme provided some funds for rainforest revegetation (up to 1995). The Queensland DNR Tree Care Scheme encouraged farm forestry efforts in southeast Queensland. Efforts to undertake remnant repair and reforestation of cleared land in parts of the subtropics were encouraged by the New South Wales National Parks and Wildlife Service. Additionally, many individuals experimented with forms of self-funded restoration and rainforest replanting on privately owned properties.

This variety of rainforest restoration efforts, many of which had been inspired by the pioneering work of the rainforest ecologist Geoff Tracey, stimulated the development of increasingly effective vegetation reinstatement techniques, and the subsequent publication of two regionally-tailored guidebooks: Goosem and Tucker (1995) in the tropics, and Kooyman (1996) in the subtropics. These techniques generally depend on planting seedlings of rainforest trees at a high density. Fast growth leads to the formation of a shady foliage canopy within a few years as the crowns of the young trees merge. This shade and leaf litter fall suppresses the growth of grasses and herbaceous weeds, which would otherwise overgrow the young trees.

More recently (since 1996), the Natural Heritage Trust has both supported the rainforest restoration activities in the Wet Tropics and boosted efforts of a rapidly growing number of Landcare groups in the subtropical rainforest regions. Farm forestry has also been promoted by this scheme, and by a range of government strategies aimed at encouraging private

agroforestry, as well as by landholders' perceptions that a mixed-species timber plot could provide both financial and environmental benefits (Vize and Creighton 2001).

In spite of the complexity involved in this relay of differently named and variously administered restoration schemes, there has been a reasonable degree of stability in the individual participants and developers of the actual on-ground projects. These have generally been undertaken by a pool of skilled and dedicated people who have progressively adjusted their project descriptions and organisational structures to suit the changing set of goalposts and requirements associated with evolving government policy and practice. Over the past decade, many other individuals have also become involved in these efforts. In spite of shifting local priorities and year-to-year uncertainty regarding funding sources, reforestation in rainforest landscapes is a growing industry.

The Natural Heritage Trust

Launched in 1996, the Natural Heritage Trust (NHT) scheme aimed to invest some $1.3 billion dollars (gained from the sale of half of the national telecommunications body, Telstra) into improving environmental sustainability within Australia, with an emphasis on on-ground action (Commonwealth of Australia 1999). The first phase of the scheme (NHT1) took place from 1997-2002. The Bushcare and Landcare programs were designed to involve local communities in conservation and land management activities by providing a large number of relatively small grants to local groups, who also provided input through labour, other in-kind contributions, and cash raised from other sources.

The Bushcare program commenced with a bold aim:

> "*to reverse the long-term decline in the quality and extent of Australia's native vegetation cover by the year 2001*" (Commonwealth of Australia 1999),

which was later modified to:

> "*...[working] with all levels of government, industry and the community to conserve remnant vegetation and biological diversity. It also aims to restore, through revegetation, the environmental values and productive capacity of degraded land and water*" (Commonwealth of Australia 2002).

The goal of the redefined Landcare program was:

> "*to develop and implement resource management practices which enhance Australia's soil, water and biological resources. These practices are to be efficient, sustainable, equitable and consistent with the principles of environmentally sustainable development*" (Commonwealth of Australia 1999, 2002).

The NHT scheme differed from previous government sponsorship of reforestation. Firstly, it was strategically focussed on conservation, biodiversity, and environmental values. The primary goal of vegetation works was to relate to these values, rather than to other priorities such as regional employment. Secondly, much of the funding was targeted at local community groups which worked independently from government, and which had to demonstrate in their funding applications that they would commit considerable in-kind effort (principally time inputs of volunteers).

However, a review in 2000 of the scheme's operations (Commonwealth of Australia 2000) contained serious criticisms of the lack of mechanisms for priority setting or coordination at a regional level, or for project tracking, or monitoring of projects' outcomes. The lack of

mechanism for either using scientific best-practice, or for contributing to the development of knowledge also received criticism from the scientific community (e.g. Lunney *et al*. 2002).

At the time of writing, a second phase of the NHT scheme (NHT2) was being implemented. In this phase, there has been a strong emphasis on the formation of Regional NRM (natural resource management) Bodies, which are required to develop Regional NRM Plans. The Commonwealth and State governments have required accreditation of these plans, prior to the approval of ongoing funding (see for example, McDonald and Weston 2004a). The plans are to be guided by three overarching objectives: biodiversity conservation, sustainable use of natural resources, and community capacity building (McDonald and Weston 2004a). Under these arrangements, Commonwealth funding for rainforest restoration and revegetation are be determined through the regional priority-setting process.

Aims and Scope of this Report

This report considers in further detail the characteristics of contemporary efforts to restore Australian rainforest. Its aim is to:

- Provide an overview of the need for rainforest restoration and revegetation in Australia, and the nature of achievements to date (this Chapter);
- Present the findings of a study (the Rainforest Reforestation Audit), which collated information on rainforest reforestation projects in the tropics and subtropics up to 1999 (Chapter 2);
- Describe and present a database (the Wet Tropics Regional Directory), which contains a comprehensive record of NHT1 projects (1997-2002) from the Wet Tropics region (Chapter 3);
- Use this information to assess the nature and cost of NHT-sponsored rainforest restoration projects (Chapter 3); and
- Consider the implications of these findings for future restoration and revegetation activities in rainforest landscapes (Chapter 4).

While considerable funds and efforts have been devoted to on-ground revegetation activities, there has been relatively little emphasis on documentation and record-keeping. Most participants have simply been too busy doing the work, or obtaining funds to do the work, to systematically document their activities. Apart from limited work within the CRRP farm forestry program, none of the revegetation schemes have been planned to include research and monitoring components. Reporting requirements of the funding schemes have varied, and existing records are widely scattered, held by individual proponents, local groups, or regional government departments. Some are at risk of being lost as people move on and government agencies are restructured. While the NHT scheme was centrally administered by the Commonwealth, and required the submission of detailed proposals and reports, these are not publicly available and have proved difficult to access.

The Wet Tropics region has been unusual in establishing a database that recorded and tracked information on the nature, costs, activities, proponents, ecological characteristics, and outcomes of NHT-funded projects. The project commenced early in the life of the NHT (2000), through collaboration between the Rainforest Cooperative Research Centre (Rainforest CRC) and the Natural Resources Management Board (Wet Tropics) Inc. (now FNQ NRM Ltd). The Wet Tropics database in turn built upon a study by the Rainforest CRC into rainforest restoration and revegetation efforts in the tropics and subtropics. Limited findings from these projects were reported in Catterall *et al*. (2004), but the databases have not previously been described or their findings discussed. To do so is a major aim of this publication.

2. REFORESTATION EFFORTS IN THE TROPICS AND SUBTROPICS TO 1999

2.1 AUDIT OF REFORESTATION SITES UP TO 2000

Aims and Regions

The Rainforest Reforestation Audit aimed to provide a landscape-scale database of sites at which rainforest restoration and revegetation had been undertaken. Such a database could then be used to provide general information on characteristics of rainforest restoration projects. This information was also used to aid in the selection of study sites for research into biodiversity values of rainforest restoration (e.g. Kanowski *et al*. 2003; Catterall *et al*. 2004). The audit of reforestation sites was undertaken in 1999-2000, at the commencement of Rainforest CRC Project 5.2 *Biodiversity Values in Reforestation*.

It was not expected that the Rainforest Reforestation Audit would be a complete list of all sites because of the limited resources available for the work. However, we aimed to obtain information on a sufficient proportion of projects within the major rainforest regions to obtain a good indication of the nature of the effort under way, and also to capture most of the older and larger projects. In the Wet Tropics region, subsequent work associated with the Regional Directory project (see Chapter 3) enabled further clarification and identification of sites for inclusion in the Audit database.

The audit targeted both tropical and subtropical rainforest landscapes of eastern Australia, and in each zone focussed on the subregion, which contained the highest concentrations of pre-European rainforest, and, more recently, of restoration projects. In the tropics, this was the Wet Tropics region of northern Queensland (referred to as WTNQ in this report), broadly comprising some two million hectares (Goosem *et al*. 1999; McDonald and Weston 2004b) from the Daintree River catchment (south of Cooktown) to the Herbert River catchment (south of Ingham), and west to Ravenshoe (the western edge of the Atherton Tablelands). Other major river catchments in this area are the Barron, Johnstone, Russell-Mulgrave and Tully-Murray, and major towns are Cairns and Innisfail.

In the subtropics there were two contiguous areas, southeast Queensland (referred to as STSEQ in this report) and northeast New South Wales (referred to as STNSW). In STSEQ, the focus was mainly on an area of around two million hectares bounded by the Great Dividing Range to the west, Gympie region to the north, and the New South Wales and Queensland border to the south. This region includes the catchments of several major rivers, including the Brisbane, Mooloolah, Pine and Mary. There is also an extensive coastal urban zone, spanning Noosa, the Sunshine Coast, Brisbane and the Gold Coast (Catterall and Kingston 1993). The STNSW region targeted was an area of some one million hectares, extending from the Queensland border south to Ballina and west to Mallanganee (although a few more southerly projects were included in the database). This area contains the catchments of the Tweed and Brunswick Rivers, the northern section of the Richmond River catchment, and the urban centre of Lismore.

Data Compilation

In all regions, information on reforestation projects was located through identifying and contacting a range of sources. These included: (1) community-based organisations involved in revegetation and natural resource management activities; (2) government agencies (Commonwealth, State, local) involved in funding or advising revegetation projects; (3) individuals involved in revegetation activities; and (4) articles in newsletters of community

groups (e.g. Big Scrub Landcare group in STNSW, Trees for the Evelyn and Atherton Tablelands group (TREAT) in WTNQ) and contacts made through leaflets distributed at Landcare field days. Discussions with initial contacts lead to the identification of further contacts, and so on. In some cases the initial contacts were then re-approached for further clarification. Major information sources are shown in Appendix 1.

Most data compilation took place from January to September 2000. A standard data proforma (see Appendices 2A, 2B) was used to gather information. We aimed to locate sites greater than one hectare in area. This excluded the very large number of projects in which trees were planted in very small areas. Proformas were completed in a variety of ways, including by landowners, by agency or community group officers, or by project staff during personal or telephone interviews. Site areas and geographical locations were provided by project proponents and landholders, but were not systematically verified through independent field inspection. Limited ground-truthing has indicated that the figures provided for areas revegetated were often over-estimates.

Because the Reforestation Audit is site-based, different stages of a phased project at a particular site were amalgamated into single records. In some cases the same site was nominated or described under different names or from different sources, and these were combined into a single record in the database. Many rainforest reinstatement projects in WTNQ occurred within the Wet Tropics Tree Planting Scheme (WTTPS). Systematic records of all sites involved in this scheme could not be located, and we compiled as much information as possible from the following sources:

- Revegetation Officers in Eacham, Mareeba and Johnstone Shires, and Cairns City Council;
- NQAA's project application records and progress reports (Bell 1996);
- Catchment Rehabilitation Plans for the Barron, Johnstone and Tully Murray Rivers (e.g. NQ Joint Board 1997);
- A report from NQAA to NHT detailing some funded activities (Gleed 2002), and an internal NQAA report summarising vegetation activities on a local government area basis; and
- Recollections of project information by individual NQAA staff.

Some restoration projects, especially in the WTNQ region, comprised multi-stage linear riparian revegetation along degraded streams. Their total length may span several kilometres and involve work by several different groups. In these cases, adjacent stages were amalgamated, but more distant sections of the same waterway may remain separate. Examples include plantings along Priors Creek and Cleminson's Creek, and the waterway associated with Bromfield swamp, all in WTNQ. Spatially separate patches of revegetation within a property were also amalgamated in some cases, where separate delineation was not feasible (examples include the various plantings totalling 136 ha on the Kokoda Barracks, Canungra property, and plantings adjacent to the Baroon Pocket Dam totalling 232 ha, both in STSEQ, and the Pelican Point site in WTNQ).

Two programs, the Queensland DNR Tree Care Scheme (based in Nambour, STSEQ) and the CRRP scheme (based in Atherton, WTNQ) had been documented through systematic records that were lodged at the time of the project in the local QDNR offices. The audit incorporates information from both. Records of the former were mainly paper files, and the latter included a computer database. However, at the time of the project, both schemes were winding down, and it seemed that maintenance of these records would not be a future responsibility of the QDNR. Since then, custodianship of the CRRP records has moved to

other, non-government organisations (at the time of writing, Private Forestry North Queensland, PFNQ). The Noosa and District Landcare organisation (STSEQ) also provided electronic records of many farm forestry sites. Industrial-scale and monoculture plantations established solely for commercial timber production purposes were excluded from the audit. The Subtropical Farm Forestry Association also has a database of members' sites, which is in the custodianship of Southern Cross University and was not accessed for the present audit.

These records included many very small and low-density plots (much less than one hectare), and some that were dominated by eucalypts or introduced plant species, rather than by rainforest plants. From the Queensland DNR Tree Care Scheme records, we estimated site areas from planting densities and numbers planted and aimed to exclude sites that were less than one hectare in area, those without rainforest tree species, and those with fewer than 800 trees / ha (occasionally down to 500 / ha if nearly all were rainforest species). The CRRP records contained information on 341 sites within the ten Local Government Areas of the Wet Tropics (a total collective area of 1,312 ha), some of which were individual entries for each year of sequential phases of tree planting on a single property. We amalgamated such sites on the same property, although it was unknown whether they were spatially adjacent. For further analyses, we then extracted the amalgamated sites only if they were at least one hectare, yielding 326 sites (total area 1299 ha). These sites are identified as WTNQ-CRRP and are here analysed separately from the other WTNQ sites. In general, plantations that were strongly dominated by eucalypts were not included in the database, even if they comprised a mixture of species, were established on former rainforest land, and their proponents believed that they were meeting environmental goals.

Database

Information from the Reforestation Audit Proformas (Appendix 2) was stored within Microsoft Access databases separately for each of the three regions (WTNQ, STSEQ, STNSW). Many sites have incomplete information, but a particular effort was made to obtain the site location, site area, year commenced and type of project. Some landowners submitted detailed records, including site maps, species lists, and other notes.

The type of project was classified into one of three categories (vegetation enhancement, vegetation reinstatement, farm forestry) or as "other". Most projects had some mixture of types, but an identifiable main type, and this was evident in the "Main project goals" section of the proforma (Appendix 2A). In some cases the Project Type was inferred or adjusted at the computer data entry stage, based on the available information about the exact nature of the project, in relation to the characteristics of each reforestation type (Table 1.1). A few projects did not clearly weight one of these types above others, and were classified as "mixed"; a few were designated "other" (mainly experimental plantings); and a few were unknown (insufficient information provided). All CRRP sites were classified as "farm forestry" because inspection of details of site records indicated that their species mixture always contained a substantial proportion of eucalypts and/or exotic species, and the planting style was low-density, irrespective of the listed purpose of plantings.

2.2 NUMBERS OF PROJECTS AND WHO WAS INVOLVED

Across all three regions, we identified a total of 807 sites involving reforestation with rainforest plants or restoration of existing rainforest remnants, up to the year 2000. In WTNQ there were 326 CRRP sites above one hectare and 184 other ("non-CRRP") sites. In STSEQ there were 201 sites, with 96 sites recorded from STNSW.

Government support and sponsorship has underpinned many activities. The undertaking of restoration and revegetation works at particular sites has typically involved a complex

entanglement of commitments by individual (usually private) landholders, independent advisory bodies, and government or non-government organisations which coordinate, propose, and support site-based activities (Table 2.1; Appendix 2). Both the advisory bodies (such as Greening Australia) and the government and non-government organisations (such as Landcare groups, catchment management groups, and some aspects of the state and local government activities) were also supported by Commonwealth funding, and further funding was then frequently obtained to support the actual on-ground works.

The level of commitment of individual landowners has ranged from providing part of their land for activities that were planned and conducted by others, to privately providing both the land and the labour and other resources involved in revegetation. The former occurred most commonly among rural landowners involved in primary industries in WTNQ, whereas the latter occurred mainly in STNSW, where some rural landowners are committed conservationists with a source of personal wealth from other enterprises. Many cases are somewhere between these extremes. Excluding the CRRP program, the frequency with which private landholders appeared to be the main proponents of site-based projects ranged from 95% in STSEQ, through 58% in STNSW, to 28% in WTNQ. Listing of government organisations showed the opposite trend.

There was minimal involvement of private enterprise in rainforest restoration activities. Even timber production activities (mainly farm forestry) were undertaken mainly by private landholders, often with government subsidy. State government National Parks departments were actively engaged in rainforest restoration in WTNQ (where activities included establishing corridor links on private land between isolated rainforest reserves) and STNSW (where activities were focused on repairing degradation within small isolated reserves), but not in STSEQ. Overall, over twenty different community groups were involved

Table 2.1: Main types of listed proponent for reforestation projects, 1991-1999.

Percentage of Projects:	STNSW	STSEQ	WTNQ	Comments
State Government	16	0	21	Usually National Parks proponents
Local Government	1	3	51	47% in WTNQ were WTTPS projects
Business	1	1	0	Golf course, rural enterprise
Community – Landcare	12	29	8	
Community – other organisations	12	9	11	A variety of conservation, catchment, dunecare, school groups
Community – private landholder	34	57	9	Most have links with government schemes
Unclassified	24	1	0	
Total	**100**	**100**	**100**	
Total number of projects[1]	**96**	**201**	**184**	

[1] Excludes 326 CRRP projects in WTNQ, coordinated first by local government, and then by State government.

Note that most projects received financial subsidy from Commonwealth Government schemes, and most projects took place on land owned by private landholders. See further details in Appendix 2A.

2.3 CHARACTERISTICS OF PROJECTS

Project Types, Sizes, and Landscape Positions

All regions contained a variety of rainforest restoration projects (Table 2.2). Reinstatement projects (typically by replanting a dense and diverse mix of native rainforest species) were common in all regions. Enhancement (repair of existing rainforest remnants, usually involving weed control and spot-planting) was the dominant activity in STNSW. Farm forestry (more widely-spaced plantings of a few tree species, in areas also used for other production purposes such as cattle grazing) was the dominant mode of restoration or revegetation in both STSEQ and WTNQ.

Most project sites were small in area (less than 5 ha, Table 2.2), in all regions. Large (>15 ha) projects comprised a small proportion of projects whose area was recorded (2-13% in various regions, Table 2.3), but accounted for a relatively large proportion of the total area (35-72%); Appendix 3B gives further details about these projects. Large areas of some enhancement projects (e.g. in STNSW) occur because the whole area of a remnant is typically nominated, even though restoration works may target only a part of this area.

Table 2.2: Frequencies of projects of different types (see also Appendix 3; "%>5ha" is the percent of known-area projects larger than 5 ha in area).

Project Type	STNSW		STSEQ		WTNQ – non CRRP		WTNQ – CRRP	
	No.	% >5 ha	No.	% >5 ha	No.	% >5 ha	No.	% >5 ha
Enhancement	41	45	29	22	13	30	0	-
Reinstatement	22	42	67	31	148	34	0	-
Farm forestry	30	33	99	18	3	0	326	20
Mixed	3	33	6	50	4	50	0	-
Other[1]	0	0	0	0	14	40	0	-
Unknown	0	0	0	0	2	0	0	-
Total	**96**	**40**	**201**	**23**	**184**	**34**	**326**	**20**

[1] Buffer and rainforest experimental sites.

Table 2.3: Numbers and total areas of projects, by area of project (see also Appendix 3; here only projects >1 ha are included).

Project Area (ha)	STNSW		STSEQ		WTNQ – non CRRP		WTNQ – CRRP	
	% Projects	% ha	% Projects	% ha	% Projects	% ha	% Projects	% ha
1-5	60	14	77	16	66	25	80	47
5.1 - 10	18	12	11	10	21	27	13	23
10.1 - 15	8	9	1	2	6	13	4	12
15.1 - 20	1	2	4	8	3	8	0	1
>20	12	63	7	64	5	27	2	16
Total No. or ha	**73**	**815**	**162**	**1531**	**120**	**659**	**325**	**1297**
No. of Unknown Area	**10**		**13**		**42**		**1**	

Many projects were conducted in riparian or floodplain zones, especially the non-CRRP projects in the Wet Tropics, 73% of which were located in riparian areas (Table 2.4). Even in STSEQ, where 33% of projects were in riparian areas, this proportion far exceeds the proportion of the total land area that lies in the riparian zone. Among projects that were concerned with the revegetation of cleared areas, reinstatement projects were much more likely than farm forestry projects to be located in riparian/floodplain areas, especially in NQWT.

Table 2.4: Number of projects and revegetation area by landscape zone. Non-bracketed numbers show the percentage of projects (total numbers shown in brackets) of known landscape zone; this was not recorded for any CRRP projects. Further details are given in Appendix 4.

Landscape Zone	STNSW Percentage	STSEQ Percentage	WTNQ – non CRRP Percentage
All Project Types:	(60)	(148)	(133)
Riparian	44	33	73
Floodplain	0	7	4
Slopes	48	53	9
Other (if zone known)	8	7	14
Farm Forestry Projects:	(18)	(60)	(3)
Riparian / floodplain	22	20	0
Slopes	78	73	33
Other (if zone known)	0	7	67
Reinstatement Projects:	(4)	(56)	(112)
Riparian / floodplain	64	52	84
Slopes	36	46	7
Other (if zone known)	0	2	9

Timing and Geographical Locations of Projects

Most projects have been instigated since 1990 (Table 2.5) – this is not an artefact of our survey method, as we made an effort to locate older projects. Projects that commenced prior to 1990 are more common in the subtropics; Appendix 3C gives further details of the oldest projects. CRRP projects were confined to the early to mid 1990s, the time at which this scheme received most funds. Project numbers in other groups increased markedly around 1996-1997, reflecting the influence of the NHT scheme. Higher activity on non-reinstatement projects in STNSW during the mid 1990s reflects an interest in the repair of degradation in small rainforest reserved remnants (Horton 1999). Many projects continued over several years following the commencement date.

Table 2.5: Percent of projects that commenced in different years. Numbers for each year are the percentage of projects up to 2000 (reinst = reinstatement projects).

Year in which project commenced	STNSW		STSEQ		WTNQ – non CRRP		WTNQ – CRRP
	Reinst.	Other	Reinst.	Other	Reinst.	Other	All
Pre-1990	27	19	9	12	4	6	0
1990	5	3	11	7	2	1	0
1991	5	4	8	4	2	2	0
1992	9	4	6	5	4	6	18
1993	5	9	11	5	3	4	30
1994	5	13	6	5	5	5	26
1995	5	12	3	4	4	5	11
1996	5	10	6	11	4	4	8
1997	9	4	8	12	16	15	6
1998	14	6	12	13	22	23	1
1999	14	12	15	19	23	19	0
2000	0	4	5	6	11	11	0
Number of projects up to 2000	22	77	65	198	122	155	325
Number unknown or commenced 2001[1]	0	19	2	3	5	19	1
Total number of projects	**22**	**96**	**67**	**201**	**134**	**184**	**326**

[1] 2001 projects were not well surveyed across regions, and are hence excluded from calculations.

In each region, projects were widely spread geographically, but there were centres of highest activity associated with particular parts of the region. For example, with respect to Local Government Area (LGA) (Table 2.6), the greatest concentration of projects in STNSW occurred in Byron and Lismore LGAs. This has arisen in part because the locations of these local authorities coincide with the area formerly covered by the "Big Scrub" rainforest, and also from a relative ease of locating sites through the well-established community network associated with the Big Scrub Rainforest Landcare Group (e.g. Bower 2004). In STSEQ, most projects were located within areas north of Brisbane, especially within the Caloundra, Maroochy and Noosa LGAs. These areas also coincide with large former tracts of rainforest, now mostly cleared, and are associated with the Maleny Plateau and the Gympie region.

In the Wet Tropics, activities were also focussed of parts of the region from which rainforest had been cleared (see Chapter 1 Introduction). There were many projects in the Cardwell, Johnstone and Eacham LGAs. However, projects were widely spread across the region, reflecting the more extensive pre-European occurrence of rainforest in the Wet tropics compared with the subtropics. There are differences in geographical distribution between the CRRP scheme and other revegetation activities, for example the latter had a greater concentration of projects in the Atherton and Herberton LGAs, which probably reflects the scheme's focus on structural adjustment for former timber industry employees.

Table 2.6: Project numbers by Local Government Area. (Data for specific LGAs are given if they contained ten or more projects.)

STNSW			STSEQ		
LGA	**No.**	**Area (ha)[1]**	**LGA**	**No.**	**Area (ha)[1]**
Ballina	16	69	Caboolture	18	82
Byron	30	409	Caloundra	50	285
Lismore	23	127	Maroochy	29	107
Tweed	12	64	Noosa	47	128
Other[2]	6	13	Pine Rivers	12	29
Unknown	9	140	Other (North)[3]	13	27
			Other (West)[3]	15	356
			Other (South)[3]	11	37
			Unknown	6	493
Total	**96**	**820**	**Total**	**201**	**1544**
WTNQ – non CRRP			**WTNQ – CRRP**		
LGA	**No.**	**Area (ha)[1]**	**LGA**	**No.**	**Area (ha)**
Atherton	13	70	Atherton	54	220
Cairns	27	66	Cairns	23	86
Cardwell	30	35	Cardwell	31	125
Douglas	11	29	Douglas	14	46
Eacham	34	208	Eacham	75	268
Hinchinbrook	12	57	Herberton	38	190
Johnstone	33	108	Johnstone	53	214
Mareeba	14	57	Mareeba	30	121
Other[4]	10	39	Other[4]	8	28
Total	**184**	**669**	**Total**	**326**	**1299**

[1] Note that the stated areas exclude some projects of unknown area.

[2] STNSW: Bellingen, Coffs Harbour, Kyogle, Maclean.

[3] STSEQ: (North) Conondale, Cooloola, Maryborough, Tiaro. (West) Esk, Gatton, Ipswich, Kilcoy, Laidley, Murgon, Toowoomba. (South) Beaudesert, Brisbane, Gold Coast, Logan.

[4] WTNQ: (non-CRRP) Cook, Herberton. (CRRP) Cook.

Projects were likewise concentrated within particular river catchments (Table 2.7). These are the catchments of large rivers that once drained extensive areas of relatively level land, covered by rainforest, but which are now considered largely cleared: the Big Scrub in STNSW (Richmond River); in STSEQ, the Maleny Plateau and Gympie lowlands (both associated with the Mary River); in STSEQ and in WTNQ, the Atherton and Evelyn Tablelands (headwaters of the Barron and North Johnstone Rivers), and the Barron, Johnstone and Tully-Murray lowlands in WTNQ. Most projects in the coastal and sub-coastal lowlands in WTNQ were located in the Tully-Murray catchment.

Table 2.7: Project numbers by catchment. (Catchment not recorded for most CRRP and STSEQ projects; data for specific catchments are given if they contained more than five projects.)

STNSW			STSEQ			WTNQ – non CRRP		
Catchment	**No.**	**Area[1]**	**Catchment**	**No.**	**Area[1]**	**Catchment**	**No.**	**Area[1]**
Brunswick	7	112	Brisbane	12	94	Barron	50	214
Richmond	67	465	Mary	36	423	Daintree Mossman	11	29
Tweed	10	55	Other (North)[3]	11	46	Herbert	18	88
Other[2]	1	4	Other (West)[3]	1	50	Johnstone	48	223
Unknown	11	185	Other (South)[3]	5	148	Russell Mulgrave	17	52
			Unknown	136	783	Tully Murray	31	38
						Other[4]	9	25
Total	**96**	**821**	**Total**	**201**	**1544**	**Total**	**184**	**669**

[1] Note that the stated areas exclude some projects of unknown area.

[2] STNSW: Bellinger.

[3] STSEQ: (North) Burpengary, Caboolture, Maroochy, London, Noosa, South Pine. (West) Murray Darling. (South) Coomera, Logan.

[4] Endeavor, Mitchell; Two projects spanned several catchments.

3. NHT-FUNDED PROJECTS IN THE WET TROPICS TO 2002

3.1 BACKGROUND, AIMS AND GEOGRAPHICAL SCOPE

The Wet Tropics Regional Directory (WTRD) project commenced in 2001 as a joint project between the Rainforest CRC and Natural Resource Management Board (Wet Tropics) Inc. (now FNQ NRM Ltd). Its objectives were to:

- Establish a database of regional natural resource management projects funded by the NHT1 scheme;
- Disseminate information about natural resource management projects in a manner that is widely accessible to the broader community;
- Improve natural resource planners' access to this type of information; and
- Encourage more efficient use of resources and knowledge by facilitating improved networking and information sharing.

The WTRD database project differed from the Reforestation Audit database (Chapter 2) in terms of:

- Geographical focus (WTNQ only);
- Temporal focus (1997-2001 rather than pre-2000);
- Nature of records (project-based rather than site-based);
- Scope (included only NHT-funded projects, but comprised diverse natural resource management projects rather than solely reforestation and restoration projects);
- Level of detail (includes detailed information on costs, contacts and activities); and
- Data access (web-based communication of aspects of project information was an intrinsic part of the project).

Nevertheless, a number of projects are represented in both databases.

The WTRD has been developed as part of the regional natural resource management process for the Wet Tropics. The region covered is the area spanned by any of the ten Local Government Areas that have significant land within the Wet Tropics NRM region as defined within NHT2 (Cook, Douglas, Cairns City, Mareeba, Eacham, Atherton, Herberton, Johnstone, Cardwell and Hinchinbrook), or of the seven main catchments (Daintree-Mossman, Barron, Trinity Inlet, Russell-Mulgrave, Johnstone, Tully-Murray and Herbert). Note that large parts of Cook, Mareeba and Herberton LGAs also lie outside the Wet Tropics NRM region, and Thuringowa LGA lies entirely outside of the NRM region even though it contains part of the Wet Tropics World Heritage Area.

3.2 THE WET TROPICS REGIONAL DIRECTORY DATABASE AND WEBSITE

Website

The WTRD website was developed to provide online public access to NHT project information. It draws on a database of NHT1 projects conducted in the Wet Tropics (Harrison *et al.* 2002, and see below). Projects and their details can be located by selecting options from eight project criteria listed on the web search page: catchment, project activities, local government area, year of work, landscape zone, instream work, associated industry and specific location. A given search will retrieve projects that match selected criteria, based on dropdown options lists (Appendix 5). The search output is a listing of relevant project titles that details each project's proponent, funding program and catchment. The search output can be further refined by adjusting the selection criteria at the end of the search results page. Further details can be obtained by clicking on the desired project: project funding, project summary and objectives, onground works undertaken, partner organisations and basic environmental characteristics (such as landscape zone, vegetation type).

The WTRD website is located at http://www.fnqnrm.com.au/regionalDirectory.html. It can also be accessed via the FNQ NRM Ltd homepage, http://www.fnqnrm.com.au, and choosing the Wet Tropics Regional Directory option.

Data Compilation

The WTRD information described here covers all funded NHT1 (1997-2001) projects that had been received and assessed within the Wet Tropics region under the "One Stop Shop" process by May 2004. This process delivered funding for ten programs through a single application form (Commonwealth of Australia 1999, 2002; see also http://www.nht.gov.au). In this region, the majority of applications were received, and their assessment coordinated, by the Natural Resource Management Board (Wet Tropics) Inc. These applications spanned four NHT 1 programs: Bushcare, Landcare, Farm Forestry and Rivercare. Applications from other "One Stop Shop" programs such as Endangered Species and Fisheries Action were submitted independently from the regional body and were not regionally assessed. Information on a few such projects was obtained from the regional office of the Queensland Department of Natural Resources and Mines (QDNR&M). Additionally, limited information was obtained for Coastcare projects (title, file number, approved funding and project summary).

Table 3.1: Sources of WTRD project information.

Source	Information obtained	Format
NHT Web Page: www.nht.gov.au/projects/index.html	Provisional list of NHT-funded projects	PDF files
QDNR&M Townsville Office	Project applications and final reports	Photocopies
QDNR&M Brisbane Office	Electronic Funds Management System (project titles, proponents, partial summaries and finances)	MS Excel spreadsheet
QDNR&M Brisbane Office	NHT final reports	Photocopies
NRM Board (Wet Tropics) Inc.	NHT applications	Photocopies
Reforestation Audit, Rainforest CRC	Information on WTTPS sites	MS Access files

Information on the projects funded by NHT1 had not previously been compiled into a single accessible source by any government agency, and it was necessary to piece together the data from a variety of different sources (Table 3.1). While the applications were received regionally, the final funding decisions were made at the Commonwealth level, and the regional NRM Board was not informed of these decisions. Notification of success was made directly by the Commonwealth to the project proponents. Progress reports (usually six-monthly) and final reports (within six months of project completion), were sent by proponents to the regional office of QDNR&M. Considerable delays and difficulties were initially experienced in gaining bureaucratic approval to access some of the data held by QDNR&M, despite NHT having funded the project to compile these data.

Most specific project data were eventually compiled from a combination of the original project application and final report. The project application forms provided information on the project proponents, project summary and objectives, financial information, descriptions of on-ground activities and their specific project goals (e.g. number of trees to be planted, area to be revegetated). The final report outlined a project's achieved on-ground outputs, any changes to objectives, final financial information, issues related to work undertaken and any future activities.

Database

The WTRD database is a series of fifteen linked data tables, constructed using Microsoft Access. It contains most information requested within project applications and final reports to NHT, together with additional information useful in summarising the data.

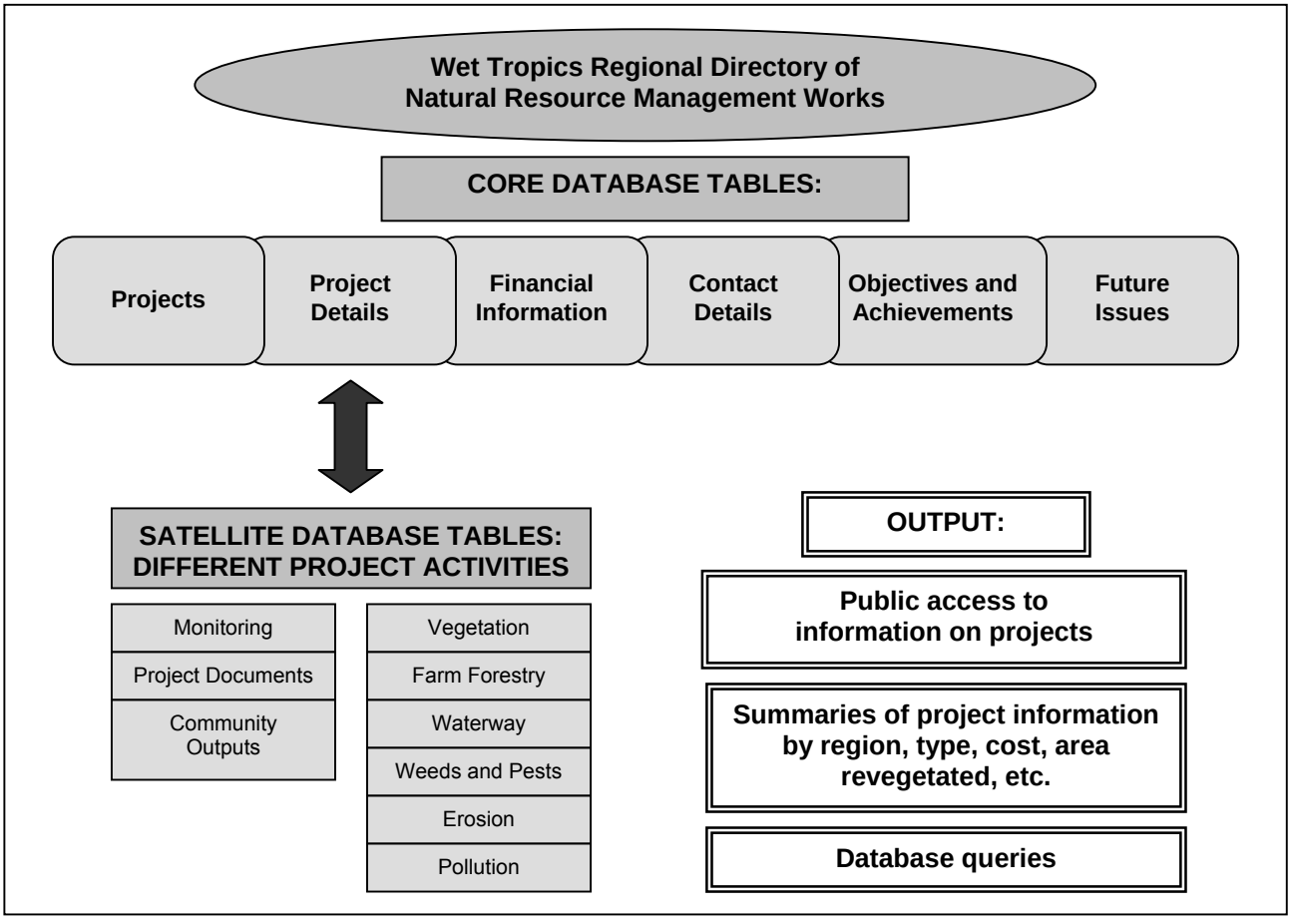


Figure 3.1: Main features of the Wet Tropics Regional Directory database.

Most entries in the database are the project proponent's claims and statements, and have not been independently checked or verified.

There are six component "core data" data tables which are completed for all projects (see Figure 3.1 and Table 3.2): Projects, Project Details, Financial Information, Contact Details, Objectives and Achievements, and Future Issues. Further project details are entered in one or more of nine "satellite" data tables. These comprise six tables that describe details of the on-ground work (Vegetation, Farm Forestry, Waterway, Weeds and Pests, Erosion, Pollution), and three tables that list, if relevant, other aspects of project outputs or outcomes (Monitoring, Project Documents, Community Outputs).

Table 3.2: Data tables in the Wet Tropics Regional Directory.

Core Tables:	
Projects	General information for all projects. Fields include project title, main goal, organisation, partner organisation and general location.
Project Details	Specific details such as the type of work undertaken, project summary, project description, and exact site location.
Financial Information	Funding sources and amounts.
Contact Details	Contact information of the organisation undertaking a project.
Objectives and Achievements	The project's objectives, and proponent's self-assessment of their success, and of challenges and difficulties dealt with during the course of the project.
Future Issues	Project duration, and issues / activities requiring ongoing attention or work.
Satellite Tables:	
Vegetation	Target and achieved areas for revegetation and type of revegetation work, if relevant. Site and general vegetation information (e.g. remnant proximity and surrounding vegetation types) are included if available.
Farm Forestry	Target and achieved areas of planting for farm forestry, if relevant.
Waterway	Target and achieved levels of waterway improvements (e.g. reduced pollution levels, improved water quality), if relevant.
Weeds and Pests	Target and achieved levels of pest species control, if relevant.
Erosion	Target and achieved levels of erosion control for relevant projects.
Pollution	Target and achieved levels of pollution reduction, if relevant.
Monitoring	Types of monitoring and monitoring site locations, if relevant.
Project Documents	Documents produced by projects, including reports, published articles and brochures and details of their locations.
Community Outputs	Project outputs into the community, e.g. volunteer training, school curricula.

Appendices 6 and 7 give further details of the database structure and components. Across all data tables, there are a total of 197 data fields, of which 90 contain core data completed for all projects. A unique "locator" number, given to each project, links the different Tables. Complex data queries can be made within Microsoft Access.

To provide a simple overarching categorisation of project types, a "Main Goal" field was also included in the Projects core data table, with six mutually exclusive options (community support, landscape management, vegetation, river improvement, threatened species, miscellaneous; defined in Appendix 7B).

Categorisation occurred at the data entry stage by examining the project's stated objectives and the nature of the largest area of on-ground works completed. Additionally, the "Work

Types" field within the Project Details core data table contains eight possible categories describing the types of work undertaken (vegetation, river improvement, etc.).

The present report is focused on Work Types described as "Vegetation" (works to reinstate, rehabilitate or protect vegetation), although a particular project may have been associated with more than one Work Type. Further description of the type of vegetation works is found within the "Onground Activity" field in the "Vegetation" satellite data table (Appendix 7B), which describes the nature of vegetation works using four mutually exclusive categories:

- "Vegetation reinstatement" (the re-establishment of native vegetation on cleared land);
- "Vegetation enhancement" (repairing remnant vegetation by works such as weed control and spot planting within or closely adjacent to remnant patches);
- "Vegetation protection" (protection of existing unreserved vegetation, such as through conversation agreements); and
- "Vegetation non-specific" (no clearly defined objectives or where the work types are mixed).

Other types of information relating to site-based activities within revegetation projects are contained within the satellite data tables "Vegetation" and "Farm Forestry". For example, the "Vegetation" satellite table also has data fields that specify the land areas involved, agreements established, and source of technical advice (Appendix 7A). Project costs are described within the "Financial Information" core data table, which also specifies the years during which the project was funded, whereas the actual start and completion dates of project activities are held within the "Future Issues" core data table.

3.3 CHARACTERISTICS OF NHT1 VEGETATION PROJECTS

Overview: Areas and Funding Structure of NHT1 Projects in the Wet Tropics

Between 1997 and 2002, 130 projects were commenced, of which 124 were completed by May 2004 (Table 3.3), receiving $15.1 million in NHT funding. Most were Bushcare, Landcare or Rivercare projects (116), collectively receiving 97% of the funds ($14.7 million). Overall, 58 projects with vegetation outcomes as their main goal received $7.2 million in NHT funds (48% of the total).

Two of the 124 completed projects were meta-projects known as the "NHT Regional" devolved grants scheme. The Wet Tropics NRM Board disbursed funds totalling $0.41 million, to support 53 small projects (<$10,000) undertaken by community groups in 2000 and 2001. These sub-projects were also individually associated with either Bushcare, Landcare and Rivercare programs; 29 were focused on vegetation outcomes, at a cost of NHT $0.24 million (54% of the total).

Table 3.3: Wet Tropics NHT1 projects 1997-2001, and breakdown by Main Goal.

NHT Program	Funded No.	Completed[1] No.	NHT $K used	Number (NHT $ bracketed) for each Main Goal[2]:				
				Vegetation	Land	Comm	River	Other
Group 1:								
Bushcare	55	54	7467	41 (6287)	8 (681)	3 (454)	0	2 (45)
Landcare	36	36	5145	6 (245)	17[4] (2982)	11 (1474)	2 (444)	0
Rivercare	29	26	2082	9 (566)	9 (840)	6 (566)	2 (109)	0
Subtotal 1	**120**	**116**	**14694**	**56 (7098)**	**34 (4503)**	**20 (2494)**	**4 (553)**	**2 (45)**
Group 2:								
Farm Forestry	4	2	221	0	1 (187)	1 (34)	0	0
Endangered Spp.	1	1	4	0	0	0	0	1 (4)
Other	5	5	207	2 (84)	3 (122)	0	0	0
Subtotal 2	10	8	432	2 (84)	4 (309)	1 (34)	0	1 (4)
Grand Total	**130**	**124**	**15126**	**58 (7182)**	**38 (4182)**	**21 (2528)**	**0**	**3 (49)**
NHT Regional[3]:								
Bushcare	27	25	168	20 (152)	3 (9)	2 (8)	0	0
Landcare	22	21	166	3 (15)	8 (62)	6 (61)	3 (18)	1 (10)
Rivercare	7	7	79	6 (73)	0	0	1 (6)	0
Total	**56**	**53**	**413**	**29 (239)**	**11 (71)**	**8 (69)**	**4 (24)**	**1 (10)**

[1] Number completed at May 2004; "completion" occurs when the Final Report is received by the QDNR&M regional office.
[2] Main Goal abbreviations: Land – Landscape Management, Comm – Community Support, River – River Improvement, Other – Comprises projects with main goals of Endangered Species and Miscellaneous.
[3] Two NHT Projects (one Bushcare, one Rivercare) were passed on to fund the NHT Regional Devolved Grants Scheme in 2000-2001, and these are classified within Community Support projects in Group 1 of the Table.
[4] Within the Landscape Management main goal, two Landcare projects claimed that a total of 2,316 ha of vegetation were protected via conservation agreements or rates rebate systems. However, no detailed records (i.e. area of agreement, location, vegetation type) of this area could be located within the source documents.

Vegetation-focused Projects: Their Nature, Locations and Costs

Vegetation-focused Projects in the NHT1 Scheme

To enable further analyses of the nature and costs of projects that focused on the enhancement or reinstatement of vegetation, we extracted the 87 projects whose "Main Goal" in the Projects database was listed as "Vegetation". Collectively, these projects used $7.4 million in NHT funds, together with a further $13.1 million provided by the project proponent as either a cash or in-kind contribution (Table 3.4), totalling $20.5 million. The projects are individually listed in Appendix 8. Collectively, they reported 693 ha of vegetation reinstatement, together with 283 ha of remnant repair (enhancement) and 2058 ha of vegetation protection (Table 3.4). Most (61 of 87) were associated with the Bushcare scheme.

Each project with a Main Goal of Vegetation was also individually classified as Reinstatement, Enhancement, or Non-specific (Appendix 8), based on the "Onground Activity" field of the Project Details satellite database. There were no projects whose Main Goal was Vegetation, together with Onground Activity of Vegetation Protection. However, any given project could incorporate combinations of specific activities involving different areas of protection, enhancement or reinstatement, which were documented for each project in various fields of the "Vegetation" Satellite Database (Appendix 7), and which are included

for each project in Appendix 8. Protection was, however, the Onground Activity in two poorly-documented projects whose Main Goal was classified as Landscape Management in the Landcare scheme (Table 3.3, footnote 4). These two projects are not considered further.

Table 3.4: Projects whose main goal was vegetation works, by program.

NHT Program	Number of Projects	Vegetation work (ha)	NHT $K spent[3]	Other $K spent	On-ground vegetation activitiy[4]:		
					Protection (ha)	Enhancement (ha)	Reinstatement (ha)
NHT Main:							
Bushcare[1]	41	2850	6287	11254	2026	234	589
Landcare	6	37	245	397	3	10	24
Rivercare	9	72	566	722	27	15	31
Other	2	21	84	140	0	0	21
Total	58	2979	7182	12514	2056	259	664
NHT Regional[2]:							
Bushcare	20	41	152	385	0	16	25
Landcare	3	4	15	37	0	1	3
Rivercare	6	8	73	140	2	7	1
Total	29	53	239	561	2	24	29
Grand Total	**87**	**3032**	**7422**	**13075**	**2058**	**283**	**693**

[1] Two of 41 Bushcare Projects are WTTPS "meta-projects", which supported many smaller projects (see below).
[2] "NHT Regional" devolved grants funded 56 small (<$10,000) community group projects (see Table 3.3).
[3] Includes both cash and in-kind contributions.
[4] Area of each type of work within a site obtained from the "Vegetation" satellite database.

Numbers of Projects and Active Groups Undertaking Vegetation Works

A very wide range of organisations were involved in the 87 vegetation-focused projects (Table 3.5; Appendix 2B). Community-based groups conducted the largest number of projects (62% of 87). This corresponds with the stated aims and funding priorities of the NHT scheme (see Chapter 1). However, the largest share of NHT funds (60% of $K7422) was allocated to the organisation NQAA, through two projects during 1997-2001, to enable continuation of the WTTPS scheme (see Chapter 1). The two WTTPS "meta-projects" comprised many different specific projects, for which full information was not available (projects 11 and 41 in Appendix 8, see also Appendix 9). They were also supported by in-kind contributions from local governments, which themselves received some funding ($K876) for vegetation projects directly from NHT.

There was a high level of collaboration between community groups, State government (e.g. CTR / TREAT) and local government (e.g. WTTPS). The community groups exhibited a range of different interests and goals, across a spectrum which included those interested largely in biodiversity conservation, those concerned mainly with mitigating land and water degradation, some with a focus on education, and a few private landholders (Appendix 2B).

Table 3.5: Types of organisation undertaking NHT1 projects focused on vegetation works, and funds used.

Category (See detailed listing in Appendix 2B)	Number of groups	Number of projects	NHT $K	Other $K[1]	Total $K
State Government	2	12	652	1041	1693
Local Government	8	14	876	1535	2411
Industry	4	5	44	100	144
NQAA (includes WTTPS – see Chapter 1)	1	2	4440	8160	12600
Community Total	29	54	834	1331	2165
Community – Landcare	10	23	575	908	1483
Community – Catchment Management	6	15	431	745	1177
Community – Conservation	7	11	377	512	889
Community – Landowners, Schools	6	5	26	73	99
Grand Total	**44**	**87**	**7422**	**13075**	**20497**

[1] Breakdowns of cash and in-kind contributions (provided for a subset of projects totalling $K2653 in the "Other" component), indicate that 61% of this component was cash, with the remainder being in-kind (often volunteer labour).

Locations, Sizes and Other Attributes of NHT1 Vegetation-focused Projects

In this section we report further on the nature of projects whose main goal was either enhancement (28 projects) or reinstatement (47 projects, excluding the two WTTPS meta-projects, for which site-specific details were unavailable, and the "non-specific" projects).

Overall, funding was allocated to projects that had commenced between 1995 and 2002. The greatest activity for on-ground commencement of NHT projects occurred in 1999 (Table 3.6). Projects typically required support for several years after commencement (although in Appendix 8 the total funding is listed against the year of first spending). The NHT Regional grants were first established in 2000, but due to logistical and funding delays, on-ground works did not commence until 2001. A similar delay occurred between the launch of the full NHT program in 1996 and the commencement of most on-ground works. The WTTPS scheme, due to its previously established infrastructure, was well positioned to access and use NHT funds earlier than other groups.

Individual projects were mostly small in area (Table 3.7): 61% of 28 enhancement projects and 83% of 47 reinstatement projects were 5 ha or less. These small projects collectively comprised 33% (120 ha) of the area of on-ground works (359 ha). The landscape zone was reported for 69 projects. Most projects took place in riparian areas; 60% of 25 enhancement projects and 93% of 44 reinstatement projects (Table 3.7).

Although vegetation works were distributed across all local government areas and catchments within the Wet Tropics region, some areas were foci of greatest activity (Table 3.8). These included the Atherton, Cairns, Cardwell, Eacham and Johnstone LGAs, and the Barron, Johnstone, Russell-Mulgrave and Tully-Murray catchments. These foci reflect the areas of greatest past land clearing and disturbance, such as the Atherton and Evelyn Tablelands (upper catchments of Barron and Johnstone Rivers, in Atherton and Eacham LGA) and the lowland floodplain of the Barron and Johnstone Rivers (Cairns and Johnstone LGAs). A secondary investment area occurred in the lower Herbert catchment in Hinchinbrook LGA. Locations of projects, catchments, LGAs and other features are shown in Appendix 8.

Table 3.6: Distribution across years of NHT1 projects focused on vegetation works; numbers and funds. Large meta-project schemes (WTTPS and NHT Regional), which were actually umbrellas for many individual site-specific projects, are treated separately from the remaining NHT projects.

Year	Percentage of projects commenced:		
	NHT – most	WTTPS[1]	NHT Regional
1995[2]	4	0	0
1996	2	0	0
1997	11	32	0
1998	11	35	0
1999	30	20	0
2000	9	13	0
2001	15	0	11
2002	19	0	82
Unknown	0	0	7
Total Percentage	**100**	**100**	**100**
Total Projects or $	**47**	**60**	**28**

[1] From the Audit database; the 60 WTTPS sites 1997-2001 (see Appendix 9); funding per site not known.
[2] These two projects (numbers 52, 53 in Appendix 8) began in 1995 but received NHT1 funds until 1999.

Table 3.7: Sizes (ha) and landscape zones of vegetation-focused projects. "Work type %" is the percentage of the project's area occupied by works involving protection (P), enhancement (E) or reinstatement (R). WTTPS and non-specific projects are excluded. There were no projects 10-15 ha in area. Total numbers are shown in brackets.

Sizes (ha) and landscape zones	Enhancement projects:					Reinstatement projects:				
	Number of projects	Work type %			Total area (ha)	Number of projects	Work type %			Total area (ha)
		P	E	R			P	E	R	
Project sizes:	(28)				(278)	(47)				(169)
<1 ha	3	0	100	0	2	9	0	0	100	4
1-5 ha	14	6	87	7	32	30	2	10	88	83
6-10 ha	7	13	58	29	54	6	0	7	93	46
16-20 ha	0	-	-	-		2	0	0	100	36
>20 ha	4	69	17	14	191	0	-	-	-	0
Landscape zones:	(28)				(278)	(47)				(169)
Riparian	15	5	67	27	55	41	1	7	92	144
Wetland	10	62	26	13	176	2	0	14	86	7
Upslope	0	-	-	-	0	1	0	0	100	2
Unknown	3	62	26	13	47	3	0	0	100	16

Table 3.8: Vegetation projects, by local governments, catchments and subregions. Large meta-project schemes (WTTPS and NHT Regional) are treated separately from the remaining NHT projects. "No." is the number of projects; "ha" is the area involved; and "$K" are funds provided by NHT.

	NHT – main			WTTPS[1]		NHT Regional			Total	
	No.	ha	$K	No.	ha	No.	ha	$K	No.	ha
Wet Tropics total:	**47**	**394**	**2152**	**60**	**200**	**28**	**52**	**236**	**142**	**644**
Local Government Areas:										
Atherton	10	71	310	2	15	6	14	43	17	94
Cairns	5	25	202	10	20	3	6	23	20	49
Cardwell	2	6	43	17	24	1	2	5	26	39
Cook	0	0	0	4	8	0	0	0	4	8
Douglas	1	5	90	7	17	3	4	29	11	25
Eacham	11	77	796	2	10	2	11	20	15	98
Herberton	1	5	67	2	19	2	1	13	5	25
Hinchinbrook	4	131	267	5	27	3	3	37	12	161
Johnstone	13	75	377	4	20	7	10	66	24	105
Mareeba	0	0	0	7	40	1	0	1	8	40
Catchments:										
Barron	16	93	509	16	66	7	14	44	39	165
Daintree / Mossman	1	5	90	7	17	3	4	29	11	25
Endeavour	0	0	0	4	8	0	0	0	4	8
Herbert	5	136	334	7	46	5	4	49	17	186
Johnstone	19	138	1063	5	27	8	20	81	32	185
Russell Mulgrave	0	0	0	3	9	1	2	5	5	11
Trinity Inlet	4	17	113	0	0	3	6	23	7	23
Tully-Murray	2	6	43	18	27	1	2	5	27	42
Subregions:										
Northern lowlands[2]	6	29	292	21	44	7	12	57	36	84
Southern lowlands[3]	19	226	1050	26	71	10	14	103	61	319
Tablelands[4]	22	138	811	13	85	11	26	76	45	242

[1] From the Audit database; the 60 WTTPS sites 1997-2001 (see Appendix 9); funding per site not known.
[2] Lowlands north of the Johnstone River (there are no northern upland projects, as most of this land is forested).
[3] Lowlands between the Johnstone River and Crystal Creek.
[4] Mareeba, Eacham and Atherton LGAs or the upper catchments of the Barron, Johnstone or Herbert Rivers.

Types and Overall Costs of Vegetation Works

Vegetation reinstatement was the main activity in 49 of the 87 Vegetation projects, with 28 enhancing existing remnants, and 10 whose objectives were mixed or undefined (Table 3.9). Overall, $5.9 million of NHT funds supported reinstatement covering 644 ha of native vegetation, with a total contribution of $16.5 million (Table 3.5), the additional $10.6 million being contributed as cash or in-kind by partner organisations. If all reinstatement projects are added together, the total cost of revegetating one hectare of land was $K25.6. Enhancement of 277 hectares of vegetation was achieved with $0.9 million NHT funds, $2.5 million in total, or $K9.1 / ha. Excluding one unusual project, non-specific projects cost $K10.2 / ha overall. Enhancement was, overall, less costly per hectare than reinstatement because it included a greater area of vegetation protection.

Table 3.9: Types of work and costs, within vegetation-centred projects.

Onground Activity[2]	No. of projects	Work types as percentage of area[1]			Total				
		Protection	Enhance.	Reinst.	Area (ha)	NHT $K	Total $K	NHT $K / ha	Total $K / ha
NHT – main:									
Enhancement	16	55	28	17	252	815	2207	3.2	8.8
Reinstatement	31	1	8	91	142	1337	3425	9.4	24.1
Reinst. WTTPS[3]	2	0	8	92	475	4440	12600	9.3	26.5
Non specific[4]	9	91	6	3	2110	590	1464	0.3	0.7
Total	58	69	9	22	2979	7182	19696	2.4	6.6
NHT Regional:									
Enhancement	12	8	85	8	26	103	309	4.1	12.4
Reinstatement	16	0	0	100	27	133	477	4.9	17.7
Non-specific	1	0	0	100	1	4	14	4.0	14.0
Total	29	4	41	56	54	239	801	-	-
Grand Total	**87**	**68**	**9**	**23**	**3033**	**7422**	**20497**	**-**	**-**
Overview:									
Enhancement	28	51	33	16	277	918	2516	3.3	9.1
Reinstatement	49	0	8	92	644	5910	16502	9.2	25.6
Non-specific[4]	10	59	33	8	111	399	1133	3.6	10.2

[1] Area of each type of work within a site obtained from the "Vegetation" satellite database.
[2] Classified from the "Onground Activity" field of the "Vegetation" satellite database (definitions are in Appendices 7A and 7B).
[3] WTTPS "meta-projects" supported many smaller projects, whose details were not fully clear (see Appendix 9).
[4] Excludes Project No. 56 (Appendix 8), whose low cost / ha reflects a very large area listed as "protected".

Characteristics and Costs of Individual Projects

Aggregate numbers such as those in Table 3.9 tend to obscure important information about how individual projects vary in their outcomes and costs. Therefore, this section further considers the 85 vegetation-focused projects for which specific information was available (excluding the WTTPS projects).

Across all projects, the range of funds per project received from the NHT scheme was $K1-379, with additional contributions ($K3-614) from the project proponents bringing the range of total funds per project to $K4-993 (Appendix 8). The level of NHT funding was highly correlated with both the level of proponent funding and the total project funds (Figure 3.2(a) and (c)), an expected pattern since adequate proponent funding was a criterion used in the assessment of applications. Also as expected, the NHT funding to individual projects in the NHT regional devolved grants scheme was much less than the other ("main") NHT projects (total funds $K1-17 vs. $K3-379). Additionally, many NHT regional projects obtained a lower proportion of their total costs from the NHT (mostly 20-30%, average 29%), compared with the "main" NHT projects (mostly 20-50%, average 40%) (see text in Figure 3.2(b)).

Across all projects, the largest in terms of total area had, on average, a higher total cost than projects whose area was smaller (Figure 3.2(d)). However this relationship is weak because the largest projects all contained substantial areas of protection of remnant vegetation (Figure 3.2(f); 48% on average for projects over fifteen hectares, compared with 5% for projects up to 15 ha). Among the 47 projects whose "Onground Activity" was classified as reinstatement, only 17% were greater than five hectares in area, and 30% covered less than two hectares. If only the 69 projects without any areas of protected remnant vegetation are considered, then the statistical relationship between project area and total cost becomes much stronger (Figure 3.2(d)).

In other words, most vegetation reinstatement projects were small in area, and increasing their size resulted in an increase in total revegetation cost, although the incorporation of areas of remnant protection within projects obscures this pattern. Even when this effect is removed (i.e. among the projects which contained no areas of remnant protection), the total cost per hectare of vegetation works varied greatly, from $K4 to $K148 (Figure 3.2(e)).

Some of this variation can be explained by economies of scale. That is, the cost per hectare was less for small projects than for large projects (Figure 3.3(a)-(d)). This relationship is strongest when the total cost per hectare of reinstatement projects is considered, and occurs mainly because of increased costs in projects that were less than 2.0 ha in area (Figure 3.3(c)). Many projects below 1.0 ha in area cost $K30-60/ha or more in total funds (and $K10-20/ha or more in NHT funds) per hectare. In contrast, projects above 5.0 ha in area were more likely to be in the range $K15-30/ha ($K5-10/ha in NHT funds), or less (Figure 3.3 (a)-(d)). The smallest projects also varied widely in their costs, and some were comparable in cost per hectare to the larger projects.

The type of vegetation works undertaken (whether wetland or forest vegetation, and whether primarily reinstatement or enhancement of vegetation) had no detectable effect on project cost. If the effects of project area are removed by considering only projects 2-5 ha in size containing no areas of protection, then 22 reinstatement projects averaged $K19/ha in total costs, which is not significantly different from $K23/ha across eleven enhancement projects. The percent contributions to these costs from NHT were 34% and 36% respectively, and the parts of the project area that were reinstatement (rather than enhancement) were 94% and 7% respectively.

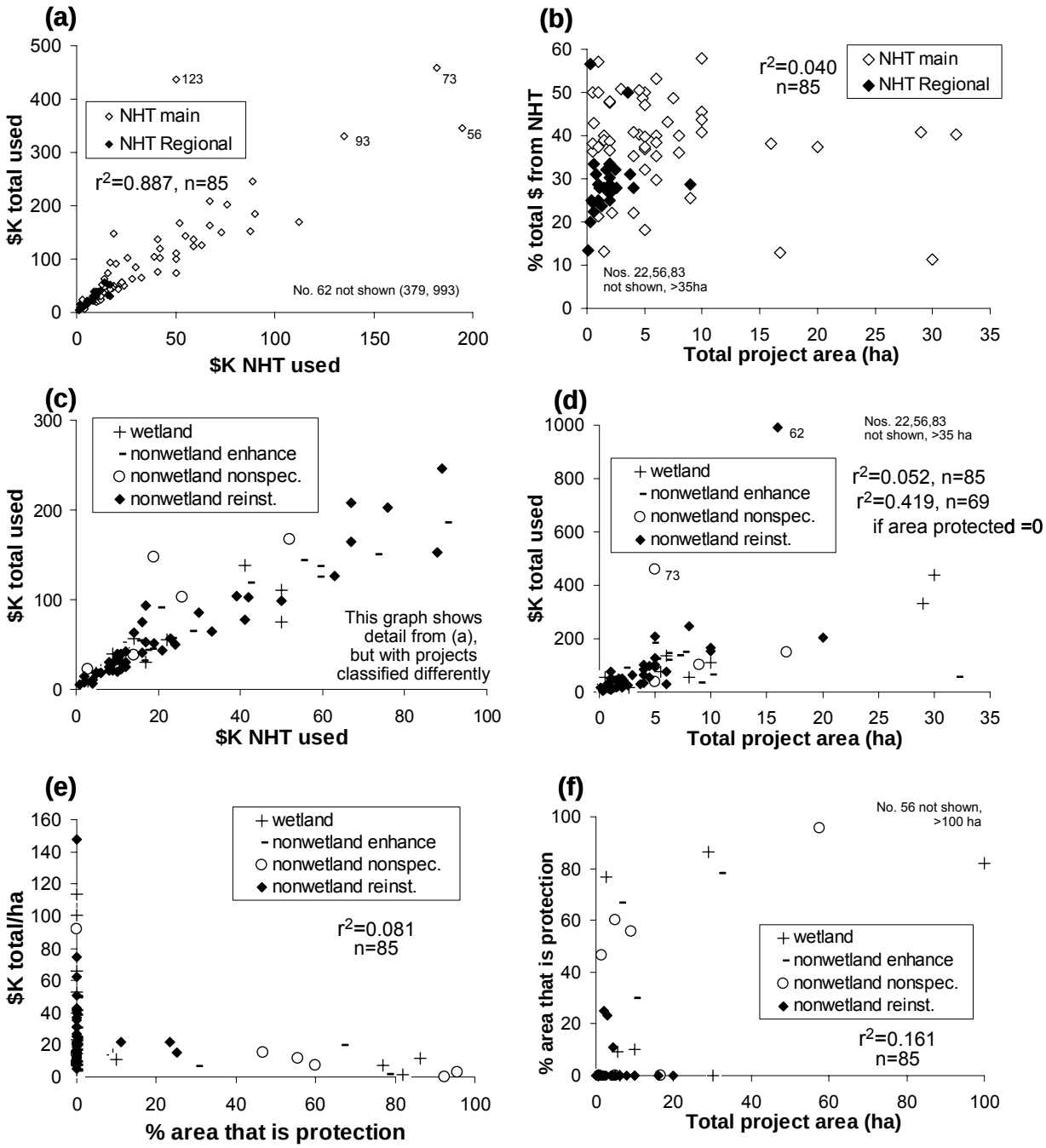


Figure 3.2: Relationships between the areas, types, and costs of vegetation-focused projects. Projects are classified by either: (1) scheme (NHT main vs. regional); or (2) wetland and non-wetland (then subdivided into enhancement, non-specific, reinstatement). r^2 values (n=85, linear) are statistically significant if above 0.046 for $P<0.05$, or 0.076 for $P<0.01$. Numbers next to "outlying" projects refer to Appendix 8.

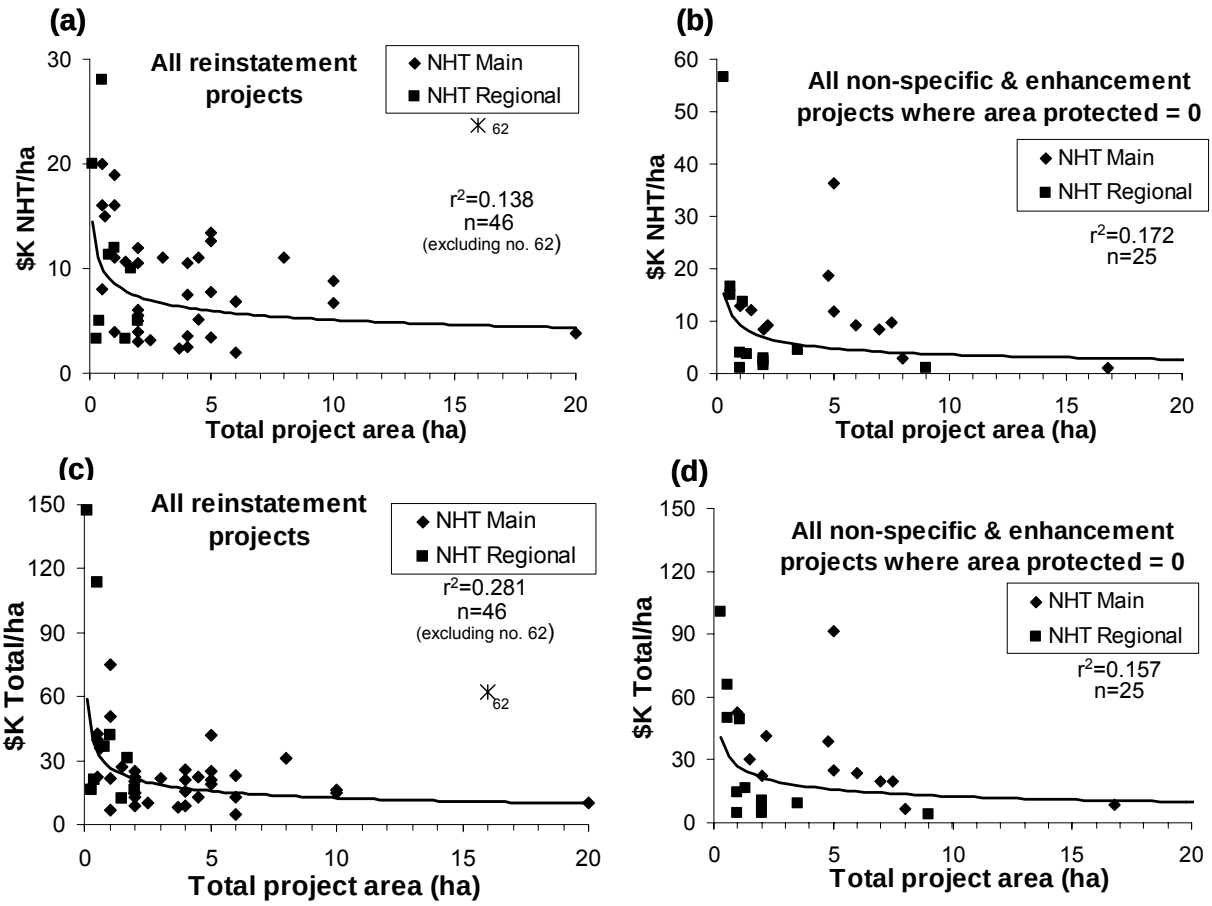


Figure 3.3: Relationships between the cost per unit area and overall size, for revegetation projects. Costs are calculated in terms of both the NHT funds granted, and the total funds (NHT plus proponents stated cash and in-kind contributions). r^2 values in (a) and (b) are statistically significant if above 0.087 for $P<0.05$, or 0.146 for $P<0.01$. r^2 values in (c) and (d) are statistically significant if above 0.157 for $P<0.05$ (0.255 for $P<0.01$). Numbers next to "outlying" projects refer to Appendix 8. Project 62 was excluded from the fitted line and statistics in (a) and (c) because a large part of its costs involved a monitoring program for small mammals.

3.4 CHALLENGES AND RESOURCES

In final reports to NHT, a wide range of challenges was described. These spanned three areas, which caused problems in roughly equal frequencies (Table 3.10):

1. Technical biophysical challenges to the planting and growth of trees;
2. Socio-economic circumstances limiting the level of support from the broader community or the amount of funding available; and
3. The lack, or inappropriate timing, of human or technical infrastructure.

Table 3.10: Challenges and difficulties reported during NHT1 revegetation projects.

Type of Problem	Examples
Biophysical environment (52):	
Physical	Drought, floods, frosts (29). Steep banks (6).
Biological	Weed growth (most frequent), plant stress (17).
Socioeconomic environment (35):	
Economic	Cost of tree planting to landholders, sugar industry crisis, cuts to Waterwatch program, delays in providing funds, insufficient funds (15).
Social	Some sections of community not supportive of revegetation activities (19). Vegetation Management Act created confusion and hesitation (1). Poor communication between proponents, NHT management, general community (3).
Infrastructure (40):	
Equipment	Equipment malfunctions, limited access (4).
Personnel	Lack of trained staff to undertake projects (7).
Logistic	Timing of in-kind support (eg council slashing, volunteers). Planning and staffing when funds availability is uncertain. Sourcing plants at appropriate times (24).
Information	Insufficient information on appropriate plants, weed control, impact of Vegetation Management Act, accessibility to databases e.g. vegetation mapping (5).

Physical and biological challenges either hindered tree-planting activities (e.g. steeply-sloping banks of waterways), or caused the death or suppression of the plants during the establishment phase (e.g. overgrowth by weeds, or adverse climatic episodes). Floods and frosts can destroy most of a season's reinstatement planting, and many projects were particularly vulnerable to flooding because of their predominantly riparian location (see Table 3.7).

Economic challenges involved the sufficiency and timing of funds. Even when sufficient funds were available, delays in their availability impacted some projects (e.g. see text associated with Table 3.6). In the annual government granting cycle, funds may be made available at seemingly arbitrary times, which may also differ from those initially promised, and the funds must then be spent and acquitted to meet external deadlines. However, revegetation activities involve a different seasonal and annual cycle in which seeds must be collected and grown many months prior to planting, and planting must be timed to coincide with the best months for seedling survival and growth. Mismatches between these two cycles are common, and revegetators working on small-scale projects are likely to be particularly impacted by them.

Social challenges mainly involved the level of support from the broader community. While sections of the community vigorously commit time and resources to revegetation, others may be unsupportive or even hostile. Some proponents identified communication among different sectors as a particular challenge.

Infrastructure challenges involved the sufficiency and timing of equipment, suitably skilled staff, in-kind contributions, plants, and information about ecological or revegetation technology. The NHT scheme sponsored the provision of technical and planning advice through Greening Australia. However, its extent was limited, and community education materials were scarce.

3.5 ON-GROUND MONITORING

Monitoring of project outcomes was a requirement of NHT funding. Some form of monitoring was reported in 72 of the 87 vegetation-focused projects, with up to four different monitoring activities per project (Table 3.11). However, most monitoring does not appear to have involved quantitative records. For example, 44% (39 of 88) of monitoring activities that were aimed at assessing vegetation or fauna consisted simply of taking photos, while an additional 31% (27 of 88) were unspecified. Less than 20% (16 of 88) of activities comprised surveys of plants or animals, and these surveys were not necessarily quantitative.

Table 3.11: Monitoring activities reported by vegetation-related projects.

(i) Attributes targeted for monitoring					
Monitoring activities per project	**Projects conducting specified no. of monitoring activities**	**Number of projects which monitored particular attributes:**			
		Vegetation	**Fauna**	**Pest Species**	**Water Quality**
0	15	-	-	-	-
1	35	31	0	1	3
2	26	25	9	3	15
3	9	11	7	2	6
4	2	1	4	2	1
Total	**87**	**68**	**20**	**8**	**25**
(ii) Type of monitoring (for fauna and vegetation targets only)					
Focus of monitoring activities	**Total number of monitoring activities**	**Type of monitoring activity:**			
		Photo	**Survey**	**Growth Rates**	**Unspecified**
Vegetation	68	39	11	6	12
Fauna	20	0	5	0	15

4. DISCUSSION AND CONCLUSIONS

4.1 THE NATURE OF REFORESTATION EFFORTS

The Reforestation Audit in the tropics and subtropics up to 1999 and the Regional Directory of reforestation works from 1997 to 2002 revealed a number of general characteristics of activities in rainforest restoration. First, these activities were the outcomes of efforts by a very large number of individuals and organisations, often working in collaboration. Community-based reforestation efforts comprised around two-thirds of all on-ground projects. More than forty different landcare, conservation, catchment management, school-based and other groups undertook rainforest restoration projects, on both private and public land.

Second, most of this work has taken place relatively recently (since 1990). Furthermore, reinstatement (ecological restoration) of rainforest on cleared land is a more recent activity than either enhancement of existing remnants or planting rainforest trees for timber. The earliest commencement date for a reinstatement project in the audit database (1980) is a private property in northern New South Wales. Around 2% or less of reinstatement projects in the database were commenced before 1990 (5 of 209, or 5 of 534 if CRRP sites are included), and these are all in the subtropics. The earliest recorded reinstatement site in the tropics (Pelican Point) commenced in 1991. Since we only sought projects for the audit database that were above one hectare in area, some pioneering smaller-scale projects were not included. Additionally, the database is not comprehensive, and some long-established sites may have been overlooked. Nevertheless, we especially sought older and larger sites, and therefore they are likely to be over-represented in the database. Vegetation repair ("enhancement") activities within existing remnant vegetation date back to 1950 in the subtropics, although the scale of activity was small. These activities have also increased greatly in frequency since 1990. Efforts in northern New South Wales prior to 1990 were discussed in Phillips (1991), and those during the 1990s were discussed in Horton (1999).

It is also clear that reforestation activities were substantially boosted by the NHT scheme. In the tropics, NHT funds facilitated further development from a base already established by initiatives such as the WTTPS and CRRP, and the activities of TREAT. In the subtropics, growth in reforestation during the 1990s was more spectacular; perhaps because NHT provided the first substantial funding support in the region, enabling an existing (but under-funded) pool of interested and skilled people to scale up their activities. However, much of this recent activity in the subtropics is not revealed in the present study, because it did not document most subtropical projects after 1999. It is uncertain whether the high level of community engagement would persist if the funding from NHT or other schemes ceased.

Third, reinstatement projects particularly targeted certain areas. While projects were well scattered across this study's target zones (around two million hectares in the tropics and three million in the subtropics), the majority occurred in particular sub-regions. These subregions once contained extensive areas of rainforest on level, fertile ground, which was cleared and converted to grazing or cropland. In the Wet Tropics, major foci of rainforest restoration were the upland Atherton Tablelands and lowlands of the Barron, Johnstone, Tully-Murray and Herbert river systems. In the subtropics, they were the uplands (Maleny plateau) and lowlands of the Mary River in southern Queensland and the entire Richmond River catchment (the former "Big Scrub" region) in northern New South Wales. Within particular landscapes, reinstatement projects especially targeted the banks of creeks and rivers, with 71% in riparian zones; although this percentage varied considerably among regions, from 43% in southern Queensland to 80% in the Wet Tropics (from Appendix 4). In contrast, only 14% of farm forestry projects were in riparian areas. Even 43% indicates strong targeting, since riparian zones occupy a small fraction of the landscape.

Fourth, the scale of individual projects was small. Even though the Reforestation Audit sought projects above one hectare in area, the stated project area for 70% of the 355 non-CRRP projects whose areas were recorded was less than five hectares (75% if CRRP projects are included). If only reinstatement projects are considered, 66% of projects were less than five hectares (from data in Appendix 3). For all NHT1 projects (irrespective of minimum area), 75% of all 75 projects of known area, and 83% of the subset of 47 projects that targeted reinstatement, were less than five hectares. Because areas revegetated were mainly based on proponents' estimates, rather than actual measurement, these figures are likely to over-estimate, rather than under-estimate, the sizes of projects.

Therefore, although the numbers of individual projects are large, the total aggregate area of replanted rainforest (reinstatement) is modest. The Regional Directory data revealed that vegetation-focused projects in the Wet Tropics that were funded during 1997-2002 by NHT1 (mainly associated with the Bushcare scheme) claimed a total area of 693 ha of reinstated rainforest, 283 ha of enhancement and 2058 ha of protection. From the Reforestation Audit, proponents' descriptions of projects undertaken before 2000 (and above one hectare in area) yielded total areas for known reinstatement projects of 528 ha in the tropics and 809 ha in the subtropics. Enhancement projects totalled 47 ha and 828 ha in tropics and subtropics respectively. Other projects (mainly farm forestry, including CRRP) totalled 1,380 ha and 709 ha in tropics and subtropics respectively (all areas are derived from data in Appendix 3A). In the tropics, because of discrepancies in documentation of WTTPS sites (see Appendix 9), overlap in projects between the two sets of data cannot be resolved, and there is some "double-counting" that cannot be separated. Hence, summing the areas across the two data sets would produce over-estimates of the total area, although this may be counterbalanced since some "missed" projects, and various projects under one hectare, in the Audit database would lead to some under-estimates.

Given the total areas above, together with the known levels of uncertainty, a reasonable estimate of the area of cleared land on which vegetation was actively reinstated in the tropics up to 2002 would be in the order of 1,000 ha. Some reinstatement was wetland or sclerophyll vegetation, so this is a conservative over-estimate of the gain in rainforest area. This gain is equivalent to 0.5% of the 180,000 ha of rainforest that is estimated to have been cleared from the region (see Chapter 1). In the subtropics, if we assume that the proportionate increase in reforestation effort after 1999 was similar to that in the Wet Tropics, the area of cleared land that was reinstated up to 2002 would be in the order of 1500 ha. This is equivalent to 0.3% of the 500,000 ha of rainforest estimated to have been cleared from the region. To these totals could be added around 1500 ha from farm forestry or mixed-purpose plantings in the tropics, and perhaps a few thousand hectares in the subtropics (although these may not create a rainforest-like habitat; see Section 4.3).

Erskine (2002) previously quoted broad estimates, for the tropics, of 1,120 ha of reinstatement through ecological replanting and 2,000 ha of farm forestry (CRRP) plantings between 1991 and 2001 (based on personal communications from administrative staff and practitioners in revegetation-focused organisations). In the light of the systematically collected information summarised in the present report, these figures were reasonable approximations, if somewhat optimistic. However, precise retrospective on-ground measurements of the areas of achieved reforestation have yet to be undertaken in either tropics or subtropics. Such measurements may reveal that the data in this report have over-estimated the area of reforestation. Achieved areas may also be less than planted areas because it is natural for proponents to err optimistically when making subjective estimates of areas, but also because climatic events such as floods, fires, drought and cyclones can cause plantings to fail. Systematic monitoring, which could provide better documentation of failure rates and their causes, has been lacking (see Section 4.5).

4.2 COSTS OF RESTORATION IN RAINFOREST LANDSCAPES

Detailed information on the costs of restoration works, in dollar terms, was provided by project proponents within project proposals and final reports, as a funding requirement for projects within the NHT1 scheme. The Regional Directory database therefore summarised these costs for NHT-funded projects in the Wet Tropics during 1997-2002. There was a patchy response to questions about costs in the Reforestation Audit.

The costs of tree-planting, and their variations, are driven in part by the expenses of seed-collection, germination, and seedling maintenance, combined with the need for a high density of planted seedlings. Good results at rapidly achieving a more rainforest-like vegetation structure and biodiversity (see Section 4.3), in which tree canopy closure occurs within a few years, are obtained at a density of around 5,000-10,000 trees / ha (1-2 m spacing) or more. In this situation, maintenance through occasional weed control is needed only during the first few years. Plantings in which tree seedlings are more widely separated (such as those found in farm forestry) are less costly to install, because they involve fewer trees and less labour. However, such plantings take longer for the tree canopy to close, and therefore incur a greater risk of overgrowth by introduced pasture grasses and weeds (Wardell-Johnson *et al.* 2005). Neither timber plantations nor regrowth reach canopy closure within the 3-5 years (or less) achieved by the denser restoration plantings (Kanowski *et al*. 2003; Catterall *et al*. 2004, 2005). This leads to a higher risk of failure due to overgrowth, or higher costs of ongoing maintenance to remove the competing grasses and weeds.

On the basis of discussions with practitioners in the tropics, Erskine (2002) described the cost of ecological replanting (circa 2000) as around $15,000 to $25,000 / ha. Our own conversations with practitioners in subtropical New South Wales who undertake tree-planting to reinstate rainforest on a contract basis for private landholders indicated costs (circa 2004) of around $20,000-$30,000 / ha or more. During the NHT1 scheme in the tropics, vegetation-focused projects reinstated native vegetation over a claimed 644 ha, at an overall unit cost of $25,600 / ha, of which $9,200 / ha was derived from NHT grants, with the remainder comprising roughly 60% proponents' stated cash contributions, and 40% their costed in-kind efforts. Enhancement projects over a claimed 277 ha were associated with a lower overall unit cost of $9,100 / ha, of which $3,300 / ha was from NHT grants.

The lower unit cost of the enhancement projects was affected by some projects in which the total area of an existing vegetation patch was large, but in which works to improve the vegetation (often including localised plantings) took place in a smaller part of the patch. Accordingly, some projects whose main goal was defined in the database as either enhancement of existing remnant vegetation or non-specific (usually indicating mixed goals) took place over relatively large areas (>20 ha), most of which comprised areas of protected intact vegetation. For those projects whose main goal was defined as "enhancement", 51% of the aggregate total project area was described as vegetation over which the only work undertaken was protection (the remainder being either active enhancement or reinstatement). In contrast, the entire area of projects whose main goal was described as "reinstatement" was the focus of either enhancement (8%) or reinstatement (92%) activities.

Among reinstatement projects there was a large amount of variation in unit costs, some of which was associated with variation in a project's area. Most reinstatement projects above five hectares in area cost less than $30,000 / ha. In contrast, below two hectares in area the unit cost of individual projects varied widely, with many exceeding this value. Above five hectares in area, project costs seemed to stabilise at the lower level. Enhancement and non-specific projects without areas of remnant protection showed a similar threshold for reduced average cost at areas between two and five hectares. Reinstatement projects 2-5 ha in size cost $19,000 / ha on average, of which 34% consisted of NHT funds.

The reasons for this economy of scale are unclear. Speculatively, undertaking larger-scale projects is an endeavour, which presumably requires larger-scale and well-established groups or proponents. Such projects may therefore be less impacted by vagaries in a number of the factors that were listed by project proponents as "challenges and difficulties", such as external funding, trained personnel, equipment availability, and the supply of seeds or seedlings. Their proponents may be more likely to be well informed, in terms of qualifications, combined learning and memory of personnel within the group, and established contact networks.

Larger-scale projects also have other potential advantages. First, a small (less than five hectares) isolated vegetation patch, which is created through revegetation activities will be intrinsically limited in its potential biodiversity value, by processes that include both edge effects and patch size effects. These would restrict both its habitat quality and its ability to sustain forest-dependent fauna and flora (e.g. Boulter *et al*. 2000; Catterall *et al*. 2004). However, a small area of revegetation adjacent to an existing forest patch would not suffer from such ecological limitations. Second, with a larger and more established proponent, there may be an increased potential for better record-keeping, the need for which is discussed below. However, larger projects themselves do not guarantee record-keeping (for example, we found it very difficult to obtain records of the specific site areas and activities for some WTTPS projects; see Appendix 9). Nevertheless, in general, obtaining the best ecological outcome per unit cost appears to be more likely within larger-scale projects (over five, or at least over two, hectares).

On the other hand, for schemes designed to foster community engagement and education, rather than to maximise ecological outcomes, many small projects may be more desirable than larger but fewer projects. The NHT Regional scheme in the Wet Tropics provided devolved NHT1 grants to smaller community groups and associations (including school groups). The projects funded under the NHT Regional scheme were relatively smaller in area (a large proportion were below 2.0 ha) than those funded from "normal" NHT grants. Their unit cost was therefore higher. Exploratory analyses of the data showed no difference in the per hectare cost of projects in the two schemes when only the small projects were considered. However, NHT Regional projects also obtained a higher proportion of their total costs from the proponents' contributions: around 30% on average, compared with 40% for "normal" NHT grants). This may indicate a greater level of community involvement, albeit at the risk of inefficient ecological outcomes. However, if the outcomes for increased public support for conservation, or capacity to undertake future projects, were measured, other benefits from these projects may become apparent.

Different objectives may suit different scales of project. If small-area projects are pursued for community engagement purposes, then proposals and reporting requirements need to include and emphasise community involvement and education objectives, while also tracking broad achievements in improving vegetation cover. For large-scale projects, there need to be clear ecological objectives, which are proposed prior to commencement and subsequently reported on.

4.3 ECOLOGICAL BENEFITS RELATIVE TO INVESTMENT

The ecological objectives of revegetation on cleared areas within rainforest landscapes are strongly influenced by the need to develop a closed tree canopy (i.e. a situation in which the crowns of adjacent trees merge to form a continuous and deep ceiling of foliage). The achievement of canopy closure is a significant threshold, which corresponds with a change in biodiversity and ecological processes towards a more rainforest-like state (Kanowski *et al.* 2003; Erskine *et al.* 2005; Catterall *et al.* in press). An open canopy allows light to penetrate to ground level, enabling a dense growth of grasses and herbs, which inhibits the survival and growth of rainforest seedlings. After canopy closure, a shady and litter-covered ground

layer suppresses grass and herb growth, but favours the survival and growth of rainforest seedlings. A dense tree canopy provides suitable habitat for fruit-eating rainforest birds, which carry in the seeds of rainforest plants, assisting the development of the site's flora. Canopy closure also contributes to the maintenance of a cool and humid microclimate, which is required by many species that depend on rainforest habitat.

Reforestation pathways in which canopy closure is achieved at a younger site age should therefore rapidly provide suitable conditions for the recruitment, survival and growth of rainforest plants. This principle has been the basis for a recommended high planting density (1-2 m between plants) in ecological restoration plantings, informed and tested by the field trials of restoration practitioners (Goosem and Tucker 1995; Kooyman 1996; BSRLG 2005). A high early planting density also encourages the early development of structural features required by many rainforest-dependent animals, such as a high foliage volume, dead timber, leaf litter, trunk crevices, and areas of vine tangle or dense stems.

Three phases of vegetation development during reforestation can be identified (Kanowski *et al*. 2004; Catterall *et al*. in press). First, the *establishment* phase is the period during which the developing canopy has not yet closed, and hence the site has not yet been "captured" from the competing grass and herb cover. Second, the *building* phase involves the development of a diverse, rainforest-like flora and fauna, and of the ecological processes which maintain them. Third, entry into the *maintenance* phase would occur when ecological characteristics (such as rates of species turnover, and types of fauna and flora) in the reforested area stabilise at a level similar to that which characterises intact rainforest. The duration of each phase varies, depending on the method and circumstances of reforestation. In plantings for ecological restoration, the establishment phase is reduced to a few years. However, the duration and progress of the maintenance phase, and whether it can be accelerated through targeted management intervention, have yet to be established. To do so requires further monitoring of revegetated sites, together with research and evaluation.

Recent studies in the tropics and subtropics have begun to provide information on the comparative patterns and rates of biodiversity development across the range of reforestation pathways (e.g. Kanowski *et al*. 2003, 2005b, 2006a; Catterall *et al.* 2004, in press; Tucker *et al*. 2004; Wardell-Johnson *et al*. 2005). This research has shown that a range of rainforest-dependent plants and animals use ecological restoration plantings by five years of age. By ten years, the plantings show a moderate similarity to rainforest in biodiversity measures. Similar-aged timber plantations support a range of native fauna and flora, but these are less likely to be species that depend on rainforest habitat. Rather, they are often generalists, species of open habitats, or weeds. Much less is known about the early development of regrowth, although limited work suggests that its biota initially develops at a somewhat slower rate than for timber plantations, but later improves more rapidly.

Therefore, the substantial unit cost of restoration plantings does seem to pay off in terms of improved biodiversity outcomes within the sites themselves. The unit area costs of timber plantations are lower than for ecological restoration (around $5,000-$10,000 / ha; Erskine 2002; Catterall *et al*. 2004, 2005), but their potential to support rainforest biodiversity is also more modest, and the maintenance costs are higher (although maintenance costs are poorly-documented for ecological replantings). Older timber plantations (40-70 years), adjacent to rainforest, where reforestation began immediately after clearing, and under which a dense understorey of rainforest plants has developed, support a rainforest-like biodiversity. However, there is a range of rainforest specialist species, which remain absent or uncommon. Furthermore, plantations that are established on former pasture, far from rainforest, and managed intensively for timber production, will support fewer rainforest-dependent species (Kanowski *et al*. 2003, 2005b). Comparisons with older restoration plantings have not been possible, because they do not yet exist, although it is clearly the hope of practitioners that the design of such plantings would accelerate development of a

rainforest-like structure and biota. Plantation designs, species choices, and management regimes, which have been developed with the aim of maximising the rate of development of timber volume, are generally unlikely to support well-developed rainforest biotas (Catterall *et al*. 2005; Kanowski *et al.* 2005a, b; Kanowski *et al*. 2006b; Wardell-Johnson *et al*. 2005). Trade-offs between production and biodiversity were discussed by Erskine and Catterall (2004).

At the broader landscape scale, different forms of reforestation may also have a range of different types of positive off-site consequences for biodiversity, for example, buffering the edges of remnant forest, facilitating dispersal of flora and fauna among remnant forest patches, and improving adjacent aquatic habitats (Kanowski *et al*. 2005a, 2006b). They may also have unwanted off-site consequences, for example if a poorly-considered choice of plants for revegetation leads to the invasion of nearby remnant forest by introduced plant species, or non-local genes. These off-site consequences are not well understood, and are difficult to measure. Generally, the balance of positive and negative off-site consequences would be better for ecological replantings than for timber plantations (Kanowski *et al*. 2005a). However, more work needs to be done before we can fully compare the relative costs and benefits of different reforestation methods.

4.4 THE POTENTIAL FOR LARGE-SCALE REFORESTATION

In order to achieve a substantial increase in forest cover in the parts of the landscape in which biodiversity and ecological processes have been compromised by the extent of clearing, much larger aggregate land areas will require reforestation than have been achieved by active revegetation to date. An investment of $16.5 million by NHT1 in the Wet Tropics resulted in a revegetated area of some 644 ha (excluding some smaller areas which would also have been revegetated within projects focused on mainly on other objectives, such as the mechanical stabilisation of stream banks).

To achieve significant increase in rainforest cover using these methods would require much larger investments. For example, Mabi rainforest on the tropical Atherton Tableland has been reduced in extent to approximately 800 ha, which is considered to be less than 5% of its pre-European extent (Queensland EPA, personal communication). If, conservatively, we assume that 5% currently remains, then to recover 30% of its former area (a figure frequently used as a rule-of-thumb in contemporary vegetation management prescriptions) would require reforestation over 4,000 ha. At a cost of $20,000 / ha (a minimal estimate – see above), this would require an investment of $80 million. Likewise, to replant rainforest over even 10% of the previously denuded subtropical Big Scrub rainforest (once 75,000 ha) would require $143 million; 30% would need $443 million. If this work was done according to the NHT1 model, with government funds providing 35% of total costs, and the rest provided by partners and community members, then the cost to government of revegetating Mabi forest would be $28 million, and the cost of minimal (10%) revegetation in the Big Scrub region would be $50 million. The latter estimates assume that there are sufficient resources and human energy in the community to meet the balance of costs, which is questionable.

Relative to current levels of government funding for restoration of nature-based environmental infrastructure, these amounts appear prohibitively large. The entire NHT1 scheme (1997-2002) had a budget of $1,499 million, of which the Bushcare and Landcare schemes accounted for $313 million and $212 million respectively (Commonwealth of Australia 2003), across the whole Australian continent. By contrast, transport infrastructure works receive much larger amounts. For example, the Pacific Motorway upgrade in southern Queensland during the late 1990s had a budget of $800 million (Queensland Department of Main Roads, personal communication). A budget of this size could achieve replanting of 40,000 ha of rainforest (at $20,000 / ha), equivalent to around 8% of the area of cleared rainforest in the subtropics. From the perspective of individual landholders, the current cost

of replanting one hectare of land with rainforest is equivalent to the cost of a medium-sized car ($20,000-$30,000). For a different sort of contrast, the structural adjustment funds required to accompany legislation, which in 2004 ended broad-scale land-clearing over most privately-owned land in Queensland were around $150 million, thereby protecting many millions of hectares of native vegetation (QDNR, personal communication).

Therefore, if land is to be reforested at an ecologically meaningful scale, there either needs to be a revolutionary change in the way both governments and individuals allocate their finances, or there must be a greater focus on methods of reinstating forest over larger areas at lower unit cost. It has been suggested that establishing timber plantations on cleared land can provide a means of cost-effectively catalysing rainforest regeneration, as rainforest species may then progressively colonise beneath the canopy of the timber trees (e.g. Lamb 1998; Lamb *et al*. 2005), and potential financial return from harvest could eventually off-set the costs of planting, and increase the attractiveness of reforestation to private landholders. However, many factors, including the timber harvest itself, act to limit the likely value of such plantations in supporting rainforest-dependent flora, fauna and ecological processes (Section 4.3; Kanowski *et al*. 2005a).

The management of naturally established (autogenic) regrowth offers another opportunity for reforestation over larger proportions of the landscape. In both tropics and subtropics, there are large areas of land that were previously intensively used as pasture for dairy cattle, or as sugar cane cropland. These are now less desired for production, because of downturns in the economics of the dairy and cattle industries. On many properties within former dairy regions, stocking rates have been reduced, or grazing practices abandoned entirely. In some cases, the land has been acquired by new owners, who derive their main income from off-property or non-agricultural activities, and who have an active interest in conservation and restoration (Emtage *et al*. 2001). Considerable areas of regrowth are already appearing in regions which supported rainforest prior to European settlement, and which were then largely cleared and used for livestock or crop production, but in which these industries have now declined (Erskine *et al*. in press). For example, around 25% of the land area in the Big Scrub region in the subtropics is now occupied by autogenic woody regrowth (Neilan *et al*. 2006). On a study area within the Atherton Tablelands in the tropics, Freeman and Seabrook (2006) recorded significant areas of naturally established rainforest regeneration.

However, there has been much less investigation of the potential of such regrowth to catalyse rainforest regeneration than there has been into the roles of ecological restoration planting or of various forms of timber plantation. One potential drawback is that, especially in the subtropics, autogenic regrowth may initially be dominated by introduced plant species. For example, regrowth forests in the Big Scrub region are dominated by the introduced tree *Cinnamomum camphora* (camphor laurel). Nevertheless, the available information suggests that these forests support a promising level of rainforest-associated biodiversity (at least equivalent to older production plantations of native timber trees in the same region; Catterall *et al* 2004; Kanowski *et al*. 2006a), together with a developing understorey in which the seedlings of mature-phase rainforest trees are well represented (Neilan *et al.* 2006). In the tropics, introduced tree species are less widespread, and the dominant trees in regrowth are those native to local rainforests. However, un-managed regrowth may be delayed or suppressed by aggressive vines and scramblers (both native and introduced), and by fires that spread within tall swards of introduced grasses (Erskine *et al.* in press).

Regrowth forests on formerly cleared land, in which native and introduced plants are both present, and where a sequence of successional development may lead to future forests which are more rainforest-like, have been termed "new forests" (Lugo and Helmer 2004). Carefully targeted management actions may be able to influence the rate and pathway of succession within the new forests, so that a rainforest-like biota develops more rapidly, and unwanted dominance by either introduced species or excessively dominant native species is

reduced (see for example Scanlon 2000). However, further work is needed to develop and trial such approaches, and to document their costs.

4.5 FUTURE ISSUES IN RAINFOREST RESTORATION

If more cost-effective means of reforestation over larger areas were developed, this would not mean that they would replace the need for some ecological replanting. Rather, the focus would be shifted to the question of what is a suitable allocation and placement of different types of reforestation (each with its particular costs and benefits) across the landscape. In large-scale reforestation, it is likely that early biodiversity outcomes may be more modest than within plantings aimed at ecological restoration, and longer developmental times would be involved. A sustainably reforested landscape is likely to contain a rich spatial mosaic of remnant forest, managed and unmanaged regrowth, timber and tree-crop plantations, and cleared land which is used for production or human settlement.

Even though it is clear that ecological restoration plantings give the best short-term, local results for biodiversity, it is difficult to specify reliably what would constitute longer-term or broader-scale "best practice" with regard to either choice of reforestation method, or the way in which different methods might optimally be placed in the landscape. Two factors contribute to this uncertainty (Catterall *et al*. in press). First, there are large gaps in current knowledge about many ecological processes involved in reforestation, which make it difficult to set priorities without making questionable assumptions. Specific, practical questions do not (and may never) have clear or simple answers. Would it be better to allocate funds to create a riparian buffer 10 m wide along 2 km of stream, or one 50 m wide along 0.4 km? Should well-established invasive exotic plants be tolerated and managed as an aid to reforestation or eliminated as unwanted aliens? And so on. Second, the environment is rapidly changing: new species' invasions, climate change (including altered temperature, carbon dioxide and rainfall), and altered fire regimes will make it impossible to forecast the future simply through observation of past pathways and processes of development. Changes to local conditions (e.g. altered water regimes associated with dams, irrigation or drainage works) will also affect the choice of suitable target vegetation on some sites.

Early restoration efforts were focused on devising methods of reinstating diverse rainforest at a local scale, with considerable success, although there needs to be further monitoring and evaluation of development pathways, and of factors affecting biodiversity outcomes. In practice, the NHT1 scheme was focused on getting widespread community involvement in revegetation activities. However, in spite of some individual projects, which showed outstanding local successes, the NHT1 scheme in the Wet Tropics has fallen short of its stated goals (see Chapter 1) of extensive revegetation and biodiversity conservation. This could be due in part to the limitations of current revegetation technology, or to the limited size of the total budget. But its success has also been limited by a lack of mechanisms for integrating scientific knowledge with the government-sponsored community activities.

Large amounts of funding were distributed during the NHT1 scheme to many groups who initially had little idea of the process they were undertaking, and projects were described in terms of vaguely stated revegetation goals. Advice from under-resourced extension sources assisted them, and achieved valuable public education, but such processes do not maximise on-ground ecological outcomes. Reports on the projects' progress and achievements were submitted to the Commonwealth, but there was no mechanism for coordinating or disseminating these reports' contents to regional decision-makers, or to the general public. The Regional Directory project (Chapter 3) was an unusual initiative in seeking to access and compile this information, for the Wet Tropics. However, in doing so it encountered a substantial number of bureaucratic obstacles. The regional basis for implementing the NHT2 scheme provides an opportunity to avoid such obstacles, and allow learning from past experiences to contribute to the development of improved outcomes from revegetation.

To do so effectively will require soundly designed, quantitative and well-documented monitoring of the outcomes of different types of revegetation project. With a few important exceptions, most NHT1-funded reforestation projects in the Wet Tropics were not quantitatively monitored for their biodiversity outcomes. In fact, the criteria for project funding under the NHT1 scheme directly discouraged monitoring, and associated research activities. Across Australia, government policy during the NHT1 scheme viewed research and monitoring activities as an undesirable interference into practical, community-based projects (Lake 2001).

This policy has had two undesirable consequences. First, the reports on project activities do not contain the information, which is needed to assess whether the projects met the environmental goals of the NHT program. Second, the opportunity for gaining knowledge to improve future restoration activities was missed, and considerable funds and resources wasted (see also Chapman and Underwood 2000; Adam 2001; Lake 2001; Lunney *et al*. 2002; Freudenberger and Harvey 2003; Kanowski *et al*. 2006b). In the tropics, FNQ NRM Ltd and the Rainforest CRC are working to avoid repeating this situation by producing a monitoring toolkit for rainforest restoration works. Stage 1 of this toolkit (Kanowski and Catterall 2006; Kanowski *et al.* in press) describes the rationale for monitoring, outlines important considerations for designing monitoring programs and interpreting their results, and provides a proforma and instructions for quantitatively measuring vegetation structure at revegetated sites.

However, monitoring the outcomes of revegetation projects requires more than just a set of methods: it also involves the time and energy of suitably skilled people, as well as continuity of involvement and data custodianship over long periods of time. These requirements severely limit the capacity of most community groups to monitor their own revegetation sites (Freudenberger and Harvey 2003; Freeman 2004; Kanowski *et al*. in press). People who volunteer their efforts to community-focused revegetation groups are generally motivated to 'do something' for the environment. For such people, monitoring activities seem neither as valuable nor as interesting as growing or planting trees. While community groups often contain individuals who have sufficient skill and experience to monitor vegetation structure, they often do not have the time or the inclination to do so.

Recent assessments of this situation have concluded that funding bodies may need to engage professional ecologists to monitor the restoration projects which have been established by community groups (Freudenberger and Harvey 2003; Greening Australia 2003; Freeman 2004). Centralised, stable, and publicly accessible, record keeping is important to allow the fate of projects to be tracked over a time-span of decades. This is well beyond the capacity of most community groups. Even for government agencies and non-government organisations, in cases where central records have been kept at the time of site establishment, turnover and restructuring seems to have frequently resulted in records of past reforestation sites becoming hard to find or access (see examples in Chapter 1). There is an urgent need for mechanisms, which rectify this situation.

A final, but promising, challenge for future reforestation activities in rainforest landscapes goes further than simply monitoring the outcomes of projects. Collaboration between scientific researchers and the broader community is needed to provide the new knowledge that could lead to improvements in "best-practice" reforestation. If different forms of revegetation (e.g. smaller or larger patches, plantings based on pioneer or mature-phase trees, management of regrowth in different ways) are viewed as repeatable experiments across the landscape, and if such areas are established within sponsored revegetation schemes, and if they are quantitatively monitored for biodiversity and other outcomes, and if there is ongoing communication between researchers and other stakeholders, then significant progress will be made towards achieving best-practice restoration.

Figure 4.1: Extensively cleared landscape in which riparian (streamside) rainforest has been recently reinstated using dense ecological restoration plantings (Atherton Tablelands; photograph courtesy of Peter Grimbacher).

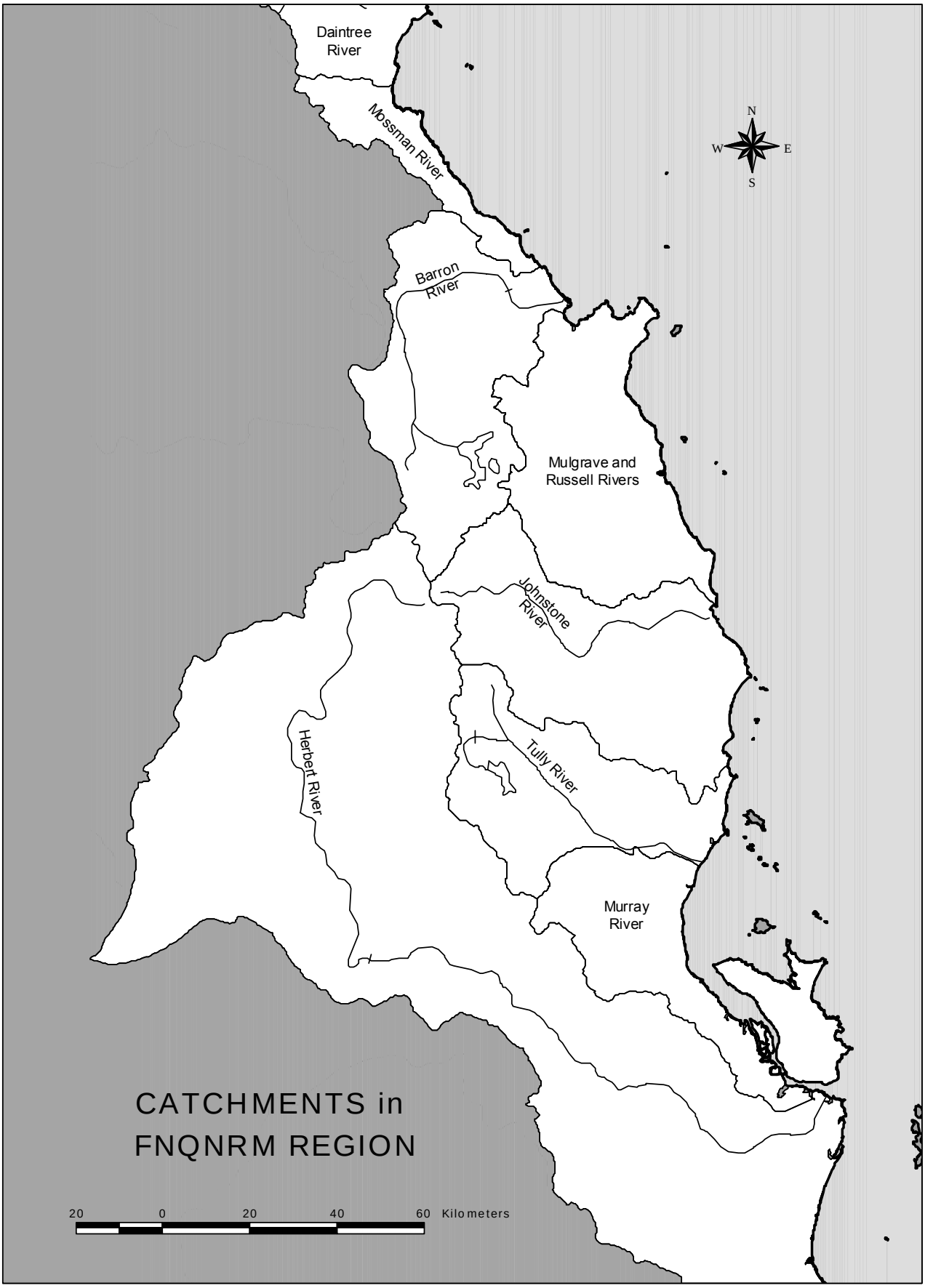
Figure 4.2: Ecological restoration plantings at (*left*) three weeks, and (*right*) eight years (photographs courtesy of John Kanowski and Heather Proctor).

Figure 4.3: Ecological restoration plantings at (*left*) sixteen years, and (*right*) 22 years (photographs courtesy of John Kanowski).

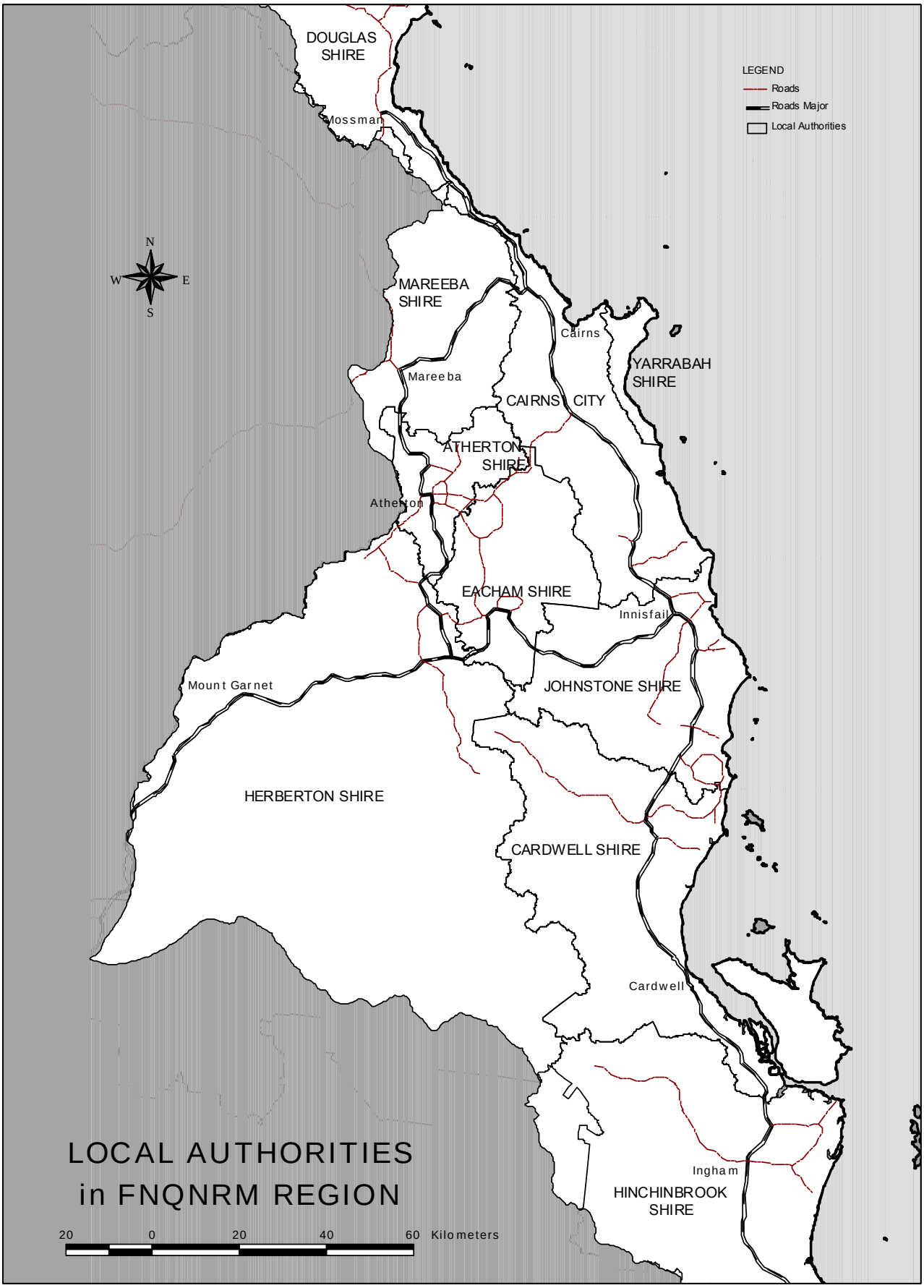
Figure 4.4: Buttressed root of quandong in a sixteen year-old planting (*left*), and (*right*) the Wet Tropics Tree Planting Scheme plantation at Pelican Point after seven years (photographs courtesy of Heather Proctor).

Figure 4.5: Ecological restoration involving community tree-planting by members of TREAT (Trees for the Evelyn and Atherton Tableland) (photograph courtesy of Peter Grimbacher).

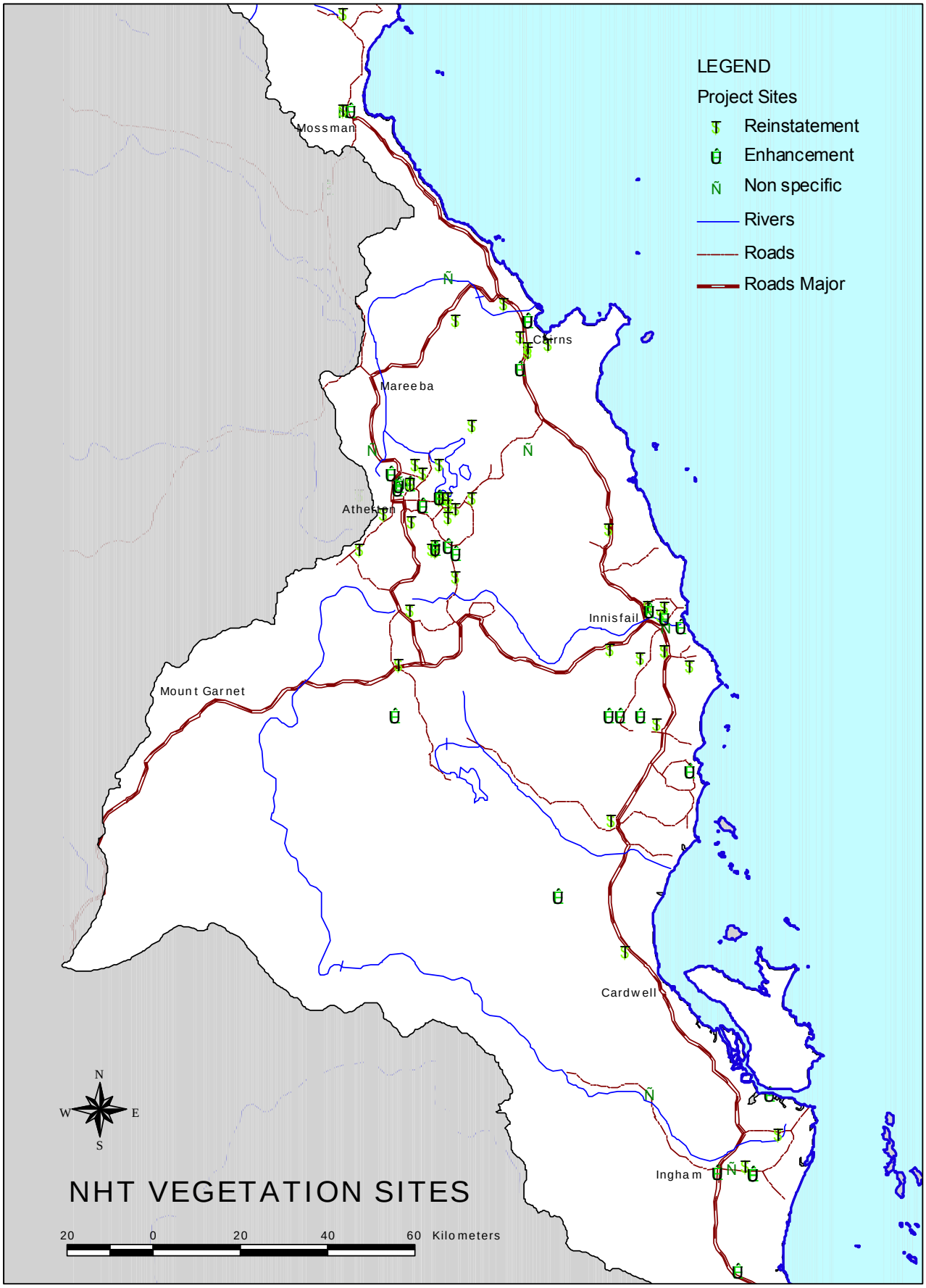
Figure 4.6: Complex vegetation structure within a rainforest remnant (photograph courtesy of John Kanowski).



Map 1: Catchments within the Far North Queensland Natural Resource Management Area.



Map 2: Local Government Areas in the Far North Queensland Natural Resource Management Area.



Map 3: Locations of the eighty-seven Natural Heritage Trust vegetation projects cited.

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APPENDIX 1A

PROFORMA USED FOR REFORESTATION AUDIT: FULL VERSION

Rainforest Rehabilitation and Restoration Project Sites

Site Location			
Site Name			**Site Number:**
***Region – general**	South QLD	North QLD	North NSW
Region – specific	Catchment Name	Local Government Area	
***Precise location**	Address or Map Reference		
Latitude / Longitude	Latitude	Longitude	
Altitude	**Slope**		**Aspect**
Soil type	e.g. colour, texture, depth, drainage, acidity, etc.		
Climatic stresses	i.e. site subject to frost, flood, salt, etc.		
Site Details			
***Type of project**	e.g. vegetation reinstatement, enhancement of existing vegetation, farm forestry, etc.		
***Area (ha)**			
***Dimensions (kms)**	Length	Width	
***Landcover at start**	e.g. Forest, regrowth, cropland, bare ground, grass, etc.		
Pre-European landcover	e.g. What type of vegetation was present initially? Is this known or guess?		
***Year commenced**			
***Area / year staging**	e.g. If project taken place in stages, give details of area or dimensions for each stage and date of each stage.		
***Landscape zone**	e.g. riparian, flood plain, ridge, mid-slope, etc.		
***Waterway details**	e.g. If adjacent to waterway, give width and depth of stream? Is it permanent water?		
***Species mix**	e.g. If native forest, give forest type. If revegetation, give approximate number and type of species?		
***Techniques**	General details on techniques used, i.e. direct seeding, planting of tube stock and density of planting etc.		
Adjacent landcover	What are the surrounding land uses?		
Proximity to other forest areas	Are there large or small forested areas nearby? How far? Are they connected to the site?		

* Asterisked attributes were those for which information was sought as a top priority.

Rainforest Rehabilitation and Restoration Project Sites (cont'd)

Project Strategy	
Main project goals	e.g. Streambank stabilisation, fauna habitat, commercial wood production, etc. Have they changed?
Technical sources or advice	What were the main sources of technical information used in planning or implementing the project?
Source of plants	Were all plants from one source or more? Name of supplier(s)?
Seed stock	Did the plants or seed come from local source? Do you know the origin? If so, where?
***Broader scheme**	Is this project part of a broader scheme? Name or description of scheme
References	Has this project been described within reports or publications? Give references.
Cost of project	Roughly how much money has been spent on the project? Over how many years?
Person hours	Roughly how many in-kind person hours have been spent on project (including volunteers and planning hours)?
Contact Details	
Proponent	e.g. Name of landcare group, landholder, etc.
***Contact person Name**	
Address	
Phone	
Fax	
Email	
Research use	Would it be OK for researchers to visit the site for fauna / flora survey?
Other	Any other information about the site or projects.
Information source	Where did the information come from?
For private property owners: Do you **agree / not agree** (circle as appropriate) for specific information about your property to be made available to others?	

APPENDIX 1B

PROFORMA USED FOR REFORESTATION AUDIT: SHORT VERSION

Site Location		**Site Number**
Site Name		
***Region – general**	South QLD North QLD North NSW	
Region – specific	Catchment Name Local Government Area	
***Precise location**	Address or Map Reference	
Site Details		
***Type of project**	e.g. vegetation reinstatement, enhancement of existing vegetation, farm forestry, etc.	
***Area (approx.)**		
***Dimensions**	Length (approx.) Width (approx.)	
***Year commenced**		
***Area / year staging**	e.g. If project taken place in stages, give details of area or dimensions for each stage and date of each stage.	
***Landscape zone**	e.g. riparian, flood plain, ridge, mid-slope, etc.	
***Species mix**	e.g. If native forest, give forest type. If revegetation, give approximate number and type of species? If unknown, indicate type of species planted and ratio / percentage, e.g. 10% pioneers, 20% acacia, 20% eucalypts, 50% rainforest species, etc.	
***Techniques**	General details on techniques used, i.e. direct seeding, planting of tube stock and density of planting etc.	
Project Strategy		
Main project goals	e.g. Streambank stabilisation, fauna habitat, commercial wood production, etc. Have they changed?	

* Asterisked attributes were those for which information was sought as a top priority.

Reforestation Audit Proforma (cont'd)

Contact Details	
Proponent	e.g. Name of landcare group, landholder, etc.
***Contact person Name**	
Address	
Phone	
Fax	
Email	
Research use	Would it be OK for researchers to visit the site for fauna / flora survey?
Other	Any other information about the site or projects.
Information source	Where did the information come from?
For private property owners: Do you **agree / not agree** (circle as appropriate) for specific information about your property to be made available to others?	
Notes (please note down any diagrams or other information relevant to site)	

APPENDIX 2

PROPONENTS UNDERTAKING REVEGETATION PROJECTS

A. Details of Listed Proponents for Audit Projects in the Tropics and Subtropics 1991-1999.

Type of Proponent	Region		
	WTNQ	**STSEQ**	**STNSW**
Commonwealth Government	Indirect subsidies through CRRP, WTTPS, NHT, Landcare	Department of Defence (Canungra); Indirect subsidies through NHT, Landcare	Indirect subsidies through NHT, Landcare
State Government	Mainly CRRP and CTR / QPWS (mostly in conjunction with private landholders); also QFRI, QDNR	Mostly QDNR Tree Care scheme in conjunction with many individual landholders	NSW NPWS
Local Government	Various councils (mostly through WTTPS), River Improvement Trusts (Douglas, Cardwell)	A few councils (e.g. Caloundra, Caboolture, Pine Rivers, Toowoomba)	Rous, Lismore councils
Business	-	Golf course	Rural enterprise
Community	TREAT, TKMG, Kuranda Envirocare, several State Schools, catchment management groups (e.g. Barron, Herbert, Russell-Mulgrave), several Landcare groups, (east Tinaroo, Cairns, Russell-Mulgrave, Johnstone)	Several Landcare groups (mainly Barung, Noosa and District, Gympie and District), BRAIN, CREEC, WPSQ, Forest Farmers Association of Queensland, one school	Several Landcare groups (mainly Big Scrub, Ridgewood Road), Dunecare groups (Pottsville, Fingal), Greening Australia, others
Private	Various individual landholders, often supported though government schemes (e.g. CRRP, WTTPS)	Various individual landholders, sometimes supported though government schemes or Landcare groups	Various landholders, many affiliated with Big Scrub Landcare and/or SFFA, working independently or engaging private revegetation contractors

B. Proponents of Vegetation Works in the Wet Tropics During NHT1

Category	Organisation
State Government	Centre for Tropical Restoration[1] (11), Queensland Forestry Research Institute (1)
Local Government	Atherton, Cardwell, Douglas, Eacham, Herberton, Hinchinbrook and Johnstone Shire Councils, Douglas Shire River Improvement Trust
Business / Industry	Arcadia Properties Ltd, Porta Brothers Pty Ltd, Queensland Cane Growers, T S & G P Watters Pty Ltd
Other	North Queensland Afforestation Association (see Chapter 1)
Community – Landcare	Atherton Landcare (LC) Group, Cairns Urban LC, Eastern Tinaroo Catchment LC Group, Hinchinbrook LC Group, Johnstone Region LC Group, Silkwood and District Action Group, Malanda and Upper Johnstone Catchment LC Association, North Johnstone and Lake Eacham LC Association, Upper Johnstone Catchment LC Association, Friends of Leslie Creek
Community – Catchment Management Associations	Barron Catchment Group, Barron River CMA, Cardwell Shire CCC, Herbert River Catchment Group, Johnstone River CMA, Russell-Mulgrave CCC
Community – Conservation	Cairns and Far North Environment Centre, Daradgee Environmental Education Centre, Johnstone Ecological Society, Johnstone Shire Community Revegetation Unit, Kuranda Envirocare, Tolga Scrub Community Management Committee, Hinchinbrook Fishcare Group, Tree-Kangaroo and Mammal Group, TREAT[1].
Community – Landowners, School Groups	L R & D K Waters, McLaughlan, Coombes and McDonald, Ravenshoe State School Parent and Citizens Association, School for Field Studies, Centre for Rainforest Studies (CRS), Stratvel State School

[1] CTR was part of the Queensland Parks and Wildlife Service, but also had a strong association with the community group TREAT.

APPENDIX 3A

RESTORATION AUDIT PROJECT GOALS BY AREA AND NUMBER OF PROJECTS

1. Numbers of Projects in Different Size (area in ha) Categories

Region and Type of Project	Size (ha)							
	<1*	**1-5**	**5.1-10**	**10.1-15**	**>15**	**Not Known**	**Total**	**Total >1 ha**
STNSW								
enhancement	2	17	5	3	6	8	41	39
reinstatement	8	7	3	0	2	2	22	14
farm forestry	3	18	5	3	1	0	30	27
mixed	0	2	0	0	1	0	3	3
Total	**13**	**44**	**13**	**6**	**10**	**10**	**96**	**83**
STSEQ								
enhancement	5	18	1	0	4	1	29	24
reinstatement	15	31	5	1	8	7	67	52
farm forestry	6	72	11	1	4	5	99	93
mixed	0	3	1	0	2	0	6	6
Total	**26**	**124**	**18**	**2**	**18**	**13**	**201**	**175**
WTNQ – non-CRRP								
enhancement	2	7	2	1	0	1	13	11
reinstatement	12	65	22	5	7	37	148	136
farm forestry	1	1	0	0	0	1	3	2
mixed	0	2	0	1	1	0	4	4
other	7	3	1	0	1	2	14	7
unknown	0	1	0	0	0	1	2	2
Total	**22**	**79**	**25**	**7**	**9**	**42**	**184**	**162**
WTNQ – CRRP								
farm forestry	0	260	43	13	9	1	326	326
Total	**0**	**260**	**43**	**13**	**9**	**1**	**326**	**326**

* For CRRP, sites <1.0 ha were excluded from the database, for others these represent a very small proportion of sites because the survey targeted projects over 1 ha.

2. Total Target Area (Estimated by Proponent) of Projects in Different Size (area in ha) Categories

Region and Type of Project	Size (ha)							
	<1*	**1-5**	**5.1-10**	**10.1-15**	**>15**	**Not Known**	**Total**	**Total >1 ha**
STNSW								
enhancement	1	48	40	37	396	-	521	520
reinstatement	4	15	23	0	88	-	130	126
farm forestry	1	42	34	37	20	-	135	134
mixed	0	7	0	0	28	-	35	35
Total	**5**	**112**	**97**	**74**	**532**	**-**	**820**	**815**
STSEQ								
enhancement	1	63	12	0	233	-	309	308
reinstatement	8	57	35	11	581	-	691	683
farm forestry	2	147	83	13	94	-	340	338
mixed	0	10	6	0	186	-	202	202
Total	**11**	**277**	**136**	**24**	**1094**	**-**	**1543**	**1532**
WTNQ – non-CRRP								
enhancement	1	16	19	12	0	-	48	47
reinstatement	6	140	155	60	173	-	534	528
farm forestry	1	2	0	0	0	-	3	2
mixed	0	2	0	12	32	-	46	46
other	3	3	6	0	22	-	34	31
unknown	0	5	0	0	0	-	5	5
Total	**12**	**168**	**180**	**84**	**226**	**-**	**669**	**657**
WTNQ – CRRP								
farm forestry	0	609	302	160	227	-	1298	1298
Total	**0**	**609**	**302**	**160**	**227**	**-**	**1298**	**1298**

* For CRRP, sites <1.0 ha were excluded from the database, for others these represent a very small proportion of sites because the survey targeted projects over 1 ha.

APPENDIX 3B

SITES WITH AREA >15 HA: DETAILS

Region and Catchment	Local Government Area	Type of project	Area (ha)	Year Started	Landscape zone	Site Name
STNSW (10 sites)						
Wilsons / Richmond	Byron	Enhancement	21		slope	Andrew Johnston Big Scrub Nature Reserve
Unknown	Unknown	Enhancement	121.5	1993		Peter Finn Refuge
Unknown	Byron	Enhancement	40	1999	riparian	Snow's Gully
Brunswick	Byron	Enhancement	90	1988	coastal	Brunswick Heads Nature Reserve
Richmond	Byron	Enhancement	98	1988	coastal	Broken Head Nature Reserve
Wilsons / Richmond	Lismore	Enhancement	25.7	1993	riparian	Wilsons Nature Reserve
Wilsons / Richmond	Lismore	Reinstatement	30	1989	riparian	Big Scrub Flora Reserve
Cooper's Creek	Byron	Reinstatement	58	1980	riparian	Hall property
Tweed	Tweed	Farm Forestry	20	1994	slopes	Lot 25 Kyogle Road
Tweed	Tweed	Mixed	28	1986	coastal	Fingal Head
STSEQ (18 sites)						
Lockyer Creek	Laidley	Enhancement	60	1992	slope	Berlin Nature Refuge
Mary River		Enhancement	56	1950	riparian	State Forest 989
Mary River		Enhancement	67	1950	riparian	State Forest 1271
	Ipswich	Enhancement	50	1999	ridge	Marburg
Burpengary	Caboolture	Reinstatement	20	1997	flood plain	Greenlink 2001
Murray Darling	Toowoomba	Reinstatement	50	1999	riparian	Gowrie Creek
	Murgon	Reinstatement	150	1990	slope	Bjelke-Peterson Dam
	Caloundra	Reinstatement	20	1993	slope	Whitlam property
	Noosa	Reinstatement	20	1978	slope	Cooroora Park (Thomas)
	Noosa	Reinstatement	24	1970	slope	Thomas property
	Caloundra	Reinstatement	65	1997	slope	Sitemann property
Obi Obi / Mary River	Caloundra / Maroochy	Reinstatement	232	1986	floodplain	Baroon Pocket Dam Planting
Coomera River	Beaudesert and Gold Coast	Reinstatement, Enhancement	136	1990	riparian	Kokoda Barrocks Canungra
	Caloundra	Farm Forestry	20	1977		Thirnbeck property
	Maroochy	Farm Forestry	17	1997	slope	Lindsay; East Farm property

Region and Catchment	Local Government Area	Type of project	Area (ha)	Year Started	Landscape zone	Site Name
	Caboolture	Farm Forestry	37	1999	ridge	Horne property
	West Ipswich	Farm Forestry	20	1997	slope	Barton property
	Caloundra	Mixed	50	1994	riparian	Mulvena property
WTNQ non-CRRP (9 sites)						
Barron	Atherton	Reinstatement	26	1994	riparian	Priors Creek Rehabilitation Proiect
Barron	Mareeba	Reinstatement	15.5	1997	riparian	East Mareeba Barron River
Johnstone	Eacham	Reinstatement	52.26	1993	riparian	Bromfield Swamp
Barron	Cairns City	Reinstatement	25	1992	floodplain	Kamerunga Reach
Russell-Mulgrave	Eacham	Reinstatement	16	1995	riparian	Donaghy's Corridor
Barron	Atherton	Reinstatement	20.23	1991	riparian	Pelican Point
Herbert	Hinchinbrook	Reinstatement	18	1998	unknown	Ingham Tyto Wetlands
Barron	Eacham	Other	21.7		unknown	Gadgarra State Forest
Johnstone	Johnstone	Mixed	31.5	1993	other	Wiles property
WTNQ CRRP (9 sites)						
	Atherton	Farm Forestry	20.31	1995	unknown	A051A
	Herberton	Farm Forestry	36.92	1993	unknown	B018A
	Eacham	Farm Forestry	17.47	1995	unknown	E090A
	Johnstone	Farm Forestry	22.82	1992	unknown	J003A
	Cairns City	Farm Forestry	30.45	1992	unknown	L002 (several stages)
	Mareeba	Farm Forestry	23.72	1992	unknown	M006 (several stages)
Barron	Atherton	Mixed	28	1996	unknown	McAtameny
	Eacham	Mixed	24.41	1995	unknown	E094A
	Herberton	Unknown	22.65	1996	unknown	B038A

APPENDIX 3C

SITES ESTABLISHED BEFORE 1990: DETAILS

Region and Catchment	Local Government Area	Type of project	Area (ha)	Year Started	Landscape zone	Site Name
STNSW (15 sites)						
Wilsons / Richmond	Lismore	Enhancement	11.5	1950	not specified	Rotary Park
Brunswick	Bryon	Enhancement	90	1988	coastal dunes	Brunswick Heads Nature Reserve
Richmond	Bryon	Enhancement	98	1988	coastal dunes	Broken Head Nature Reserve
Wilsons / Richmond	Lismore	Reinstatement	30	1989	riparian	Big Scrub Flora Reserve Reinstatement
Richmond	Ballina	Enhancement	8	1978	upper slope	Victoria Park Nature Reserve
Brunswick	Bryon	Reinstatement	0.8	1984	not specified	Kooyman Property
Richmond	Ballina	Reinstatement	8	1978	mid and upper slope	Victoria Park Nature Reserve
Dam's Creek Doroughby	Lismore	Reinstatement	9	1981	mid-slope	Holy Goat Ranch
Bellinger River	Bellingen	Mixed	3.5	1984	riparian	Bellingen Island
Not given	Maclean	Farm Forestry	2.5	1984	mid-slope	McLean
Wilson River (Boomerang Ck)	Lismore	Farm Forestry	6	1988	riparian	Nightcap Range
Upper Coopers Ck	Bryon	Reinstatement	58	1980	riparian	
Tweed	Tweed	Reinstatement		1986	riparian	Mother Nature's Bush Tucker
Tweed	Tweed	Enhancement		1989	mid-slope	Tree Haven Wildlife Refuge
Tweed	Tweed	Mixed	28	1986	coastal dunes	Fingal Head
STSEQ (23 sites)						
Chingee Ck	Beaudesert	Reinstatement	1.5	1989	slope	Tree Beard
Unknown	Tamborine	Reinstatement	1.5	1989	slope	Tamborine Mountain
Mary	Unknown	Enhancement	56	1950	riparian	State Forest 989
Mary	Unknown	Enhancement	67	1950	riparian	State Forest 1271
Unknown	Noosa	Reinstatement	20	1978	slope	Cooroora Park
Unknown	Noosa	Reinstatement	24	1970	slope	Thomas
Moggill Creek	Beaudesert	Enhancement	8.9	1985	riparian	Spencer's Place
Unknown	Caloundra	Farm Forestry	2	1979		Cooke
Unknown	Maroochy	Farm Forestry	2	1980		Cash
Unknown	Caboolture	Farm Forestry	3.5	1981		Flocke
Unknown	Maroochy	Farm Forestry	2	1977		Goodwin

Region and Catchment	Local Government Area	Type of project	Area (ha)	Year Started	Landscape zone	Site Name
Unknown	Caloundra	Farm Forestry	20	1977		Thirnbeck
Unknown	Caloundra	Farm Forestry	1.5	1983		Gotz
Unknown	Maroochy	Farm Forestry	2	1982		Moron Reeve
Unknown	Caloundra	Farm Forestry	0.75	1987		Maleny High School
Unknown	Caloundra	Farm Forestry	3	1989		Duhig
Unknown	Caboolture	Farm Forestry	4	1989		Morris McKay
Unknown	Caloundra	Farm forestry	3	1984		Cameron
Unknown	Caloundra	Farm forestry	7	1986		Carroll
Mary	Caloundra	Reinstatement	0.8	1988	riparian	Maleny State School
Mary	Unknown	Reinstatement	232	1986	floodplain	Baroon Pocket Dam Planting
Coomera	Beaudesert	Farm Forestry	8	1929	slope	Murphy's Farm
Unknown	Maroochy	Farm Forestry	6.5	1983	slope	Jorg
WTNQ non-CRRP (9)						
Barron	Cairns City	Reinstatement		1989	slope	Redlynch Railway Fire Break
Barron	Eacham	enhancement	2.5	1985	riparian	Thurlings
Russell Mulgrave	Cairns City	Reinstatement		1985	floodplain	Little Mulgrave River
Russell Mulgrave	Johnstone	Reinstatement		1984	riparian	Eubenangee Swamp
Johnstone	Johnstone	Reinstatement	2	1988	riparian	Fishers Creeks B
Russell Mulgrave	Eacham	Reinstatement		1988	other	Lake Barrine National Park (Road Side)
Barron	Atherton	Enhancement	0.6	1985	riparian	Tom Cowie and George Jackson Memorial Rainforest Plot
Johnstone	Johnstone	Mixed	1.5	1988	slope	Gurrmba
Barron	Eacham	Mixed	1	1982	slope	McLeash Road

APPENDIX 4

REFORESTATION AUDIT: NUMBERS OF PROJECTS AND REVEGETATION AREA BY LANDSCAPE ZONE

(Landscape zone was not recorded for CRRP projects).

Landscape zone	STNSW		STSEQ		WTNQ – non CRRP	
	No.	Percentage*	No.	Percentage*	No.	Percentage*
All Project Types:						
Riparian	26	44	49	33	99	73
Floodplain	0	0	10	7	5	4
Slopes	29	48	79	53	12	9
Coastal	5	8	0	0	3	3
Other	0	0	10	7	14	11
Total	60	100	148	100	133	100
Unknown	36		53		51	
All sites	96		201		184	
Farm forestry projects:						
Riparian	4	22	7	12	0	0
Floodplain	0	0	5	8	0	0
Slopes	14	78	44	73	1	33
Coastal	0	0	0	0	0	0
Other	0	0	4	7	2	67
Total	18	100	60	100	3	100
Unknown	12		39		0	
All sites	30		99		3	
Reinstatement projects:						
Riparian	9	64	24	43	89	80
Floodplain	0	0	5	9	5	4
Slopes	5	36	26	46	8	7
Coastal	0	0	0	0	2	2
Other	0	0	1	2	8	7
Total	4	100	56	100	112	100
Unknown	8		11		36	
All sites	22		67		148	

* Percentage of projects of known landscape zone.

APPENDIX 5

WET TROPICS REGIONAL DIRECTORY WEB SEARCH PAGE OPERATION

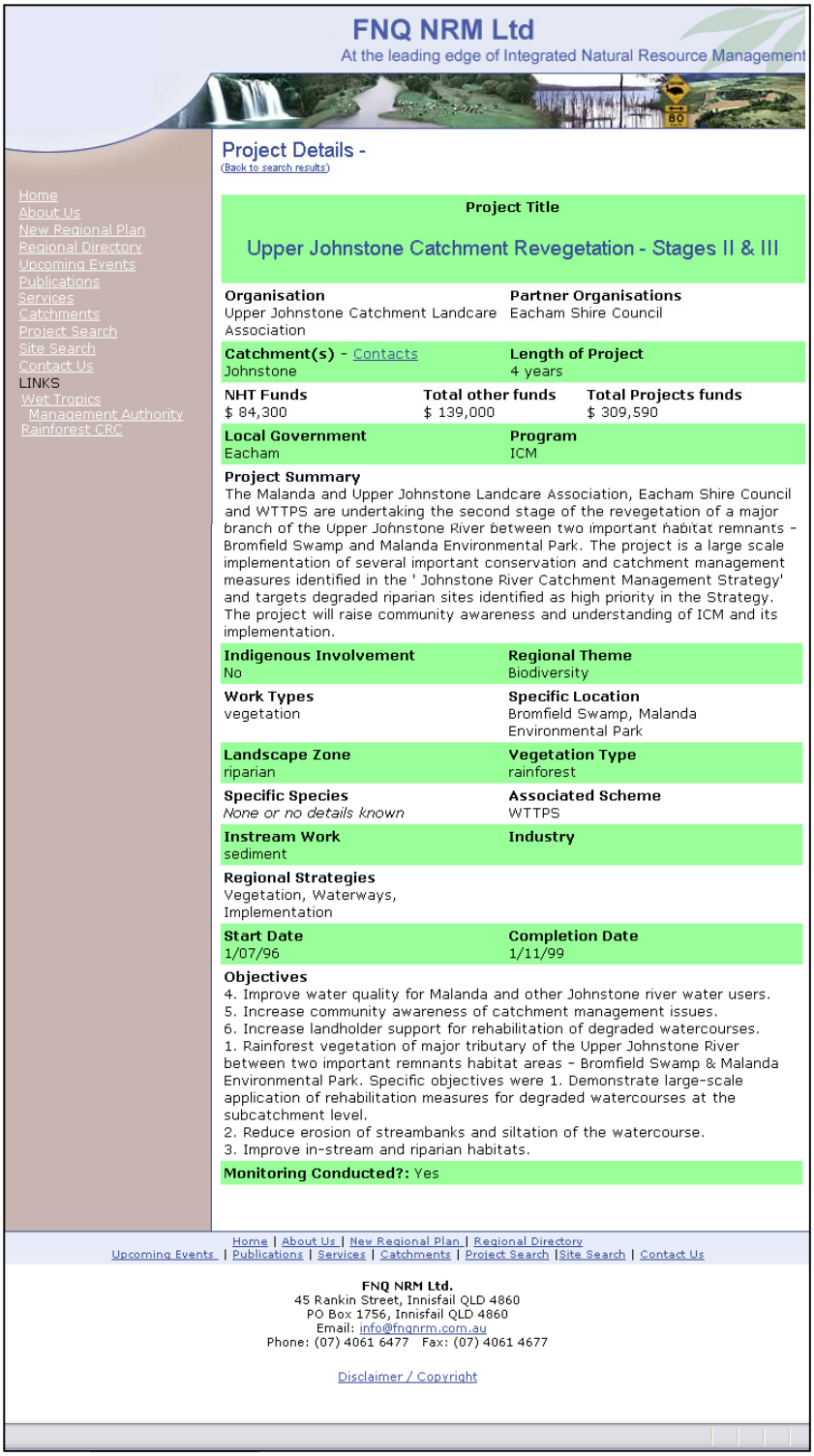
A. List of Drop-down Menus

Catchments	Local Government Area	Project Activities	Year of Work	Landscape Zone	Instream Work	Associated Industries
All	All	All	All	All	All	All
Barron	Atherton	Community Support	1992	Coastal	Drainage	Agriculture
Daintree	Cairns	Farm Forestry	1993	Floodplain	Erosion	Fisheries
Endeavour	Cardwell	Landscape Management	1994		Flood mitigation	Forestry
Gulf Headwaters	Cook	Land stabilisation	1995	Riparian	Sediment	Mining
Herbert	Douglas	River Improvement	1996	Wetland	Stabilisation	Other
Johnstone	Eacham	Threatened Species	1997		Water quality	
Mossman	Herberton	Vegetation	1998			
Mulgrave	Hinchinbrook	Waterway	1999			
Russell	Johnstone		2000			
Trinity Inlet	Mareeba		2001			
Tully			2002			
Murray						

B. Example of a Search

Step 1:
Search for vegetation projects within Johnstone Shire.

Step 2:
Selection of a particular project.



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Project Details -

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Wet Tropics Management Authority
Rainforest CRC

Project Title

Upper Johnstone Catchment Revegetation - Stages II & III

Organisation
Upper Johnstone Catchment Landcare Association

Partner Organisations
Eacham Shire Council

Catchment(s) - Contacts
Johnstone

Length of Project
4 years

NHT Funds
$ 84,300

Total other funds
$ 139,000

Total Projects funds
$ 309,590

Local Government
Eacham

Program
ICM

Project Summary
The Malanda and Upper Johnstone Landcare Association, Eacham Shire Council and WTTPS are undertaking the second stage of the revegetation of a major branch of the Upper Johnstone River between two important habitat remnants - Bromfield Swamp and Malanda Environmental Park. The project is a large scale implementation of several important conservation and catchment management measures identified in the ' Johnstone River Catchment Management Strategy' and targets degraded riparian sites identified as high priority in the Strategy. The project will raise community awareness and understanding of ICM and its implementation.

Indigenous Involvement
No

Regional Theme
Biodiversity

Work Types
vegetation

Specific Location
Bromfield Swamp, Malanda Environmental Park

Landscape Zone
riparian

Vegetation Type
rainforest

Specific Species
None or no details known

Associated Scheme
WTTPS

Instream Work
sediment

Industry

Regional Strategies
Vegetation, Waterways, Implementation

Start Date
1/07/96

Completion Date
1/11/99

Objectives
4. Improve water quality for Malanda and other Johnstone river water users.
5. Increase community awareness of catchment management issues.
6. Increase landholder support for rehabilitation of degraded watercourses.
1. Rainforest vegetation of major tributary of the Upper Johnstone River between two important remnants habitat areas - Bromfield Swamp & Malanda Environmental Park. Specific objectives were 1. Demonstrate large-scale application of rehabilitation measures for degraded watercourses at the subcatchment level.
2. Reduce erosion of streambanks and siltation of the watercourse.
3. Improve in-stream and riparian habitats.

Monitoring Conducted?: Yes

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Step 3:
Obtaining further information on the selected project.

APPENDIX 6

WET TROPICS REGIONAL DIRECTORY DATABASE STRUCTURE AND COMPONENTS

Structure of the WTRD Database (core and satellites data tables and fields within each). The nature of each field is described in brackets next to the field name. Possible multiple listings of field types are indicated by "up to #". "One of #" indicates selection of one option is possible. Shaded cells are those most relevant to later summaries of revegetation activities, and are further explained in Appendix 7.

A. Core Data Tables

Projects	Description
Information sources	Text
Locator	Number
Project completed	Number – One of 5
Main goal	Text – One of 6
Grant type	Text – One of 7
Project type	Text
Subproject	Text – One of 3
Parent project number	Number
Parent project (yes / no)	Text – Yes / No
Start year	Text
Funding round	Number
NHT Number	Text
Related project	Text
Org classification	Text – One of 12
Organisation	Text
Project title	Text
Program	Text – One of 12
Partner organisations	Text
Sub-catchment	Text
General catchment	Text – One of 10
Region	Text – One of 3
Local government	Text – One of 11

Project Details	Description
Locator	Number
Latitude	Text
Longitude	Text
Map information	Text
Grid reference	Text
Site location notes	Text
Start date	Text
Completion date	Text
Project summary	Text
Project outputs	Text – Up to 10
Application type	Text
Indigenous	Text – Yes / No
NHT region	Text
Key words	Text
Regional theme	Text – One of 3
Work types	Text – Up to 8
Specific location	Text
Landscape zone	Text – One of 3
Vegetation type	Text – One of 10
Specific species	Text
Associated scheme	Text – One of 2
Instream	Text – One of 5
Industry	Text – One of 5
Other	Text – One of 12
Monitoring	Text
Regional strategy program	Text – Up to 8
Regional strategies, Number	Text
Objectives change	Text – Yes / No
Alteration to original application	Text

Financial Information	Description
Contributor	Text
Locator	Number
Type of funding	Text – Up to 17
Funds sought	Number
Total project (all funds) sought	Number
#Yrs funding sought	Number
Total matching funds sought	Number
# Yrs other funds sought	Number
Funds approved	Number
# Of years funded to date	Number
Funds unspent	Number
Funds spent	Number
Funds discrepancy	Text
Actual start date	Date / Time
Actual completion date	Date / Time

Objectives and Achievements	Description
Locator	Number
Objective number	Text
Objective	Text
Achievements	Text
Assessment	Text
Challenges and difficulties	Text
C and D keywords	Text – Up to 8
Challenge description	Text

Contact Details	Description
Locator	Number
Title	Text
First name	Text
Surname	Text
Organisation	Text
Address	Text
Town	Text
Postcode	Text
Base catchment	Text
Telephone	Text
Fax	Text
Email	Text
Consent	Text
Telephone 2	Number

Future Issues	Description
Locator	Number
Actual start date	Date / Time
Actual completion date	Date / Time
Future actions	Text
Further issues	Text
NHT client feedback	Text
Data entry notes	Text

B. Satellite Tables

Vegetation	Description
Locator	Number
Onground activity	Text - One of 4
Year of work	Text
Map reference	Text
Project notes	Text
Location description	Text
Audit notes	Text
Final vegetation area (ha)	Number
Target vegetation area (ha)	Number
Remnant protection (ha)	Number
Remnant protection target (ha)	Number
Enhancement (ha)	Number
Enhancement (ha) target	Number
Reinstatement (ha)	Number
Reinstatement (ha) target	Number
Total # planted trees	Number
Target # trees	Number
Established direct seeding lines (km)	Number
Target direct seeding lines (km)	Number
Length of protected fencing established (km)	Number
Target protected fencing (km)	Number
Established voluntary agreements (ha)	Number
Target voluntary agreements (ha)	Number
Enhancement area established	Number
Target enhancement area (ha)	Number
Other on ground outputs	Text
Original vegetation type	Text
Nearest remnants	Text
Distant to remnant (km)	Text
Remnants area (ha)	Text
Techniques to be used	Text
Technical advice	Text

Waterway	Description
Locator	Number
Waterway protected by fencing achieved (km)	Number
Target waterway protected by fencing (km)	Number
Length of fenced waterway revegetated (km)	Number
Target length of fenced waterway revegetated	Number
Downstream benefits of waterway physical works	Number
Target downstream benefits of waterway physical works	Number
Instream benefits of waterway physical works	Number
Target instream benefits of waterway physical works	Number
Environmental flow benefits	Number
Environmental flow benefits target	Number
Native fish restocking # of fingerlings	Number
Native fish restocking target # of fingerlings	Text
Area specific native fish fingerlings	Text
Target area specific native fish fingerlings	Text
Other beneficial waterway activities	Text
Type of pollution control	Text
Pollution sources	Text
Current levels	Text
Target levels	Text
% Improvement	Text

Weeds and pests	Description
Locator	Number
Achieved area (ha) of effective weed control	Number
Est. area (ha) of effective weed control	Number
Achieved area (ha) of vertebrate control	Number
Est area (ha) of vertebrate control	Number
Other	Text
Other types of control	Text

Farm Forestry	Description
Locator	Number
Wood production target area of native species	Number
Wood production area achieved for native species	Number
Target area of native species for non wood production	Number
Area of native species for non wood production	Number
Target exotic spp for wood production	Number
Exotic spp for wood production	Number
Target area native forest for production	Number
Area native forest for production	Number
Target # of landholders to participate	Number
# Of landholders who participated	Number

Erosion	Description
Name	Type
Locator	Number
By target revegetation (ha)	Number
By revegetation (ha)	Number
Target grazing control	Number
Grazing control (ha)	Number
Target by cropping tech	Number
Cropping technologies (ha)	Number
Target gully erosion	Number
Gully erosion control (ha)	Number
Other (ha)	Text

Pollution	Description
Locator	Number
Pollution Control Type	Text
Pollution Sources	Text
Current Levels	Text
Target Levels	Text
% Improvement	Text

Monitoring	Description
Locator	Number
Subject	Text - One of 9
Monitoring type	Text
Monitoring program description	Text
Location of monitoring	Text
Map information	Text
Monitoring frequency	Text
Comments	Text

Project documents	Description
Locator	Number
Author	Text
Date	Text
Publisher	Text
Organisation	Text
Project title	Text
Resource classification	Text- One of 5
Resource type	Text - One of 8
Keywords	Text
Title	Text
Subtitle	Text
Location	Text
Description	Text
Research activities	Text
Regional theme	Text - Up to 3
Regional strategies	Text - Up to 8

Community Outcomes	Description
Locator	Number
Type of output	Text
Subject	Text
Description	Text

APPENDIX 7A

WET TROPICS REGIONAL DIRECTORY DATA FIELDS AND DEFINITIONS FOR VEGETATION-RELATED ACTIVITIES

Numbered fields contain keywords which are defined in Appendix 7B.

Data Table	Field Names	Field Descriptors
Projects	Main Goal (1)	Community Support, Landscape Management, Vegetation, River Improvement, Threatened Species, Miscellaneous
	Catchment	Any of the seven River Catchments, e.g. Barron
	Local Government	Any of the ten Local Government Areas, e.g. Cardwell
	Program	Landcare, Bushcare, Rivercare, Coastcare, ICM, Farm Forestry, Fisheries Action, Clean Seas, Weeds, Endangered Species Program, National Reserve System
	Region (2)	North, South or Tablelands
	Grant Type (3)	NHT1 project, NHT Regional, NHT2 project, WTTPS, WHAadj, Envirofund, Other
Project details	Latitude	Latitude of project
	Longitude	Longitude of project
	Work Types (4)	Vegetation, Land Stabilisation, River Improvement, Pest and Weed Management, Community Support, Landscape Management, Farm Forestry, Threatened Species
	Landscape Zone	Riparian, coastal or wetlands
	Vegetation Type (5)	Coastal, dry land forest, floodplain, foreshore, forest, Mabi, Melaleuca forests, rainforest, rainforest Type 1b, rainforest Type 3a, rainforest Type 5b, riparian, wetlands
	Associated Scheme	CRRP, WTTPS
Financial information	Type of Funding (6)	Total Funding, Proponent Funding, NHT Funding*, Catchment Management Associations, Community, Government, Industry, Local Council, Other Organisations
	Funds Spent	Value of funds (cash and/or inkind)
	Funds Approved	Value of Funds (cash and/or inkind)
Objectives and achievements	Challenges and difficulties Keywords (7)	Biological constraints, Climatic conditions, Communication, Community attitudes, Economic issues, Equipment, Information issues, Legislation, Logistic issues, Pest species, Physical constraints, Training
Vegetation	Onground Activity (8)	Reinstatement, Enhancement, Protection, Non-specific
	Final vegetation area	Total project area (ha)
	Area of remnant protected	Area of protection (ha), e.g. conservation agreements
	Achieved area of remnant rehabilitated	Area of enhancement works (ha)
	Achieved revegetation of cleared land	Area of vegetation reinstatement on cleared lands (ha)
	Length of protected fencing established	Length of fencing erected (km)
	Number of voluntary land agreements	Number
	Nearest remnants	Descriptions of nearest remnant vegetation and technical advice gained
	Technical advice	Technical advice, e.g. revegetation methods

APPENDIX 7B

DEFINITIONS OF KEYWORDS FOR VEGETATION-RELATED ACTIVITIES

Numbered fields correspond with numbered field names in Appendix 7A.

1. Main Goal ("Projects" table)

Community Support	Project provides support to the community by coordinating projects, providing information and advice, or creating financial arrangements that sustain environmental values
Landscape Management	Project facilitates the development of landscape management practices or tools, e.g. development of plans, best management practices, collation of strategic data, rate deferral schemes.
Vegetation	Project goal is to undertake work aimed at improving the quantity and quality of vegetation cover, including revegetation and repair of remnant vegetation.
River Improvement	Primary goal is to improve the waterway environment/s through various techniques eg rock works, stabilisation of riverbanks, flood mitigation, water treatments, and wetland construction.
Threatened Species	Project's primary goal is the enhancement and protection of threatened species and/or their habitat.
Miscellaneous	Projects that do not meet other project definitions or are a mixture of several project goals.

2. Regions ("Projects" table)

Tablelands	Projects located in Mareeba, Eacham and Atherton LGAs or the upper catchments of the Barron, Johnstone or Herbert Rivers.
North	Lowlands Projects located north of the Johnstone River to Bloomfield River.
South	Lowlands Projects located between the Johnstone River and Crystal Creek in the south.

3. Grant Type ("Projects" table)

NHT1 project	Projects funded by NHT up to 2001.
NHT2 project	Projects funded by NHT after 2002.
WTTPS	Projects undertaken by WTTPS before 1997.
WHAadj	Projects funded by the World Heritage Adjustment Funding, pre 1997.
Envirofund	Projects funded under Envirofund 2001 onwards.
Other	Projects funded from other sources such as industry.

4. Work Types ("Project Details" table)

Vegetation	Works to reinstate, rehabilitate or protect vegetation (other than farm forestry).
Land Stablisation	Work undertaking erosion control such as gully works, vegetation works, grazing control, and stabilisation of coastal dune systems.
River Improvement	Project undertakes to improve the waterway environment/s through various techniques, e.g. rock works, stablisation of riverbanks, flood mitigation, water treatments, wetland construction.
Pest and Weed Management	Projects focusing on management of pest and weed species.
Community Support	Provision of support to the general community by coordination of projects, provision of information and advice, or instigate financial arrangements.
Landscape Management	Project facilitates the development of landscape management practices or tools, e.g. development of plans, best management practices, collation of strategic data.
Farm Forestry	Work associated with farm forestry (wood production) or techniques.
Threatened Species	Project undertakes work to enhance and protect threatened species and/or their habitat.

5. Vegetation Types ("Project Details" table)

Coastal	Vegetation within the coastal zone.
Dry land forest	Works undertaken in wood land or sclerophyll forest.
Floodplain	Works undertaken in floodplain vegetation – no specific species identified.
Foreshore	Projects undertaken on the foreshore.
Forest	Projects undertaken in non-specified forest types.
Mabi	Projects undertaken in Mabi forest type (= 5b of Webb and Tracey).
Melaleuca forests	Projects undertaken in Melaleuca forest types.
Rainforest	Projects undertaken in non-specified rainforest types.
Rainforest Type 1b	Projects undertaken in rainforest Type 1b of Webb and Tracey.
Rainforest Type 3a	Projects undertaken in rainforest Type 3a of Webb and Tracey.
Rainforest Type 5b	Projects undertaken in rainforest Type 5b of Webb and Tracey (= Mabi).
Riparian	Projects undertaken in riparian vegetation, no specific species noted.
Wetlands	Projects undertaken in non-specified wetland habitats.

6. Types of Funding ("Financial Information" table)

Total funding	Total project funding from all sources – cash and in-kind.
Proponent funding	Funds provided by applicant, regardless of organisation type.
NHT funding	Funding sought and received from NHT.
Catchment Management Associations	ICMs, CMAs, Catchment Co-ordinating Boards, River Trusts, NRM Board, BRICMA
Community	Community Groups, Schools, Fishcare, Environment Groups
Government	State and Federal Government Departments and Agencies, e.g. DPI, QPWS, WTMA, EA, CTR, QFRI
Industry	Canegrower Groups, Businesses, BSES
Local Council	All local councils, e.g. Cairns City, Atherton, WTTPS
Other	e.g. NQAA

7. Challenges and Difficulties ("Objectives and Achievements" table)

Biological constraints	Nutrient limitations.
Climatic conditions	Flooding, frosts, drought.
Communication	Lack of communication between governing bodies, interested parties, etc.
Community attitudes	Resistance to new techniques.
Economic issues	Financial constraints to implementing practices or limiting community participation in activities or implementing techniques.
Equipment	Equipment malfunctions, lack of equipment.
Information issues	Lack of information, inability to access information.
Legislation	Legislation restricting / encouraging activities.
Logistic issues	Groups / Council conflicting over equipment use, timing funding.
Pest species	Pest species damaging plantings or reducing outcomes.
Physical constraints	Steep slopes, compacted soil.
Training	Lack of training.

8. Onground Activity ("Vegetation" table)

Vegetation reinstatement	Primary focus is revegetation work undertaken on cleared land to re-establish native vegetation.
Vegetation enhancement	Primary focus is to repair an area of remnant vegetation. This may include maintenance such as weed control and/or revegetation work in, around or adjacent to remnant vegetation.
Vegetation protection	Primary focus is protection of existing unreserved vegetation, e.g. through vegetation conservation agreements.
Vegetation non-specific	Vegetation work undertaken with no specified goal stated, or where goals are clearly mixed, e.g. combinations of erosion control, reinstatement, water quality, farm forestry.

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APPENDIX 8

CHARACTERISTICS OF INDIVIDUAL PROJECTS WHOSE MAIN GOAL INVOLVED VEGETATION WORKS

Grant Type: Proj: NHT Project; Reg: NHT Regional Project. **Program:** BC: Bushcare; LC: Landcare; RC: Rivercare; FA: Fisheries Action; ICM: Integrated Catchment Management. **Ongr Act:** Onground Activities: rein: reinstatement; enhan: enhancement; ns: non specific. **Protect (ha):** Area of remnant protected (ha). **Enhance (ha):** Area of vegetation enhanced (ha). **Rein (ha):** Area of vegetation reinstated (ha). **Total (ha):** Total project area (ha). **L/zone:** Landscape Zone: rip: riparian; wet: wetlands; slop: slope. **LGA:** Local Government Area: Ath: Atherton; Card: Cardwell; Cns: Cairns; Each: Eacham; Doug: Douglas; Mar: Mareeba; John: Johnstone; Herb: Herberton; Hinch: Hinchinbrook. **Catch:** Catchment: All: All Catchments; Barr: Barron; DaMo: Daintree Mossman; Herb: Herbert; John: Johnstone; RuMu: Russell Mulgrave; TI: Trinity Inlet; TuMu; Tully Murray. **Region:** N: North; S: South; TBL: Tablelands; WT: Wet Tropics. **NHT $K:** NHT Funds (1000's$). **Other $K:** Other Funding (1000's$). **Total $K:** Total Funds (1000's$). **$K/ha NHT:** NHT $K/ Total (ha). **$K/ha Other:** Other $K/ Total (ha). **$K/ha Total:** Total $K/ Total (ha).

Locator No.	Grant type	Prog	Ongr Act	Protect (ha)	Enhance (ha)	Reinst (ha)	Total (ha)	L/ Zone	Year	LGA	Catch-ment	Region	NHT $K	Other $K	Total $K	$K/ha NHT	$K/ha Other	$K/ha Total	Project Title (abbreviated)
1	Proj	BC	rein	0	0	2	2	rip	2000	Each	Barr	TBL	21	23	44	10.5	11.4	22.0	Peterson Ck Corridor Consolidation
3	Proj	BC	rein	0	0	4	4	rip	2001	John	John	S	30	55	85	7.5	13.7	21.2	Johnstone Community Wetland Rehabilitation Program
4	Proj	RC	rein	0	0	1	1	rip	2000	John	John	S	19	32	51	19.0	31.5	50.9	Restoring the Riparian and Aquatic Habitats along Sweeney Creek
11	Proj	BC	rein	0	0	76.2	76.2		2000	All	All	All	840	4529	5369	11.0	59.4	70.5	WT Vegetation and Biodiversity Management Program (aka WTTPS)
14	Proj	BC	rein	0.7	0.5	1.8	3	rip	2000	Ath	Barr	TBL	33	32	65	11.0	10.6	21.8	Strategic Revegetation of Mazlin Creek
15	Proj	RC	ns	1	5	4	10	wet	2001	Hinch	Her	S	50	60	110	5.0	6.0	11.0	Palm Creek Rejuvenation (Stage 2)
16	Proj	RC	rein	0	2	6	8	rip	2001	Cns	Barr	N	89	158	246	11.1	19.7	30.8	Rehabilitation of Freshwater Creek, Kamerunga and Lake Placid Sections
18	Proj	LC	rein	0	0	5	5		1997	Herb	Her	TBL	67	141	208	13.4	28.2	41.6	Management of Major Sediment Sources – Herbert Catchment
20	Proj	ICM	rein	0	0	20	20	rip	1996	Each	John	TBL	76	127	203	3.8	6.3	10.1	Upper Johnstone Catchment Revegetation – Stages 2 and 3
22	Proj	BC	enha	82	0	18	100	wet	1998	Hinch	Her	S	112	58	170	1.1	0.6	1.7	Ingham Tyto Wetlands
23	Proj	RC	rein	0	0	0.5	0.5	rip	1998	Ath	Barr	TBL	4	7	11	8.0	13.2	22.0	Carrington Falls Creek Rehabilitation Project
24	Proj	BC	enha	4	1	1	6		1997	Ath	Barr	TBL	42	77	119	7.0	12.8	19.9	Tolga Scrub Rehabilitation Project
25	Proj	BC	rein	0	0	5	5	rip	1998	Ath	Barr	TBL	63	62	126	12.6	12.5	25.1	Peterson Creek Revegetation Project
27	Proj	BC	rein	0	0	6	6	rip	1997	Each	Barr	TBL	41	36	77	6.8	6.0	12.9	The Lakes Corridor Project
28	Proj	BC	rein	0	0	0.5	0.5	rip	1998	Cns	TI	N	10	10	20	20.0	20.2	40.0	Rehabilitation of Crowley Creek
32	Proj	BC	enha	0	2.2	0	2.2	rip	1997	John	John	S	20	71	91	9.1	32.2	41.3	Walter Hill Rangers Corridor Rehabilitation
34	Proj	BC	enha	0	3	4	7	rip	1999	Ath	Barr	TBL	59	78	137	8.4	11.2	19.6	Mazlin Creek Rehabilitation Project

Locator No.	Grant type	Prog	Ongr Act	Protect (ha)	Enhance (ha)	Reinst (ha)	Total (ha)	L/ Zone	Year	LGA	Catch-ment	Region	NHT $K	Other $K	Total $K	$K/ha NHT	$K/ha Other	$K/ha Total	Project Title (abbreviated)
36	Proj	BC	rein	0	0	0.6	0.6	rip	1998	Cns	TI	N	9	12	21	15.0	20.5	35.5	Cairns Urban Creeks Rehabilitation Project
38	Proj	BC	rein	0	0	1	1	rip	1997	John	John	TBL	16	59	75	16.0	58.7	74.7	Massey Creek Corridor Rehabilitation
40	Proj	FA	rein	0	0	0.5	0.5	rip	1999	Hinch	Her	S	8	13	21	16.0	26.0	42.7	Palm Creek Regeneration Project – Stages 1 and 2
41	Proj	BC	rein	0	40	358.7	398.7	rip	1997	All	All	All	3600	3631	7231	9.0	9.1	18.1	WT Vegetation Management Program (aka WTTPS)
52	Proj	LC	rein	0	0	6	6		1995	John	John	S	12	18	30	2.0	3.0	5.0	Rehabilitation of Degraded Areas Through Direct Seeding
53	Proj	LC	enha	3	4	3	10	rip	1995	Ath	Barr	TBL	28	36	64	2.8	3.6	6.4	Priors Creek Revegetation Project (Continuing)
56	Proj	BC	ns	1850	100	50	2000		1998	Mar	Barr	TBL	195	150	345	0.1	0.1	0.2	Kuranda Environmental World Heritage Corridor
60	Proj	BC	rein	0	0	4.5	4.5	rip	1998	Ath	Barr	TBL	23	33	57	5.1	7.4	12.6	Lower Peterson Creek Revegetation Project
62	Proj	BC	rein	0	0	16	16	rip	1998	Each	John	S	379	614	993	23.7	38.3	62.0	Walter Hill Ranges Rehabilitation Project
64	Proj	BC	enha	0	8	0	8	wet	1999	Cns	TI	N	22	34	55	2.8	4.2	6.9	Revegetation and Rehabilitation of Cairns Central Swamp
73	Proj	BC	ns	0	5	0	5		1999	Ath	Barr	TBL	182	276	458	36.4	55.2	91.6	Rehabilitation of Threatened Type 5b Forest Remnants
80	Proj	BC	ns	0.5	5	0	5.5	wet	1999	Hinch	Her	S	50	25	75	9.1	4.5	13.6	Palm Creek Rejuvenation Ingham
83	Proj	BC	ns	55	1	1.5	57.5	rip	1999	Doug	DaMo	N	52	115	167	0.9	2.0	2.9	Conservation Works on Rural Lands
85	Proj	BC	enha	0	3	3	6	rip	1999	John	John	S	55	88	143	9.2	14.7	23.9	Upper Liverpool Creek Rehabilitation Project
88	Proj	BC	ns	0.7	0.5	0.3	1.5	rip	2000	Ath	Barr	TBL	3	20	23	2.0	13.2	15.1	Rehabilitation Process for Barney Springs
92	Proj	BC	enha	0	3	4.5	7.5	rip	1999	Cns	TI	N	73	78	150	9.7	10.3	20.0	Cairns Urban Creeks – Trinity Inlet section
93	Proj	RC	enha	25	0	4	29	wet	1999	Hinch	Her	S	135	197	331	4.7	6.8	11.4	Lagoon Creek Catchment Rehabilitation and Best Management Practices
94	Proj	RC	rein	0	0	10	10	rip	1999	Each	John	TBL	88	65	152	8.8	6.5	15.2	Upper Johnstone – MUJCLA Support Component
96	Proj	BC	ns	5	4	0	9	rip	1999	John	John	S	26	77	102	2.9	8.5	11.4	Johnstone Community Vegetation Initiative
97	Proj	BC	rein	0	1	5	6	wet	1999	John	John	S	41	97	138	6.8	16.2	23.0	Bulguru Swamp Wetland Rehabilitation
98	Proj	BC	rein	0	2	3	5	rip	1999	John	John	S	17	77	94	3.4	15.4	18.8	Moresby Catchment Rehabilitation Stage 2
99	Proj	BC	rein	0	2	2	4	rip	1999	John	John	S	14	49	63	3.5	12.3	15.8	Flying Fish Point Revegetation Project
100	Proj	BC	enha	25	2	5	32		1999	Ath	Barr	TBL	23	35	57	0.7	1.1	1.8	Tolga Scrub Rehabilitation Project – Phase 2
101	Proj	LC	rein	0	0	10	10	rip	1999	Each	John	TBL	67	97	164	6.7	9.7	16.4	Upper Johnstone Revegetation Project Stage 3
102	Proj	BC	rein	0	0	2	2	rip	2000	Each	Barr	TBL	12	13	25	6.0	6.5	12.6	Stewart's Gully Riparian Rehabilitation Project
104	Proj	BC	rein	0	0	1	1	rip	2000	Card	TuMu	S	4	3	7	4.0	3.3	6.9	Revegetation of Kennedy and Meunga Creek for water quality improvement
105	Proj	BC	rein	0	0	1	1	rip	2000	John	John	S	11	11	22	11.0	10.9	21.7	Strategic Revegetation of Lower North Johnstone River
117	Proj	BC	ns	3	0	2	5		2002	Doug	DaMo	N	14	24	38	2.8	4.7	7.5	Conservation Grants for Rural Lands (Stage 2)

Locator No.	Grant type	Prog	Ongr Act	Protect (ha)	Enhance (ha)	Reinst (ha)	Total (ha)	L/ Zone	Year	LGA	Catch-ment	Region	NHT $K	Other $K	Total $K	$K/ha NHT	$K/ha Other	$K/ha Total	Project Title (abbreviated)
119	Proj	BC	enha	0	1.5	0	1.5	rip	2001	Ath	Barr	TBL	18	27	45	12.0	17.9	30.2	Upper Barron Revegetation Project
120	Proj	BC	rein	0	0	5	5		2001	Card	TuMu	S	39	65	104	7.8	13.0	20.8	Key Habitat Connectivity in the Cardwell Shire
121	Proj	BC	rein	0	0	1.5	1.5	rip	2002	Ath	Barr	TBL	16	25	41	10.7	16.7	27.1	Mazlin Ck Rehabilitation Project (Stage 2)
122	Proj	BC	ns	0	16.8	0	16.8	rip	2001	John	John	S	19	128	147	1.1	7.6	8.7	Johnstone Community Vegetation Initiative – Stage 2
123	Proj	BC	enha	0	30	0	30	wet	2001	John	John	S	50	388	438	1.7	12.9	14.6	Clancy Estate Wetland Remnant Rehabilitation Project
124	Proj	BC	enha	0	2	0	2	rip	2001	Each	John	TBL	17	27	44	8.5	13.5	22.2	Upper North Johnstone River Revegetation Project
125	Proj	BC	rein	0	0	2	2	rip	2002	Each	Barr	TBL	24	26	50	12.0	13.0	25.0	Peterson Creek Corridor Consolidation (Stage 2)
126	Proj	BC	rein	0.5	0.5	1	2	rip	2001	Each	Barr	TBL	11	19	30	5.5	9.4	15.1	Advancing Lower Peterson Creek Revegetation Project
131	Proj	RC	enha	0	4.8	0	4.8	rip	2001	Doug	DaMo	N	90	95	185	18.8	19.8	38.5	Stream Stabilisation and riparian revegetation in Douglas Shire
132	Proj	LC	enha	0	5	0	5	rip	2001	Each	John	TBL	59	66	125	11.8	13.1	24.9	Upper Johnstone Revegetation Project Stage 3 Extension
135	Proj	LC	enha	0	1	0	1	wet	2001	Hinch	Her	S	13	40	53	13.0	40.0	52.5	Adopt and Restore the Macknade Wetland
142	Proj	RC	rein	0.5	1	3	4.5	rip	2001	John	John	S	50	49	99	11.1	11.0	22.0	South Johnstone River Stabilisation Project
143	Proj	RC	rein	0	2	2	4	rip	2001	John	John	S	42	61	103	10.5	15.2	25.7	North Johnstone River Stabilisation and Riparian Vegetation Reinstatement
900	Reg	BC	rein	0	0	0.1	0.1	rip	2001	Herb	Her	TBL	2	13	15	20.0	127.5	147.5	North Cedar Creek Riparian Regeneration
901	Reg	BC	enha	0	0.6	0	0.6	rip	2001	Herb	Her	TBL	10	20	30	16.7	33.3	50.0	Revegetation of the South Cedar Creek Reserve
903	Reg	BC	rein	0	0	2	2	rip		Cns	TI	N	10	31	40	5.0	15.4	20.1	Trinity Inlet Creeks Revegetation
904	Reg	LC	enha	0	0	1	1	rip	2001	John	John	S	1	4	4	1.0	3.5	4.4	Alexandra Palm Enrichment Planting – Upper Liverpool Creek
905	Reg	BC	rein	0	0	0.8	0.8	rip	2001	Doug	DaMo	N	9	20	29	11.3	25.4	36.7	Riparian vegetation on sugarcane farms
906	Reg	BC	rein	0	0	1.5	1.5	rip		John	RuMu	N	5	13	18	3.3	8.5	11.9	Creek Rehabilitation – East Mulgrave
908	Reg	BC	enha	0	0.6	0	0.6	wet	2001	John	John	S	9	31	40	15.0	51.7	65.9	Warrina Lakes Wetland Rehabilitation and Aquatic Plants Nursery
916	Reg	BC	rein	0	0	2.5	2.5	rip	2001	John	John	S	8	17	25	3.2	6.6	10.0	Pandanus Creek Rehabilitation and Wildlife Linkage
920	Reg	LC	ns	0	0	1	1	rip	2001	Cns	RuMu	N	4	10	14	4.0	10.5	14.2	Reducing sediment load in runoff into creeks by use of agroforestry
922	Reg	BC	rein	0	0	3.7	3.7	rip	2001	Ath	Barr	TBL	9	20	29	2.4	5.5	7.8	Rehabilitation of Leslie Creek and Tributary: Phase 1
928	Reg	RC	rein	0	0	0.5	0.5	wet	2002	Hinch	Her	S	14	43	57	28.0	85.6	113.8	Adopt and restore the Macknade Wetland – Stage 2
929	Reg	RC	enha	0	1.3	0	1.3	rip	2002	Ath	Barr	TBL	5	16	21	3.8	12.4	16.5	Advancing Lower Peterson Creek Revegetation
930	Reg	RC	enha	2	0.6	0	2.6	wet	2002	Hinch	Her	S	5	12	18	1.9	4.8	6.9	Bambaroo Wildlife Corridor

Locator No.	Grant type	Prog	Ongr Act	Protect (ha)	Enhance (ha)	Reinst (ha)	Total (ha)	L/ Zone	Year	LGA	Catch-ment	Region	NHT $K	Other $K	Total $K	$K/ha NHT	$K/ha Other	$K/ha Total	Project Title (abbreviated)
931	Reg	RC	enha	0	0.5	0.6	1.1	rip	2002	John	John	S	15	39	54	13.6	35.5	49.5	"Brutus Creek" Vegetation Linkage and Bank Stabilisation
932	Reg	BC	rein	0	0	1	1	rip	2002	John	John	S	12	30	42	12.0	29.7	41.9	Cheeki Creek Revegetation
933	Reg	BC	rein	0	0	2	2	rip	2002	Ath	Barr	TBL	6	12	18	3.0	6.0	8.9	Cherry Creek Revegetation
934	Reg	RC	enha	0	0.3	0	0.3	wet	2002	Hinch	Her	S	17	13	30	56.7	43.5	100.4	Enhancement of Lemon Tree Swamp
936	Reg	BC	rein	0	0	0.4	0.4	rip	2002	Ath	Barr	TBL	2	6	8	5.0	15.4	20.7	Implementation of sustainable farm practises
938	Reg	BC	enha	0	9	0	9		2002	Each	John	TBL	10	24	35	1.1	2.7	3.8	Jaggan Habitat Restoration Project
939	Reg	RC	enha	0	3.5	0	3.5	rip	2002	John	John	S	16	16	32	4.6	4.6	9.1	Liverpool Creek remnant vegetation rehabilitation
940	Reg	BC	rein	0	0	1.7	1.7	rip	2002	Doug	DaMo	N	17	36	53	10.0	21.3	31.0	Lower Daintree River Wildlife Corridor
941	Reg	BC	enha	0	2	0	2	wet	2002	Doug	DaMo	N	3	6	9	1.5	3.0	4.5	Habitat restoration and establishment of a small native wetland area
943	Reg	BC	rein	0	0	0.3	0.3	rip	2002	Mar	Barr	TBL	1	4	5	3.3	12.7	16.2	Rehabilitation of 120m section of riparian corridor on Ganyan Creek
944	Reg	BC	rein	0	0	2	2	slop	2002	Cns	TI	N	8	22	30	4.0	11.0	14.8	Revegetation of rainforest Great Dividing Range, Cairns
947	Reg	BC	rein	0	0	2	2	rip	2002	Ath	Barr	TBL	11	29	40	5.5	14.5	20.1	Upper Barron River riparian restoration – extending Mabi Forest Corridor links
949	Reg	LC	rein	0	0	2	2	rip	2002	Each	John	TBL	10	23	33	5.0	11.5	16.5	Ithaca Riverbank Reforestation
951	Reg	BC	enha	0	2	0	2	rip	2002	Card	TuMu	S	5	10	15	2.5	5.1	7.5	Boar Creek Riparian Habitat Restoration and Protection
952	Reg	BC	enha	0	1.5	0.5	2	wet	2002	Cns	TI	N	6	15	21	3.0	7.4	10.4	Cairns Central Swamp
955	Reg	BC	rein	0	0	4	4	rip	2002	Ath	Barr	TBL	10	26	36	2.5	6.6	9.1	Nursery expansion and seedling production

APPENDIX 9

PROJECTS WITHIN THE WET TROPICS TREE PLANTING SCHEME (WTTPS)

The "devolved" grants for vegetation reinstatement within the WTTPS (1997-2001) were treated separately in some analyses, since detailed information on the characteristics of individual sites at which WTTPS works were conducted was largely absent from the reports to NHT. Some relevant information could be obtained from NQAA records and from the Reforestation Audit (Chapter 2). However, some discrepancies remained between the different information sources.

The WTTPS received $K4440 in NHT1 funds through two grants. However, there are no government files with records of specific project details, works undertaken, or on-ground outcomes for the first of these grants. The Reforestation Audit currently contains the most comprehensive accessible record of works undertaken during WTTPS, however it does not contain much detail on each site. Furthermore, the Audit database does not contain funding information for these sites.

The Table below shows the sources consulted for information on WTTPS sites that were potentially active during the NHT1 period, and the resulting data. The compiled available information for the WTTPS gives widely varying cost estimates, from $K18/ha in 1997-1999 to $84/ha in 2000-2001. Areas in the Reforestation Audit data and the Draft Report to Environment Australia by NQAA (2002), differ from those stated in the NHT Final Reports and we are uncertain of the accuracy of the 475 ha estimate as an output for the NHT-funded part of WTTPS.

Source and Year	No. of project sites	ha enhanced	ha reinstated	ha total area	$K NHT funds	$K other sources	$K Total	$K/ha NHT	$K/ha Total
NHT1 Project Records:									
1997-1999[1]	46	40	359	399	3600	3631	7231	9	18
2000-2001[2]	20	0	76	76	840	4529	6369	11	84
Total	66	40	435	475	4440	8160	12600	9	27
Reforestation Audit Records:									
All WTTPS Sites up to 2000[3]	85	0	395	395	n/a	?	?	-	-
WTTPS sites 1997-2001[4]	60	0	200	200	4440	8160	1360	22	68
Draft overall report on WTTPS:									
WTTPS 1997-2001[5]	not stated	0	268	268	4610	not stated	not stated	17	-

[1] Source: Project 972141 Final Report to NHT1, March 2001. This final report covered work from July 1997 to September 2000. No project details (i.e. location, start date, type of work) were provided for sites, but a reference was made to the original application. This application could not be located in NQAA or QDNR&M offices.

[2] Source: Project 2002017 Final Report to NHT1, November 2002 (Report on the On-ground Activities by WTTPS 2002). Of the 20 listed projects, 18 sites are shared with the previous (2001) Final Report. Start dates for commencement of works at sites were not given, which prevents distinguishing which projects were conducted under each grant or if these are latter stages of work at the same sites.

[3] Audit data on site numbers and areas obtained from WTTPS Nursery Managers and NQAA Records. There were six sites named in the WTTPS Projects 1997-1999 Final Report to NHT1 that were not identified in Audit records.

[4] Audit data on site numbers and areas obtained from WTTPS Nursery Managers and NQAA Records; funding data for taken from the Final Reports to NHT1 as recorded in the WTRD.

[5] Draft NQAA Report on WTTPS to Environment Australia (Gleed 2002). No specific details of the site names, site areas, or works were given, but the total area planted in each Local Government Area was shown in graph form. The stated NHT funds are also from this report.