BABINDA CREEK ACTION PLAN – FINAL DRAFT

For the Period 2011 - 2015

“Restoring the Flow, Restoring the Bank, Restoring the Life”. 
A MESSAGE FROM THE EXECUTIVE COMMITTEE OF THE RUSSELL LANDCARE AND CATCHMENT GROUP

Welcome to YOUR Babinda Creek Action Plan, and welcome to the world of our activity – the Russell Landcare & Catchment Group (RLGG).

Restoration of Babinda Creek was the highest priority expressed by the community. In view that Babinda Creek contributes to around 1/3 of sediment flowing out of the Russell River at Mutchero Inlet. Our aims are a direct result of community priorities in environmental issues. Our aims have been justified by successful field truthing at both minor tributaries and Babinda Creek itself.

This is a project of major proportions, and we expect problems to arise in each phase during the five year period 2011 - 2015. However we are confident of managing a highly successful outcome for restoration of this river.

We urge and welcome any form of input from the community and any other source, regardless of your level of interest or involvement. We also recognise and acknowledge the previous Executive and members of RLCG and their efforts. Enjoy reading, from the current RLCG Team:

- Ray Jones, President
- Garry Davison, Treasurer
- Sam Parisi, Technical Support
- RLCG Members & Volunteers

- Leo Bonso, Vice President
- Selena Nelson, Secretary
- Jason Birch, RLCG Coordinator
- Daryl Killin, Terrain Coordinator
RUSSELL LANDCARE & CATCHMENT GROUP ENVIRONMENTAL MANAGEMENT POLICY OVERVIEW

This section provides an overview of our management policy, both to the community and participating professionals alike. It also encompasses frequently asked questions.

When a study is conducted into the behaviour of a river system, an initial focus is placed on damage caused under high flow conditions. This normal thought reacts to the easily visible quantity of debris and erosion in a relatively short period of time, often during the monsoon season.

Yet under medium and lower flow conditions, usually unnoticed, a river in poor condition is quietly maintaining saturation of high erosion areas, and depositing coarse material in undesirable places at a more rapid rate than it would naturally, due to the presence of invasive exotic weeds.

Rock battering of problem outside bends is the major successful initiative in the source removal of detrimental nutrients and sediment in solution, which now reach the Great Barrier Reef. Brute force is required to control the equally brute force of water impact. This procedure is expensive, yet a permanent solution.

Any concerns that we intend to straighten and shorten rivers and convert them into 'canals', creating back-stepping river bed erosion, are totally the reciprocal of our aims.
The result of our actions will increase water volume capacity, and reduce average water speed accordingly during medium and higher flow events. It is at the opposite end of the scale to back-step hydrology.

Also the river's middle and lower sections flow over a floodplain travelling relatively slowly. This currently is the cause of the major defects in river health. Naturally weathered rock from the mountains, in a highly modified river system such as Babinda Creek, produces large sand deposits in the river basin, causing river movement. This is the only extraction target of our activities.

This coarse sand is often confused as a Reef contaminant. A healthy river flushes the sand to sea. The tidal current in tropical Queensland runs north/south inside the Reef. Inshore water motion, with onshore wind, naturally maintains our beaches with that sand. Beaches are often found on the north side of river mouths in north Queensland.
The ability of the rivers to self-maintain has been removed in this catchment by the removal of riparian vegetation caused by deforestation of river banks, by our ancestors, for agriculture. Every day since then, the rivers have been increasing in average length to no natural advantage. Landholders are also concerned with the alarming loss of subsoil due to rapid erosion on the outside bends. Water flowing to the Reef is contaminated by nutrients and sediment in solution.

To quote a major report (FNQ 2010 Regional Environmental Strategy - Key Waterways Report, Burrows 1998): “Excessive sediment deposition in the Russell and Mulgrave rivers resulting from bank erosion and land degradation, particularly downstream of the Bruce Highway, is forming large sand bars. This has changed the waterways from a series of deep pools separated by gravel bars to a shallow sandy environment, and may be worsening overbank flooding in some locations due to the in-stream islands becoming vegetated. These in-stream islands may also redirect water flows and cause erosion.”

We have recognised the need to return a river to its natural functioning state. If you return the ability of the river to flow naturally, then everything else will fall into place. Increase of volume capacity minimises transport of detrimental nutrients and sediment sourced from eroded soil, and decaying plant matter on the land surface.

Revegetation of river basin margins then restores control of negative river function and restores wildlife habitat. The popular Cassowary especially needs this restoration in order to survive.

Hence the Vision of this Plan is “Babinda Creek – Restoring the Flow, Restoring the Bank, Restoring the Life”.

The RLCG Executive Team – August 2011.
DRAFT Report Date: 20 April 2011

This DRAFT report was made possible by the funding support of Terrain NRM, a non-profit company supporting catchment groups in the Wet Tropics.

The primary author of this DRAFT Babinda Creek Action Plan is Daryl Killin. Daryl is the local Russell River Catchment Coordinator engaged by Terrain NRM in Babinda.

Whilst all due diligence has been applied in the development of this report, it may contain errors or omissions. All maps, data and information presented is for general discussion only, and should not be interpreted as relating specifically to any one person, property or project.

Special thanks go to all those who have been or are members of the Russell Landcare & Catchment Group, especially those who have held Executive positions. The hard work done by the local Cairns Regional Council Operations Team in partnership with Terrain is also acknowledged.

Please feel free to provide comments on this DRAFT Babinda Creek Action Plan to:

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IDINJI WELCOME

Ning-u Bulmba I you Bulmba Yonda Bulmba Youmee Bulmba

“This is my place, it is also your place and our place.”

Murrai (Annie Wonga)

These are the words engraved on the plaque at Wonga Park. Murrai (Annie Wong) is a Story Teller and is the last of the local Idinji pygmy people (also known as the “mangrove dwellers”); their arts and great skills are documented in the Babinda Cultural Heritage Centre. This Babinda Creek Action Plan is dedicated to Annie.
PREFACE

The Russell River catchment has been the subject of numerous plans and reviews in the past 30+ years, many of which identify recurring issues that have long been associated with the area, including:

- Loss of vegetation and natural buffer zones
- Sedimentation of the river and its tributaries
- Increasing pressures on health of waterway due to severe erosion
- Waterway health (hydrology, water quality, exotic weed infestations)

Existing reports identified different areas within the Russell River Catchment as priority areas for rehabilitation or remediation work dependent on the specific aims of the particular study. The areas identified are generally large and generally require large or many years of investment to achieve the aims within the area identified. In an attempt to compile the existing information a meeting of representatives from various groups, bodies and disciplines was called in February 2010. A summary of the existing priorities and general theories and aims supporting them was presented. A guided discussion followed to try to achieve some consensus of the main issues faced and values held within the Russell River Catchment and an area within which to focus short to medium term effort in Natural Resource Management. From this workshop Babinda Creek was identified as a priority sub-catchment for rehabilitation work by the attendees. Babinda Creek was identified as a wetland area of general ecological significance in the FNQ Regional Plan 2009-2031. The conservation and ecological value of the upper reaches within the Wet Tropics World Heritage Area was determined to be very high in the Conservation Value of Waterways in the Wet Tropics World Heritage Area. The majority of the Babinda Creek foreshore scored four out of five for rehabilitation in the Russell Mulgrave Catchment Management Plan.

Babinda Creek scored the second highest rating possible for relative value in terms of habitat value in FNQ 2010 Regional Environmental Strategy: Key Waterways Report. However investigations of Riparian Tree Width and Sedimentation in Stream Habitat and Fish Resources in the Russell Mulgrave Rivers Catchment showed signs of large scale degradation. Much of the riparian tree width was 0-5m at many of the sites within the lower reaches with only one exceeding 10m. The lower Babinda Creek sites sampled in this study assessed the stream bed as covered with sediment and sediment filling any pools. The rehabilitation of Babinda Creek also rated in the top five priority issues for the Russell Mulgrave Catchment Coordinating Committee in the late 1990s.
INTRODUCTION

This report was produced by the Russell Landcare and Catchment Group Inc (RLCG) and Terrain Natural Resource Management (Terrain). The preparation of this report has been part funded by the Australian Government’s Reef Rescue Program but mainly through volunteer effort and the time of the Terrain Russell Catchment NRM Coordinator. This report has been prepared to assist catchment rehabilitation planning for the Babinda Creek Sub-catchment of the Russell River Catchment. While acknowledging the role of the condition of the broader catchment and land management practices time and funding constraints limit the assessment to focusing on the waterways and adjacent riparian areas.

River catchments provide clearly definable physical areas which establish natural boundaries for many physical and ecological processes and therefore provide an ideal until for resource management planning. Much of the upper Babinda Creek catchment is protected within the Wooroonooran National Park, although these areas have their own unique management issues, this study concentrates on the foothills and coastal floodplain within the agricultural landscape.

A healthy catchment is one in which the ecological function of the system is operating sufficiently and effectively to maintain the landscape and the communities that it supports. Rehabilitation can help restore the functioning of natural areas and agricultural areas that have been degraded and contribute to maintaining natural values such as biological diversity and water quality, as well as enhancing community quality of life. It is fair to say that the Russell catchment is the most degraded catchment in the Wet Tropics, and is far from a healthy catchment. In fact, the erosion and sedimentation are so severe that many organisations and groups seem to have “written off” the catchment as they consider it to be so degraded that investment is not wise. Management options have been limited in the past by a lack of a clear plan, plus insufficient resources to tackle large-scale problems, and a lack of united community support and action.

This report recommends specific actions for Babinda Creek and its tributaries over the next 5 years (2011 – 2015) so as to provide some guidance at the local level, and as a foundation for public and private sector investment. It is intended to apply the lessons learnt in the implementation of this Plan to the Russell River in the subsequent five year period. But we have to focus our efforts on one place at a time.
MANAGEMENT VISION

“Babinda Creek – Restoring the Flow, Restoring the Bank, Restoring the Life”

MANAGEMENT OBJECTIVES

In order to provide an effective long-term management strategy for Babinda Creek, the following five primary management objectives have been identified. Meeting these objectives will ensure the best outcomes for Babinda Creek to improve the long-term health and sustainability of the sub-catchment:

1. Maintain and improve natural hydraulic capacity of the creek system by identifying areas of excessive sedimentation and identify potential environmental sand extraction sites;
2. Increase ecological values within the riparian area by regular exotic invasive weed control operations, installation of erosion control rock works and strategic revegetation corridors to improve biodiversity; and
3. Prioritise those management actions that will have the maximum net benefit to the creek.
4. Attract sufficient finance from government and the philanthropic private sector to fund projects.
5. Engage the local community through membership of the Russell Landcare & Catchment Group (RLCG).
IDINJI – THE LOCAL TRADITIONAL PEOPLE

The Idinji people used small heavy dug-out canoes cut from the wood of certain mangrove trees to move through the rivers, waterways and mangrove swamps of the Russell and Mulgrave River areas. Idinji had many traditional ways that were confronting to the Europeans, such as mummification.

Annie Wonga is a Story Teller and is the last of the local Idinji pygmy people (also known as the “mangrove dwellers”); their arts and great skills are now lost to all except the written word. This Babinda Creek Action Plan is dedicated to Annie. Annie's family was the first Idinji settlers at Babinda Creek site, where Annie now lives. She moved here (upstream) to be closer to town and school. Her sister Nancy went to Babinda State School and excelled but sadly her mother Minnie died giving birth to youngest brother Jimmy. Annie had two other brothers, Fred and Jack.

In Idinji culture, the Story teller addresses family members by totem names. Is usually woman, and passes on the ancestral creation stories, family stories, stories of change, in order to try and make sense of present happenings, and stories of instruction to help the younger family members survive. Storytelling was passed to Auntie Nellie who passed it to Annie.

Totem names were usually taken from the surrounding environment. The medicine man or elders gave totem names to individuals shortly after their birth. There were individual totem names and clan totem names. Totem names were danced in by corroboree. Males danced for the boys and females danced for the girls. Clan totem names covered a wide area and included all the people living in that area who came together regularly for an exchange of goods, settling disputes and feasting. Clan elders were appointed to represent these people at clan gatherings.

Idinji artifacts (axes and grinding stones) have been locally collected over a wide area. A "T" shaped rock was found in a cave on the slopes of Choorechillum. Annie Wonga's clan totem name is **Jarraga**, the Orange-Footed Scrubfowl ('scrub hen'), which Annie also gave to the RLCG as their logo. Jarraga bountifulness symbolizes the linking of the Russell and Mulgrave rivers at Mutcheroo Inlet. She has written: “*The spiritual meaning and my spiritual heritage I share with all: In loyalty to each other the Scrubfowl builds a big mound to incubate life, nurture the young, the nourishment of eggs in the rainy season (Gurra Bunna) and foods (Mayee), and the works of the season to joyous calls of laughter, sorrow of death and timely precaution against danger. The natural resources of the sea, the waterways and with people who work the seasons who live on and off the land as our ancestors and Elders who have left this place (Bulmba) country and homeland have spoken of the need to respect and share with others, and to take only what you need and leave the rest for others to follow.* “

Russell Landcare & Catchment Group
Annie’s individual totem name is Murrai, meaning unconditional love and friendliness. Her generally recognised clan area is south from the Pyramid to Daradgee, through the Eubenangee, east down the Russell and Mulgrave areas, and right along the coast from Bramston Beach to Russell Heads, where she used to walk as a child. The Pyramid in Gordonvale is thought to be the scrub hen mound; this is agreed between neighbouring families.

Annie Wonga represents local indigenous issues on the Cairns Indigenous Land Council. The following is a quote from BUNNA BINDA - Babinda Stories by MURRAI (Annie Wonga):

**Welcome To Country**

"The Russell and Mulgrave Rivers with their creeks higher up were full of eels, catfish, black brim and jungle perch and fresh water prawns. Woolanmaroo (Russell Heads) and coastal foreshores were important areas of fishing and hunting as well. Above Cassowary Rock is a cave which was once a wet weather camp. Shell middens have been found along the foreshores. Our father was especially attached to this area and spent much time fishing there and visited whenever he could. So much so that he was caught in a flood while fishing and lost his life near Cassowary Rock."

Further information on Idinji is available at the Babinda Cultural Heritage Centre.
BABINDA CREEK SUB-CATCHMENT DESCRIPTION

Babinda Creek Study Area

Figure 1. Babinda Creek Sub-catchment Map

Babinda Creek rises in the Bellenden Ker Range between two of Queensland’s highest mountains, Mount Bartle Frere (1622 m) and Mount Bellenden Ker (1593 m) flowing eastward past the town of Babinda to the Russell River.

The upper reaches of Babinda Creek are protected as part of the Wooroonooran National Park in the Wet Tropics World Heritage Area.

After entering the coastal floodplain, Babinda Creek flows through agricultural cane farming land before meeting the Russell River on its way out to the Coral Sea via Russell Heads.

Figure 1 shows the Study Area of this Action Plan, with the blue lines being rivers, creeks and tributaries and the orange lines being roads or tracks. The valley has been cleared for sugar cane production. The township of Babinda is shown, population approximately 1200 (2010).
Topography

Figure 2. Contour Map of Babinda Creek Sub-catchment Area

Figure 2 shows an old topographical map of the Babinda Creek Study Area before the draining of the Babinda Swamp, which was a freshwater peat swamp similar to Eubanangee and Wyvuri Swamps. The twin massive of Mt Bellender Ker and Mt Bartle Frere can be seen to the west of the valley. At this time (circa 1950), it can be seen that Babinda Creek was mapped by surveyors as being widest in its middle sections during low flows. Today, these sections of the creek are some of the narrowest, with sediment trapped by exotic invasive weeds reducing the width of the creek.

A closer inspection reveals the approximate locations of the four sugar cane railway crossings established along Babinda Creek to service the Babinda Sugar Mill. All of these crossings have now been removed, but some of the foundations remain embedded in the creek bed. The Mill owners have indicated that the facility will be closed in 2011.

Also shown is the old Bruce Highway before the straightened upgrade in the 1990s.

Figure 3 overleaf shows a Google Earth view of the Russell River catchment terrain, vegetation, agricultural land and towns.
Figure 3. Google Earth view of Russell Catchment
Climate

Data from the rain gauge at Mount Bellenden Ker suggest an annual average rainfall of around 9,000 millimetres (mm), and estimated potential maxima as high as 17,000 mm, both of which would make the mountain one of the wettest places in the world. Even in what constitutes the "dry season" in most of tropical eastern coastal Australia, rainfall on the summit is very heavy at around 800 mm in May and 350 mm in August, whilst in the wettest month of March estimated averages are as high as 1,800 mm. Babinda received 6968 mm of rain in the 2010 calendar year. The total rainfall is strongly influenced by intense tropical low pressure systems when very high recordings but often of a much localised nature may be recorded. The high winds associated with these low pressure systems may have a devastating effect on rural production, particularly to tree crops.

Calculations based on available lowland data (Innisfail, Cairns and Port Douglas) suggest that as much as 2,000 mm fell daily during the 1911 cyclone which, if accurate, would be the highest daily rainfall in the world. The high rainfall, the tallest mountains in Queensland and the flat valley floor of the Russell catchment combine to produce regular flooding which affects agricultural production. Flooding has been worsened by past actions of land clearing and current trapping of moving sediment by exotic invasive weeds.

Figure 4. Long-term rainfall (mm) statistics from Babinda Post Office (BOM)

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Geology

Figure 3 shows the geology of the Babinda Creek Action Plan Study Area as being highly variable west to east. Soil parent materials in the uplands include a range of granites, low grade metamorphic (which include some basic rocks) and minor basalt flows. The geomorphology of the lowland country is very complex. The uplands are surrounded by low angle alluvial fans, the distal end of which usually overlies riverine alluvium. The latter is usually of mixed origin and ranges from coarse sands to heavy clays and even peat and may be as thick as 100 metres. The mountains are highly erodible granite; there is the odd intrusion of basalt flow from the Atherton Tablelands where the land was lower; and where the water slows down the soil type is fertile alluvium deposited over millions of years.

Figure 5. Geology of Babinda Creek Sub-catchment
Soils

Figure 6 shows the soil types of the study area vary considerably. The large peat-dominated Babinda soils of the former Babinda Swamp can be seen clearly in the lower right hand side of the diagram. The main agricultural soil types are Tyson, Thorpe and Pin Gin on the well-drained foothills, leading down to Liverpool and Utchee, followed by the poorer-drained Tully, Coom and Timara soil types on the floodplain either side of Babinda Creek. There is a gradation of colour and texture from the west to the east, and obviously with depth. Obviously the clay content rises when the water speed reduces over and through soil.

One can see why the extensive drainage network was needed to enable water to drain away from the peaty soils of the Babinda Swamp, so as to expand the cane farming capacity of the region. The Babinda Swamp Drain enters Babinda Creek just before the junction with Russell River. There is great potential to establish silt traps in the farms around the old Babinda Swamp area, so that nutrients can be slowed down and deposited prior to entering Babinda Creek.

Figure 6. Soils of the Babinda Creek Sub-Catchment
Acid Sulphate Soils (ASS)

Acid sulphate soils are areas where low pH can mobilise naturally occurring metals in the soil and create a leachate that can devastate the natural and built environment.

The State Planning Policy 2/02 Planning and Managing Development Involving Acid Sulfate Soils applies to all development proposed in low-lying areas, especially involving the use of excavation. Excavating or otherwise removing at least 100 m$^3$ of soil or sediment; or filling of land involving 500 m$^3$ or more of material with an average depth of 0.5 m or greater, in all land, soil and sediment at or below 5 m Australian Height Datum (AHD) where the natural ground level is less than 20 metres AHD, trigger the legislation. This is further explained in Figure 7 and project managers need to take Acid Sulphate Soils into consideration when designing silt traps or wetlands in sensitive areas.
## Areas and Development to which SPP 2/02 Applies

<table>
<thead>
<tr>
<th>Surface Elevation ≤ 5 m AHD</th>
<th>Surface Elevation is greater than 5 m and less than 20 m AHD</th>
<th>Surface Elevation ≥ 20 m AHD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Filling and/or excavation trigger may apply</td>
<td>Excavation trigger only may apply</td>
<td>The SPP no longer applies even if excavation ≥100 m³ occur below 5 m AHD</td>
</tr>
</tbody>
</table>

### Surface Elevation ≤ 5 m AHD
- **0 m AHD (mean sea level):**
  - If filling is ≥500 m³ and ≥0.5 m average depth the SPP applies
  - If excavations are <100 m³ the SPP applies

### Surface Elevation is greater than 5 m and less than 20 m AHD
- **+5 m AHD:**
  - If excavations are ≥100 m³ and below 5 m AHD the SPP applies
  - If excavations are ≥100 m³ but less than 100 m³ below 5 m AHD the SPP does not apply

### Surface Elevation ≥ 20 m AHD
- **+20 m AHD:**
  - If excavations are not below 5 m AHD the SPP does not apply

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**Figure 7. Legislation & Acid Sulphate Soils - State Planning Policy 2/02**

*The local governments listed in Annex 1 of the SPP must have regard to the SPP where the natural ground level is below 20 m AHD*
Regional Ecosystems

Figure 8. Regional Ecosystem Types of the Babinda Creek Sub-Catchment

As far as vegetation goes, the entire length of Babinda Creek has little if any riparian strip. Little if any of the original vegetation remains on the lowland country and for some soils it is now impossible to determine the original vegetation type prior to clearing with any degree of accuracy.

On the foothills and the World Heritage-listed Mountains, rain shadow effects are very noticeable as evidenced by the sharp changes in the vegetation communities. Some caution is required when trying to interpret rainfall patterns from the vegetation pattern. The major determinate for a rain forest community to persist is a soil with an adequate soil water regime and that may be determined by a number of factors such as parent material, depth to rock, amount of gravel and position on slope.
The mean annual flow data state that the Russell River discharges 1,000,000 ML (1917 - 2006) of which the Babinda Creek tributary contributes approximately one-third of the flow (mean of 360,000 ML: 1925 – 1988 Gauge No 111102 A & B, Babinda Creek at Babinda). Figure 10 shows the coarse initial modelling of the SedNet program which models the predicted sediment load attributable to various parts of the landscape. As illustrated, the Babinda sub-catchment is at the upper end of the sediment load spectrum, with an estimated 1.19 – 1.58 tonnes per hectare per year expected to flow through the sub-catchment. Please note that the SedNet model has not yet been ground truthed and these figures are only a rough estimate.

What this effectively means is that Reef Rescue funding from the Commonwealth under the Reef Plan is aimed at water quality improvements, and targeting the Babinda Creek Sub-catchment adds weight to the case for funding. The purple areas are successful Reef Rescue projects funded to date, and there is a strong correlation with sediment discharge.
Landuse

The main landuse (1999 figures only) in the Russell River Basin is national parks/conservation lands/native vegetation which collectively makes up 79% of the area. Sugar (18.5%) makes up virtually the remainder of the catchment area concentrated in the middle-lower sections. Up until Cyclone Yasi, there was approx 300 ha of hardwood forestry plantations, but these have since been destroyed. Small areas of dairy (0.6%) are concentrated in the upper catchment and irrigated fruit trees (1.6%) and some minor rural residential lands (0.2%) are scattered throughout the catchment area.

Figure 10. Landuse of the Babinda Creek Sub-Catchment
Water & Wetlands

Figure 11. Wetlands of High Ecological Significance in the Babinda Creek Sub-Catchment

As Figure 11 illustrates, there are some wetlands of High Ecological Significance in the Babinda Creek sub-catchment, mainly on the edge of the Babinda Swamp area. These wetlands are of the Palustrine type, which means that they are primarily vegetated non-channel environments of less than 8 hectares. They include billabongs, swamps, bogs, springs, soaks etc, and have more than 30% emergent vegetation. There are a few palm forest areas on the edge of the Babinda Swamp Drain, leading into Babinda Creek, and these are critically important for filtering nutrients.

A key action of this Babinda Creek Action Plan is to engage the community in improving their knowledge of water quality issues, and this Plan will feed into and assist the development of a Healthy Waters Management Plan for the Russell River, to be developed in mid 2011.
PLANNING METHODOLOGY

Strategic Catchment Planning - A Practical Approach

Figure 12. Babinda Creek Problem Solving Methodology

The development of the Babinda Creek Action Plan involved the following four basic planning steps, with a fifth and final step being Plan Implementation, Monitoring & Review:

Step 1 – Define Vision & Management Objectives

Many catchment rehabilitation plans start on the top of the bank and work outwards. The Babinda Creek Action Plan starts with the premise that you must begin looking at the middle of the creek itself, and extend outward. The Vision is: “Babinda Creek – Restoring the Flow, Restoring the Bank, Restoring the Life”.

Biodiversity (tree planting and therefore wildlife habitat) cannot thrive without a stable bank, and a stable bank cannot exist without either rock stabilisation or ensuring that the flow of the creek is not affected unnaturally by the build-up of excessive sand due to exotic invasive weeds. This Plan seeks to outline a more strategic approach focused on one area, Babinda Creek, rather than sporadic project investment spread out over a larger area.

Step 2 – Identify and describe the problem

Relevant information at catchment and reach scales including maps, reports, strategies, recent and historical aerial photographs and local knowledge and experiences were collated and examined. Using this information combined with practical field experience and feedback from many local farmers with local knowledge, potential problems and issues were identified. The management approach adopted was pragmatic rather than academic. Further detailed site information will be collected during the implementation of this Action Plan, which includes the requirement for monitoring and reporting.
Step 3 – Define reaches at a conceptual level

The Babinda Creek system was then broken up into reaches, with four reaches identified in the main watercourse and a further reach for Giddins Creek, a major tributary. Reaches were defined by identifying sections of the creek with similar characteristics in terms of riparian vegetation, general flow rates, sediment build-up, and logistical boundaries.

Step 4 - Visual assessment to define and prioritise strategies and proposed actions to meet management objectives

Five broad indicators were used to identify high priority works:

1. Heavy sand deposition sites on inside bends
2. Erosion occurring on outside bends
3. Poor riparian vegetation (either non-existent or minimal)
4. Overall biodiversity health (presence) or lack of it (absence)
5. Water quality and water quantity
Learning from Past Lessons

Figure 13. Babinda Creek prior to European settlement and subsequent agricultural clearing
Creeks in developed catchments tend to be shallower and wider

Figure 14. Babinda Creek today

The contrast between Figures 13 and 14 is a common thread in Australia, where agricultural production on floodplains sometimes involved clearing of vegetation right up to the bank of the waterway itself. In Babinda Creek this has had a dramatic effect on the overall health of the system, leading to increased erosion, subsequent sedimentation and degradation of waterway health.
How to Fix Slumping & Erosion Hot Spots

The following strategy has been devised by decades of revegetation experience to fix severe slumping and erosion hotspots:

- Protect the toe of the bank using rock where possible or dense planting of selected species eg: Figs, Kanuka Box, Golden Penda, Ferns, Lomandra;
- Allow for natural angle of repose to minimise slumping: horizontal : vertical; sand 3:1; silty 2:1;
- When shaping banks stockpile topsoil to be spread back on top to maximise weed seed and organic material;
- Aim to achieve grass cover quickly even if it is left for a season prior to revegetation (Singapore Daisy is better than nothing);
- Choose planting locations, species and densities carefully;
- Plant the same distance back from the top of the bank as the height of the bank to prevent slumping; and maintain grass cover amongst revegetation during Nov-April.

**General principles:**

- Establish a strong toe and stable outside bend but also treat the inside bend
- Avoid blanket spraying of in-stream sites and exposure to erosion
- Plant specific species at specific spacings for specific purposes
- Plant larger seedlings if possible and spray around or in strips to minimise weed competition until they are at least 2m tall
- Ensure a good root network far back from the top of the bank above the low flow water level to prevent slumping
- Encourage regeneration and clear snags and cut large logs into 1m sections
BABINDA CREEK REACHES

Four reaches of Babinda Creek have been defined using a combination of biological and physical characteristics such that they make sense to the layperson. They reflect natural boundaries, where the creek changes ‘personality’ in the way that it flows and the forces it creates as it passes through the landscape.

Babinda Creek Reach I – Boulders to Double Barrel Creek

Reach I of Babinda Creek starts in the pristine Boulders National Park area where tourists and locals alike swim and participate in recreation. It then moves rapidly down through steep but largely undisturbed forested areas, past the first cleared farms of the upper sub-catchment. When it hits the farming area, even though there is more remnant riparian vegetation than further down, the first signs of erosion and impacts of flooding can be seen. The end of Reach I is defined at the junction with Double Barrel Creek, as from here on in the volume of water in the creek starts to increase significantly.

Overall Reach I is the only one of the four reaches that retains a satisfactory level of riparian vegetation. This reach is dominated by the presence of rock of varying sizes, and erosion is restricted to the farming land where vegetation is removed. The speed of water is very fast in this reach, and flash flooding is common during the wet season, hence the many tourist warnings.

Reach I does not require anywhere near the erosion control works of other reaches, but this is the area where monitoring for water quality would be useful, as a benchmark to determining the location and health of aquatic invertebrates as well as vertebrate animals such as turtles and platypus. There is also great opportunity to combine secondary and tertiary students in such monitoring programs.
Babinda Creek Reach II – Double Barrel Creek to Bruce Highway

Figure 17. Babinda Creek Reach II

Reach II of Babinda Creek is defined as that section between Double Barrel Creek and the Bruce Highway. This reach is characterized by a wide bank to bank width, but a narrow creek width. There is significant outside bank erosion in many places of Reach II, due to a number of massive sand deposits that are forcing the creek into a narrower and narrower low flow. These trapped coarse sand areas are covered with Singapore Daisy and flooding occurs even after moderate rainfall according to farmers adjacent to the creek.

The priority in Reach II of Babinda Creek is to stabilize these erosion hotspots with rock to stop the erosion. Since there is not really enough money to fix all of the hotspots at one time, a back-up plan is to continue to spray the exotic invasive weeds each year before the wet season, so that the floods remove the dead weeds and move some of the coarse sediment downstream. The two large blue sand deposits shown in Figure 17 present opportunities to undertake sand extraction for environmental purposes, and this is being explored with Department of Environment and Resource Management (DERM) and the Environmental Protection Agency (EPA).
Babinda Creek Reach III – Bruce Highway to High Voltage Line

Reach III of Babinda Creek is defined as that section east of the Bruce Highway up to the new high voltage transmission line installed by Powerlink. This reach is again characterized by a wide bank to bank width, but in places the creek is even narrower than Reach II. Reach III includes the junction with the mouth of Giddins Creek, the main tributary of Babinda Creek, the QR railway line, the bridge near the tourist swimming hole, and the Mill Sugar water discharge point (EPA Licence).

The priority in Reach III of Babinda Creek, similarly to Reach II, is to stabilise erosion hotspots, continue to spray out invasive weeds and assess sediment deposits for environmental sand extraction opportunities. There has been limited tree planting completed on some inside bends of this reach, but the real pressure points are outside bends. The River Improvement Trust has undertaken some rockwork in this reach with outstanding results, especially on the sharp S-bend alongside the old Bruce Highway – Howard Kennedy Drive. There are a couple of ideal sand extraction sites in this reach and these will be investigated.
Babinda Creek Reach IV – High Voltage Line to Russell River

Figure 19. Babinda Creek Reach IV

Reach IV of Babinda Creek is defined as that section from the Powerlink line to the junction of the creek with the Russell River. Just before this junction, the Babinda Swamp Drain enters Babinda Creek, and this entire section can back up when the Russell tidal influences prevent water from flowing towards the sea. There are some remnant palm forests in this section performing a vital ecological function intercepting floodwaters and slowing down the water to assist in reducing nutrient run-off.

The priorities in Reach IV of Babinda Creek are to assess sediment deposits for environmental sand extraction opportunities, and possible some re-instatement of wetland and/or silt trap functioning. There has been limited tree planting in this reach, with varying degrees of success. Publicly-funded tree planting, unless done as part of a significant biodiversity corridor, is seen as being expensive in this reach and difficult to maintain due to regular flooding and hence poor access for maintenance.
LOCAL BIODIVERSITY

The following are some well-known locally important and appreciated animals, but there is a plethora of other important species playing a key role in ecosystem health, including rare plants, birds, butterflies, reptiles (including snakes), native fish, vertebrate insects and invertebrates. A key action to be implemented is increasing the knowledge of the extent and status of biodiversity in the Babinda Creek Action Plan.

**Jarraga: Orange-Footed Scrub Fowl**

The Megapodius *reinwardt* (Jarraga or Orange-Footed Scrub Fowl) refers to the species of bird with robust feet and it is about the size of a domestic hen. Jarraga’s legs and feet are orange, the body is dark brown, the breast and upper neck have a blue/green tinge and there is a small crest on the head. Their habitat extends along a narrow coastal band in northern Australia. What separates Jarraga from others in the Genus is its large incubator mound whose size ranges from 2 – 4 m high to approximately 15 m in diameter! The mound, often used for decades, can be used by more than one pair of birds. It consists of soil, moist decaying forest leaves and debris, which combined with the sun’s heat, causes a temperature range of 30-38 degrees Celsius near the eggs.

Male and female birds form monogamous pairs for life and breeding takes place between August and March. They exert loud territorial calls, mainly during the night and especially during breeding season. However, the parents are not known to nurture the chicks. One report tells of the newborn chicks flying for short distances immediately after hatching so they are relatively advanced at birth. The birds feed on seeds, fallen fruit and terrestrial invertebrates.
Southern Cassowary

Cassowaries (*Casuarius casuarius johnsonii*) are Gondwanan in origin and were concentrated in the small part of the supercontinent that later broke apart and became the present areas of Northern Australia, Papua New Guinea and some of the eastern island groups of Indonesia. One of the most striking features about the cassowary is its long and unusual black feathers. Cassowary feathers differ from other birds in that they have a quill that splits in two. A cassowary is a solitary animal and when it is a sub-adult, it is banished from the home range of its father. The young animal wanders off to find its own future patch of habitat. It finds a part of the forest where there are no adult cassowaries and starts learning its way around. This is a vulnerable time for the maturing cassowary. Once the cassowary has established its home range, it moves regularly through that range which can be quite large.

There are at least another 80 species of plants which are also assisted by the cassowary's eating habits. These species have smaller seeds but many are toxic and only the cassowary can safely consume them. Such dangerous eating habits are possible because the cassowary has a short/rapid digestive system which appears to be supported by an overactive liver and an unusual combination of stomach enzymes. Other animals such as White-tailed Rats may help distribute these smaller seeds but more often than not, they damage the seed rather than dispersing it intact. So the cassowary is vital for the widespread continuance of over 150 species of plants and is considered a "keystone species".

Figure 21. Cassowaries are Iconic locally
Aquatic Vertebrate Animals – Turtles & Platypus

Turtles are a common site to all who work or recreate in Babinda Creek. A healthy turtle population is a good sign for any waterway.

Platypuses build a simple burrow in a river bank, just above water level and often among a tangle of tree roots. They live mostly alone, but can share a water body with several other platypuses.

After the record La Nina event of 2010-11, there was anecdotal evidence that platypus numbers may be well down, with the many regular floods destroying their nests.

There is potential to involve secondary and tertiary students, as well as interested people from the local community, in a project to assess the extent and health of aquatic animal population such as turtle and platypus.
WEEDS OF SIGNIFICANCE

It would be impossible to include all weeds found locally as there are over 100 species that are of concern! Here a few of the important ones.

Hymenachne

Hymenachne (*Hymenachne amplexicaulis*) is a Weed of National Significance (WONS). It is regarded as one of Australia’s worst weeds because of its invasiveness, potential for spread, and socioeconomic and environmental impacts. At the same time, however, hymenachne is valued by graziers as a source of fodder for cattle.

Hymenachne is a semi-aquatic grass, initially introduced into Australia for use as a ponded pasture in central Queensland. It was later planted in tropical wetlands in North Queensland and the Northern Territory, where it has escaped from cultivation and now seriously threatens natural wetlands, riparian zones and waterways.

Hymenachne can form dense stands that reduce plant diversity and habitat for native animals. It invades permanent water bodies and seasonally inundated wetlands. It blocks waterways, potentially causing or increasing flooding, and threatens water quality. Hymenachne blocks drainage and irrigation channels and infests crops such as sugar cane, and can act as a fish barrier.

**Figure 23. Hymenachne**
Pond Apple

Pond apple (*Annona glabra*) is a Weed of National Significance. It is regarded as one of the worst weeds in Australia because of its invasiveness, potential for spread, and economic and environmental impacts. Introduced as grafting stock for the closely related custard apple, it is a very hardy tree and an aggressive invader. Over time the dense thickets it forms can gradually replace everything else in the canopy and create an undesirable new habitat.

Its ability to grow in flooded areas and to tolerate salt water has enabled it to spread through much of northern Queensland's wet tropics area. It now infests more than 2000 ha of the Wet Tropics Bioregion, and threatens melaleuca wetlands and native mangrove communities.

While pond apple is considered an environmental weed, its commercial impacts are also increasing as it spreads. It is now threatening the cane and cattle industries by growing in and along creeks, fence lines and farm drains. Unlike many weeds, it can invade and transform undisturbed areas.

Pond Apple tends to spread rapidly in the areas prone to flooding and there are weed control operations run by Cairns Regional Council.

Figure 24. Pond Apple: Voracious Invader
**Singapore Daisy**

Singapore Daisy is a vigorous ground cover with lush glossy green leaves. The leaves are usually 3 lobed and in pairs up the stem. It produces yellow to orange-yellow Daisy flowers about 2 cm across all year round. The flowers are held above the leaves on short stalks. Singapore Daisy is a garden escapee and native of tropical America.

Singapore Daisy produces variable amounts of seeds but is mainly spread by cuttings via slashing and pruning. Revegetation of the cleared area should be pre-planned to ensure that other weeds don’t gain a foothold in the disturbed area, include mulching to keep weeds down.

Singapore Daisy is a declared Class 3 plant under the Land Protection (Pest and Stock Route Management) Act 2002, which prohibits supply or sale of Class 3 plants and may require their removal from environmentally significant areas. This weed species is now on the labels of products containing metsulfuron-methyl (such as Brush-Off), which are very effective at killing the weed.

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**Table:**

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<th>Method</th>
<th>Herbicide</th>
<th>Rate</th>
<th>Registration status</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foliar spray</td>
<td>metsulfuron-methyl</td>
<td>10 g per 100 L water</td>
<td>DPI Board approval</td>
<td>Spray thoroughly to wet all foliage, but not to cause run-off. Minimise contact with desirable species.</td>
</tr>
<tr>
<td></td>
<td>(600 g/L)</td>
<td>plus wetting agent</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Read the label carefully before use and always use the herbicide in accordance with the directions on the label.
The Class 1 declared weed, Glush weed (*Hygrophila costata*) has recently been discovered in the East Russell and Babinda area. Initial surveys have revealed the weed to occur along several kilometers of the Russell River and adjoined catchments including Babinda Creek. It produces large amounts of water dispersed seeds; fortunately to date all Queensland specimens have proven to be sterile. However, the weed still rapidly spreads through vegetative propagation. There is no published research confirming seed longevity or viability. The Cairns Regional Council Pest Management Officer is encouraging landowners to learn to identify this invasive aggressive species that is outcompeting Singapore Daisy in places along the edge of the Russell River and into Babinda Creek. It is effectively killed with Glyphosate products.
PESTS

Tilapia

*Tilapia* species are highly invasive and exist under feral conditions in every country where they have been cultured or introduced, including Australia. Feral populations of two species of tilapia (*Oreochromis mossambicus* and *Tilapia mariae*) are now widely distributed in tropical north eastern Queensland.

Many species of tilapia, particularly those that reside in tropical areas, have an extended breeding season, often covering most of the year, and have several weeks of parental care of young fishes. Some of the simulations completed suggest that it is possible to drive tilapia populations to pseudo-extinction using very high levels of fishing pressure or a combination of fishing pressure and recruitment failure.

Tilapia fish pose a great risk to the ecology and water quality of waterways because of their fecundity, ability to prosper under a wide range of ecological conditions, and aggressively territorial behaviour. These characteristics enable tilapia to outcompete and displace native fish species and have earned tilapia the title of ‘cane toads of the waterways’. It is illegal to possess or eat Tilapia in Queensland.

Figure 27. Tilapia
Feral Pigs

Pigs are an introduced animal that exist in large numbers throughout Australia including the Cairns Region. Pigs impact on agricultural, residential and natural lands by way of soil disturbance, damage to waterways, destruction of crops and potentially, by spreading disease. In Queensland, feral pigs are declared pests under the Land Protection (Pest and Stock Route Management) Act 2002. This legislation places responsibility for their control onto every landholder. Pigs are difficult to control due to their intelligence, their nocturnal feeding habits and cautious behaviour. Further, pigs are adaptive to various food sources, and are known to cover large ranges following seasonal feeding patterns. Although trapping is labour intensive and at times ineffective, it remains Cairns Regional Council’s primary control measure for pigs. Success in trapping on private property is heavily reliant on participation from landholders.

Cane Toads

Cane toads were introduced to Australia just up the road at Gordonvale, and they have a dramatic impact on other predator reptiles such as brown snakes and lizards. The toxins occur in their skin and organs and can be secreted by large glands at the back of the animal’s head when it is threatened. Controlling toads has been difficult as things that kill them will often kill frogs. Recent research has found that cane toads are infected with a lungworm parasite which slows down adults and, in laboratory tests, kills around a third of baby toads. The parasite does NOT kill Australian frogs and this is a breakthrough. Events such as ToadBusters are a popular way for the local community to get involved with controlling this well-known pest.
PROPOSED ACTIONS & SITES

1. Giddins Creek Rehabilitation Project

This material is sourced from a paper written by Melanie McDonald in collaboration with Alan Dunne following field inspections 8 May 2010.

Giddins Creek is a major tributary of Babinda Creek that arises on Mt Bellenden Ker within Woonooroonan National Park and the Wet Tropics World Heritage Area. Downstream of the WHA the creek is contained almost entirely within private land, much of which is used for sugar cane production, with only a couple of small areas of Council managed land. Upstream of The Boulders Rd Giddins Creek is well vegetated and appears relatively stable. On the coastal lowlands agricultural area the stream is for the most part choked by invasive weeds with little in the way of natural riparian vegetation.

Boulders Rd to the confluence between Giddins Creek and Babinda Creek is the area discussed in this section. Throughout this reach the low flow stream width was consistently 3m wide with a channel of an average 25m width. Singapore Daisy (*Sphagneticola trilobata*) and Para grass (*Urochloa mutica*) were by far the most abundant species and their vigorous growth has lead to the stabilisation of sediment on point and lateral bars and in some cases forming islands within the stream. Restriction of sediment movement has lead to a raised channel and most likely a raised bed level. This can reduce the carrying capacity of the channel and lead to more widespread flooding during smaller flood events.

Lack of vegetation diversity means a lack of habitat for animals including fish. Although Para grass seems to support some fish species these are expected to reduce as the more invasive Singapore Daisy out competes Para grass over time. There have been two small revegetation projects along the reach of Giddins Creek, one towards the upper end of the reach and another towards the lower end. Examining the success and failures of these projects has helped form and support the recommendations to follow.

Giddins Creek is a relatively small system and although the granite substrate is extremely erodible the gradient tends to flatten substantially upon reaching the coastal lowlands. The small size of the channel decreases the cost of rehabilitation making improvements more achievable. Rehabilitation without the use of expensive earthmoving machinery is by far the most efficient means of rehabilitation. By using the natural meander and specific species chosen to perform specific functions from an engineering view point a relatively stable system can be established. Once the system is in a stable state with minimal weed invasion biodiversity will have the opportunity to establish naturally from the abundant seed stock located in the upper reaches. The absence of resident crocodiles is certainly an advantage when working in a creek system.
The most important part of rehabilitating a stream to achieve a stable state is to establish a strong toe on the outside of bends to maintain the position of the low flow channel. By establishing a strong root system on the toe to contain low flows the risk of stream migration can be minimised. It also produces shade over the low flow channel reducing the ability of Para Grass to colonise and stabilise sediment slugs, which should naturally move through the system. When weed colonisation leads to the stabilisation and accretion of sediment bars and slugs the likelihood of meander migration and erosion is increased.

Species with strong root systems and the ability to withstand high velocity flows that are suitable for planting on the toe and outside banks include River Cherries (*Syzygium tierneyanum*) and Golden Penda (*Xanthostemon chrysanthus*). Leichardts (*Nauclea orientalis*) and Figs (including *Ficus racemosa*, *Ficus virens* and *Ficus vagiegata*) can be interspersed amongst these to add diversity. Although other species may also be suitable the ones included here were listed in the Queensland Government’s Bioregional Ecosystems description for the Giddins Creek area. The description of each Regional ecosystem includes a list of typical species present in remnant vegetation or likely to have been present prior to clearing.

It is important to work with the current alignment of the low flow meander as this is the most stable path.

It has been observed on many occasions that realignment of creeks and rivers using machinery to reshape mobile sediment present in shaded areas in the lower end of the reach banks and install groins can lead to erosion as the stream moves to re-establish a meander or erosion occurring both upstream and downstream of installed structures. Several rows of the toe species mentioned above planted on outside bends ensure interlocking of roots and maximum stability. Traditionally these have been planted 2m apart, to achieve maximum canopy cover in the shortest time, however in nature they are more likely to be spaced at 3-6m. To plant at the wider spacing could substantially reduce funds spent on seedlings, although it would be best to plant larger seedlings to start with. Strip or ring spraying to reduce weed competition may need to be undertaken for a little longer as this should be done until the tree is at least 2m in height.

On the outer bank above the height where very fast flow is experienced there is the opportunity to plant a greater diversity of plants however it is still best to use those that have some tolerance to flow and inundation. Again it is worth trialling planting at lower densities and including a mix of pioneer species throughout which will provide early weed suppression but disappear as the other plants grow larger. Planting at wider spacings involves a longer term approach. It is accepted that it will take a longer length of time to achieve full canopy cover than dense plantings. However by not completely spraying the site the weed present will continue to provide stabilisation until the trees are large enough to provide this stabilisation and shade the area to reduce weed growth. Spraying of weed around the seedlings only needs to occur until the trees are large enough that their growth is not inhibited by the weed.
The inside bend is the target of environmental sand extraction activities first and foremost. Following this extraction, re-vegetation can proceed. Within the channel on the inside of the stream bend it is advantageous for the high flow channel to contain sparse shading vegetation that reduces weed growth and allows debris to pass by during higher flow events. Leichardts are especially good at filling this role as they are flood and flow tolerant and can create a large amount of shade with their far reaching limbs and large leaves, while posing minimal obstruction to passing flows and debris. If a natural high flow channel is present it is important to try to position these so that the root system of some of the plants can provide stability during high flows. The inside bank of the wider channel also requires moderately flow tolerant species to ensure stability is maintained during larger floods.

A lateral strip along the toe of the bank can be sprayed to allow the toe to be planted first without disturbing any of the other weed until these plants are established. When establishing the sparse shading plants within the channel there is no need to spray the entire area.

Strips can be sprayed out every 4-8m to plant these trees within. If the project cannot be spread out over a number of years and the whole area must be planted at once, 2m wide strips across the stream from the top of one bank to the other can be sprayed to establish cross sections of specific plants across the channel while minimising soil exposure and erosion risk.

An essential part of maintaining the current alignment of a vegetated creek system is to manage snags and large woody debris. The presence of river sediments throughout the Russell River floodplain observed during drilling activities suggest that over time local creeks have wandered back and forwards across the landscape. The major contributor to this is believed to be the diversion of flow caused by the accumulation of large woody debris. In order to minimise stream movement accumulations need to be managed by cutting fallen or snagged logs which may cause obstruction to flow into lengths of approximately one meter and leave them in stream. This means that they will still provide habitat and detritus for natural cycles but do not have the ability to divert flow and cause erosion and stream movement.

Based on the techniques described and revegetation of the area currently covered in weed we can calculate an approximate cost of rehabilitation. By using an inflated cost of $20 per seedling to prepare the site through the use of herbicides, plant and maintain the seedling for 3 years with paid labour. The cost of revegetating up to 7ha of riparian land between the Boulders Road and the confluence with Babinda Creek at the more sparse spacings described (1500 seedlings per ha) is around $210 000. By rehabilitating the stream from an engineering point of view and using specific species selected for specific purposes a functional system can be created for a fraction of the cost of traditional methods such as hard engineering and diverse dense plantings. With the abundant seed stock located in the upper reaches and weed within the system suppressed it will only be a matter of time before regeneration of a diverse number of species will occur.
In order to maximise the success of rehabilitation while limiting seedling losses and erosion risk it would be most efficient to plant larger seedlings than those grown in standard native tubes. Growing seedlings for a longer period of time to establish a larger root system prior to planting can double or triple per seedling purchase costs. However reduced maintenance and enhanced survival rates have been seen from planting advanced seedlings which are more able to compete with weeds such as Singapore Daisy.
Figure 31. Plan view of specific species positioning

Babinda State School is located very close to Giddins Creek backing onto a major tributary. Teachers from the school have expressed interest in the students becoming involved in the rehabilitation of a local creek. Giddins Creek would provide the ideal opportunity for students to conduct surveys and planning exercises, propagate and grow seedlings in larger pots, plant the seedlings and monitor their success.
2. Erosion Control Works – Reef Rescue & River Improvement Trust

The Cairns River Improvement Trust is a statutory body under the River Improvement Act (1940). In conjunction with Terrain NRM, a non-profit company dedicated to environmental repair, the River Improvement Trust regularly undertakes river and creek stabilisation projects.

The Russell Landcare & Catchment Group was successful during 2010 in securing Reef Rescue 3 funding from the Commonwealth (administered by Terrain NRM) to tackle severe erosion on a bend in Babinda Creek known as “Stager’s Corner”. There are many such bends well known to locals in the area and the purpose of this project was to be a showpiece of how to combine rockwork with revegetation to secure badly eroding areas. During the dry season, excavators will move trapped sediment from the inside bend over to the outside bend to provide a 1:1.5 battered slope. This slope will be embedded with sharp-edged rock of various sizes according to the flow rate expected. Then the site will be enhanced by revegetation.

Rehabilitation Aim

To achieve a relatively stable system that provides multiple benefits, including:

- channel and bank stability with no erosion or accretion of the bed and bars;
- natural rates of sediment movement;
- natural suppression of invasive species which reduces the need for herbicide use on and off farm;
- habitat for native fauna;
- natural nutrient and carbon cycles including carbon sequestration; and
- improved aesthetic and recreational amenity.

Figure 32. Cross-Sectional View of Stagers Corner Proposed Restoration Works
Figure 33. Aerial shot of proposed Stagers Crossing project under Reef Rescue 3
3. Environmental Weed Control & Sand Extraction Project

At a meeting of the Babinda Creek Action Network held on 19 September 2010, 16 local landowners agreed to support a proposal to spray out weeds on Babinda Creek. The operation was carried out on 6th December 2010. Landowners neighbouring Babinda Creek agreed to contribute $150 towards the chemical costs of the operation, and so far many of them have done so.

The purpose of the aerial spraying operation was to kill environmental weeds, mainly introduced grasses and Singapore Daisy, located on the inside bends of Babinda Creek. A helicopter spraying contractor with appropriate licences was engaged to kill weeds that were holding the sediment in place. The significant 2010-11 La Nina wet season floodwaters were able to push more towards the centerline of the creek and assist the natural sediment movement and reduce severe erosion on the outside bends. This was the first step in restoring the original creek flow, reducing siltation of the creek and the subsequent flooding of farmland that removes topsoil. It is acknowledged that fortifying all outside bends with rock is a more desirable outcome, but without sufficient funds to do this, spraying was considered to be the best management option. The following four shot sequence shows one site: on the day of the operation; one month later; two months later; four months later:

Note that it is evident that the spraying of exotic invasive weeds has allowed the creek to naturally decide where it wants to go, and it has, over the course of three months, months, removed sediment that had taken years to build up, and which was threatening the outside bend resulting in boiling and erosion in a small tributary. It is proposed to evaluate the full length of Babinda Creek for environmental sand extraction opportunities and apply for one licence under both local government and state government approval processes and procedures. Each site has to be fully profiled to determine the amount and type of sediment, the volume of material to be removed and any conditions of the permit. It is likely that a 3 – 5 year spike in sand extraction may be necessary to restore the natural flow of Babinda Creek. After this is done, it is envisaged that a reduced sustainable extraction of sand will continue.
### SUMMARY OF PROPOSED ACTIONS BY REACH

<table>
<thead>
<tr>
<th>Reach</th>
<th>Description</th>
<th>Environmental Assets</th>
<th>Management Issues</th>
<th>Actions Required</th>
<th>Priority</th>
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</table>
| Reach I      | Benchmarking of biodiversity                      | • Relatively stable system with high ecological values and generally good riparian vegetation  
• Ecotourism operators and locals alike currently use asset for recreation | • Examine options for involving secondary and tertiary students in biodiversity assessments of aquatic life and animals. | • Develop program with the education sector to benchmark biodiversity in Reach I of Babinda Creek  
• Prepare Funding Proposal under relevant funding program | MEDIUM   |
| Babinda Creek|                                                  |                                                                                       |                                                                                  |                                                                                  |          |
| Reach II     | Erosion Hotspot Control  
Environmental Sand Extraction | • Heavily degraded system requiring urgent attention  
• Ecotourism operators and locals alike currently use asset for recreation | • Community and farmer engagement process  
• Obtaining funding  
• Addressing government permit requirements  
• Logistics and Coordination | • Prepare Reef Rescue 4 funding proposal  
• Complete site management plans for any proposed sand extraction sites | HIGH     |
| Babinda Creek|                                                  |                                                                                       |                                                                                  |                                                                                  |          |
| Reach III    | Erosion Hotspot Control  
Environmental Sand Extraction | • Heavily degraded system requiring urgent attention  
• Ecotourism operators and locals alike currently use asset for recreation | • Community and farmer engagement process  
• Obtaining funding  
• Addressing government permit requirements  
• Logistics and Coordination | • Prepare Reef Rescue 4 funding proposal  
• Complete site management plans for any proposed sand extraction sites | MEDIUM   |
<p>| Babinda Creek|                                                  |                                                                                       |                                                                                  |                                                                                  |          |</p>
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<td>Reach IV</td>
<td>Babinda Creek</td>
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<tr>
<td>Babinda Creek</td>
<td>Wetland Assessment</td>
<td>Standing remnant Palm forests of critical conservation value</td>
<td>Community and farmer engagement process</td>
<td>Prepare Reef Rescue 4 funding proposal</td>
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<td>Environmental Sand Extraction</td>
<td>Natural and current sand deposits</td>
<td>Obtaining funding</td>
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<td></td>
<td>Addressing government permit requirements</td>
<td>Explore options for reinstatement of major wetland(s)</td>
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<td>Logistics and Coordination</td>
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<td>Giddins Creek Revegetation Project</td>
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<td></td>
<td>Giddins Creek Revegetation Project</td>
<td>Heavily degraded system requiring urgent attention</td>
<td>Community and farmer engagement process</td>
<td>Prepare funding proposal for Carbon &amp; Biodiversity Sink for farming community</td>
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<td></td>
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<td>Limited current tree planting sites</td>
<td>Obtaining funding</td>
<td>Complete revegetation of riparian zone from World Heritage area, through Babinda township to join up with Babinda Creek</td>
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<td>Logistics and Coordination</td>
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PLAN IMPLEMENTATION, MONITORING & REPORTING

The main purpose of writing any Action Plan is to implement it. This Plan is to guide actions for the five year period 2011 – 2015 to address severe degradation in the Babinda Creek Action Plan. The Plan will be implemented by the Russell Landcare & Catchment Group (RLCG), a non-profit Incorporated Association in conjunction with local farmers and the general community, either as volunteers or informed observers. Monitoring and reporting, so that progress and success can be determined, against this Plan will be completed annually and reported on in the RLCG Annual Report at each Annual General Meeting.