# Science, Education and Partnerships: steps towards the recovery of a flagship butterfly species *

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## Abstract

This presentation offers a case study in how local, regional and global partnerships in Science and Education supported community efforts in saving one threatened species. The Richmond Birdwing Butterfly (*Ornithoptera richmondia)* was presented to the community as a flagship species in order to motivate their participation in recovery strategies. The recovery was based on scientific information, an education strategy and community participation. This paper outlines the significant factors which characterised the recovery process from 1989 to 2009. Details are provided also of the practical activities undertaken such as propagating, planting, and recording of the lowland host vine; raising awareness of, and removing, exotic vines; as well as protecting and managing habitat on public reserves and private land holdings. The recovery of the Richmond Birdwing Butterfly demonstrates an Australian success story and it may serve as a useful example of saving threatened invertebrate species through community engagement.

## Introduction

The presentation begins with the decline of the Richmond Birdwing Butterfly and then documents the role of scientists and educators in shaping a recovery program undertaken by the community. This community, spread across two states of Australia, was then supported by national and regional environmental networks.
In the presentation, we will highlight key elements of this recovery program:

- Publications on the ecology of the butterfly by international entomologists;
- Use of CSIRO Double Helix leadership to partner with Qld and NSW Education Departments to develop school programs;
- Collaboration between Parks and Wildlife Service and Nurseries to propagate and distribute the necessary vines to Northern-eastern NSW and South-eastern Qld schools for ongoing field-based programs;
- Public workshops and awareness sessions on both public and private land.

The presenters will also outline the successful outcomes of this collaborative enterprise up to 2009.

*Background paper presented at the 6th World Environmental Education Congress July 2011 Brisbane

## The Education Factor

(a) Role of Scientists

One key scientist leading this Recovery project is Dr Don Sands OAM who has a career of over 30 years and ongoing affiliation with Australia's CSIRO (Commonwealth Scientific and Industrial Research Organisation). Dr Sands and Bob Moffatt began collaborating to recover the Richmond Birdwing Butterfly (RBB) in 1989. Dr Sands has provided invaluable scientific advice and guidance to the recovery project and the Network to the current day.

Other participating scientists in Australia included Dr Tim New, Dr Ian Gynther and Dr Albert Orr.

In October 1995, a RBB Recovery Team was formed and in May 1996 the "Richmond Birdwing Butterfly Recovery Plan 1996-2001" was lodged with the Australian Nature Conservation Agency and distributed to Qld and NSW government departments.

**Table 1** Criteria for flagship status (after Field 2011)

| Criteria | Rating for RBB | Benefit to conservation |
|---|---|---|
| Environment – urban | +? | + |
| - peri urban | + | + |
| - rural | + | + |
| Ecology - known | + | + |
| - simple | + | + |
| Occurrence in the wild | + | + |
| Mobility | + | + |
| Visual - size | + | + |
| - colour | + | + |
| - diurnal | + | + |
| Conservation status | + | + |

(b) Role of other Individuals

One key individual was Bob Moffatt, a Ranger with the National Parks and Wildlife Service team at Lismore, NSW. After meetings with Dr Sands, Bob Moffatt arranged the first propagation of hundreds of seedlings of the RBB lowland vine *Pararistolochia praevenosa* at Balunyah Nursery. This Nursery, an Aboriginal cooperative, at Coraki, northern NSW, agreed to propagate the vines from seeds collected by Dr Sands. Bob Moffatt then organised, from his Lismore office, a planting campaign involving schools and local residents.

One key educator to the project was Dr Sue Scott who responded to Dr Sands' invitation to involve the CSIRO Double Helix Science Club. This renowned science club for youth coordinated the school and school community participation across south-eastern Qld and north-eastern NSW from 1993 to circa 2000.

Entomologist Dr Tim New observed: "Since publication of Australia's national Butterfly Action Plan ( Sands and New 2002) a number of butterfly conservation projects have indeed gained greater public profiles and agency acknowledgement, but further advances and understanding have come in large part through education and advocacy in the wider community. Without that support some projects simply could not proceed effectively."

(c) School Staff and Student Efforts

In 1991, forty-six schools in the Richmond Valley (NSW) were each given six vines to plant in their school grounds. Vines were distributed by Bob Moffatt through the Balunyah Nursery. By early 1997, more than 300 schools between Grafton (NSW) and Maryborough (Qld) were involved in the project.

(d) Support to Schools

In 1999 the 'Adopt a Caterpillar' Scheme began with the support of the company, Bayer Australia. From September 1999 to April 2000, Richmond Birdwing larvae supplied by CSIRO were raised in south-eastern Qld at St Francis College, Crestmead, as well as State Primary Schools at Jindalee, Chapel Hill, Mt Crosby, Springwood Central and Sunnybank Hills. A permit was issued by Qld Parks and Wildlife Service to enable handling of the Richmond Birdwing, especially in its immature stages. Students gained hands-on experience in raising the caterpillars and releasing the butterflies after they had matured. School staff and students recorded information on the butterflies' development until their emergence as adults.

(e) Community Effect

Dr Sue Scott observed that "students …(were) letter writing to local nurseries urging them not to sell the Dutchman's Pipe Vine (*Aristolochia elegans*) and planting *P. praevenosa* at their schools and in home gardens".

School students and community groups in NSW participated in "search and destroy" missions aimed at removing or poisoning Dutchman's Pipe Vine (a weed toxic to RBB larva) from the whole region. These efforts were remarkably successful in northern NSW where this weed is now rarely seen in the suburbs or national parks.

**Table 2** Key dates in recovery history

| Year | Event |
|---|---|
| 1989 | Community Nursery grows vines |
| 1993 | Double Helix coordinates rural schools |
| 1997 | Official habitat reserve for RBB |
| 1999 | Environmental Caretaker Network projects |
| 2002 | Positive signs of RBB recovery |
| 2005 | Richmond Birdwing Recovery Network |

## The Community Factor

(a) Role of Plant Nurseries

In 1989, about 600 seedlings raised by Dr Sands (from seed collected from wild plants between Nerang and Tamborine Mountain, Qld, and near Lismore, NSW) were potted up by Bob Moffatt and delivered to Balunyah Nursery. This founder culture at the nursery became the source of most vines distributed over the next few years. By 1996 over 15,000 vines had been sold by Balunyah Nursery for planting in school gardens, parklands and bushland regeneration projects; and by 1998 more than 29,000 vines had been distributed to 150 schools, retailers, and community groups.

Owners of rural properties were encouraged to plant vines in large numbers to form connecting corridors and habitat across the landscape for butterflies and other wildlife. Also, land owners were encouraged to set land aside for conservation and protection of native plants supporting the Richmond Birdwing habitat in the form of either a Voluntary Conservation Agreement registered on a title of land or in the form of Wildlife Refuge recognition. In return, land owners received property

improvement such as fencing, revegetating, rehabilitation of degraded land and planting of native tree species to extend or enhance existing habitat.
Information and practical techniques were presented to landowners to improve land management practices and habitat rehabilitation. Queensland examples included Richmond Park (Beerwah) in the category of private property landowner; Sunshine Coast Regional Council which promoted the Land for Wildlife conservation program, including land management planning and plant identification; and Barung Landcare Group for the supply of native plants. All in the long term were rewarded for their efforts when habitat connectivity was achieved.

(b) Efforts by existing Conservation Groups

In 1997, the Wildlife Preservation Society of Qld – Caloundra Branch, together with Barung Landcare of Maleny, Qld and members of the local community, received a National Heritage Trust grant to care for, and revegetate, Stanley River Park near Peachester. This Park was Queensland's first officially-designated butterfly habitat reserve for the Richmond Birdwing. In 1999, a grant was received from the World Wide Fund for Nature –National Heritage Trust for a project on the Richmond Birdwing recovery. This project, called Environmental Caretaker Network, led to many initiatives in the community e.g. community groups coordinated Qld projects at Beerwah, Stanley River and Tallebudgera Valley; surveys were undertaken to record the food plant *P. praevenosa* occurring naturally in north-eastern NSW and south-eastern Qld.; five coloured display boards describing the biology of the Richmond Birdwing were erected in Qld at Mary Cairncross Scenic Reserve (a Reserve of Sunshine Coast Regional Council), Stanley River, Chapel Hill and Canungra as well as in NSW at Alstonville; local community groups contributed by identifying natural strands of vines for the database, planting vines and coordinating local activities. In 2002, several community groups encouraged Dr Sands and Dr Scott to continue addressing the decline of the butterfly and its larval food vine.

(c) Activities by new Network

In 2005, Dr Sands and Dr Scott formed a new community group, the Richmond Birdwing Recovery Network, adopting several activities from the Double Helix Science Club project, especially a need to cultivate more food plants. Brisbane City Councillor, Helen Abrahams, officially launched the Network at Brisbane Forest Park. The network invited membership from interested community members, local governments, environmental branch representatives, Queensland's Environmental Protection Authority, and all interested members of environmental organisations. In 2006, it became an incorporated body and organised a number of Community Workshops with the first of these being held at Mary Cairncross Scenic Reserve, Maleny on 22 November 2006 with 65 participants. Further in the period 2006-2007, the Network members hosted more than six talks and field events for local community groups on the Sunshine Coast.

(d) Efforts from Property Owners

By the end of 2007, on the Sunshine Coast (Qld) alone, more than 1500 *P. praevenosa* vines had been planted on 22 privately-owned properties and on 13 sites of Council-owned land from Noosa to Beerwah, including Mary Cairncross Scenic Reserve. Similarly, on the Gold Coast (Qld), more than 5,000 *P. praevenosa* vines had been planted on private and Council land from Tamborine Mountain to Tallebudgera and at Canungra.

(e) Support from Commercial companies

In 1997, Southbank Corporation, in the heart of Brisbane, nominated "Butterfly

Island" for student and public education and planted the site with 30 *P. praevenosa* vines.

(f) Support from Councils and State Governments

The support of regional and state authorities was vital. Dr Sands noted: "Working with Caloundra City Council (now Sunshine Coast Regional Council) on the Richmond Birdwing project, I realised there was a level of conservation concern that could be addressed most effectively at the municipal level. Practical conservation happens in the community and municipal councils are the closest you can get to the community and still have government teeth."

(g) Ownership by the Community

In 2000, Dr Sands said "The project is now being handed over to community groups to sustain the conservation efforts on a local basis. This was one of the long-term objectives for managing the Richmond Birdwing Butterfly. The key to the success of this project has been the combination of people involved. The community was wonderfully enthusiastic and keen to be involved. But without the science to lead them, the project would not have been so successful. Likewise, the scientists would never have been able to achieve these results without the communities and schools taking part".

(h) Effect on Conservation of habitats and other species

In 2001, Wendy Pyper outlined the key role that flagship species can play in countering habitat loss. Dr Sands also stated that one of the best ways to address habitat loss is through species-oriented conservation. This involves choosing flagship species such as the Richmond Birdwing which are indicators for a particular habitat. When efforts are then focussed on preserving that habitat, the indicator species and other organisms that use it will be conserved.

The scientific literature has further noted that: "The revival of the Richmond Birdwing offers hopes that through research, education, dedication and teamwork, local communities can secure a future for threatened species".

**Table 3** Factors that may encourage or discourage participation and interest in species conservation (New 2010, Williams 1996)

1. Encourage
   a. Focus for conservation initiative that community identifies with personally
   b. Encourage community involvement from earliest stages of a conservation initiative
   c. Develop programs that are beneficial to the community as well as to conservation
   d. Listen to the community's concerns
   e. Gain the community's trust
   f. Provide community with appropriate information at the appropriate level and at the appropriate time
2. Discourage
   a. Failing to recognise community's understanding of ecological concepts can create resentment
   b. Failing to appreciate what the community hopes to gain from participating can dampen enthusiasm
   c. Failing to provide appropriate support after community-based programs have been initiated can threaten continued commitment
   d. When an agency starts to behave as if management belongs only to it, community is discouraged from developing a personal responsibility for conservation

**The Tangible Action Factor**

(a) Establishing the Recovery Network

The need for a not-for-profit Network was recognised both by the amateur scientists and the professional entomologists researching the data required for the recovery program. This umbrella group laid down the guidelines leading to their goal: the recovery and conservation of the Richmond Birdwing butterfly.

The Recovery Network collated and distributed the correct scientific information through free workshops, talks, field days, and newsletters. Information was made freely available to the general population and organizations directly or indirectly involved with environmental issues affecting the Richmond Birdwing butterfly. The leaders in the Network worked towards community ownership of the recovery process so they were quick to support appropriate local initiatives. Participants were encouraged to take ownership of the programs and were supported by nominated local coordinators from the Recovery Network. Other leaders across the Network strove to respond promptly to requests from local groups and from emerging leaders of the community activities. Such requests were for information, speakers, printed material or practical assistance. The Coordinators knew their local cultures and priorities, and exercised guidance and leadership for community participants.

(b) Using established and new plant nurseries

A key component for the recovery program was the establishment of new, or utilization of existing, nurseries adjacent to local communities. These nurseries were helped to achieve the capability to propagate and grow large numbers of the supportive vines successfully. Then the volunteers from the community were involved with the propagation and distribution process. Because effective methods of propagating this particular vine in numbers had not been fully documented, a trial-and-error method was adopted and recorded. Successful methods and outcomes were then shared at workshops, published in the Network newsletter and posted on the Recovery Network website.

(c) Establishing Network website and database

The scientific observations and documentation of events indicating a decline of this species was only one of the criteria which led to the decision to establish a comprehensive database. Historical records and reports of remaining fragmented habitat capable of supporting stands of the necessary vines, and vines planted prior to the formation of the network, were also taken into account and recorded on the database.

A survey format available in hardcopy and on the website was accessed by the public and interested parties. Locations and numbers of planted cultivated vines were recorded via Global Positioning System (GPS) or street address. Sightings and numbers of adult butterflies and life cycle stages were also recorded as the species recovered and dispersed across the landscape.

Mapping and recording areas of potential habitat threats, and making available these records to infrastructure planners, was a priority so habitat loss could be minimized or the appropriate rehabilitation processes adopted in planning schemes.

The website was built to communicate awareness and educational materials and to establish connectivity with supporters, potential supporters and outside agencies for the Richmond Birdwing recovery program.

(d) Sharing information and networking in community

Communicating the plight of this threatened butterfly had the effect of uniting small communities and establishing a focus on reaching a common goal. This provided the opportunity to open up dialogue amongst groups and individuals who would not normally have had the motivation to be engaged in such a program; and develop skills in communication and leadership.

The sharing of information about the Richmond Birdwing and the early successful outcomes such as butterfly sightings demonstrated that tangible goals could be achieved with persistence. These community successes captured the attention of well-known academics and staff in the top echelon of Council, State and Federal government departments, thus easing the way for community groups in their applications for financial support.

(e) Creating Partnerships to support Project

One important partnership was with experienced State government staff to develop a Richmond Birdwing captive breeding program. This program addressed inbreeding depression in isolated populations of the Richmond Birdwing. This partnership with the Queensland State government also facilitated permits for the Network to access restricted conservation parks and reserves to replenish and protect supportive vegetation. This partnership had the side benefit of raising further the commitment of the public service staff towards protecting fragile and sensitive habitat areas for invertebrate species.

Network members collaborated with the major institutions and organizations distributing financial support to environmental projects and achieved funding support for the Recovery project. The Network developed liaison with local Media outlets which provided publicity useful for reaching a broader potential pool of supporters for the Recovery project.

One long-term partnership was created with the Sunshine Coast Council Community Support Service whose teams encouraged residents to enhance habitats for the Richmond Birdwing on their rural and urban properties.

## The Simplicity Factor

(a) Selection of Strategy

The crucial strategy selected by Dr Sands and Bob Moffatt to save this regional butterfly was recruiting local people to plant the larval food vine in locations known to be suitable. This strategy choice was informed by the scientists' experience and knowledge of the butterfly's ecology and the historical records available.

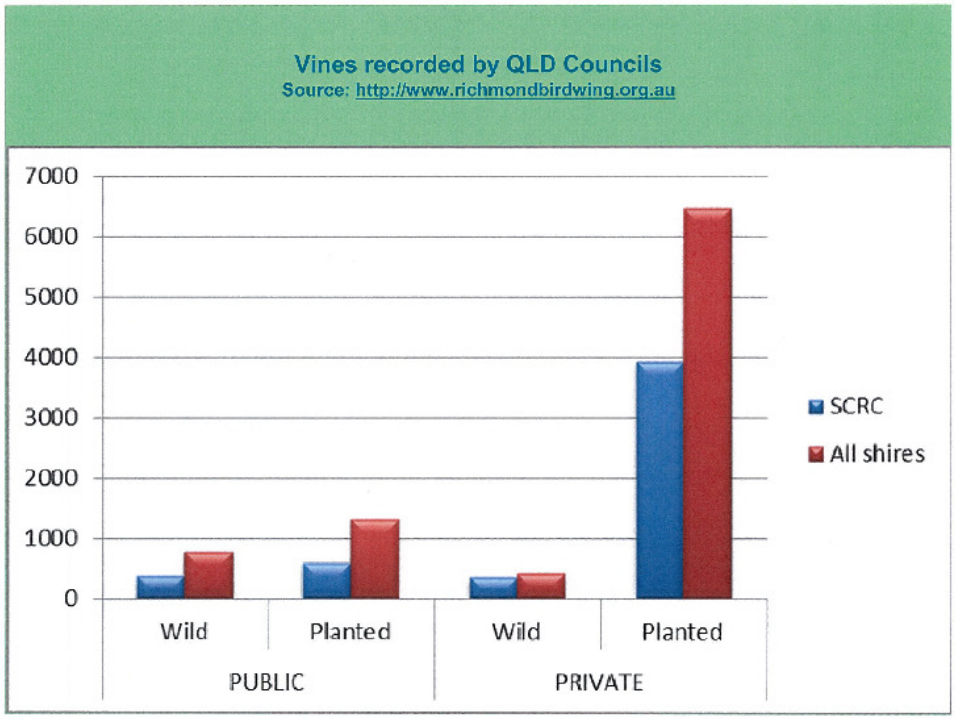


**Table 4** Record of vines planted on public and private land in Queensland to 2009

(b) Using existing Organisations

The instigators of the Recovery Project, out of necessity, used existing organisations to pioneer the fieldwork such as propagating, distributing and planting vines; and educating local people about the roles they could play in the recovery:

i) The existing Balunyah Aboriginal plant nursery at Coraki propagated the first commercial vines;
ii) state government staff distributed the initial wave of vines;
iii) schools hosted the early lowland vine planting on public land;
iv) the CSIRO Double Helix Science Club coordinated the education materials.

(c) Selected Scientific Information and Quality Control

Scientists identified the key ecological information required by participants working on different aspects of the Project and distributed the information using quality control procedures. Similarly, the vine propagation and distribution was supervised to maintain integrity and simplicity.

(d) Simplified Record Keeping and planting activities

The Recovery Network members developed a Survey Sheet for members and the public to record their sightings of the Richmond Birdwing eggs, larva, pupa, and emerged adult. A Sheet was also developed to record the location of wild vines or vines planted recently by the community. Record sheets were sent to one designated Network member and records were then placed on the Network website.

(e) Basic formats for Community Education

For the sake of accuracy and time, a standard format was developed for presenters who spoke at meetings and community workshops. Presenters prepared written material on the essential information relevant to their audience and displayed actual vines with illustrations of the butterflies. Standardising the information ensured simplicity and accuracy for the presenters and audience. Presenters also ensured the educational materials and specimens were suitable for storage and moving from one workshop to another.

(f) Use of common communication channels for participants

The Network provided several channels of communication among members and the public involved. For example, the regular Newsletter was issued to Network members and Coordinators were appointed to geographical areas, partly as a communication contact.

**The Reward Factor**

(a) Land owners/residents

Residents shared positive and exciting experiences with leaders and organizers knowing that their findings and reports were recorded on a database for future reference. They formed friendships with neighbouring property owners and participants in the community interested in the recovery of the butterfly and helped the conservation work spread around their neighbourhood.

Local people took the opportunity to volunteer their time and leadership skills to coordinate and take on the responsibility of being a central communication point. They made themselves available so all participants could report their observations personally. Local people were given individual support when required and had a network where they could share their excitement and joy and be acknowledged in the conservation of this Butterfly.

(b) Students/ staff /parents

Students carried out experiments on the propagation and growing of plants. They saw the success of their efforts through observing and monitoring the Richmond Birdwing life cycle at close quarters. These School practical experiences led to long term development of the students' science skills.

Student excursions to environmental parks and reserves provided a context for their scientific studies e.g. visits to Mary Cairncross Scenic Reserve to see an example of a remnant sub-tropical rainforest. Students participated in competitions e.g. painting and photography where they expressed their observations of the butterflies' life cycle.

The Butterfly project allowed students to express themselves in various curriculum areas e.g. Science by measuring leaf toughness; Art through painting; or Dance by mimicking the butterfly and English through creative writing.

Teachers and students encouraged parents to support the project by growing the butterfly vines in their home yards. Parents then collaborated and raised funds in the community to support the Recovery projects.

(c) Local community/ group members

Leaders and Coordinators talked to individuals in the community and passed on their passion and leadership to inspire actions resulting in positive outcomes.

The Recovery Project opened up new dimensions in urban and peri-urban gardening. The recovery of threatened species is often focused on rural land and government reserves. Now, residents in towns and cities were given an opportunity to help by planting food vines on their home blocks.

Experienced and new propagators experimented in the research and trials of more effective methods of growing large numbers of vines to cater for the increased demand. Their success,

in turn, allowed community group members to extend their skills through practical field experiments in planting vines at natural and greenfield sites.
The positive early signs of recovery over a relatively short period of time encouraged the communities to take ownership of, and pride in, their local program.

(d) Network members

By harnessing the professional skills of members on a voluntary basis, the Network's leadership team became a well organized and cost effective team. Leading members of the network developed skills through carrying out a range of duties such as Local Coordinator, Funding Applicant and Workshops Convenor. Because positions within the Network were open to all potential participants, members had the opportunity to extend their personal and technical skills.
Members gained from their participation in various Network activities such as creating survey or information sheets, leading their local community, and presenting workshops to groups.

(e) Scientists

The research into historical records and scientific papers to determine the original range of the Richmond Birdwing provided satisfaction for investigators and vital information for community participants. Scientists used professional networks and personal communications with colleagues to collate and compile scientific information useful for the education program and for scientific publications. Scientists were rewarded knowing that their methodology and strategies, developed over a life-time of experience, were successfully adopted in this Recovery project with outstanding results.

(f) Society

Over the period 1989 to 2009, conservationists in eastern Australia became aware of the Richmond Birdwing Butterfly as an emblem or flagship species which needed to be saved from extinction. They saw and recognised the contribution of local, Council, State, and national organisations that cooperated to implement the recovery processes. The success of this community-based Recovery Project brought pride to all involved with invertebrate recovery programs across Australia.

## Conclusion

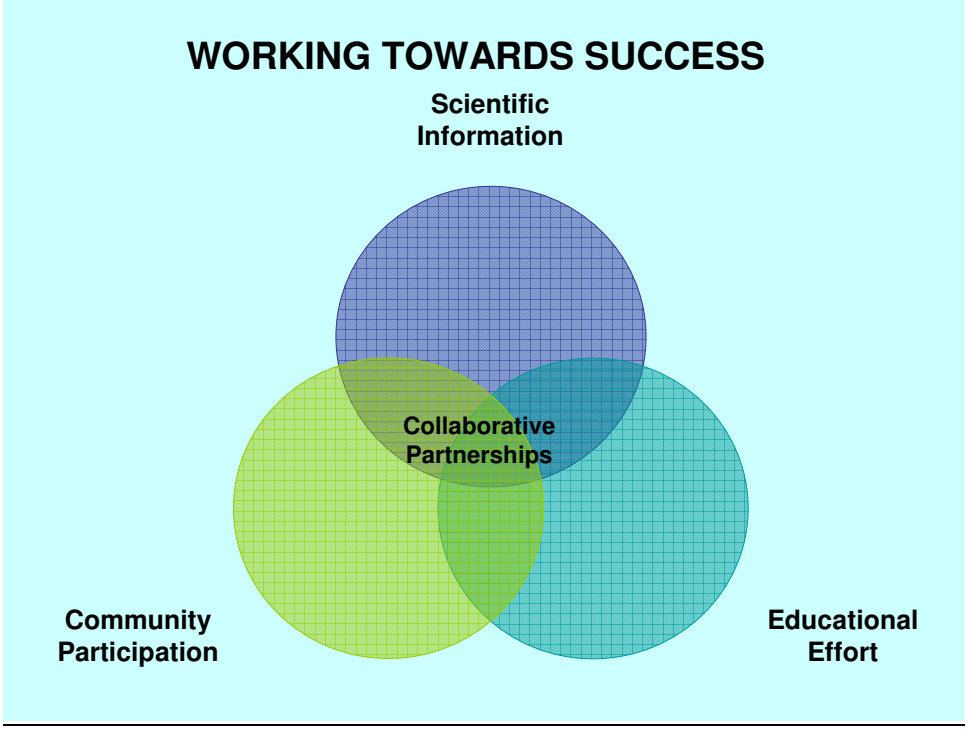


**Table 5** Ongoing collaborative partnerships supporting the successful recovery

This paper has outlined the key factors that led to a successful community project focussed on the recovery of one of Australia's endangered invertebrates, the Richmond Birdwing butterfly. **The key factors, from our perspective, were: an education program based on scientific evidence, empowering local communities, an emphasis on tangible action, keeping the processes simple, and making the project rewarding.**
Sustaining these and other factors were the **partnerships created and developed with one goal in mind**: ***saving a species and its habitat for the wider environmental benefit.*** These partnerships prevailed at the level of the suburb or community, the Council region, the state departments, the national organisations and international networks. Participants were inspired by this butterfly project to work within and beyond their normal circle of influence to multiply the effectiveness of their contributions.
The success of this project empowered many individuals and groups in terms of knowledge gained and skills acquired. The project has brought tangible, short and long term benefits to individuals, communities and the environment of eastern Australia. It provides an example of a collaborative, community-engaged Recovery Project that could be applied to other invertebrate species in locations across Australia.

**Acknowledgements**
The authors wish to thank the following people:

- Dr Don Sands and other colleagues within WPSQ/RBCN
- Dr Sue Scott and CSIRO Double Helix Science Club
- Bob Moffatt and NSW National Parks & Wildlife Service
- Dr Tim New
- Staff within Sunshine Coast Regional Council (Qld)
- Staff within Dept of Environment & Resource Management (Qld)
- Hugh Krenske & Mrs Pam Seddon
- Mrs Louisa Walker
- Volunteers – local, interstate and overseas

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