Biodiversity - the Big Picture

Proceedings of the 2001 Southern Queensland Biodiversity Recovery Conference

The Southern Queensland Biodiversity Network presents:

Biodiversity - the Big Picture

Proceedings of the 2001 Southern Queensland Biodiversity Recovery Conference

Lake Perseverance Recreation Centre
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Conference Convenor

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Introduction

The 2001 Southern Queensland Biodiversity Recovery Conference

Biodiversity - the Big Picture

Bruce Boyes, Conference Convenor, PO Box 215, Crows Nest, Q, 4355.

What biodiversity conservation progress have we made, both positive and negative, since last year's biodiversity recovery conference?

On the one hand we are continuing to lose our biodiversity to a range of threats including land clearing, weed invasion, feral animal predation and inappropriate fire regimes. On the other hand, new initiatives such as the Regional Vegetation Management Plan (RVMP) process, the National Action Plan for Salinity and Water Quality (NAPSWQ) and Natural Heritage Trust Stage Two (NHT2) offer considerable opportunities for achieving biodiversity outcomes. The *Draft Regional Nature Conservation Strategy for South East Queensland* provides an excellent framework for assisting the delivery of these outcomes; built as it is on a growing foundation of biodiversity conservation initiatives by local governments, community groups and landholders.

How do we maximise the ability of the RVMPs, NAPSWQ plans, NHT2 and other key processes and initiatives to deliver biodiversity conservation outcomes? How do we make sure the science is right? What gaps still exist? Who will fill these gaps, and how and when?

These were the questions asked by the 2001 Southern Queensland Biodiversity Recovery Conference, which brought together over 100 key biodiversity decision-makers at local, regional, State and national level.

The Conference was an initiative of the Southern Queensland Biodiversity Network, and was facilitated by a funding contribution from the Queensland Environmental Protection Agency and in-kind support and assistance from Crows Nest Shire Council. The Conference was held from 29 October to 2 November 2001 at the Lake Perseverance Recreation Centre near Toowoomba.

How do we maximise the ability of the RVMPs, NAPSWQ plans, NHT2 and other key processes and initiatives to deliver biodiversity conservation outcomes?

How do we make sure the science is right?

What gaps still exist? Who will fill these gaps, and how and when?

The Southern Queensland Biodiversity Network

The Southern Queensland Biodiversity Network is an informal network that encourages and assists the conservation of the rich biological diversity of the South-East Queensland and Brigalow Belt South Bioregions through sharing knowledge, promoting understanding and fostering innovation. Our vision for biodiversity in Southern Queensland is...

By the year 2050, the whole community is working together to sustain biodiversity (and its contribution to our quality of life) by sharing knowledge, respect, commitment and responsibility.

The Network holds an annual conference in a different location each year, hosting the conference in partnership with organisations that are recognised biodiversity conservation leaders.

Conference location and venue

The 2001 Southern Queensland Biodiversity Recovery Conference was held at Lake Perseverance Recreation Centre in Crows Nest Shire, approximately 50 km north of Toowoomba. Crows Nest Shire provided the ideal location for the conference, and Lake Perseverance Recreation Centre the ideal venue.

Crows Nest Shire is a rapidly growing area where the impacts on biodiversity from threats such as vegetation clearance and weed invasion can be clearly seen. At the same time, Crows Nest Shire Council is one of the first inland rural Councils in Australia to introduce a full package of biodiversity conservation measures including an environmental rates levy, rate rebates for landholders who set aside areas of remnant vegetation, planning scheme conservation measures, a Code of Environmental Practice for Council works, a small grants scheme for conservation works on private land, and a works program on Council-controlled lands.

Too many conferences are priced beyond the means of landholders and community group members. These people do not attend, and their important perspectives are left out of the decision-making. The use of low-cost facilities at Lake Perseverance Recreation Centre meant that conference fees could be kept very low, and as a result the conference attracted a large number of landholders and community group members.

Conference program

The conference was held from Monday 29 October to Friday 2 November 2001:

Monday 29/10/01

- Field Trip - CSIRO Grazed Landscapes Management Project. A group from CSIRO Sustainable Ecosystems has been working with producers, State agency staff and Landcare and Catchment Management Groups to address the issues of ecological health in grazing lands in southern Queensland. One of the research areas has been in the Emu Creek Catchment of Crows Nest Shire. The Grazed Landscapes Management Project field trip explored the outcomes of this important project.
- Welcome Reception.

Tuesday 30/10/01	• Presentations and Keynote Presentations. • Conference Dinner and Special Guest Presentation.
Wednesday 31/10/01	• Presentations and Keynote Presentations. • Discussion Forum and Conference Resolutions.
Thursday 1/11/01	Practical Workshops: • Workshop 1 - "Understanding Regional Ecosystems" explained the science behind, and the application of, the Regional Ecosystem classification system used in biodiversity planning in Queensland. • Workshop 2 - "Managing fire for biodiversity conservation" explained the vital role that fire management has in biodiversity conservation and introduced the products of the South East Queensland Fire and Biodiversity Consortium, including the Individual Property Fire Management Planning Kit. • Workshop 3 - "Things that go bump in the night" explained how to identify nocturnal fauna, and included a visit to a Brush-tailed Rock Wallaby colony and a night spotlighting walk.
Friday 2/11/01	Close of Conference.

Conference proceedings

These conference proceedings provide a wealth of information that will be invaluable to anyone involved in any way in the conservation of Southern Queensland's highly significant biodiversity.

The conference papers represent the diversity of participants at the conference. Many of the writers have had no experience writing scientific papers, and many of the papers thus do not conform to accepted standards for scientific papers. However, no attempt has been made to sanitise the papers, and nor should it be, because biodiversity conservation success will only result from plans of action that embrace the diverse experiences of landholders, government bodies, scientists and community groups.

Acknowledgements

The efforts of many people contributed to the success of the 2001 Southern Queensland Biodiversity Recovery Conference. The Southern Queensland Biodiversity Network would like to thank:

- The **Queensland Environmental Protection Agency/Queensland Parks and Wildlife Service** and **Crows Nest Shire Council** for facilitating the organisation of the conference. The Queensland Environmental Protection Agency/Queensland Parks and Wildlife Service provided a $4,000 funding contribution and Crows Nest Shire Council provided office and administrative support.

- **Nigel Kimball** for his outstanding efforts in the role of Assistant Conference Coordinator.
- **Joanne Pallister** for her outstanding secretarial support.
- **Carl Binning** for his Special Guest Presentation.
- **Keynote presenters Dr. Jeremy Thompson, Professor Helen Ross, Sean Hoobin and Professor Ockie Bosch** for their excellent presentations.
- **All of the conference presenters** for a great range of perspectives on biodiversity conservation.
- **Shane Rieck and staff from Lake Perseverance Recreation Centre** for their well-managed conference venue.
- **Lyn Rieck and staff from Lake Perseverance Catering Service** for keeping us very well fed during the conference.
- **Gayle Drabsch and Geoff Anderssen from the Lockyer Catchment Centre** and **Joanne Pallister** for staffing the check-in desk and running many errands.
- **Sue McIntyre, John McIvor, Neil Macleod, Katina Heard, Cam McDonald, and Tara Martin from CSIRO Sustainable Ecosystems** for hosting the Grazed Landscapes Management Project field trip.
- **Peter Sparshott and Jeff Rayner from the Queensland Parks and Wildlife Service**, **Greg Ford from North East Downs Landcare** and **Veronica Newbury from Toowoomba City Council** for hosting Workshop 3 - "Things that go bump in the night".
- **Perry Poulton from CSIRO Sustainable Ecosystems** for setting up the phone link for Carl Binning's Special Guest Presentation.
- **The many willing volunteers** who helped out by chairing conference sessions and moving furniture and equipment.
- **Everyone who attended the conference** for their enthusiasm, participation and commitment to the conservation of Southern Queensland's biodiversity.

Conference Resolutions

Conference Resolutions

The 2001 Southern Queensland Biodiversity Recovery Conference resolved that:

1. Planning

1A The Regional Vegetation Management Plan (RVMP) process should be expedited so that RVMP outcomes are better synchronised with the preparation of Integrated Planning Act (IPA) Planning Schemes, which local governments must prepare by March 2003.

1B The rapid adoption of the actions of the *Draft Regional Nature Conservation Strategy for South East Queensland* (RNCS) by local governments and the Regional Vegetation Management Plan (RVMP) process is encouraged, as is the expansion of RNCS actions from just SEQ to the whole of southern Queensland.

1C The Common Nature Conservation Classification System (CNCCS) should be applied across all of southern Queensland (not just SEQ).

1D The RNCS should be used to guide RVMP mapping, establish the biodiversity aspects of the RVMP code, and to recommend declared areas of nature conservation significance in the RVMPs.

2. Research

2A Research is to be carried out to determine the economic and social impacts and benefits of biodiversity conservation in rural landscapes.

2B Research is to be carried out to determine minimum vegetation retention thresholds to sustain biodiversity at the bioregional, province, catchment and property scale.

2C Research is to be carried out to determine the impacts of increased development and production on biodiversity.

2D Coordination of research and information needs to be improved, and all existing research needs to be centrally collated and easily available to all stakeholders.

3. Resources

3A Funding programs for natural resource management need to offer greatly increased security and stability (natural resource management funding programs should offer long-term grants instead of yearly grants).

3B Levels of biodiversity conservation funding need to be adequate enough to ensure the achievement of genuine long-term sustainability.

3C Base levels of funding need to be established to provide long-term security for all major biodiversity conservation, natural resource management and economic management staff in Non-Government Organisations (NGOs), local governments and State and Commonwealth Government agencies.

3D Adequate levels of biodiversity conservation funding need to be dedicated by all three levels of government (Local, State, and Commonwealth).

3E Better coordination between funding programs is required.

3F Adequate levels of funding need to be available for all necessary on-ground biodiversity conservation works.

3G Markets for ecosystem services need to be developed, where the users of ecosystem services (such as clean air and clean water) pay the landholders who are providing those services.

4. Education and Information

4A Landholders and land managers need to be provided with significantly better information on biological resources and funding resources, which will improve the capacity for communities to implement biodiversity conservation actions.

4B Information sharing between Government and communities needs to be improved.

4C The role of existing networks in sharing information needs to be recognised, and these networks need to be used and supported.

5. Management

5A Land management practices need to maintain or improve the productive capacity of soils, which are our basic natural capital.

5B Fire needs to be better managed for the achievement of biodiversity conservation outcomes.

5C Weeds and pest animals need to be better managed for the achievement of biodiversity conservation outcomes.

6. Implementation

6A The implementation of the RNCS for SEQ and the RVMPs needs to be linked to the National Action Plan for Salinity and Water Quality (NAPSWQ) and Natural Heritage Trust 2 (NHT 2).

6B All biodiversity conservation actions need to be implemented through cooperative partnerships.

Setting the Scene

Keynote Presentation

Dr. Jeremy Thompson, Manager Biodiversity Planning, Queensland Environmental Protection Agency

A Regional Nature Conservation Strategy for South East Queensland

Dr. Jeremy Thompson, Manager Biodiversity Planning, Queensland Environmental Protection Agency, PO Box 155, Brisbane Albert Street, Q, 4002.

In recognition of the biodiversity values of the South East Queensland region and the increasing pressures on this diversity, a *Regional Nature Conservation Strategy for South East Queensland* is being prepared by government in partnership with the community.

The draft Strategy released in February 2001 recognises the need to conserve and manage the region's biodiversity so that ecological processes, opportunities for survival and potential for continuing evolutionary adaptation are maintained and restored. It also recognises the need for sustainable human use of areas of biodiversity significance, and that much biodiversity remains within the care of private landowners.

The Strategy identifies areas of nature conservation significance by applying the Common Conservation Classification System (Chenoweth EPLA 2000). The classification system provides a standard set of criteria for assessing the conservation value of remnant areas of vegetation within a specified geographical area.

Consultation on the Strategy is continuing and a final Strategy is being prepared for approval in mid 2002. Submissions to the draft Strategy are currently being analysed by the Regional Nature Conservation Strategy Working Group, leading to a revision of proposed actions or the addition of new actions in the final Strategy.

Part B of the draft Strategy is reproduced in Appendix B of these conference proceedings. The contents of Part B are:

1. Approaches for identifying nature conservation significance.
2. Use of the Common Conservation Classification System to identify areas of regional and sub-regional significance in South East Queensland.

3. Results [of application of Common Conservation Classification System to identify areas of regional and sub-regional significance in South East Queensland].
4. Areas of nature conservation significance compared with local government landuse allocations.
5. A process for managing areas of nature conservation significance.
6. Decision support processes to achieve positive outcomes in areas of nature conservation significance.
7. Sub-strategies, performance indicators and actions.
8. Actions for each sub-strategy.

Regional Vegetation Management Planning in South West Queensland - A Model for Regional Consultation for Vegetation Management Reforms

Peter Voller, Regional Planner, Vegetation Management,
Queensland Department of Natural Resources and Mines, PO Box 318, Toowoomba, Q, 4350.

Vegetation management is an important component of long-term land sustainability. Landscape scale planning which allows for the inclusion of important environmental and economic outcomes should include equitable and practical approaches to retention and management of native vegetation.

Department of Natural Resources and Mines (NR&M) South West (SW) Region includes areas that are highly productive from an agricultural perspective, the Region is also naturally diverse, inhabited by a wide range of native plants and animals and is potentially at risk of accelerated land degradation. Regional vegetation management planning is a critical component in the development of sustainable rural and urban landscapes in this Region.

The issue of vegetation management is important to many sectors of the community and the development of regional plans should include participative approaches that consider the views of many and result in an improved outcome for all sectors.

Legislative background of Regional Vegetation Planning

Under Section 11 of the *Vegetation Management Act 1999*, the Minister for Natural Resources must prepare and make Regional Vegetation Management Plans. In preparing a plan, the Minister must consult with:

- An advisory committee established under Section 69 of the *Vegetation Management Act 1999*;
- A relevant Regional Vegetation Management Committee; and
- Affected local governments in accordance with Section 13.

Section 14 requires public notice and invitation for public submissions on a draft plan.

Section 70(1) of the *Vegetation Management Act 1999* states that the Minister may establish Regional Vegetation Management Committees (RVMCs) to advise the Minister on vegetation management planning at a regional level.

Under Section 70(2) of the Act the Minister can determine the functions/terms of reference of a RVMC, its membership and how the committee is to operate. The Minister has an

obligation to consult relevant RVMCs during the preparation of Regional Vegetation Management Plans (RVMPs) (Section 13).

Under the *Land Act 1994*, the Minister must also approve guidelines for broadscale tree clearing applying to areas of the State. The guidelines must be prepared with appropriate public input.

Section 7 of the *Vegetation Management Act 1999* provides for regional vegetation management planning to occur across any tenure. To reduce duplication of effort Regional Vegetation Management Plans will incorporate local guidelines under Part 6 of the *Land Act 1994*.

A regional consultation process is to be initiated by NR&M to develop suggestions to the Minister for:

- Goals, strategies and actions to achieve sustainable vegetation management; and
- Modifications to the State Code.

The consultation process is also expected to provide community based advice identifying areas of high nature conservation value and areas at risk of land degradation. The Minister is required to consider this advice as part of a process of formulation of a formal Regional Vegetation Management Plan.

Principles underlying this work plan

The process of regional vegetation management planning must result in enhanced community understanding and ownership of sustainable vegetation management and its interaction with broader natural resource management outcomes.

Such a plan requires adaptation of a regulatory framework to regional and local circumstances as well as providing opportunities to continue a strong tradition of voluntary conservation and sustainable management of remnant and regrowth woody vegetation.

The process should also work proactively with existing community based natural resource management groups and to strengthen relationships between these groups, the broader community and industry groups.

The community reference process proposed in the work plan is predicated on a number of additional factors:

1. There are quite a number of matters which are ‘not negotiable’ in the State policies and code. These include:
    - The retention of endangered Regional Ecosystems on all tenures;
    - The retention of “of concern” Regional Ecosystems on leasehold;
    - The requirement that Regional Ecosystems cannot change status; and
    - That 30% retention is a minimum requirement for remnant vegetation across a bioregion.

These matters should be clearly indicated to the community at the start of the reference process (the last of these points is of particular relevance to the New England Tablelands bioregion, which is already close to or below 30% remnant).

2. There has already been a number of processes of consultation run across the Region on this issue in the form of the leasehold guideline process in 1995; the development of a number of land management manuals (in cooperation with Landcare) and through strategic plan development by catchment groups (strategies which have in fact been endorsed by State Ministers for Environment, Natural Resources, Local Government and Primary Industries).

3. The region contains a diverse range of industry, community, landcare and catchment groups as well as local governments who have indicated interest in this issue, but do not necessarily want to enter into protracted dialogues.

4. For a consultation process to work it will need to be:
   - Transparent;
   - Representative;
   - Scientifically based;
   - Cost efficient; and
   - Have clearly articulated goals i.e. achieve best possible environmental outcomes in each bioregion and identify opportunities for social and economic benefits.

Table 1. Contents of a Regional Vegetation Management Plan (Draft).

Element	Purpose
1. Outcomes.	Sets out outcomes for vegetation management in the bioregion.
2. Actions.	Identifies how the outcomes will be achieved. May be based on best practice. Can be regulatory and/or voluntary.
3. Areas of high nature conservation & vulnerable to land degradation.	Identification & strategies for management.
4. Performance Indicators.	Identified from State Code.
5. Code for assessment of clearing.	Suggest performance standards and acceptable solutions for the region for each purpose in the State Code.
6. Maps.	Spatial representation of outcomes/strategies and Code.
7. Monitoring & evaluation strategies.	Where to next, roles & responsibilities, integration with other mechanisms.
8. Review of Plan.	Time frame for review, mechanism for review.
9. Bibliography used to develop Plan.	List of technical information used as basis for plan.
10. List of RE's and Status.	Description of vegetation types in region in greater detail than in regional overview.

Expected outputs of the process

Community participation in regional vegetation management planning, as an activity under the *Vegetation Management Act 1999* and Broadscale Tree Clearing Policy (*Land Act 1994*), will:

1. Advise the Minister in relation to preparation of a Regional Vegetation Management Plan that includes:
   - A statement of the region to which the plan applies;
   - Statutory and voluntary outcomes for vegetation management and actions proposed to achieve the outcomes which together will form the basis for achieving best practice vegetation management in the region;
   - A code for the assessment and approval of clearing of vegetation under the *Integrated Planning Act 1997* on freehold land which is consistent with the purposes of the State code;
   - Local guidelines for the assessment and approval of tree clearing under the *Land Act 1994* on leasehold and State land; and
   - Other actions proposed to achieve the outcomes.

   The RVMP may identify areas which could be declared as having high nature conservation value or vulnerable to land degradation and vegetation management arrangements that could apply in these areas. The plan may also provide advice on voluntary and semi institutional approaches (e.g. use of covenants) to protect vegetation providing habitat values or protection from degradation.

2. Advise the Minister in relation to the preparation of a spatial representation of bioregional or sub-catchment vegetation management strategies.

3. Provide advice to the Minister relating to the development and implementation of strategies for practical and sustainable vegetation management in the region.

4. Ensure that the best available technical information and advice is considered and used in the development of the plan.

There are other duties relating to vegetation management, which could be the role of a specially formed Regional Vegetation Management Committee (RVMC), or alternatively be taken on by Regional Strategy Groups following the completion of a RVMP. These could include providing advice to the Minister in relation to:

- The integration of the RVMP and vegetation management with other natural resource management initiatives in the region; and
- Monitoring, reviewing and evaluating the RVMP.

Bioregional Vegetation Management Planning areas

Three planning areas will be used for Regional Vegetation Management Plans. These are:

1. The Mulga Lands Bioregion where it occurs in Queensland (as described in Sattler and Williams 1999).

2. The New England Tablelands Bioregion where it occurs in Queensland (as described in Sattler and Williams 1999).

3. The southern section of the Brigalow Belt Bioregion where it occurs in Queensland (as described by Sattler and Williams 1999) and sectioned to the northern boundaries of Murweh, Booringa, Bungil, Taroom, and Chinchilla Shires.

These areas have been determined on the basis of a requirement for regional planning to be undertaken on a bioregional basis. The planning areas are not intended to be further subdivided by formal means for the purposes of this exercise.

It is anticipated that many of the existing groups in the bioregions will consider the issues involved in local and sub-bioregional areas as they see is relevant. Such groups include some 33 local Governments, 50 landcare groups, 50 AgForce branches, 5 catchment management associations, 64 local action-planning groups funded under NHT and numerous interest groups from environment, industry, indigenous and general community sectors.

Regional Vegetation Management Planning process

It is proposed that in South West Region, NR&M provide the wider community with the opportunity to comment on components of a draft RVMP by means of widely circulated bioregional discussion papers. These discussion papers are intended to provide critical 'grass roots' information on direction and content of regional vegetation plans for the use of community based planning groups.

The discussion papers would contain a number of scientifically argued options for modification to the State code based on the previously generated leasehold tree clearing guidelines, and other source documents, with additional scientific information from more recent research and extension activity.

A flow chart for the participation process in regional planning is shown in Figure 1.

Project teams

1. Stakeholder Executive Panels (SEP)

It is suggested that in the first instance, executive panels be formed from relevant stakeholder groups for each bioregional area. These *Stakeholder Executive Panels* will have a role as mentors for consideration of the discussion paper model and to provide comment on processes for community engagement.

<u>Terms of reference</u>

It is suggested that these panels would provide an oversight role for a process which is primarily run by NR&M staff. The group would have at least two formal meetings during the formative phases of activity but would mostly be contacted by means of email or teleconference. The members of the executive panel would have leadership, guidance and communication roles throughout the consultation process.

The primary function of the SEP is to provide NR&M with surety that the process is transparent, relevant and deliverable in the target planning areas.

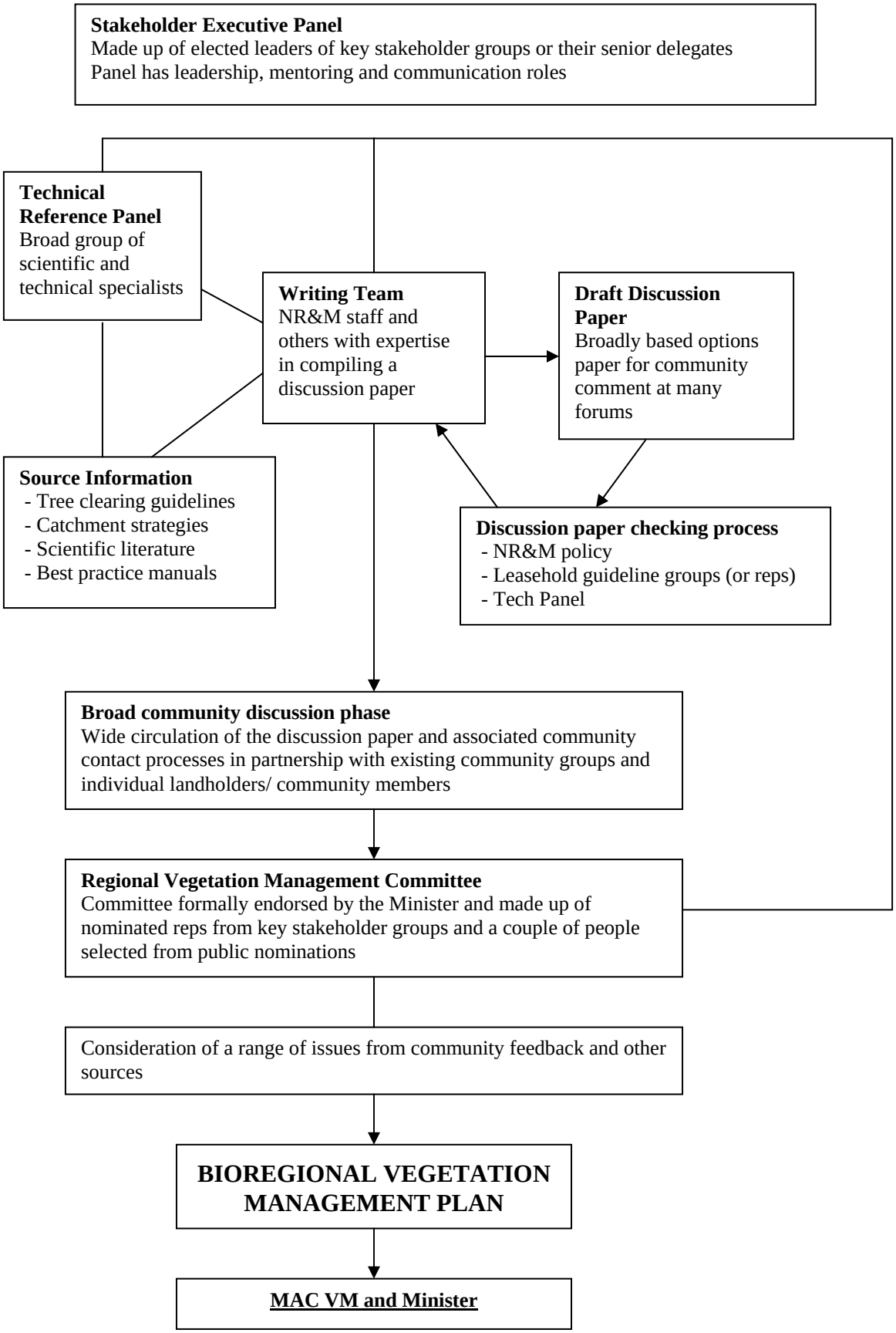

Figure 1. South West Region Regional Vegetation Management Planning process

The SEP will:

- Endorse the membership of technical reference group;
- Endorse membership of discussion paper writing team;
- Review and comment on the discussion paper prior to its public release; and
- Assist in identifying suitable nominees for the Regional Vegetation Management Committees.

It is expected that the SEP will be formally active during the developmental phases of the process but will dissolve after the formation of the RVMCs.

Composition

This panel will be made up of elected regional leaders or delegates of key groups from the industry, conservation, indigenous, local government, and catchment management sectors and others deemed necessary by RSD, CHQ Vegetation Management Unit, the Director General and/or the Minister.

The regional NRM strategy group, Queensland Murray Darling Committee (QMDC) has indicated willingness to form a strong partnership with NR&M in ensuring that membership of the SEP is balanced and representative of the whole community of interest for each bioregion. This Committee presently provides a role as a peak advisory group to NR&M on regional natural resource management issues and as such would be a suitable partner in the vegetation management consultation process.

South West Strategy NRM Group have indicated strong preparedness to undertake this partnering role in the Mulgalands and are in the process of planning for cooperative activity.

Nomination and selection of members of Stakeholder Executive Panels

Elected leaders of key stakeholder groups and regional leadership of key agency groups will be formally invited to join the Stakeholder Executive Panels for their bioregion. They will be provided with brief information regarding the process, an outline of the desired roles of panel members and information on meeting structure.

The elected leaders will be given the option to nominate a delegate for involvement on these panels, which will be formally convened by the RSD.

Possible stakeholder groups who could be approached for representation on the SEP will include:

For the Brigalow Belt:

- Toowoomba and Region Environment Council;
- Wildlife Preservation Society of Qld;
- World Wide Fund For Nature;
- AgForce Southern Inland;
- AgForce South Eastern;
- South West Local Government Association;
- Darling Downs Local Government Association;
- Queensland Murray Darling Committee;
- Dawson Catchment Coordination Association;
- Goolburri Land Council;
- Cotton Australia;

- DPI; and
- EPA.

For the Mulgalands:

- Wildlife Preservation Society of Qld;
- World Wide Fund For Nature;
- AgForce South Western;
- AgForce Southern Inland;
- South West Strategy Natural Resource Management Inc.;
- South West Local Government Association;
- Goolburri Land Council;
- DPI; and
- EPA.

For the New England Tablelands:

- World Wide Fund for Nature,
- Toowoomba and Region Environment Council;
- Darling Downs Local Government Association;
- Queensland Fruit and Vegetable Growers Association;
- AgForce South East;
- Goolburri Land Council;
- Traprock Wool;
- DPI; and
- EPA.

2. *Technical Reference Panels (TRP)*

There is an expectation from the community that development and implementation of regional plans will be based to a large extent on good science and adequate communication of this science.

It is suggested that in the South West Region *Technical Reference Panels* be formed to provide the Stakeholder Executive Panel, NR&M and other participants in the process with relevant information.

<u>Terms of reference</u>

The panels will be used to:

- Provide inputs and verification to the contents of the bioregional discussion papers;
- Provide technical recourse for the SEP, writing team, RVMC and general community on issues raised during the process of RVMP development; and
- Verify and advise in relation to correlating Regional Ecosystems and land types.

These panels will be formed following proclamation of the VMA and the first meeting of the SEP.

<u>Composition</u>

The final composition of such a panel would be based on recommendations from the Stakeholder Executive Panel but could include a wide list of people with specialised knowledge that could be called in as required. These people would not need to participate in the process on a regular basis and the TRP need not have a tenured membership.

3. *The Regional Vegetation Management Committee*

It is proposed that formal RVMCs be formed on a bioregional basis following circulation of discussion papers.

During the community discussion phase, NR&M will canvas for membership of formal Regional Vegetation Management Committees in each bioregion with the specific task of developing a Regional Vegetation Management Plan using the discussion paper and feedback from the community as baseline information.

It is suggested that the SEP and partner groups such as the QMDC and SWS NRM Group would play a role in drafting up some likely candidates for membership of the RVMCs.

Terms of reference

This Committee will have primary carriage for the production of advisory information for the Minister on the issue of vegetation management in accordance with the terms of reference outlined in this document (see Table 1). This will entail interpretation of community feedback as well as the development of positions on issues such as declaration of areas of high nature conservation value and subject to land degradation.

This Committee will also have the final say on advice to the Minister regarding modifications to regulatory frameworks in the bioregions.

This Committee will also provide ongoing advice to NR&M, and will utilise the resources of the SEP, TRP and the discussion paper writing team.

The RVMC's primary role will be to draft a plan produced from the process of synthesis of the discussion paper and comments supported by additional information as required in the terms of reference (see Table 1).

The RVMC will also consider additional issues raised during the discussion phase and expected as components of advice to the Minister. One such issue could be the identification of areas suitable for declaration for high nature conservation or to avoid land degradation.

In these instances, the RVMC will have the opportunity to draw together what could be natural products of targeted extension activities in partnership with the community, such as sub catchment action planning and in response to activities such as the development of 'landcare standards' and other ideas presently in the public forum relevant to this issue.

There is evidence of a desire from many landholder groups to use the RVMP process as a way to validate existing good practice on many farms. The process of voluntary identification and conservation of valuable remnants and regrowth in exchange for some form of recognition is ardently sought by some sectors of the rural community.

These activities may occur in parallel with the formal RVMC process and could contribute richness to the RVMP spontaneously.

It is also likely that spatial planning will be most relevant and deliverable in the sub catchment/ local community context and as the result of extension and local planning activity.

Bioregional discussion papers

Bioregional discussion papers are to be produced by the writing teams with the support of the SEP and the TRP.

The bioregional discussion papers will:

- Provide some basic information on the VMA;
- Outline the State policies and code and articulate alternatives;
- Provide some information on bioregional goals and possible actions; and
- Contain information on voluntary activity and options presently available.

The discussion papers will use information generated from previous consultation processes as a basis for developing alternatives to the State code. The papers will also explain those parts of the new legislation that cannot be changed in this consultation process.

Key source documents for development of the discussion papers will be:

- Relevant local tree clearing guidelines from the leasehold process;
- Strategies, goals and actions from catchment management processes;
- Relevant land management manuals; and
- Any other relevant information from previous community consultation.

The discussion papers will also contain scientific information that provides some quantification of need for modifications to the level of control. Such scientific information will be provided or ratified by a number of acknowledged researchers from within and outside NR&M.

The discussion papers will use previous consultation with the community to segment the bioregions on the basis of land types. This was done for the leasehold process. The reintroduction of this type of landscape segmentation allows existing community groups or individual landholders to review past advice to government on vegetation management planning requirements on the basis of land types rather than in the context of a single broad landscape. It also removes the need to break the bioregion into smaller planning areas for the purposes of this consultation.

The land types would be correlated to Regional Ecosystem types as described in Sattler and Williams (1999). The correlation would be tested and verified by the Technical Reference Panel or a subset of it. Where there are inconsistencies in the definition of land types, additional typing will be included based on land typing in land management manuals or through advice from the Technical Reference Panel.

The discussion papers, when prepared and checked by the Technical Reference Panel and Stakeholder Reference Panel, would be referred back to groups who provided source information, i.e. remaining members of local guideline groups and catchment management organizations for checking/comment.

Wide release of the discussion paper, community discussion phase

It is proposed that the discussion papers will form the basis for wide public discussion on this issue through presentation at community sponsored meetings and in client contact at NR&M counters or in the field.

This approach provides a wide section of the community with the opportunity to comment on the planning process for vegetation management, in particular the goals and strategies for regional activity and codes used for assessment of clearing applications across a range of land types.

The process is participative in this phase and provides the opportunity for individuals to determine for themselves how a regulatory framework and voluntary activity may work in their situation. The process will also provide information on the focus of community concern in regard to vegetation management.

There is considerable evidence to suggest that contact with stakeholders via the discussion paper model could be sponsored by a range of existing organisations including:

- Landcare groups;
- AgForce branches;
- FutureProfit groups;
- Industry groups;
- Rural Women's Network;
- Top Crop groups;
- Rural consultant networks;
- Local government;
- Catchment Management Associations;
- Greening Australia and conservation groups; and
- DPI, EPA, QPWS.

Some of these groups have already indicated a desire to network and to help in facilitating contact with community members.

The discussion papers would remain in circulation for three to four months in the public domain.

Data capture and analysis

The writing team will seek advice from relevant experts in the design of community feedback processes. Feedback may be stratified on the basis of respondent type, e.g. directly affected landholders (those with large areas of remnant vegetation), residents of the bioregion, etc.

NR&M will establish a secretariat for data capture in the Region which will receive feedback, maintain a database of respondent's contact details and will compile feedback into useable results for consideration by the RVMCs.

Data analysis techniques will be discussed with social scientists in organizations such as Rural Extension Centre, University of New England and CSIRO, and such scientists will be invited to become part of the TRP.

Regional Vegetation Management Planning in South East Queensland

Paul Harris, Regional Vegetation Management Coordinator SEQ/Wide Bay and Burnett,
Queensland Department of Natural Resources and Mines, PO Box 573, Nambour, Q, 4560.

The boring bit

Under Section 11 of the *Vegetation Management Act 1999* (VMA 1999), the Minister must prepare and make Regional Vegetation Management Plans (RVMP's). In preparing a plan, the Minister must consult with the Ministerial Advisory Committee established under Section 69, the relevant Regional Vegetation Management Committee and affected local governments in accordance with Section 13. Section 14 requires public notice and invitation for public submissions on a draft plan.

Section 69 & 70 of the VMA 1999 states that the Minister may establish Advisory Committee's and Regional Vegetation Management Committees (RVMC's) to advise the Minister about vegetation management and help in the development of the RVMP's (if determined in the functions and terms of the committee).

Under the Land Act 1994, the Minister must also approve guidelines for broadscale tree clearing applying to areas of the State. The guidelines must be prepared with appropriate public input. Section 7 of the VMA 1999 provides for regional vegetation management planning to occur across any tenure. To reduce duplication of effort in vegetation management across freehold and leasehold tenures, it is proposed that the RVMC's also consider leasehold issues, and that the RVMP's incorporate local guidelines under the Land Act 1994.

So, what's that statutory stuff mean?

- The Minister has an obligation to prepare and make RVMP's;
- Committee's will be formed to advise the Minister and/or help with development of the plans;
- Local governments covered by an RVMP must be consulted;
- RVMP's will be across both freehold and State land;
- The Minister must consult and give notice of preparation of an RVMP;
- RVMP's will be targeted at landscape planning outcomes;
- RVMP's must link with existing plans; and
- RVMP's provide a mechanism for community input.

The current bit

Regional vegetation management planning (RVMP) commenced in SEQ/Wide Bay and Burnett in January 2001. 5-multi sector Working Groups with memberships of 14-16 were established as phase 1 of the plan development and consultation process. First round of meetings were held in May 2001. The groups are the:

- North Coast Working Group;
- South Coast Working Group;
- Brisbane Valley Working Group;
- Inland Burnett Working Group; and
- Coastal Wide Bay Working Group.

A technical panel made up with representatives from QDPI, EPA and DNR&M support each of the Working Groups.

At this stage the process looks like developing 3 RVMP's (Inland Burnett, Coastal Wide Bay and SEQ) and the preliminary timeline is first drafts for wider consultation December 2002.

Opportunities or smoke and mirrors for biodiversity conservation?

The purposes of the *Vegetation Management Act 1999* are to regulate the clearing of vegetation on freehold land to preserve the following:

- Remnant endangered regional ecosystems;
- Vegetation in areas of high nature conservation value and vulnerable to land degradation;
- Ensure clearing does not cause land degradation;
- Maintain or increase biodiversity;
- Maintain ecological processes; and
- Allow for ecologically sustainable land use.

The *Vegetation Management Act 1999* relates to remnant vegetation only - regrowth is referred to as non-remnant. Remnant is defined by the Queensland Herbarium as vegetation that:

- Averages more than 70% of the original undisturbed height;
- Covers more than 50% of the undisturbed canopy; and
- Is composed of species characteristic of the undisturbed canopy.

Regional Ecosystem maps produced by the Queensland Herbarium define remnant vegetation for the landscape. These maps are updated approximately every 6 months and are certified under the VMA. These RE maps are the law as it relates to regulating tree clearing in Queensland on both freehold and State land.

The VMA has been criticised as a coarse piece of legislation that regulates broad scale tree clearing in rural Queensland...*that is its purpose*. The VMA does not have purposes of preventing population growth, modifying use rights for existing developments, ensuring

harvest certainty for forest products, ensuring viable rural communities, preventing extinctions, for rehabilitating biodiversity, for directing local government planning schemes...etc. The VMA is not a surrogate for securing biodiversity outcomes above other existing legislator. But there are opportunities depending on what is the state of play in the region for a RVMP.

Current state of play for SEQ

Understanding the current state of play for vegetation management in SEQ is important to understanding the opportunities for biodiversity outcomes. The questions to ask are:

1. What is the total area of preclearing vegetation in SEQ?
2. What is the current area of remnant vegetation?
3. What % of remnant is protected from clearing due to the existing State policy or via tenure (i.e. National Parks, State Forests, other reserve systems)?
4. What area or % of remnant vegetation is partly or wholly available as potential clearing?
5. What does the remnant layer look like spatially across the landscape?
6. What is the area of non-remnant vegetation and what does it look like?
7. Is SEQ in a no net loss/net gain scenario regards vegetation across the landscape?

Opportunities

RVMP's will make recommendations to the Minister for statutory and voluntary outcomes to meet the purposes of the legislation and State policy. If SEQ is realistically going to be a no net loss type policy for tree clearing (i.e. offsets perhaps) then voluntary outcomes across the landscape to meet the purposes are likely where the gains will be made.

A high reliance on voluntary outcomes implies some form of incentive or payment to landholders for public good conservation, market mechanisms for conservation, reversing perverse incentives, targeted on ground works, retention and rehabilitation targets etc etc. Support is waning for another wishy-washy strategy document - workable outcomes in the SEQ RVMP will be those supported by realistic incentive and implementation strategies.

And the SEQ RVMP is likely to be but a phase within a change management cycle for the SEQ landscape.

Perspectives on Private Land Biodiversity Conservation

Threats to Achieving Good Biodiversity Outcomes

Russell Turkington, “Twin Hills View”, 376 Lagoon Creek Road, MS 371, Greenmount, Q, 4359.

I wish to discuss the following issues:

1. Political decisions which do not achieve good results for sustainability and biodiversity.
2. Land valuation: increased rating = increased exploitation = minus biodiversity.
3. Government rewarding landowners for doing the wrong thing.
4. Ageing landowners - where are the youth with experience and finance to take over?
5. Government decisions - decisions made to stay in power in the short-term versus long-term planning to really achieve long-term benefits.
6. Lack of continuing financial support to all Catchment Management, Landcare and Biodiversity Programs.

Political decisions which do not achieve good results for sustainability and biodiversity

Originally our country was open forest - few trees, well grassed. Our family have owned and been custodians of land for 110 years. My Grandfather was required to clear 10% per year to meet the obligations of Government guidelines. At the time, this land was lightly timbered; it was mostly brush and wattle. There was little grass as a result of wild cattle in large numbers (a residue of Pilton Station occupancy).

Since then there has been a dramatic increase in tree population as a result of aboriginal land management being removed (i.e. removal of regular use of fire). We continually thin our timber and are modifying our grazing management to rotational grazing which has led to a large increase in native animal and bird populations.

Land valuation: increased rating = increased exploitation = minus biodiversity

Land valuations should consider:

- Water catchment management to maintain water quality;
- Carbon credits to recognise a good timber cover; and
- Rewarding good management, not as is the present situation which is rewarding over clearing and overstocking etc.

Government rewarding landowners for doing the wrong thing

The Vegetation Management Act is a glaring example of Government rewarding landowners for over clearing land. If you have got rid of all timber you are in the white area on the map with no restrictions placed on you. If you have kept good tree cover, you are in the colour and

now need Government permission - and pay a $250 FEE - to cut one wattle bush! A lot of country has the ability to grow more and more timber.

Ageing landowners - where are the youth with experience and finance to take over?

Needs no further comment.

Government decisions - decisions made to stay in power in the short-term versus long term planning to really achieve long-term benefits

Recognition, rewards and incentives are paramount for landowners to manage efforts to meet community needs. A future partnership, including State Government departments, local government, landholders and the community is badly needed to develop long term trust and mutual respect that will achieve biodiversity conservation and sustainable land use.

Lack of continuing financial support to all Catchment Management, Landcare and Biodiversity Programs

Realistic and reliable funding is essential. A Medicare type levy is sorely needed to address all aspects of land care (Landcare, weeds, Catchment Management, biodiversity conservation etc.) - at present community groups have to devote too much time to solving funding problems, meaning that there is not enough action on the ground.

Conclusion

To maintain biodiversity, all the components of land and people management need to be addressed. I feel the major threat to biodiversity will come from weeds e.g. madeira vine, cats claw, and parthenium, to name a few, and feral animals. These pests are not easily controlled.

I believe timber cover and trees are a plus to any land use as long as they are managed to protect grass cover, land stability and sustainable land use, whether grazing, farming, forest production, ecotourism etc., as long as common sense management prevails.

Too many trees can be as bad as too few. Management should always be for sustained biodiversity and not for political expediency. That way we hopefully will all be protected in the long term.

Encouraging Conservation Through Valuation

Robert F. Skitch, Queensland Department of Natural Resources and Mines,
GPO Box 2454, Brisbane, Q, 4001.

The report 'Encouraging Conservation through Valuation' examines how statutory property valuation and/or property taxes could be used as tools to encourage natural heritage conservation and the sustainable management of productive land, in non-urban areas. The State Government and the Commonwealth's National Heritage Trust have funded the report. Bill Hall, Operations Manager, Department of Natural Resources and Mines presented the report findings to the Conference.

The statutory valuation process is used to compare properties and provide a basis for levying property taxes such as municipal rates, State land tax and rents for State leases. This form of valuation is not an indication of market price and is of minimal relevance to buyers and sellers when they are transacting sales.

Key findings in the report include:

- *Valuing under the current valuation system on the basis of highest and best use means that landholders are rated on the potential of their land for development. A more realistic basis may be to rate landholders on present use, as this would reflect the current use of the land and production capacity. Therefore, land used for farming, conservation or open space could be valued as it is.*
- *A 'green accreditation' scheme within the valuation system could be used to reward sustainable 'good practice' on rural properties. A non-government body could operate this accreditation.*

Several previous reports on statutory valuation over more than three decades have highlighted the deficiencies of the unimproved value approach used in Queensland. More recently, there have been specific claims that the property valuation system unfairly discriminates against conservation and sustainable farming practice. The report has outlined a workable and better alternative system.

The Queensland Government has not accepted the report. It has been passed to the Department of Natural Resources and Mines to assess the practicability of implementing the conclusions and what affect it would have in each local government area. In the meantime, the Department is placing the report in the public domain as a matter of public interest.

Chapter 13 of the report, which is a compilation of the conclusions from Chapters 1 to 11, is reproduced in this paper. The full report can be viewed on the website www.dnr.qld.gov.au/resourcenet/land/landplan/ectv/index.html

Chapter 1 - Introduction

In this chapter, the main terms used are defined. The project objective confines the examination largely to non-urban lands.

Chapter 2 - The environmental case

It is clear that the goals of the Natural Heritage Trust will not be achieved without the whole-hearted support of private landholders - those who hold responsibility for the direct hands-on management of the greater part of Queensland. Recognition of the public interest component of land management is the basis of, and justification for, government support of projects that may contribute to the achievement of those goals. Landholder support can be encouraged by offering tangible incentives, which, on this premise, are justified.

Chapter 3 - The nature of property valuation

1. Valuation is the process of estimating the monetary worth of individual properties. It can be carried out for a range of public or private purposes by a range of methods legitimately yielding quite different numerical results.

2. The annual valuation is a measure of comparisons, one property against another, and is conducted solely to provide an orderly base for the levying of rates, land tax and State lease rentals.

3. Qualified valuers undertake the annual valuations pursuant to established valuation legislation and practice. The reliance on recognised valuation methods is a requirement for acceptance by both the community and the judiciary. The valuation system draws its credibility from its direct evidence-based reliance on the real estate market.

4. It is this fundamental connection with the market which, *unless* there is a legislated intervention, prevents the annual valuation system from reflecting environmental and community values that are not recognised in the open market. In rural districts, most environmental values are not recognized directly by the real estate market.

5. The basis of Queensland's annual valuation system is currently unimproved value assessed on highest and best use, but it could be some other form. Site value is simpler to calculate and has been supported by all previous inquiries into valuation. Adopting it would have the effect of taxing land improvements such as tree clearing, draining and filling, which currently escape a tax penalty. In this respect, it would be more advantageous from an environmental point of view.

6. In the application of the annual valuation process *most appropriate use* has only marginal relevance. It cannot be used as a substitute for *highest and best use* as the basis of annual valuation because it cannot be determined easily and quickly by valuers. But *present use* could, perhaps, be adopted.

7. The question arising from this analysis is not - should we tamper with the pure valuation in order to achieve some objective (conservation) not directly deriving from market interpretation - because there is no such thing as a pure valuation. The true question is - which land uses do we wish not to tax?

Chapter 4 - Taxing the private and public interest

No system of valuation or property taxation can achieve all possible policy objectives at the one time. Property taxation can be directed at encouraging development of all kinds indiscriminately, or at encouraging only *sustainable* development. The choice is available.

Chapter 5 - Vehicles for delivering a concession

1. A conservation action will, by definition, affect a market-based property valuation only when those attributes are recognized and valued by the open market. The extent to which this happens will depend largely on the location of the property, that is, it will be high only in localities where there is buyer interest in conservation. And in such localities, buyer interest in conservation may increase property valuation rather than decrease it. Similar remarks apply to sustainable management.

2. For this reason, a market-based approach by itself will not be sufficient to reliably deliver, Statewide, any substantial incentive for either conservation or sustainable management. At least, however, the base valuation can be improved by adopting site value instead of unimproved value, which presents a perverse incentive for conservation.

3. Both the valuation and rating systems are sensitive to the circumstances of specific properties, yet both can be subject to Statewide adjustment through State legislation. There is no theoretical obstacle to using either system to deliver either a broad or a property-specific concession for some legitimate land-use related purpose based upon public interest. The reasons for choosing the valuation system directly over the indirect rates system, or vice versa, are mainly practicalities such as administrative convenience, cost, jurisdictional simplicity and consistency of application.

4. The most self-managing, controversy-free method of delivering a concession is by applying, through legislation, a formula adjustment to valuation. Reliance upon adjustments to rating by local governments as a means of encouraging conservation would be council-specific and would expose the rate levels annually to political debate. However, central government is encouraged to produce some guidelines, or a model differential rating scheme, to assist local governments to use this tool.

5. If it is legitimate to use the valuation legislation to grant a concession to farmers or a 40% concession to land subdividers, as at present, it must surely be legitimate to use the process for a public-interest purpose such as conservation or sustainable management.

6. Retention of the existing concession for farming is supported by the analysis, but this can be achieved in a simpler way by moving the base valuation to present use. This move would, at the same time, serve conservation purposes.

7. However, as an alternative, the existing concession for farming could be broadened by legislation to extend also to conservation: in other words, the development potential for all properties managed primarily for conservation should be disregarded.

8. In addition, a discount could then be applied to the valuation for all properties which satisfy certain objective criteria in an application-led accreditation or covenanting scheme.

9. Any objections by valuers to interfering with the base of valuation could be overcome if Parliament, by legislation, deemed that annual valuation would henceforth serve the purpose not only of determining relative equity for taxation purposes, but also of encouraging conservation and sustainable management.

10. Annual valuation need not, and should not become application-led, as this would compromise its self-managing elegance. An application-led accreditation or covenanting scheme can be run by a separate authority and a formula adjustment then made by the rating, renting and taxing authority upon receipt of formal advice of qualifying properties.

Chapter 6 - Perverse incentives

1. The progressive elimination of some five identified perverse incentives from annual valuation would go some distance towards meeting the objective of conservation and sustainable management.

2. Adopting a simpler and more conservation-friendly *valuation base* for rating and taxing purposes (a most appropriate measure in itself) is also desirable to improve the efficiency of any direct concessions for conservation and sustainable management. As concluded by previous reviewers, the adoption of site value would provide a fairer, more consistent and equitable base on which to apply incentives and at the same time it would remove a major perverse incentive against conservation and sustainable management. Before adopting site value, the effects should be modeled extensively, so that appropriate phase-in procedures can be devised.

3. *Rural concessions* both direct under section 17 of the Valuation of Land Act and indirect through income tax operate to the advantage of the rural producer over the conservationist owner.

4. The *concession to subdividers* under section 25 of the Valuation of Land Act operates to the indirect disadvantage of the conservationist and other owners who don't subdivide and is a subsidy to land developers.

5. *Highest and best use* encourages intensification of land use, at least symbolically, and contributes to the perverse impact of the current land valuation process. *Most appropriate use* is not a viable alternative to highest and best use as the basis for annual valuation due to its subjective nature and difficulty in investigation. Valuation based on *present use* offers a superior basis. The adoption of *site value* and *present use* as the basis of statutory valuations would eliminate most perverse incentives currently associated with the annual valuation process.

6. The *valuation as a single entity* of several land parcels held as an aggregation in common ownership provides an economic advantage to the owner and can act as a perverse incentive to reconfiguring properties sustainably.

Chapter 7 - Public and private interest

1. All landholders have an ethical and a limited statutory responsibility to exercise a duty of care by managing in an ecologically sustainable manner.

2. Ecologically sustainable management serves the public interest as well as the landholder's private interest. Where such management is in the public interest according to transparent

criteria, especially, but not solely, where this is at the expense of the landholder's private interest, the actions can attract an incentive.

3. The inherent characteristic of property valuation, based on market interpretation as currently defined, is recognition of the private interest. Within that process there is no mechanism for identifying and valuing the public interest.

4. Valuation can act as one of the available vehicles to encourage or reward management practices that are in the public interest. For this to occur, a partial departure from market interpretation through some formula or other form of adjustment is necessary.

Chapter 8 - Case studies

1. Support for conservation and ecologically sustainable development, both from landholders and local councils, is widespread. Landholders accept the responsibility of managing their properties in an ecologically sustainable way.

2. There is considerable interest in and, at least in principle, support for the concept of incentives for conservation and sustainable management, from both landholders and councils. This support is qualified by concerns about how much of the cost would be borne by either the State Government and/or Federal Government; and by the practicalities of administering such a scheme. An absence of a commitment from either the State Government and/or Federal Government for funding, could be fatal to obtaining local acceptance.

3. There are substantial gaps between aspirations and capabilities. For instance:
   - The rate-related revenue base of councils is, in most cases, extremely limited;
   - The natural resource knowledge base of managers is also limited; and
   - Landholders are not necessarily familiar with the existing sources of conservation-related technical and financial support.

4. Given the somewhat negative attitude of landholders to government, an incentive scheme that requires any form of tailored agreement with government is likely to be taken up by only a minority of landholders. Landholders in the near-coastal areas appear more open to agreements with government.

5. Conservation and sustainable practices are being constrained by a lack of trust between the various players who share responsibility for these activities, including landholders, conservation organisations and all tiers of government. This has significant implications for the receptivity to government programs of all kinds.

Chapter 9 - Will incentives work?

1. The studies indicate that property rates are a small proportion of the total costs of production on *most* farms. In *economic terms*, a reduction in rates to provide a conservation incentive would for most properties not provide a benefit sufficient to motivate conservation or sustainability actions.

2. However, rates can represent a quite significant proportion of total administration expenses. At certain times of the year, if cashflow is low, rates may be particularly prominent and unwelcome.

3. The goals of property owners vary from profit to lifestyle to conservation. Many properties are not regularly profitable. For properties with low or negative income, rates are a highly visible burden. Even for profitable properties in years of unfavourable commodity prices and/or drought, the deficits in the cashflow need to be funded by external sources, that is, banks. During these times, rates can be a significant addition to these burdens.

Chapter 10 - Implementing incentives

1. The annual valuation process is a mass appraisal system and therefore does not readily offer the facility for carrying out regular and in-depth assessments of the details of on-property management.

2. However, the signing of a statutory property agreement can indirectly and automatically flow through into the valuation, because it can be recognised by the market.

3. To move beyond reliance upon the vagaries of market recognition, a formula adjustment can be applied to valuation or a differential rate. If detailed on-property management is to be rewarded, an application from the landholder would be necessary. This could result in (listed in order of increasing security) green accreditation, a non-statutory agreement, or a statutory agreement.

4. If some recognised body established a green accreditation scheme, qualifying properties could be granted a concession on valuation or on rates. The accrediting body may be government or non-government; the latter will be preferred by landholders.

5. For green accreditation or some other application-led system, environmentally based criteria would need to be established against which the standard of management could be evaluated. The establishment of criteria could be left to the local government or other accrediting body, but it would be good to develop a model set that could be made available to local governments Statewide or could underpin a Statewide scheme.

6. Public accountability demands periodic property inspections if concessions are to be given to qualifying landholders without a perpetual statutory agreement.

Chapter 11 - Incentives - who pays the piper?

1. There need be little or no cost to the State Government where local government is prepared to (or required to) adopt a *revenue-neutral* arrangement whereby the rate reduction gained by qualifying landholders is balanced by a rate increase to non-qualifying landholders.

2. However, the State Government or local government can offer an additional incentive to accelerate uptake of some form of conservation or sustainability practice if they wish.

3. Many inland local governments would not willingly adopt a revenue-neutral approach and strong negative reaction would be expected from non-benefiting landholders in local governments where non-benefiting landholders are relatively few in number.

4. Ultimately the evolution of the concept of incentives into a workable scheme will be judged on a number of factors, including cost-benefit. There is no easy method of estimating how high the uptake would be and so how extensive the benefits would be. Landholder surveys and other consultation show that there is likely to be greater interest and acceptance in an incentive scheme in coastal regions than in the pastoral regions.

5. A pilot scheme to test the concept in selected local government areas in diverse regions of the State may provide some evidence of actual benefit, although to do so convincingly might require a prolonged timeframe. This approach need not apply to the addressing of perverse incentives that should be removed Statewide at the earliest date possible.

Nature Conservation on Freehold Land – Some Views, Particularly Regarding Land Tax

Doug Cook, 1480 Tallebudgera Creek Road, Tallebudgera Valley, Q, 4228.

My wife, Lyndria and I bought two bush blocks in Tallebudgera Valley, Gold Coast Hinterland in 1982. The area is 108 ha and the current valuation (Unimproved Capital Value i.e. UCV) is $85, 000. At the time we paid $100,000. We have a two kilometre common boundary with the Springbrook National Park, and there are about twenty species of rare and threatened plants on the property. It is almost completely forest covered and has rugged topography.

At the time of purchase the full conservation significance wasn't understood, at least not by me. The land is eminently suited to permanent protection of its natural values, for example by way of a Nature Refuge Agreement or Higher VCA with the Gold Coast City. However we want exemption from land tax in exchange and this should be a general exemption for all nature conservation land, provided there is permanent protection on title.

Private conservation is expensive, especially in comparison to other uses for the money. Had we bought four rental properties, negatively geared, and with an income stream, it is not unrealistic to say that we would have been at least one million dollars "better off" today. That is expensive in any language, but we have no regrets. We live about five kilometres from the property but visit regularly to work on weeds, tracks or just to enjoy the place.

Conservation on private land is a great growth area for the future. "A significant challenge to the conservation of threatened species in Queensland lies outside conservation reserves…In addition, rare and threatened plants are poorly represented in protected areas in a number of Queensland bioregions" (Borsboom, 2000). For example, in the South East Queensland bioregion, 81% of 131 rare species are represented in protected areas, and 70% of 99 threatened species. The figures are worse for the Wet Tropics where 67% of 284 rare and 35% of 79 threatened species are in protected areas.

Clearly there will have to be conservation on private land, not only to protect species and ecosystems, but also to buffer smaller conservation areas and to reduce the cost of the protected area system.

Gold Coast City Council has addressed rate relief, by way of a Voluntary Conservation Scheme offered at "general" and "higher" levels. Under the higher scheme, which gives permanent protection, the rate relief could be up to 100%.

Land Tax

Land Tax is a State tax levied on the total UCV of all land owned by an entity in Queensland (other States have a similar system). There are a variety of exemptions, notably for one's principal place of residence and for land used for primary production. Because there is a statutory deduction of $200,000 for individuals (less for companies and trusts), it means that the average member of the public never has to think about land tax. In fact it is unusual to find someone who understands the issue.

The exemption for principal place of residence means that no land tax would be paid by someone with a $2M home on a $3M fabulous block of waterfront land, however a modest residence on a $500,000 larger block of rural land would be subject to land tax, even if set aside for conservation, because conservation is not an exempt use.

Land used for primary production is exempt, even though that use is not "locked in", allowing the unscrupulous to "farm" even though the purpose is to hold the land with reduced costs until more profitable for development. The message at the moment is that its OK to flatten the vegetation and grow cows or bananas or some such thing, that will be land tax exempt, but to set the land aside for conservation leaves one in the position that land tax may have to be paid on that land.

Sporting and religious bodies are exempt from land tax, the argument being that these bodies act for the public good or provide a public benefit. Clearly the same can be argued for land set aside for conservation, particularly as I have shown that an individual holding such land has already made a considerable financial sacrifice.

The tax starts as a low rate, and builds to 3.3 cents in the dollar, then drops to 1.8 cents. My council general rate is .02643 cents in the dollar, so land tax when it cuts in it is substantially higher than the general (council) rate.

Costing exemption

Quantifying the cost is a little bit difficult but I will try.

The first method is to look at all existing Nature Refuge Agreements and see what land tax is being paid there. Its only a guess but I expect none or very little. Unfortunately this doesn't tell us anything about those who don't have a NRA.

The second method is to case study an area, identifying all land which it would be desirable to have protected, then calculate the revenue loss if every identified owner were to sign up. Of course the land tax can only be calculated by looking at each owner's situation, it isn't as simple to work out as council rates are. Gold Coast has identified 240 blocks which it would like to have in its VCA scheme and this could be the basis for such a study.

The third method is to juggle the figures a bit and ask a few "what if?" sort of questions.

Queensland's area is about 172 774 000 ha of which 4% is protected area or 6 911 000 ha. Some 18% or 31 099 00 ha is freehold. Some 75.5% is leasehold. Last year land tax raised $224M.

Our property's UCV is $85,000 and area of 108 ha. If all conservation land were similarly valued and if it were paying land tax at the maximum rate of 3.3 cents in the dollar, and if we

were prepared to sacrifice 10% or $22.4M of the land tax income for conservation purposes, then some 862 000 ha of land could be set aside. This is substantial.

However if only one owner in twenty were actually liable for land tax and if their average rate were 1.03 cents in the dollar then more than 55 234 900 ha could be set aside for conservation. However there is only 31 099 000 ha of freehold land in Queensland!!

Clearly the cost of land tax exemption for conservation land is likely to be small, that cost will only gradually be incurred as owners take up conservation, and also it is an income foregone and does not need to be budgeted each year. Government must move with the times and encourage conservation on private land, at the least to shelter owners from a State tax when that owner is providing a public service.

Conclusion

The land tax exemption is one measure which must be implemented to spread the cost of private nature conservation across the community. The cost to the State is likely to be very small.

The fact remains that at the moment clearing, grazing etc of one's land for primary production entitles one to exemption from land tax, but providing a permanent conservation reserve does not.

Recommended reading

Binning, C. and Young, M. (1999). *Conservation Hindered - The impact of local government rates and State land taxes on the conservation of native vegetation.* National Research and Development Program on Rehabilitation, Management and Conservation of Remnant Vegetation - Research Report 3/99. This report is available from Environment Australia.

References

Borsboom, A. "Conservation with current landuse" in Playford, J. and Murray, R. (2000) *Threatened Plants Active Bushcare*, The Centre for Conservation Biology, The University of Queensland.

Nature Conservation on Private Land - Where Does it Fit?

Sally Stephens, Bush for Wildlife National Coordinator, 11 Finn Street, O'Connor, ACT, 2602.

Recognition of biodiversity loss is not new

For example:

1795: Governor Hunter prohibits the felling of cedar trees on public land along the Hunter River in order to stop them being 'indiscriminately cut'.

'The protection of the continent's native fauna and flora, pollution of its rivers, degradation of its pastoral lands were all major issues in the colonial era'.

[Quotes from Bonyhady, T. 2000. The Colonial Earth. Melbourne University Press, Melbourne.]

1892: Hamilton, Royal Society of New South Wales:

'Probably one third of the total forests have been swept away since the colony was founded'.

In their place 138 species of introduced plants were well established and spreading.

Nature conservation on private land

This paper will revolve around five basic questions:

1. What is nature conservation on private land?
2. Why do we need nature conservation on private land?
3. What do we have to support private land conservation?
4. What are some of the constraints and impediments to private land conservation?
5. What do we need for effective private land conservation?

What is nature conservation on private land?

7% of Australia's land mass is designated as public National Parks and reserves, and 60% of Australia's land mass is 'private' land (includes freehold and Crown leasehold). Logically, nature conservation must occur outside the reserve system.

Private landholders can:

- Retain and conserve remnant vegetation and wildlife habitat on their land;
- Rehabilitate degraded habitat; and
- Re-establish habitat, and expand existing habitat.

Volunteers and community groups can:

- Generate and participate in conservation activities on public land (such as that managed by local councils, public reserves, schools, riparian areas, coastal areas etc).

Businesses, corporations and commercial landholders can:

- Manage their own land for conservation, improve EMS; and
- Contribute to conservation management of public land by supporting volunteer groups, sponsorship, publicity etc.

Non-government organisations can:

- Support conservation management by covenants; and
- Purchase land, raise funds, raise awareness, lobby.

Governments can:

- Support conservation outside the formal reserve system - financial and non-financial;
- Improve incentives, remove impediments; and
- Provide leadership, information transfer etc, to improve effectiveness within the State and nationally.

Why do we need nature conservation on private land?

Private and public land can:

- Contain valuable areas of native vegetation;
- Provide suitable habitats for many species;
- Link patches of habitat across the landscape;
- Reduce isolation of populations (plant and animal); and
- Act as 'safety nets' in case of declines elsewhere (for example, as a result of over-clearing, disease, fire, drought).

Values to wildlife and biodiversity

Conservation reserves are scattered and separated:

- Alone they cannot conserve all our species and ecological communities;
- Some species are isolated from populations elsewhere - isolation and inbreeding can lead to extinction; and
- Many species and ecological communities only occur outside reserves, often on private or public land (e.g. agricultural land, or on public land such as that managed by local government such as roadsides, commons, council reserves, cemeteries, stock routes).

Benefits to the landholder

Retaining natural vegetation plays a major role in sustainable agriculture, assisting:

- Erosion control;

- Salinity and soil acidity control;
- Pest control;
- Soil health; and
- Crop and stock production.

Natural systems provide many things we take for granted, such as clean air and water and healthy soils.

Incorporating nature conservation into property management

Even if landholders do not want to commit land to conservation management, particular management practices can enhance the conservation values of their property. Some simple suggestions are offered below.

Some suggestions from Land for Wildlife (Vic):

- Retain and protect remnant vegetation;
- Allow leaf litter, fallen logs and branches to accumulate in habitat areas;
- Fence areas near native bush to allow regeneration;
- Restrict livestock access to stream banks;
- Fence natural wetlands;
- Leave river snags in place for fish and invertebrate habitat;
- Protect dead trees with hollows;
- Plant local native trees, shrubs and grasses;
- Construct a wildlife dam (with an island, shallows and natural vegetation); and
- Control pets, environmental weeds, rabbits and foxes.

What do we have to support private land conservation?

Several schemes exist, supported by State Government agencies, non-government conservation trusts, local government, community groups, and partnerships. This might appear as a disconnected maze of schemes, especially when one looks nationally.

Queensland:

- Land for Wildlife;
- Nature Refuges;
- Management Agreements; and
- Voluntary Conservation Agreements.

Table 1. Schemes supporting nature conservation on private land – Queensland.

Scheme	Assistance
Land for Wildlife (QPWS, local government & community groups)	Regional and local staff. Property assessment, technical advice and notes, newsletters, field days, links with other LfW members. Non-binding (no fixed period). Sept 2001: 1353 properties (+ 304 'working towards registration). 143,969 ha habitat.
Nature Refuges (QPWS)	Regional staff. Property assessment, management advice, some funding. Volunteers conduct flora and fauna surveys. Agreements vary; most are permanently binding. Sept 2001: 63 declared, 11 awaiting declaration. 35,100 ha. 16 in negotiation. 163,480 ha.
Management Agreements (QPWS)	Similar support to Nature Refuges. Not binding on title. Focus on high conservation sites. Sept 2001: 4 properties. 34,783 ha.
Voluntary Conservation Agreements (VCAs) (local government)	Brisbane, Ipswich, Gold Coast, Johnstone, Cooloola Councils; others starting. Technical advice; assistance with vegetation management plans; some cash management assistance; links to other owners; training and field days. Agreements binding for agreed period (can be permanent).
Total area protected: 377,332 hectares (excluding Council VCAs).	
Total permanently protected: 198,580 hectares (excluding Council VCAs).	

Other States and Territories:

- Land for Wildlife;
- Voluntary Conservation Agreements;
- Conservation Covenants;
- Heritage Agreements;
- Property Agreements;
- Private Forest Reserves;
- Protected Areas on Private Land;
- Sanctuary Scheme;
- Wildlife Refuges;
- Conservation Management Network; and
- Remnant Vegetation Protection Scheme.

etc.

Plus land purchase, covenanting and selling-on (Revolving Funds - e.g. Trust for Nature, Vic).

Plus land purchase by non-profit organisations (e.g. Australian Bush Heritage Fund).

Plus land purchase by private organisations (e.g. Earth Sanctuaries).

Plus grants from Commonwealth and State agencies for conservation works.

Table 2. Schemes supporting nature conservation on private land - National.

Scheme	Assistance
NHT Programs - e.g. Landcare, Bushcare, Endangered Species, Wetlands, Rivercare, Coastcare, Waterwatch.	Grants available to incorporated community groups, such as Landcare Groups.
Private Protected Areas NHT National Reserve System Program.	NRS assists purchase of land of significant conservation value. For incorporated community groups and local governments.
Indigenous Protected Areas NHT.	To assist indigenous landholders to establish and manage protected areas on their land.
Remnant Vegetation Fencing Incentive Scheme (Greening Australia).	Funds for fencing remnant vegetation; technical and management advice (NSW, Tas, Vic, Qld and ACT). In Vic, some managed by Trust for Nature.
Grassy Ecosystems Grants (WWF).	Funds for on-ground conservation works in priority grasslands.
Threatened Species Network Community Grants (WWF).	Grants for on-ground actions for listed species. Advice and contacts for specialist help.
Australian Bush Heritage Fund.	Non-profit organisation; raises funds to buy land of outstanding conservation value. Donations tax-deductible.
Community Biodiversity Network.	Education, networks, databases, information, contacts. Encourages local involvement in conservation activities.

What are some of the constraints and impediments to private land conservation?

The Productivity Commission report (July 2001): 'Constraints on Private Conservation of Biodiversity' found that Commonwealth, State and Territory institutional and regulatory arrangements can impede conservation activity. The report focused on the issues noted below.

Land tenure

- More than 60% of Australia's land area is privately managed land (private freehold and private Crown leasehold land);
- About 40% of Australia's land area is private Crown leasehold land - mostly pastoral leases in arid and semi-arid rangelands;
- Legislation regulates provisions and conditions of pastoral leases; and
- No existing leases recognise conservation as the primary land use in the way that a pastoral lease recognises pastoralism.

Competitive neutrality

1995 Competition Principles Agreement (Commonwealth and State governments):

- Government businesses should not have competitive advantage over private sector competitors;
- Only applies to 'significant' businesses (does this mean telecommunications companies, for example?);
- No private sanctuaries are listed as 'significant'; and
- So private sanctuaries might not be able to 'compete' with publicly owned reserves.

Native wildlife regulatory frameworks

Increasing involvement by private conservation initiatives with conservation of wildlife:

- Each State and Territory has legislation covering conservation 'in the wild' and regulating taking, use and trade of wildlife;
- Regulatory frameworks and licensing systems are extensive, inconsistent and overly complex;
- Property rights for native wildlife not clearly defined; and
- Lack of consistent and coordinated approach (e.g. clearing applications might be approved, while applications to participate in wildlife management might be rejected).

Taxation

Some tax arrangements can create disincentives to private conservation efforts:

- Landholders who manage land solely for biodiversity conservation cannot access deductions available to those who undertake 'conservation type' expenditures on land used for commercial purposes, including primary production; and
- Donations of money to charitable organisations (and land donations > $5,000) are tax deductible. 'Donations' through conservation covenants are not deductible (however this is changing).

Tax deductions are available for income-generating costs. What about conservation costs that are not income-generating? Landholders might be forced into income-generation that conflicts with conservation goals.

Recent changes to taxation:

- Capital Gains Tax: will not apply to payments made for entering into a conservation covenant; and
- Income Tax Deduction will be allowed for any reduction in land value that results from entering into a conservation covenant (limited to accredited covenants).

What do we need for effective private land conservation?

The suggestions below come from discussions with landholders and extension officers. They are not in any order of priority or preference. All are important:

- Clear information, readily available;
- Integration of government efforts (reduced duplication, reduced confusion, gaps filled);
- Level of support recognises level of landholder commitment (e.g. permanent commitment, binding on land title, should receive more support than less powerful agreements);
- On-going support and contact to landholders managing for conservation;
- Local and regional extension network;
- Practical, relevant technical advice;
- Listening to landholders;
- Research and results to improve the integration of biodiversity conservation with production;
- Inclusion of biodiversity conservation components in Property Management Plans;
- Labour force for occasional and seasonal conservation management works (weed and feral pest control etc);
- Removal of tax and regulatory impediments;
- Range of options (LfW, permanent covenants etc);
- Inclusion of biodiversity into natural resource management and regional planning initiatives; and
- EQUALITY IN PARTNERSHIP.

Land for Wildlife

Carole Rayner, State Bushcare Coordinator, Queensland Parks & Wildlife Service,
PO Box 155, Brisbane Albert Street, Q, 4002.

The *Land for Wildlife* scheme is voluntary, legally non-binding and delivers useful and reliable information to landholders at no charge. The scheme provides recognition, information, education and contact between people with a common interest in nature conservation and aims to assist landholders to find solutions to management problems involving wildlife and wildlife habitat.

Land for Wildlife began as a property registration scheme in Victoria in 1981 and was expanded further in 1990. Currently *Land for Wildlife* is being developed in all other states and the Northern Territory. In 1998 the scheme was launched in South-east Queensland in conjunction with 11 local councils and NHT funding. In April 2000 other areas in regional Queensland commenced registering properties and 8 coordinators were employed, each funded by the Commonwealth Government's NHT program.

Aims

The major aims of *Land for Wildlife* are to:

- Facilitate landholders to voluntarily register their property and develop management plans;
- Assist landholders in protecting and enhancing areas of wildlife habitat;
- Conserve species and habitats that are presently not adequately represented in protected areas on public land;
- Reduce threatening processes such as erosion, salinity, weeds and feral animals;
- Provide habitat continuity across landscapes;
- Promote community participation in nature conservation; and
- Contribute to the ecologically sustainable long-term viability of agricultural systems by educating landholders of the benefits of ecological management of their properties.

Benefits

Land for Wildlife offers significant conservation and community benefits including:

- Recognition and support for land owners who take a positive approach to nature conservation;
- Peer support to land owners;
- A voluntary, non-threatening and non-binding approach to nature conservation;
- Ready access to experts and information on land management practices;

- Development of a database of off-reserve conservation areas;
- An increase in area of land managed effectively for nature conservation;
- Information to enable re-vegetation programs to incorporate wildlife habitat in their plans;
- Increases in the habitat of specific rare and threatened species; and
- An improvement in management of large areas of land at minimal cost to Government.

Participants receive a metal sign, quarterly newsletters and Wildlife notes, visits by extension officers and access to field days.

The program is delivered through a network of Regional Land for Wildlife Coordinators based in Cairns, Townsville, Airlie Beach, Mackay, Gladstone, Hervey Bay, Brisbane and Toowoomba. All these staff are funded or part funded through the NHT program. An NHT funded pilot program will commence in early 2002 in the Channel Country based in Longreach.

The program is also delivered through local Council staff. This is particularly so in SEQ where staff are employed as part-time LFW officers within local Councils. Some Council staff in Far North Queensland also assess properties for registration with the program. Many local Councils support the program financially or through "in-kind" contributions, use of vehicles, office support, photocopying, etc.

Recently staff from other organisations such as Greening Australia and WWF have assessed properties and undertaken other tasks associated with the LFW program. This cooperative approach is of benefit to all parties.

Sixty-one local Councils are supporting the program and over 1900 properties are registered. Total habitat managed for nature conservation is 228,714 ha within properties covering 288,926 ha (refer Table 1).

Table 1. Landholder registration for Land for Wildlife in Queensland at November 2001.

Region	Registered landholders	Working towards registration	Total retained habitat (ha)	Habitat under restoration (ha)	Total property area (ha)
Northern	143	2	146,317	135	147,290
Mackay/ Whitsunday	78	40	15,514	163	17,264
Wide Bay/ Burnett	150	13	33,366	1,254	60,651
Murray/ Darling	61	3	5,117	250	22,213
South-east Qld	1,150	264	28,400	1,085	41,508
Total	**1,582**	**322**	**228,714**	**2,887**	**288,926**

Land for Wildlife differs from most private land conservation programs in that registration is completely voluntary and non-binding on the property title. This can be seen negatively as providing no conservation security compared to programs such as Native Refuges, VCAs etc.

The non-binding nature of the program can also be seen as one of the program's strengths. Many property managers have been excluded from participating in on-going extension programs because their property did not "qualify" or they were reluctant to commit to a binding covenant.

Whilst properties registered with LFW may withdraw at any time, history has shown that very few do. In Queensland, to date, no property has been withdrawn due to lack of desire to continue participation.

The strength of LFW is that it provides an ongoing and regular extension service. Participants register in the knowledge that there will be no financial reward or any guarantee that they will be able to access any service or funds. Registration is based on the landholder's willingness to manage for habitat values, the value and/or potential value of their habitat and their future plans for the remnant.

LFW registration allows participants to obtain knowledge that will assist them to manage their remnant habitat more effectively.

Registration facilitates closer liaison with staff from local Councils, State Government departments and non-government conservation agencies. Closer liaison allows for relationships to develop and natural trust to prosper. Land for Wildlife introduces landholders to long-term conservation programs. Results from a recent survey of 500 LfW participants showed that 80% would or would consider entering into a more binding conservation agreement.

Improving land management

Membership of LfW in Queensland allows more than 1900 property managers to gain access to advice on land and wildlife management. The value of this advice varies naturally depending on the base level of knowledge of the member. Members of Land for Wildlife include museum curators, university professors and professional land managers. Information provided by the program may have limited value to these people (indeed their properties should be in good hands).

However the vast majority of members are from backgrounds other than nature conservation or natural resource management. These members, who control the bulk of the habitat, are the ones that the program needs to reach with good extension advice.

Recent survey results (n=262) indicate that 89% of respondents found LfW to be useful in helping them manage wildlife habitat. Seventy four percent stated that their management practices have improved.

LfW is an excellent example of applied extension that is having tangible results "on-the-ground". Feedback indicates that members are managing their habitats in a more informed manner. They are learning about weed management and about managing domestic animals. They are fencing remnants and planting corridors. They are accessing funds from other programs such as Greening Australia and catchment groups. They are networking with each other and with other workers in the conservation industry. They are talking to their neighbours and friends and importantly, they are feeling recognised for their efforts.

The challenge facing the program is to maintain the existing high standards and to increase the integration with other programs to ensure that the best value is obtained from the limited resources available for extension in Queensland.

Bushcare

A program of the Natural Heritage Trust

Integrated Native Forest and Native Pasture Management

Valmai Burnett, “Rathburnie Environmental Estate”, Avocavale via Linville, Q, 4306.

Credits

1. Crows Nest Shire Council - insight.
2. Queensland Environmental Protection Agency - the ideal agency to coordinate the work of various Departments, organisations and landholders involved in protection of the environment.
3. Bruce Boyes - for expert Conference direction.

Quotes applicable to conference

Biologist and environmentalist Emeritus Professor Rene Dubos wrote in “A God Within”:

> We do not live ON planet earth but WITH the life it harbours and WITHIN the environment that life Creates.

God, the Creator, in the 4th Commandment enjoined us to “Remember the Sabbath, and keep it holy”. The Sabbath was the seventh age when the world was a Garden of Eden - a world in ecological balance.

Location

“RATHBURNIE” - an Environmental Estate so named by Justice Murray Wilcox when President of the A.C.F. as one “on which economic farming practices are conducted with minimum ecological impact” - 1700 acre hill property with flats on Avoca Creek and irrigated flats on the Brisbane River below the junction of Cooyar Creek.

Prior to retirement - running 300 Angus breeders. Turn-off - prime yearlings and surplus organically grown lucerne hay. Property now subject to long-term lease and covenants, with exception of 40 acres adjoining homestead retained (improvements including farmhouse and cottage are situated on leased property).

Background

Before starting

I point out that “CELL” grazing is a form of “PULSE” grazing explained by Botanist Dr. Christine Jones (Jones, 2000). Not "SPELL GRAZING" of NATIVE PASTURES to which I refer.

Purpose speaking

To address BIODIVERSITY RECOVERY not BIODIVERSITY DEVASTATION.
Increasing awareness of an economic and sustainable balance achieved between:

Native Forest
Native Pasture
and
Biodiversity

Experiences

- Aged 74, grew up overlooking lower Brisbane River at Sherwood;
- Worked as Assistant to Senior Research Officer at CSIRO Cooper Laboratory at Lawes and St Lucia;
- Met Graham Burnett at cattle sale adjoining Emu Creek, discussed introduced grasses he had trialled for CSIRO;
- Married in 1952;
- Worked outdoors since then - all aspects farm, cattle husbandry, farm office and home, and cared for aged relatives until their death; and
- Travel 1970-1990 worldwide with Angus World Forum Tours, International Park Tours, other groups and alone.

History

With no family and siblings, I endeavour to fulfil Graham's hopes for “Rathburnie” which is bequeathed to WORLD WIDE FUND FOR NATURE AUSTRALIA in trust to make it available for “research, demonstration and education into integrated ecologically and economically sustainable farming practices”.

Graham - born in 1910 at “Coleaster” on Emu Creek at Colinton - had a unique affinity with the land over which he roamed barefoot (without his Mother’s knowledge) as a child.

This affinity is best described in the words of author Di Morrissey: “In Aboriginal lore - the place where you are born is where your spirit lives - a sacred Dreaming Place. It is a place of belonging, of being one with the land. A place where knowledge, peace and joy are found.” It exerts a PULL ON THE SPIRIT AND SOUL always to return to the “Heart of One’s Dreaming”, and Graham's grave is on a hilltop on “Rathburnie”.

This spiritual pull which - to his parents’ dismay - made boarding school intolerable but sustained him through the years he was a POW taken prisoner on the beach at the end of the Greek campaign.

Land management -Brisbane River Valley

These years away from his beloved country opened his eyes to the degradation that had occurred during his absence - not so obvious on a day-to-day basis to those remaining. Early explorers described the soils as friable and peaty. The forest meant all open grassy woodland with widely spaced trees you could gallop a horse through. His parents had recounted the management practised by the grazing Estates founded in the 1840’s in the Brisbane River

Valley; and in 1900 this was confirmed by John Cameron, MLA of “Kensington Downs” in a Report for the AMP Society published on 7/4/1900.

By 1900 Colinton Estate of 44,000 acres - including its Avoca Freehold portion on which “Rathburnie” is situated - had all been cleared by Aboriginal employees, with the exception of 3,000 acres on the tops of ridges. It had been stocked with sheep and cattle and burnt regularly so the original Kangaroo or Mountain Oat Grass had been severely depleted; and less desirable Spear Grass (whose seed is fire tolerant) had invaded the native pastures and made it impossible to continue to run sheep.

This form of introduced "LAND MANAGEMENT"! continues to this day with resultant degradation of our land - the basis of all wealth and our NATIONAL ESTATE. This week we see devastation of thousand of acres of land by hot fires lit by misguided landholders seeing a “cool burn” after long-awaited rains without any preparation of fire-breaks to confine raging fires to their own properties or any concern for the lives of volunteer fire fighters, livestock, fencing or BIODIVERSITY.

Their justification - the Aborigines burnt! The Aborigines told Graham’s father they burnt small patches at the close of winter when the cold nights put the fires out. This is a vastly different country from that the Aborigines knew - hard-footed animals, fences, cultivation and wild fires have changed it dramatically in just 200 years of so-called “Land Management”. It was a Garden of Eden - a land in ecological balance. CRY THE BELOVED COUNTRY!

One solution

1. Native pastures

About 1960 Graham put a mob of weaners into a fenced-in band planted to exotic pines where the native grasses had grown up, seeded and fallen over for several years. These young cattle - the fussiest of eaters - ate the long standing seeded grass and the mulch build-up beneath to bare earth. The earth was quite moist and friable as this mulch (or litter) was slowly being incorporated by the soil microorganisms into the soil humus (or compost).

Since 1960s he excluded fire from “Rathburnie”, burning firebreaks around perimeters in July from bulldozed fence line maintenance tracks. Obviously burning or overgrazing leaves no plant and little animal residues as litter on the ground to provide the soil biota (nature’s ploughmen) with food to produce the humus in living soil.

HUMUS - the most important natural resource on earth - is what we in Australia have squandered over the past 200 years. Without humus content, living soil becomes dirt or even dust. It is the base of the PYRAMID OF LIFE. Mankind is at the apex and if the base of that pyramid goes - so do we.

HUMUS:

- Increases soil fertility;
- Provides the soil porosity needed to enable plants to obtain oxygen to utilize that fertility; and
- Improves the moisture holding capacity of the soil thereby increasing effective rainfall and feeding streams all year round.

On an undeveloped bullock paddock purchased during the depression and with only a bank guarantee from his father, Graham could not afford to de-stock and allow plant residues to build up after his return from the War. He also saw that even low stocking rates depleted the most nutritious grasses and legumes selectively grazed by stock.

He decided to graze the NATIVE PASTURE PADDOCKS on a SPELL GRAZING SYSTEM - whereby ALTERNATE PADDOCKS WERE SPELLED DURING THE PREVAILING WET SEASON for two successive years in every four to allow native pastures to set seed before the cattle were allowed to return. The other alternate paddocks provided adequate feed during the wet months but ended up shorter and less dense at the end of autumn, thus providing a form of fire control.

Settlers had "mined" the HUMUS built up over centuries by burning to get a "green pick" for protein in early spring. In the early years this worked; but as the moisture-holding capacity and fertility of the soil HUMUS was depleted, the response become less and less. We now have man-made droughts and scorched earth through fences with good grass cover and green base on road reserves where fires have not destroyed the wildlife corridors that roadsides provide.

I quote from Graham's article in "Plant a Tree" in 1984:

> There has been a gradual change in the composition of native pastures. As the moisture-holding capacity of the soil improves and its fertility and stability increase, there follows an increased diversity of species. A greater content of softer native grasses and legumes has completely covered the ground. Spear Grass - whose seed is fire tolerant - has reduced.
>
> Native fauna has started to re-appear.
>
> It must however be emphasized that although burning can be stopped immediately, initial progress in restoration of the soil micro-organisms and ultimately soil fertility is slow but gradually increases.

Patrick Francis, writing in the October 2001 "Australian Farm Journal" under the heading "PASTURE - TOO MANY PASTURES FAILING LIVESTOCK AND THE ENVIRONMENT":

> There seem to be fewer incentives to look beyond the plant and animal factors to incorporate SOIL HEALTH into the equation.
>
> Why then is southern Australia grazing land so threatened by dryland salinity, acidity, low water holding capacity, lowering soil organic matter and decreasing animal and plant BIODIVERSITY?
>
> Blaming tree clearing is not the answer as Dr. Christine Jones pointed out in her series of articles in the "Australian Farm Journal" earlier this year.
>
> Issues that need to be related to grazing management are... the role of plant litter in protecting soil organisms in enhancing soil organic matter, soil carbon and water holding capacity to ENHANCE BIODIVERSITY AT A MICRO AND MACRO LEVEL with subsequent benefits for plant disease control and wildlife in general in controlling water quality, soil erosion and nutrient run-off.

Dr Steven Morton, Chief of CSIRO Sustainable Ecosystems, is quoted in the Resources Section of the last Weekend Australian under the heading "SCIENCE TRIES A RADICAL TACK ON SOIL PROBLEMS":

> Farming in Australia - the application of European methods to this continent, with its variable rainfall and shallow, ancient soils often underlaid with salt - is in effect a 200-year experiment.

He said scientists have been good at documenting ecological problems:

> For 50 years, we in Australia have been analysing, describing and quantifying the decline in our land resources and our biodiversity. Now, after 50 years of that R & D investment, we are still seeing a decline. We have to turn around and ask a hard question of ourselves: why is the work we have been doing for these decades not making enough difference?

Dr. Morton said:

- His Division is striving to put science into a social, economic and community context;
- The solution starts with partnerships, with resource users such as farmers, and community groups, non-government organisations like Greening Australia and even other divisions of CSIRO; and
- The first step alone is a huge challenge, given the comparatively low uptake of research findings by farmers.

Those quotations were written this month. It has taken decades for Graham's ideas to even be considered. WHEN WILL THEY BE ADOPTED?

2. Native forest regrowth

Graham then turned his attention to the integration of grass management and timber production from REGROWTH of native forests.

With about 1000 acres of hill country, timber regeneration had thickened as fire stimulated the seed germination, significantly reducing grass production and limiting light for sweet grazing and moisture available to grass.

> "TOO MANY TREES make a property economically unsustainable whilst also limiting mill and fence timber production."
>
> "TOO MUCH CLEARING renders the property unsustainable, both ecologically and economically in the long run."

REGROWTH must therefore be sustainably controlled preferably by harvesting unwanted timber for pulp, wood chips, ethanol production being trialled now from ligneous cellulose etc. and by using "Glyphosate" rather than "Tordon" which penetrates the soil and water table. Graham found people sent to control this regrowth were deadening valuable trees despite clearly set out guidelines; and stopped the work accordingly until such times as we see TRAINED SUPERVISORS AND A CONSERVATION CORPS become available.

There is a huge overlooked potential in NATIVE FORESTS where REGROWTH already sequesters carbon fastest between 10 and 20 years of age. But in Queensland to date there are no restrictions on deadening REGROWTH, whilst owners of "OF CONCERN" forests - often

mostly regrowth as is the case on “Rathburnie” - are penalised by controls and expense; and incentives are paid to establish PLANTATIONS - a form of monoculture not of biodiversity.

By culling the non-productive sector of a NATIVE REGROWTH FOREST to a density of 80 stems/hectare with consideration to retain young stems to replace trees that are harvested or retained for wildlife and biodiversity or die naturally so that there is a constantly developing understorey, CSIRO has demonstrated in a Narrow-leaf Ironbark and Poplar Box woodland at Kingaroy that this density has a negligible effect on biomass production plus the benefit of timber trees.

Dr. Kerrush (Formally Principal Research Scientist with CSIRO Forests) and Sean Ryan (Native Forest Officer, Gympie DNR) write and believe an economic return and greater incentives to maximise productivity could ensure sustainability of our native forests. Bloemfontein Research Station proved over decades the increased carrying capacity of 50-80% could be achieved by SPELLING PASTURES during a prevailing wet season.

Graham Burnett believed that INTEGRATED SPELL GRAZING & TIMBER THINNING OF NATIVE FORESTS as I have outlined was the way to go both economically and ecologically; and Dr. Joe Baker OBE Chief Scientist with DPI with whom Graham discussed his plans for “Rathburnie” when Dr. Baker was a WWF trustee, has recently written to me:

> I hope you do not become too disheartened because I remain convinced that what you are trying to do is the proper way for landholders to PRACTICE SUSTAINABILITY IN THE FUTURE.

Conclusion

The Brisbane River and its tributary Emu Creek have played quite a role in my life, and now at this Conference held by the Southern Queensland Biodiversity Network and Crows Nest Shire Council on the upper reaches of Emu Creek, I should like to stress that the BRISBANE RIVER is important to our State Capital and should take next precedence after the Murray/Darling basin.

I am too tired and too old to carry on to bring Graham's foresight to reality.

I would like to invite those present here to take up the challenge and perhaps utilize “Rathburnie” and its adjoining well-equipped Lions Camp Duckadang established on the edge of “Rathburnie” on an old Aboriginal campsite proven by the presence of middens. Graham hoped this 75-person camp would be both an environmental education and recreation complex bringing the city and the country together in understanding of the importance of BIODIVERSITY to us all.

Resolutions proposed

1. SOIL MICRO-ORGANISMS. The first concern of this Biodiversity RECOVERY Conference should be THE RECOVERY OF THE BIODIVERSITY OF THE SOIL’S MICRO-ORGANISMS (the soil biota) on which all living organisms above ground level depend. (In healthy living soil the soil biota should weigh the equivalent of the weight of 5 sheep/acre grazing above.)

2. REGROWTH TIMBER. The overlooked potential of Native Forest Regrowth if properly thinned to allow timber production and grass production should be written into

Vegetation Management Legislation to permit RECOVERY OF THE BIODIVERSITY OF LIVING ORGANISMS ABOVE AROUND LEVEL.

3. FIRE MANAGEMENT. Research is needed into optimum fire management to ensure biodiversity is restored NOT devastated by indiscriminate burning-off of native pastures and native woodlands under the misguided land management practices over the past 200 years. (The permit system is unsatisfactory - It is difficult to police or to prove who actually lit the fire. Perhaps legislation ensuring landholders are liable if firebreaks are not in place by the end of July each year could be investigated.)

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Protecting Biodiversity - Using the Best Available Science

Keynote Presentation

Sean Hoobin, Queensland Murray-Darling Officer, World Wide Fund For Nature

Protecting Aquatic Biodiversity - Using the Best Available Science... and Taking Precautionary Action

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The water allocation process in the Queensland Murray-Darling Basin has been strongly criticised as lacking sufficient science - both hydrologically and environmentally. Environmental flows are seen as a key process to ensure the health of the aquatic ecosystem. But what sort of environmental flows are required and what other catchment impacts, such as land clearing, need to be managed to ensure that our rivers, and the flora and fauna that depend on them, will survive?

This paper addresses the strengths and weaknesses of the current information on defining aquatic ecosystem health and the key actions that impact upon it. The crucial question "How do decisions get made without full scientific certainty existing?" is discussed. The paper finally looks at what improvements need to occur so that the community can be assured that government decisions on environmental protection are backed up by strong science.

The World Wide Fund For Nature Murray-Darling Basin Program

World Wide Fund For Nature (WWF) aims to conserve nature and ecological processes by:

- Preserving genetic, species and ecosystem diversity;
- Ensuring that the use of renewable natural resources is sustainable both now and in the future; and
- Promoting actions to reduce pollution and the wasteful consumption of resources and energy.

WWF's ultimate goal is to stop, and eventually reverse, the accelerating degradation of our planet’s natural environment, and to help build a future in which humans live in harmony with nature. WWF is active in 96 countries and has 4.7 million regular supporters.

The WWF Murray-Darling Basin (MDB) Program focuses on mitigating the main pressures threatening biodiversity and agriculture:

- Poor water management;
- Poor vegetation management; and
- Dryland salinity.

The MDB Program works at a number of levels:

- Local/site/species level;
- Regional/catchment scale; and
- State and National levels.

WWF's vision for the Murray-Darling Basin is:

> WWF aims to ensure the long-term ecological, social and economic health of the Basin through conservation of the Basin Is biodiversity -comprising species, habitats and the ecological processes that sustain them in the catchments of the Murray and Darling Rivers.
>
> This will be achieved through strategic interventions that facilitate and support social and economic research, develop model projects, implement select community-based activities, campaigns, advocacy, and information sharing.

The Queensland MDB Officer promotes:

- Environmental flows which are sufficient to protect aquatic ecosystem health;
- Water efficiency adoption which also returns water to the environment when needed or adverts the need for further dams or weirs;
- Farm practices which decrease water use and water pollution;
- Catchment scale planning to ensure that aquatic ecosystem health is protected and enhanced; and
- The use of economic tools which encourage sustainable use of natural resources (full water pricing, trading, removal of subsidies which assist environmentally damaging practices, economic valuation of the environment).

Murray-Darling Basin biodiversity

The Murray-Darling Basin encompasses a diverse range of environments from alpine to desert. It has a large proportion of the nation's most threatened species and ecological communities and contains many Ramsar and World Heritage sites.

The MDB is identified as a WWF Global 200 region, mainly because of its high diversity of flora and fauna. The Global 200 regions have been identified by WWF as the most significant areas of biodiversity in the world today. WWF's aim is to conserve a comprehensive representation of the world' s habitats. So, WWF focuses its work on 200+

ecoregions, all identified as biologically rich, biologically at risk, or both. This way, we can conserve the broadest range of the world's species and most endangered wildlife, as well as the ecological and evolutionary processes that maintain the web of life.

Threats to MDB biodiversity include:

- Dams;
- Tree clearing;
- Salinity;
- Land degradation;
- Invasive species;
- Water pollution; and
- Water extraction.

A case study: Science and river health in the Condamine-Balonne

The Condamine-Balonne catchment, located at the top of the MDB, has evoked controversy in recent years and illustrates the challenges that need to be addressed to protect aquatic biodiversity from the impacts of water extraction.

Organisms need water to exist. However, medium annual flows from the Murray-Darling to the sea are only 21% of natural flows. In Queensland, water has not been extracted to the same extent, but catchments such as the Condamine-Balonne are heavily extracted with flows to Narran Lakes at the end of the system down to 25% of natural medium annual flows.

So how much flow is enough? Intuitively you would think that having less than a quarter of natural flows in the system is too little, but some people in the Condamine-Balonne dispute this. So what are ecologically sustainable extraction levels? How much water needs to be put back to ensure the ecosystem can remain healthy?

The Technical Advisory Panel (TAP) for the draft Condamine-Balonne Water Allocation Management Plan (WAMP) advised the Queensland Government how much water needed to be returned to the environment, however in the draft WAMP the Government only proposed to return a small proportion of this.

Irrigator groups in the Condamine-Balonne catchment have attacked the scientific basis of the draft WAMP. Reporting on the results of a legal challenge, Country Life newspaper ran the sensational headline “QLD’S WATER CHAOS...WAMP’s fatal flaw exposed”. The basis of the claim was that there was no quantitative relationship between flows and ecosystem health and that some of the biodiversity testing had not been done properly. The reality is that the TAP’s report recognised these ‘flaws’ up front and the court case revealed nothing of substance.

The TAP advice came from expert opinion. The TAP report stated:

- There is limited data describing the interactions between flow and ecology;
- To fill the existing knowledge gaps professional opinion can be used as the source of the best scientific information available; and

- The expert panel approach relies on the combined knowledge and experience of a multidisciplinary panel of professional scientists - it is the main method which has been used to determine environmental water requirements.

What needs to be known? Measures of river health need to be developed. For cost and efficiency reasons this will most likely be in the form of indicator species. Methodologies need to be developed which can link health drivers such as flows, and also others like water quality and tree clearing, to these health indicators.

The Queensland Government is undertaking a project to develop linkages between indicators of river health and catchment scale influences. Data collection and analysis is currently occurring in the Condamine-Balonne. However, the study outcomes will not be applied for some years and decisions need to be made now on the best available information, which is incomplete.

The TAP has stated that decisions need to be made now without full scientific knowledge:

> Because of this uncertainty ... the "Precautionary Principle" should be used when establishing suitable flow strategies ...(this) requires that a suitable "ecological safety margin" be implemented - water resource development being confined for the time being to relatively conservative levels.

Many irrigators are saying that without full scientific certainty decisions to control licences should not occur. The options are either foolhardiness or precautionary action:

- To continue with business as usual, allowing significant further water resource development, and hope the experts have got it wrong and the result won't be a significant decline in catchment health and biodiversity; or
- To hold off on major water resource development until the effect of this are known.

Precautionary action

The Water Act states "if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation". Serious or irreversible environmental damage is apparent in the Condamine-Balonne, so what would taking precautionary action mean?

These decisions do have social and economic consequences. This is the very reason irrigators are opposing allocation controls. Precautionary action needs to be taken but done so as not to have an unfair impact on people's lives. It needs to be remembered, however, that healthy rivers are essential for the survival of rural businesses, as farmers are finding out in the southern States. Allocation controls bring economic sustainability.

In an over-allocated catchment further water extraction should not be allowed. This should include restrictions on developing existing licences. If this is insufficient to ensure the ecosystem has enough water, measures should be put in place to return water to rivers whilst not impacting on production viability.

Precautionary action - controls

Licences that have not been developed, or have been only partially developed, should be controlled. There is little sense in allowing businesses to develop all of the infrastructure to

use their allocations if in ten years time it will become redundant when the science shows conclusively that water needs to be returned to the environment. This would cause much greater economic hardship.

Precautionary action - efficiencies

Water efficiency programs should be used to allow current production levels to be maintained whilst also returning water to the environment. Currently the Queensland Government is funding water efficiencies in the Condamine-Balonne but all saved water is being kept for production. Pricing water at true cost would provide a further incentive for efficiencies, as efficiencies would decrease the costs of production.

Precautionary action - trading

The trading of water will allow operations to gain access to increased allocations, and will allow water to go to more efficient operations with higher value crops. A percentage of traded water should be returned to the environment - the buyer and seller both benefit from the trade and it is reasonable that they should share in the costs of maintaining a healthy productive river.

Conclusion

Governments need to commit to sustainable water extraction levels that leave enough water at the right time in rivers. To do otherwise and act contrary to the best available scientific advice is to consciously commit to environmental harm and the degradation of the natural resources upon which economic production relies.

Scientific research needs to be supported so informed decisions can be made in the future regarding water extraction and environmental flow requirements. Until this better understanding is reached, precautionary action must be taken. Further extraction must be controlled. Otherwise the problem when fully understood will likely be much worse.

To protect aquatic biodiversity we must use the best available science... and take precautionary action.

Maintaining the Biodiversity of Insectivorous Bats in Suburban Brisbane by Providing Artificial Roost Habitat

Monika Rhodes, Suburban Wildlife Research Group, Australian School of Environmental Studies, Griffith University Nathan Campus, Q, 4111.

Introduction

With more than 80 species, bats (Mega- and Microchiroptera) comprise more than 30% of Australian native mammals. More than half of Australian microchiropterans roost in tree hollows yet relatively little is known about their roost ecology. Smaller Australian Microchiroptera roost in mature, dead or declining trees. The abundance of these types of trees is being rapidly reduced as forest logging and suburban development progresses. These trees are crucial for bats as well as other native hollow-dependent arboreal mammals and birds. In South-East Queensland, 22 insectivorous bat species, various birds (e.g. parrots, lorikeets, cockatoos), marsupials (gliders, possums) and insects (wasps, bees) use tree hollows as roosts for individuals or colonies.

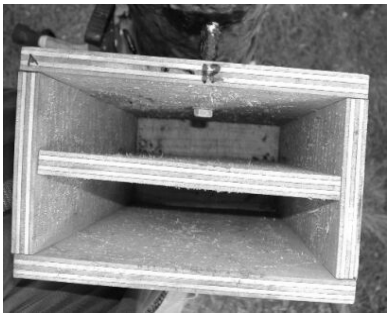
The aim of this study is to investigate ecology and conversation issues associated with urban wildlife. Brisbane is one of the largest and fastest growing urban cities in the world with the fastest rate of population growth of any region in Australia. This resulted in large losses of important vegetation across the region since 1974. The high rates of urban expansion in the region mean that there is continuing high pressure on the bats' contribution to local and regional biodiversity.

Recent research in Brisbane found mature eucalypt trees with bat colonies with an estimated tree age ranging from 200 up to 600 years. Unfortunately few of these old trees that may provide suitable roosts for bats and other arboreal vertebrates are available now in suburban areas due to vegetation clearance on private land, and trimming of old trees on public and private land. Part of my study aims to assess the effects of urbanisation on the roosting ecology of suburban bat species. In addition I assess the acceptance of artificial roosts (bat boxes) by insectivorous bats. In suburbia where old tree stands are limited, nest boxes may be the only source of hollows for wildlife populations and therefore could provide habitat which is essential for these species to persist in the area. Bat boxes have been proved to be very successful to attract insectivorous bats into cities or young plantations. In many countries, especially in Europe and in the United States of America, bat boxes have been shown to provide suitable roosts for many bat species, where roost sites became scarce. In Australia, however, the systematic use of bat boxes to provide roosts is at an early stage and literature and information about other bat box usage in Australia is virtually non-existent.

I sought people interested in being involved in a long-term bat conservation study by purchasing their own bat box to locate in their property. This media appeal was so successful that I had to soon limit the numbers of participants. To study the acceptance of artificial boxes by bats 40 bat boxes have been installed in over 30 gardens throughout metropolitan Brisbane. Additionally I installed different sized bat boxes with a range of entrance slits and internal volumes to assess the different roost requirements of different bat species. Six boxes varying in sizes and configurations have been mounted on five study sites, resulting in 30 boxes. Between 17/10/00 and 12/12/00 a total of 70 bat boxes have been installed.

Box type 1,2:
170Hx120Wx98D
15/12mm bottom
entrance slit

Box type 3,4:
430Hx205Wx98D
18mm front
entrance slit
360Hx205Wx98D
18mm bottom
entrance slit



Box type 5,6:
430Hx205Wx100D
15/12mm front entrance slit, double compartment

Results

Bat box monitoring started in January 2001. All boxes were checked every three to four months. The first boxes were used by bats within the first six weeks and by end of October 2001 25% had been used at some stage. Six individuals from two species (*Nyctophilus bifax* and *Nyctophilus gouldi*) were found roosting in boxes. No other bats have been found in any of the boxes, but the existence of bat scats as a proof of bat box acceptance is widely used by researchers.

Some of the bat boxes contained ant colonies, such as *Samponotus novaehollandiae*, *Pristomyrmex* sp., 3 different *Polyrhachis* species, and four other unidentified ant species. I removed these colonies by sprinkling talcum powder inside the boxes and by applying waterproof 'boat/marine grease' on the spacers between the box and the tree trunk. So far this method seems to deter ants. Various other species were found to inhabit the boxes, such as different species of huntsman: *Holconia immanis* (Grey Huntsman Spider), *Tyostola* sp. (Giant Green Huntsman), *Heteropoda jugulans* (Brown Huntsman Spider); *Valanga irregularis* (Hedge grasshopper), several cockroach species: *Cosmozosteria subzonata* (Barred Cockroach), *Blatella germanica* (German Cockroach), *Periplaneta australasiae* (Australian Cockroach), *Periplaneta americana* (American Cockroach), and (unidentified) geckoes (*Gehrya dubia* or *Hemidactylus frenatus*).

Except for the ant colonies I do not consider the other species as box excluders or competitors so I do not remove them from the boxes.

Conclusions

This is the first study of artificial roost sites in a suburban environment in Australia, and with the 70 mounted bat boxes, one of the largest worldwide. This will allow me to study the acceptance of artificial roosts by various bat species and also to study the microclimate and the importance of differing box sizes and configurations. This is very important as until now

there is still not enough information available as to why bats use some bat boxes over others. The acceptance of artificial roost habitats by bats can take up several years therefore I was pleased to find some boxes occupied within three months of mounting. Bat box monitoring will continue until end of 2003. This is important as roost acceptance needs time. Simultaneously the characterisation of bat box, its tree and surrounding area and the measurements of the microclimate of all boxes will be studied.

It is also necessary to understand which bat species of the 22 found in SE Queensland can be attracted by artificial roosts and are more likely to persist in a suburban environment on a long-term basis.

My PhD study is the first study on urban microbats in Australia. By combining the results at the end of my three-year study I aim to provide recommendations for bat conservation and management in suburban areas. Conservation issues resulting from my research in Brisbane may be applied to other suburban areas in Australia, especially the more populated cities such as Sydney and Melbourne.

Measuring the Restoration of Rainforest Biodiversity: A Case Study in Research Design, and its Implications for Establishing Monitoring Frameworks

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Monitoring and measuring effectiveness is an important component of scientific ecosystem management. We outline the design of a research program to examine the effectiveness of different reforestation styles for biodiversity recovery of rainforest in eastern Australia, and examine its implications for monitoring rainforest restoration in general. Monitoring programs need to be carefully designed to evaluate the effectiveness of the restoration against criteria that match the goals of the restoration program. Collaboration amongst practitioners with diverse areas of expertise is a good way to begin the process.

Introduction

Monitoring is the process of repeated assessment of the condition of a resource and is an integral component of adaptive management (Gill and Nicholls 1989, Lee 1999). Bosch *et al*. (1996) argue that monitoring can contribute to the adoption of more sustainable resource management practices if it is seen as an ongoing process within the context of adaptive management. While the world literature on measurement and monitoring of biodiversity recovery remains in its infancy, in recent years there have been reviews of appropriate methodologies to achieve cost effective monitoring programs for nature conservation (e.g. Margules and Austin 1991) and for particular biotic groups (e.g. Oliver *et al*.1999 for terrestrial invertebrates, Austin 1991 for plants). According to Oliver *et al.* (1999), assessment of biodiversity requires consideration of eight key components: the question, goal or purpose; the sampling design; the taxa; the sampling methods; identification; data management; analysis; and recommendations. These same components can be used to form the framework for a monitoring program.

As restoration plantings are dynamic systems, their progress towards recovery can be altered by management regimes. Every monitoring event should be a learning experience, which if necessary leads to changes in management actions for improved outcomes. Monitoring is most effective where goals or objectives have been set (Underwood 1989, Ehrenfeld 2000), and criteria established against which success may be judged (Webb 1997). Restoration plantings have diverse goals dependent on those who implement them.

Given the necessity of monitoring, what is the nature of its measurement? Measurement refers to size or quantity and a specific methodology. Here, an important consideration is the

intended level of accuracy and/or precision involved in the gathering of information in a monitoring program. At one extreme, monitoring may be simply the occasional checking of the site from a passing car window. Alternatively, it may involve a regular quantitative measurement of a range of variables based on detailed requirements of the restoration program against predetermined criteria. There is obviously a difference in cost and commitment in these two extremes. There is also a difference in the value of the information obtained.

In this paper we describe a set of survey methods that were developed within the "Biodiversity Values in Reforestation" project of the Rainforest CRC, in order to evaluate the effectiveness of different types of land cover in contributing to the maintenance or recovery of a site's biodiversity. We use a range of organisms that reflect the scalars operating within a site, and which are logistically suited to a fairly rapid assessment of restoration plantings from a biodiversity perspective (see McKenzie *et al*. 1996 and Pressey and Bedward 1991 for reviews of scale-needs in assessment). We do not suggest that the methodology outlined is the most appropriate for everyone's needs or for monitoring programs in general. However, we do argue that the processes undertaken by the team in developing this research program have important lessons for the design of monitoring programs. We conclude with some suggested directions for ensuring more effective use of survey and monitoring data.

The study

The Rainforest CRC (Cooperative Research Centre) is a multi-institutional, collaborative arrangement that links researchers from research organisations, universities and land management agencies. The approach adopted by the Rainforest CRC enables the initiation and coordination of research into many aspects of rainforest conservation and management. Within the Rainforest CRC there are seven programs, embracing a range of issues including Environmental Planning, Ecotourism, and Aboriginal involvement in research. The Rehabilitation and Restoration Program (Program 5) comprises three main research subprograms: biodiversity values, revegetation techniques, and socio-economic issues. Little work has previously been carried out to examine and develop techniques used for determining biodiversity values of restoration. The team therefore sought to use the initial two years of a seven-year-long study to gain an overview of the effects of rainforest retention, deforestation and reconstruction, by surveying the ecological characteristics of sites representing a range of land cover types in selected regions. While the methods used were inclusive of many components of biodiversity (see also McKenzie 1991), we confined ourselves to asking questions answerable through measurements within a unit sample area (quadrat or transect). The questions related to both pattern and process, and were intended to provide results that would guide the development of subsequent research questions.

The primary question for the initial phase of the research has been: "to what extent do sites that have been reforested using different methods recover the integrity of their biotic assemblages from a 'pasture' towards a more biodiverse, rainforest-like, state?" Careful attention to study design was required in attempting to answer this question due to the complexity of the biota and the specific nature of the available sites within the regions considered. The main body of this paper presents the questions asked by the team in the establishment of this research program.

Site selection

There is considerable variation in land cover types in the rainforest domains of eastern Australia. We chose sites within a tropical landscape (the Atherton Tablelands) and a subtropical landscape (southeast Queensland/ northern NSW). Both areas supported extensive tracts of complex notophyll vine forest (Webb 1968) prior to European settlement, which were almost totally cleared from fertile, level areas to make way for agricultural development. Both areas now have a variety of land cover types in the rural landscape and a decade or longer history of rainforest restoration practice by members of the local communities. Within each of these two areas at least four land cover types could be discerned which had as a goal (sometimes not explicit) some change from pasture towards tree cover. These are: ecological plantings, mixed species timber plantings, monoculture timber plantings and abandoned pasture sites that are regenerating through unassisted recruitment. The long history (over a century) of the use of indigenous rainforest trees in timber plantations gave the opportunity to provide an additional dimension to the study, that of time. The monoculture tree plantations used in our study ranged in age from five years post-establishment to over 60 years. Orchards and horticulture, which have an overriding production focus, were not considered within the study framework.

The number of sites including in a monitoring program will be affected by funding, the magnitude of the measurement task, and the ability to assess all sites in a timely manner (for comparative purposes). It will also be affected by the number of 'treatments' (or in this case land cover types) and the need to incorporate replication to encompass the background variability within each land cover type. This variation includes components due to differences in three major properties: site physical conditions (soil type, topographical position, etc.); specific details of reforestation (e.g. the exact nature of planting within any broad category); and normal spatio-temporal biotic patchiness (due to the unpredictability of occurrence of many plants and animals). Few field studies can be regarded as controlled experiments and almost all 'treatments' include considerable variation within them. Although desirable, it is frequently impossible to control the variation in a study. However, it may be possible to both understand the variation through replication of sampling sites, and also limit it as far as possible by standardising the environmental context of study sites and the specific sampling methodologies used.

Selection of reference sites

To monitor the 'success' of a restoration planting, it is necessary to select a set of reference sites against which progress can be judged. Preferably, these reference sites should include a number of sites representative of the pre-planting state (e.g. pasture) as well as a number of sites representative of the target state (e.g. intact forest). Having reference sites at both ends of the spectrum allows one to assess how far the restoration planting has come from the pre-planting state, and also how far it has to go to resemble an 'intact' forest system (assuming that this is achievable).

Reference sites should be chosen to match, as closely as possible, the particular combination of environmental conditions present at the restoration sites (i.e., the presumed pre-clearing forest type). This is important because the structure and biota of native forests often varies markedly with environmental conditions, and it is important to assess restoration plantings against an appropriate target. For example, to monitor the set of 35 reforestation projects in the tropical landscape, we located five reference sites in pasture and 10 reference sites in intact rainforest, matching, as far as possible, the soil parent material, altitude, and rainfall of

the reforestation sites: viz, basalt sites between 600 - 800 m above sea level with rainfall between 1300 - 2500 mm per annum. Our reference sites spanned some of the variation evident in intact forest across a local east-west rainfall gradient. We also used five reference sites in pasture and 10 reference sites in intact rainforest to monitor a set of 39 reforestation projects in the subtropical landscape. In this region, the reforestation projects were located on a variety of substrates, between sea-level and 400 m a.s.l., and with rainfall between 1100 - 2000 mm p.a. Consequently, we located reference sites in several different forest types typical of this range of environments (e.g., Araucarian vine thicket, complex notophyll vine forest).

Controlling for area and age

As the size of an isolated forest patch is likely to exert a significant influence on the biota within it (Laurance & Bierregard 1997), it is necessary to control for patch size when seeking information on the response of biota to other site attributes. In our study, this meant that we needed to ensure that measured differences in biota were due to land cover rather than being due to differences in patch size from different land cover types. We controlled as best we could for area, by choosing to sample only patches above four hectares in size. This threshold size was chosen for several reasons. First, we considered that below this size there would be a strong likelihood of fragmentation-related differences due to the penetration of edge effects (Murcia 1996, Laurance & Bierregard 1997). Second, this was the largest minimum size that we could feasibly set since most replanted sites were much smaller (often one hectare or less), and few were above 10 hectares. Third, this was the minimum size into which a unit sample area that could adequately measure a sufficient range of biota (including vertebrates) could be fitted. Patch shape may also be a determining factor, but since many replanted sites are linear and riparian, our only concession to shape was that the standardised sampling quadrat could be contained within the boundaries of the site.

Age of restoration planting is also likely to be an important determinant in species composition. It is desirable to begin monitoring as early as possible in the restoration process, preferably with controls and before any plantings have been carried out (hence a before-after-control-impact - BACI design - see Stewart-Oaten *et al*. 1986). However, our study had a limited lifespan of two years, and limited resources. Hence, as the next best alternative, we controlled for age of replanting. We chose sites that were of an age where canopy closure could be expected to have occurred within ecological style plantings at which there had been effective management. This is likely to have occurred by 5 years after replanting, and therefore we selected 5 years as the minimum acceptable age. We also sought to determine the position along the trajectory from pasture to rainforest for older managed monoculture stands. Hence, we also chose monoculture sites that were at least 40 years old.

Choice of target variables

Forests are complex systems and the choice of which components to measure to assess ‘success’ of restoration plantings is not easy. For example, should one survey the plants, birds, mammals, reptiles or invertebrates (above or below ground), or some other group? Which group or groups of invertebrates is likely to be most instructive for fine-scale pattern and processes in rainforest recovery? To what extent should we rely on species representation in the different vegetation layers within the restoration? What about forest structure (see Lindenmayer and Fraklin, 1997, Spellerberg and Sawyer 1997)? Soil condition? Pollination? Seed dispersal? Ideally, one should measure several taxa (as each may respond differently to restoration attempts), relevant structural variables and some important ecological processes,

as all these elements must be present and functioning in a similar manner to an intact forest system before a restoration planting can be called a 'success'.

In practice, the choice of target variables to measure is often a function of the available time, money and expertise (see Burbidge 1991). A basic yet still reasonably comprehensive survey might include floristic composition, birds and a few measures of forest structure. However, at the moment there is little evidence that such a stripped-down monitoring program would provide results that parallel those of a full program. If a good relationship does exist between taxa, more easily measured groups might serve as surrogates for other groups that are more difficult to monitor. Our study is also seeking to determine to what extent a few relatively easily measured taxa (or structural characteristics) describe the pattern and process of rainforest recovery for other groups and in general. If they do, then the task will become more manageable for sampling teams in future monitoring programs. If they do not, then the question shifts to "what is the minimum feasible set that should be measured?" and "s there a cost-effective way of monitoring each?"

The measurements that we chose were a compromise between what we considered important or desirable, what would be feasible within a rapid field sampling program (we needed to assess around 50 sites within a 4-6 week period) and the specific taxonomic expertise of the team members. After considerable discussion, the following variables were selected:

- Forest structure (including canopy cover, stem density, d.b.h., height classes, ground cover, woody debris, the presence of special life forms - e.g., lianes and epiphytes);
- Floristic species composition within each of three vegetation strata (canopy, midstory and ground story);
- Bird species composition;
- Reptile species composition;
- Invertebrates at a mixture of ordinal and familial levels (in leaf litter and on the ground);
- Soil physical and chemical parameters;
- Rates of decomposition; and
- Seed predation (removal rates from seed depots placed in the field).

Survey design and sampling regime

The survey design and sampling regime must adequately measure the target variables chosen for monitoring. For birds, this is likely to involve a number of surveys conducted at different seasons, in order to cover the migratory species. For reptiles, a warm, sunny period is optimal, while it may only be possible to adequately survey frogs immediately following heavy rainfall. If the goal of monitoring is to measure the progress of restoration over time, then surveys will need to be repeated at yearly or greater intervals. However, such surveys will only be informative if sufficient effort is expended to adequately characterise the state of the restoration planting in each time period. Where survey resources are limited this will lead to a trade-off between the effort per survey and the frequency of surveys. For example, it may be better to conduct a thorough survey every second year, than to conduct brief annual surveys. The results of surveys whose effort is not carefully planned are likely to be confounded, biased, or simply limited, by variation due to seasonal or climatic change, or natural irregular fluctuations. Thus, for frogs at least 8 sampling times during the optimal sampling period is considered necessary to provide a reliable list of species in a given site

(Parris *et al*. 1999). Consequently, before attempting to survey any group, it is necessary to be sure that sufficient time, funding, expertise and commitment are available to carry out the prescribed survey in the required manner at the required time to obtain reliable, repeatable data.

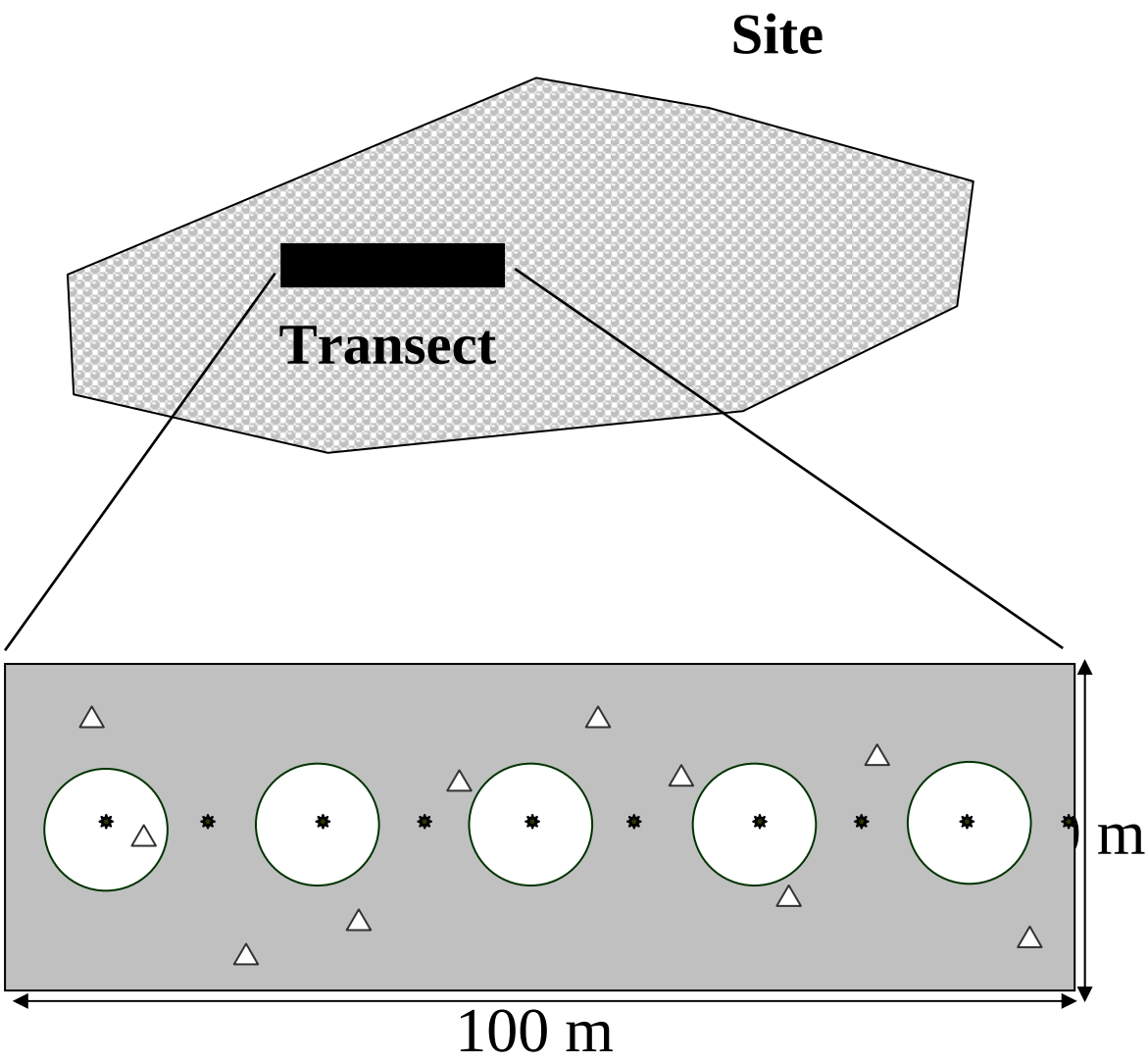

Figure 1. Survey design used by to monitor reforestation projects in north Queensland, south-east Queensland and northern New South Wales. Birds and lizards were surveyed over the entire transect; plants (floristics and structure) in five circular quadrats, each 5 m radius; pitfall traps were set for ground invertebrates at 10 m intervals (stars), while leaf litter was collected haphazardly over the transect to extract invertebrates (triangles).

The scale of survey must also be appropriate for the target taxa. Again, for birds, this may mean a search of a transect 100 -200 m long and 30 - 50 m wide, whereas floristic composition may be determined from a series of small plots, say 20 m x 20 m. Invertebrates are likely to be patchily distributed over a site and hence will require collection over a number of subsample points to assess adequately. In our surveys, we used a standardised transect, 100 m x 30 m in area (Figure 1). Birds and reptiles were surveyed over the entire transect: birds on six to eight occasions and reptiles on three occasions a year. The floristic composition and forest structure of each site were each assessed once on a series of quadrats (each 5 m radius) located systematically along the transect. Soil from the holes dug for the

pitfalls was retained for physical, chemical and decomposition analyses. Leaf litter invertebrates were sampled twice, once in the post-wet and once in the post-dry season, from litter samples gathered haphazardly throughout the transect. Ground invertebrates were sampled once in pitfall traps located at 10 m intervals (twice would have been desirable, but our limited resources did not permit this).

A key sampling question is "should biotic measurements be made on a transect or site basis?" Vertebrate surveys are often conducted over whole patches rather than within standard unit areas such as transects. However, such surveys give results from which it is impossible to separate the effects of the patch area from the effects of the other target variables such as (in our case) the reforestation style. For this reason we chose to carefully standardise all measurements to the same 100 m x 30 m transect. For the invertebrates this involved taking 10 small samples that were scattered across the area (since it is clearly not feasible to sample or count across the entire 0.3 hectare transect), whereas for birds it meant counting the whole transect during a 30 minute period that was repeated 6-8 times over a year. The data analyses that will test the adequacy of these sampling regimes are currently under way.

Different component of the biota require different types of time and resource input (Landsberg *et al*. 1999). Bird surveys, especially in rainforest, require moderate field time input from well-skilled and experienced observers who can identify birds from both their calls and fleeting glimpses, but no further processing time is needed: the field data can simply be entered straight onto computer database. Reptile surveys also require skilled field observers, but little follow-up time. Workers who have no entomological training can take insect samples in the field rapidly, but sorting and identifying the insects from these samples requires hours of laboratory work. People with basic tertiary-level biology training can readily do identification to Order, but identification to genus or species is an advanced skill that can only be acquired over many years, and this level of identification takes further time. Plant identification in the field requires experienced botanists, and there is often a need for further identification of pressed specimens that could not be named in the field, which adds to the time required.

Analysis

As outlined by Oliver *et al*. (1999), the involvement of an ecological statistician is often useful in the formulation of a monitoring project. It is pointless to spend much time and money collecting data that is not useful or cannot be interpreted or analysed. Failure to consider the outputs from a sampling or monitoring regime is considered to be one of the most common and serious censusing sins (Sutherland 1996).

The formal analysis of restoration 'success' should aim to quantify the extent of movement away from the pre-planting state, as well as the degree to which the restoration planting has progressed toward a reference forest system. Simple, univariate measures of species richness (for the biota) are a useful first step, particularly if it is possible to construct separate measures for native and exotic species, or for various guilds. For example, we found that bird species richness was often higher in restoration plantings than in intact rainforest. This was because the restoration plantings provided habitat for a number of open-forest species and some rainforest specialists. However, these plantings also had fewer rainforest specialist species (e.g. riflebirds, fruit pigeons) than the intact rainforest. A simple measure of overall bird species richness could give a misleading picture of the differences in the bird assemblage. Thus, it is necessary to separate the components of richness for a reliable measure of restoration success for biodiversity conservation.

A useful way of separating the various components of biodiversity is to examine a site by species matrix for each major group (e.g. birds, reptiles, plants etc). This can be followed by a multivariate pattern analysis (Faith 1991) to give a summarised overview of the similarities and differences between sites. Three approaches can give useful information on the data structure within site/species matrices: ordination, cluster analysis and network analysis. These three approaches are complementary and should not be used in isolation. For example, cluster analysis will provide groupings in the data even if none exist in reality. Similarly, ordination will show the overall relation of all sites to one another but gives only limited understanding of how the groups are demarcated. Neither approach is ideal for defining the closest neighbours to any site, a purpose for which network analysis is best suited. There are several assumptions and options within each of these approaches.

These approaches have been valuable for quantifying the restoration of species assemblages to our replanted study sites. For example, while bird species richness did not vary greatly between restoration sites and intact forest in north Queensland, the multivariate pattern analysis showed clearly that intact forest supported a distinct bird assemblage from restoration sites, which contained species drawn from open forest and rainforest edge habitats. The disadvantage of multivariate methods relates to their computational complexity, but relevant software is becoming increasingly user-friendly (e.g. Belbin *et al*. 2001).

These exploratory approaches can be accompanied by statistical tests of the hypotheses that particular species vary in abundance among site types (e.g. ANOVA), or that the assemblage composition varies among site types (e.g. ANOSIM). Expert statistical guidance should be sought for this component of the analysis and presentation.

Conclusion

It is clear that the program outlined in this paper is beyond what any individual researcher or restoration practitioner could be expected to achieve. However, there is increasing expertise in the broader community, on many components of the biota (particularly plants, birds and frogs). A multidisciplinary approach may be appropriate whereby landowners connect with land-care and other groups to learn in a collaborative way about how or whether their sites are recovering, although long-term success is also likely to require expert advice from someone with a knowledge of sampling design, data handling, and data analysis. In this paper we have addressed five of the eight components of biodiversity assessment provided by Oliver *et al*. (1999); i.e. the question, sampling design, taxa, sampling methods, and to a lesser degree, analysis. We have particularly emphasized the need for replication, for carefully selected and reference sites, and the need for a standardised methodology. These are areas difficult to achieve in monitoring efforts unless they are part of a wider program. We therefore applaud the increasing tendency of the many individuals involved in restoration to be part of a wider knowledge and information network and urge that effective monitoring becomes part of the restoration process.

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Managing Impacts of Introduced Predators on Native Wildlife in the Helidon Hills

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Introduced predators are one of the most important pests for both animal production and wildlife conservation in Australia. Graziers have traditionally used poison baits to protect their livestock. Wildlife managers have also used baiting to control foxes and wild dogs in wildlife reserves. Previous research has developed many technical aspects of baiting, including the use of 1080 poison to target introduced species, burying bait to reduce uptake by non-target species, and the use of soil plots to monitor species removing bait.

Although the new techniques are well known among professionals and researchers, graziers and landowners usually use the traditional method (laying bait on surface) in the Helidon Hills. In Queensland, landowners have access to two kinds of poison for baiting. First, they can obtain a licence from the Health Department to buy and use strychnine. However, little information is provided by the Department to help landowners apply the poison correctly. Second, the Department of Natural Resources & Mines or the local government will supply 1080 poison and inject the correct dosage into meat bait supplied by the landowners. Written instructions for tethering and burying bait are provided by the Department.

Previous studies have also demonstrated that coordinated baiting over a large area is more effective because introduced predators will reinvade a small area rapidly after baiting. However, baiting is usually applied by individuals because of the small land holdings in the Helidon Hills. Recently the Department of Natural Resources & Mines have coordinated baiting programs with landowners in the region.

Clearly, there is scope to improve existing baiting practices both by improving the techniques used by individuals and by greater attention to concerted action by communities.

The University of Queensland Wildlife Biology Team is co-ordinating a Natural Heritage Trust (NHT) funded project to enhance the capacity of the Helidon Hills local community to manage the impacts of introduced predators. So far we have produced a field guide of mammal tracks found in the Helidon Hills to improve the skills of the participants to identify the footprints of local wildlife (see Figures 1 and 2). We also assisted landowners in the Helidon Hills to participate in a coordinated baiting program.

In association with this project, we are conducting a long term scientific monitoring of the abundance of native wildlife and introduced predators. This will help determine the long-term success of the baiting project.

Furthermore, we independently conducted field trials to improve the effectiveness of baiting techniques in four areas in the Lockyer Catchment in winter and spring, 2001. We use the results of the trials to develop improved baiting techniques. We will develop a training workshop to provide the local community in the Helidon Hills with training in improved baiting techniques. The workshop will be conducted possibly in February 2002. A summary of the improved baiting techniques is as follows.

Trials in Gatton and Laidley have demonstrated that few foxes or wild dogs were attracted to surface laid baits (non-toxic), whereas non-target species were. Burying baits 10 cm below the surface attracted primarily foxes and dogs. Baiting before spring avoided bait take by goannas.

It was found that 14.6% of all baits taken by foxes were cached at distances ranging from 30 - 200 m from the bait station. Wild dogs cached bait on four occasions in the trials. This is a significant finding because prior to the present study no published data has been recorded on wild dog caching, however, caching has been observed (Corbet, L unpublished observation).

The consumption of a single properly prepared 1080 bait is almost certainly lethal to foxes and dogs. Cached baits will increase not only the cost of baiting but also the risk of poisoning non-target species. The latter is an important issue for properties with domestic dogs.

In the trials, caching of baits by foxes was prevented by wiring chicken pieces to fixed pegs and by cracking eggs just short of collapse. Bait uptake appeared to be affected by bait type but more trials are needed to determine the most palatable bait type for the Helidon Hills.

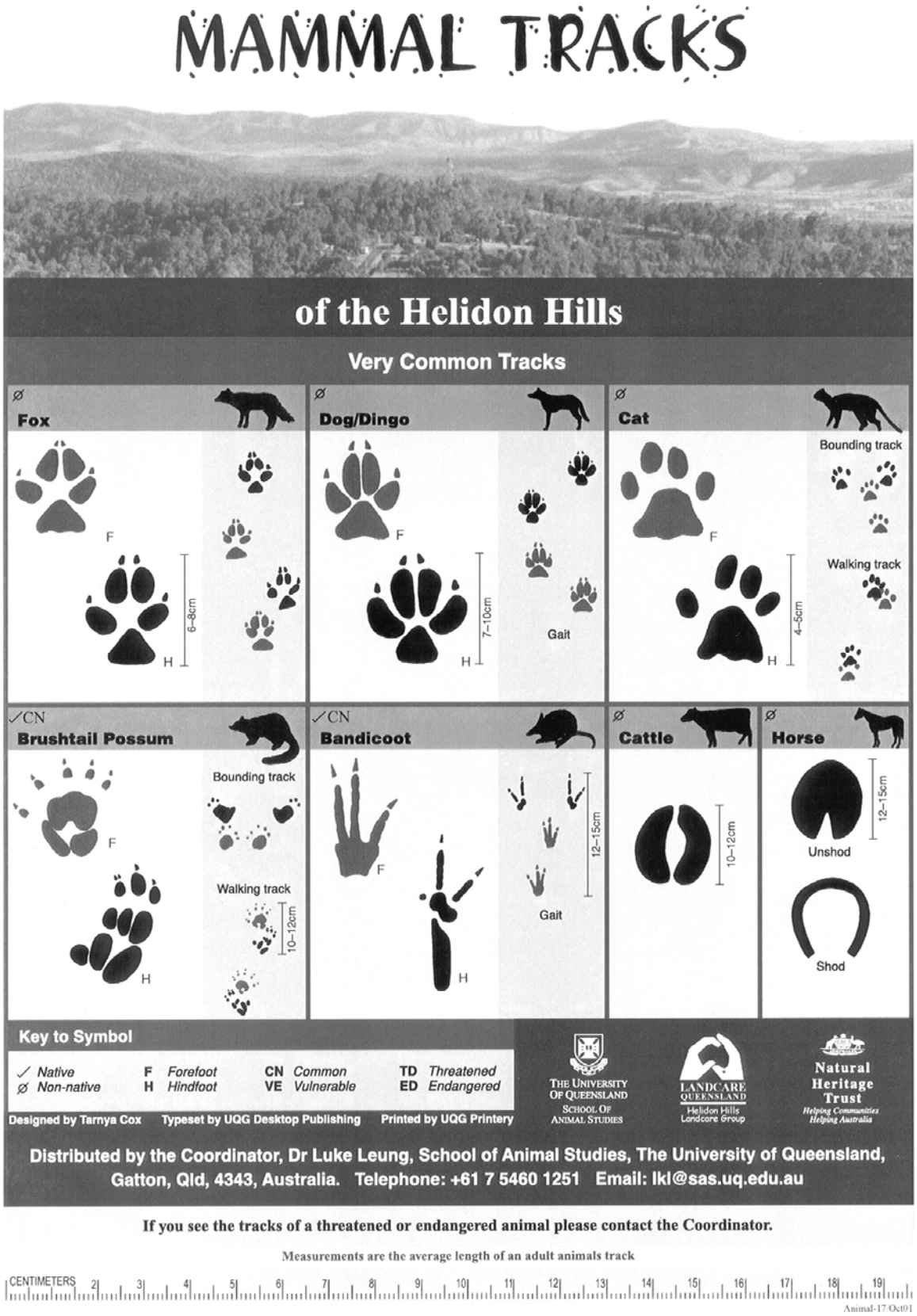

Figure 1. Mammal Tracks Field Guide (Front).

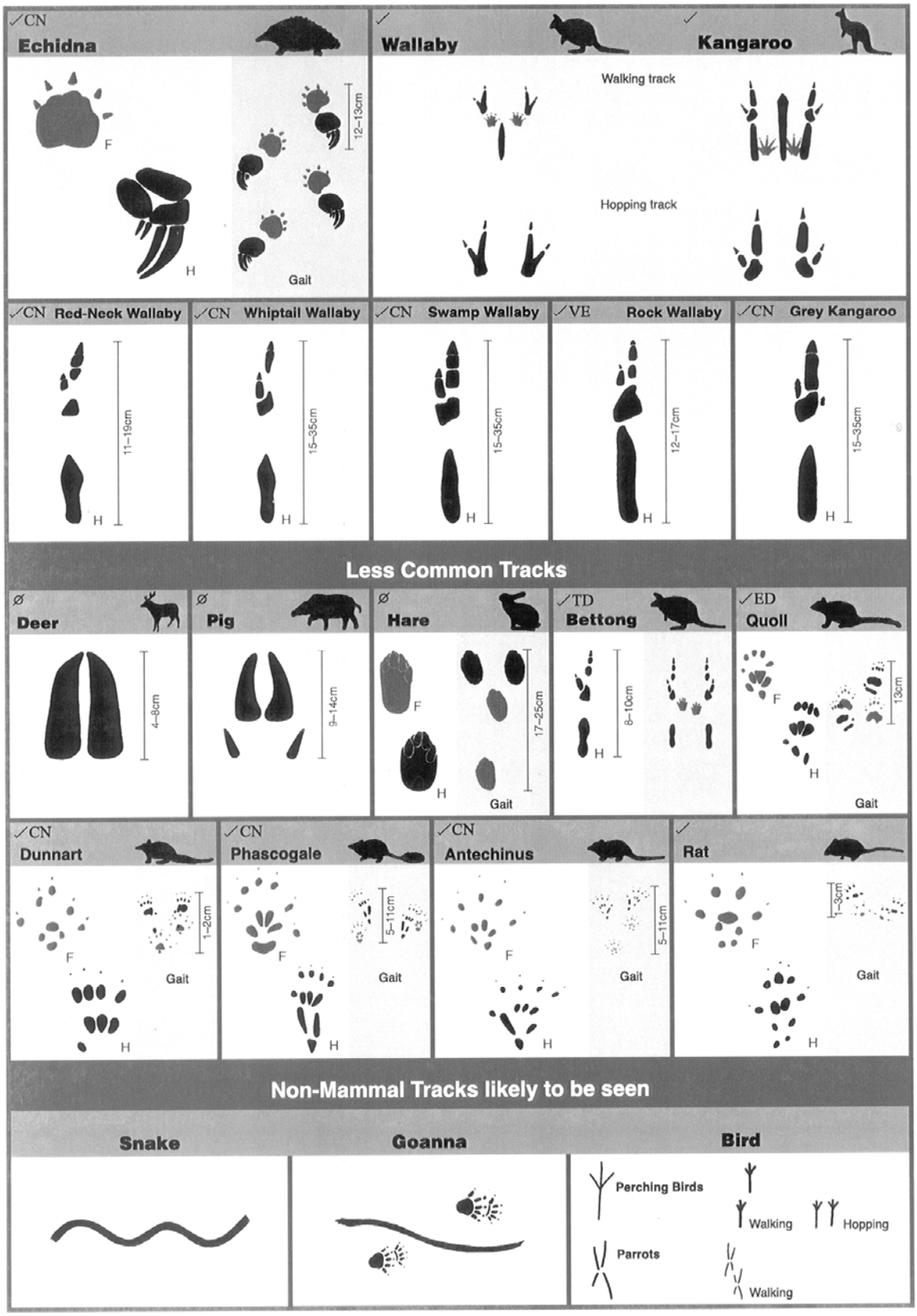

Figure 2. Mammal Tracks Field Guide (Reverse).

Woodland Birds Project - Queensland

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The Woodland Birds Project in Queensland is a Birds Australia project which has been operating for almost two years from the Toowoomba Queensland Parks and Wildlife Service (QPWS) Office. The Project Officer is Peter Sparshott and the project is supported by Birds Australia through major private sponsorship and the QPWS. It is raising public awareness of the rapid declines in the abundance and variety of native birds using brigalow woodlands being experienced in Queensland and throughout woodlands in Australia. It is guided by a steering committee of representatives from Birds Queensland, the Toowoomba Bird Observers, World Wide Fund For Nature, Queensland Conservation Council and the Naturesearch programme of QPWS.

The project is conducting a regional and State media campaign in print, radio and television, networking with Landcare and Greening Australia, Shire Councils, landowners and others to raise the perceptions of landowners and managers of the importance of native woodland as bird habitat, our continuing loss of bird biodiversity and how to prevent it. It is also monitoring local changes in bird biodiversity by conducting surveys for landowners, in association with other organisations like the Herbarium and the Toowoomba Bird Observers to develop specific examples of bird declines in the region to back up the need for action to conserve native woodlands in Queensland. It has produced a poster and a brochure detailing how woodland can be protected and managed to sustain native bird populations. It is also helping to promote the awareness and involvement of people in appreciating birds and working to recover threatened species that occur in the region. Species like the Swift Parrot, Regent Honeyeater and others whose particular needs are not being met. They are in need of urgent action now, but urgent action is also needed to maintain native woodland habitat generally in Queensland for a larger group of bird species whose populations are also shrinking rapidly. The survival of twenty-four species of threatened woodland birds from southern brigalow woodlands in Queensland is currently at issue. One species, the Paradise Parrot, once found only in the region has not been seen since the 1930's and is presumed extinct. However dozens of other species are rapidly declining in range and number because of the loss of habitat through the continued clearing and fragmentation of woodlands.

Birds Australia is a scientific organisation focussing on the welfare of birds, nationally. In partnership with State and Federal governments (QPWS and Environment Australia) it has, in 2001, completed the second national assessment of the status of all 1247 kinds of Australian birds. It showed 264 kinds are extinct or at risk of extinction and that most had island or woodland habitats. Over the past eight years since the previous assessment was done in 1992, the total number of near threatened species (82) has increased by 18 because of declining populations and the rate of decline and loss is increasing rapidly as habitats, particularly woodlands, are depleted and fragmented. Speckled Warbler, Hooded Robin, Brown Treecreeper, and Crested Bellbird have disappeared from large tracts of southern woodland that up until recently no one had the slightest concern about and similar declines are occurring in Queensland. Native bird species are key indicators of the health and sustainability of the

natural environment, their populations are readily monitored and most people are familiar with them and many appreciate them as a valuable natural resource. The project will continue to welcome partnerships with landowners and other people who can help us to promote the retention and maintenance of native woodlands for birds.

Submission on the Management of Bats on State Lands as Part of the Southeast Queensland Regional Forest Agreement Process

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Members of the Bat Advisory/Recovery Team that have contributed to the submission are listed below in alphabetical order:

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- *Adrian Borsboom, Senior Wildlife Ecologist, QPWS.*
- *Greg Ford, Project Officer, North East Downs Landcare Group Inc.*
- *Dr. Ian Gynther, Senior Conservation Officer, QPWS.*
- *Luke Hogan, Senior Wildlife Technician, QPWS.*
- *Dr. Nicola Markus, Environmental Consultant.*
- *Linda Reinhold, Zoologist, ex-QPWS.*
- *Dr. Martin Rhodes, Environmental Consultant.*
- *Monika Rhodes, PhD student, Griffith University, thesis on bats.*
- *Bruce Thomson, Senior Conservation Officer, QPWS.*
- *Melanie Venz, Zoologist, QPWS.*

This is a short version of the original submission. The submission can be obtained from the Queensland Environmental Protection Agency.

Introduction

The views and facts presented in this short summary report are from a recently formed Bat Advisory/Recovery Team. The views expressed are not necessarily unanimous. The team was established to respond to management issues for bats in the Southeast Queensland Bioregion, Kroombit Tops and the Blackdown Tableland, as part of the planning process for conversion of a number of State Forests to conservation reserves. The team recognizes there are several management issues to be considered for microchiropteran and megachiropteran bats on public lands in southeast Queensland. Views and information presented in this document should only be seen as a supplement to information on bats of concern in reports associated with the southeast Queensland Regional Forest Agreement (RFA) process.

The team could not identify with certainty areas of high insectivorous bat biodiversity and use in the Southeast Queensland Bioregion because of limited distributional and abundance information. Best distributional information is in reports associated with the Queensland RFA process. There is little information on the location of breeding and roost sites. Currently our best knowledge on locations of insectivorous bat roost and breeding sites is for

species that utilize caves and old mine shafts. As a consequence of this knowledge gap, we have been predominantly generic in our management recommendations for insectivorous bats. For flying-foxes our knowledge of camps, movement, numbers, breeding and general ecology is significantly better.

High priority management issues

Four high priority management issues have been identified:

1. Fire Management

Fire management is important. An inappropriate fire regime for bats (e.g. very hot fires) is one that burns out stags (dead trees) and living, hollow trees. Hollow-bearing trees are important as roosting and/or breeding sites for many species of insectivorous bats. Tree hollows are also important to many other hollow-dependent fauna species.

Continued maintenance of firebreaks is recommended. A fire management plan needs to be implemented that continues to burn the natural landscape, but utilises a temporal and spatial burning mosaic that minimizes the risk of burning out stags and living, hollow trees. Within the range of bats that are known or strongly suspected to use hollows as breeding sites, avoid burning during the breeding period. Where a hollow tree is known to be regularly used as a breeding site, maintain a firebreak at least 2m around the base of the tree (there is anecdotal evidence that even 'cool' fires can burn out hollow trees and stags).

No burning of vegetation should take place during the flying-fox breeding season either in or directly adjacent to flying-fox camps where breeding is known to occur. One critical period is when young flying-foxes are too heavy for the female to carry, but still too young to fly and feed independently. Smoke as well as flames can cause mortalities.

2. Public Access and Recreation

The Recovery Team recommends that public access and recreation are compatible with bat conservation EXCEPT for the following situations:

- Flying-fox camps

  Public access should be restricted in the vicinity of permanent and temporary flying-fox camps. This action is necessary for minimizing disturbance at camps and also for public health and safety reasons. Some camps are used as breeding sites and undue human disturbance may impact on rearing and recruitment of young to the adult population. The weaning period is particularly critical. Areas with permanent camps should have restricted access via locked gates and signs. Roads and walking tracks should not be sited near these areas unless a carefully managed visitor management plan has been instigated that minimizes public health issues and disturbance to bats. Also refer to Draft QPWS policy "Managing Flying-fox Colonies in Urban Areas" (contact Kathryn Adams, QPWS).

- Caves and mine shafts

  Public access should be restricted or excluded from these areas, particularly during the coldest winter months and breeding season. In caves where bats enter periods of torpor or hibernation during the winter months, frequent human disturbance may result in severe stress or even death of bats. Likewise during the breeding season, microbats can have

specialised roosting requirements; with pregnant bats often congregating into maternity colonies with distinct humidity and thermal properties. For most species the critical time occurs between October and January. Disturbance during the birthing and lactation stages of the breeding season of cave-dependent bats must also be avoided.

- Tracks and amenities

  Placement of tracks and facilities should be done so as to minimise loss/removal of hollow-bearing trees and stags.

3. Management of mines and caves

No disturbance or destruction of caves used as roosting and/or breeding sites by bats should occur. Cave microclimate may be critical for bats (e.g. a humid, warm maternity cave). Old mines are to be treated as caves for bat management purposes. Bat-friendly gating may be required if disturbance by humans is a risk or there are human safety and health concerns. Working mines should minimize disturbance to roosting bats. Management will need to be on a case-by-case basis in consultation with Bruce Thomson, Senior Conservation Officer, QPWS.

4. Mining/quarrying activities

No removal of large rocks from rock outcrops and cliff lines should take place where insectivorous bats are known or suspected to roost. A field survey may be required to establish if bats are using the site. No quarrying should occur that destroys or disturbs bat breeding and natural roost sites, or modifies the microclimate inside such sites (e.g. a humid, warm maternity cave).

Medium priority management issues

Two medium priority management issues have been identified:

1. Management of road culverts and bridges

All culverts and bridges, prior to any major repair or replacement, should be surveyed for use by bats. If bats are present, repair or replacement should minimize disturbance of bats. This may require blocking access to culvert/bridge roost sites after bats have left to feed.

In the colder months bats may not feed every night. Where this is the case, works may need to be conducted during warmer months. However, we recommend no works take place during the breeding period for bat species which use bridges and culverts as roosts.

2. Grazing

Light grazing is considered compatible with bat conservation, except where barbed stock fencing poses a regular threat to the little red flying-fox (*Pteropus scapulatus*) or the common blossom bat (*Syconycteris australis*). Both bat species can fly low and have been reported entrapped on barbwire fencing. Barbed fencing also entraps gliders. Where regular entrapment of bats occurs it is recommended to consider replacing the top barbwire strand with plain wire. This will need to be decided on a case-by-case basis and will be particularly relevant when fencing requires repair or new fencing is planned.

We recommend that high stocking rates be avoided, due to the detrimental effects of heavy grazing on plant diversity and plant community structure. This could impact on insect diversity with negative flow on effects for insect-feeding bats. It may also affect flowering species at ground level that are used by the blossom bat *S. australis*, e.g. *Xanthorrhoea* spp. Grazing stock may also reduce the quantity of flowering plant species by feeding on seedlings, e.g. cattle have a fondness for the seedlings of forest red gum (*Eucalyptus tereticornis*). This tree is a critical flowering species for flying-foxes during the maternity period. Clearing or semi-clearing for grazing purposes also reduces flowering trees available to flying-foxes.

Lower priority management issues

Two lower priority management issues have been identified:

1. Apiary sites

Escape of European honeybees from apiary sites can result in competition for tree hollows with native species. The Team recommends apiarists manage hives to minimize bee swarms establishing in tree hollows. This could require some apiarists to undertake more regular monitoring of hives and to instigate appropriate management strategies to either minimize swarming or provide bee boxes for swarms to establish in.

Competition with native bees and birds for nectar and pollen resources also needs to be taken into consideration. There have been several studies conducted in relation to the impact of European honeybees on native wildlife utilising floral resources, however it remains inconclusive. Further research needs to be conducted, particularly with reference to the impact that the possible displacement of native wildlife has on pollination i.e. fruit set and seed viability.

2. Artificial water points (stock dams)

Whilst artificial watering points provide resources (water, insects, etc) for microbats, their artificial permanence may cause changes to faunal communities. It is recommended that consideration be given to not maintaining existing dams, instead allowing them to dry or silt up over a long period of time; thus gradually returning the system to a more natural state. Action should be on a case-by-case basis and take into account the importance of such watering points to other fauna (e.g. amphibians), especially if swamps and other natural waters in the area have been drained or severely modified. Some dams are also important as a water source for fire fighting.

Ecological Services Provided by Vegetation Remnants of the Brigalow Belt Bioregion

Stuart Collard, PhD Student, Land Use Study Centre, The University of Southern Queensland, Toowoomba, Q, 4350.

The Brigalow Belt Bioregion - background

The Brigalow Belt Bioregion:

- Is a large area of Queensland and northern New South Wales that covers around 36 million hectares, running in a broad band up the inland east coast from northern NSW to about Townsville;
- Is characterised by Acacia harpophylla (brigalow), a tree with distinctive silvery foliage that can grow to over 15m tall;
- Is much maligned because of vigorous regrowth and consequent deterioration of productive lands; and
- Has suffered extensive clearance and fragmentation, mostly since the 1960s.

There has been recognition of threatened communities in the Brigalow Belt Bioregion e.g. the brigalow, bluegrass and semi-evergreen vine thicket communities recently listed under the Commonwealth *Environment Protection and Biodiversity Conservation (EPBC) Act 1999*. However, these ecosystems represent but a few of the threatened ecological communities of the bioregion. The bioregion also has rare and threatened species, including Golden-tailed Gecko, Spotted-tailed Quoll, Powerful Owl, Common Death Adder, Greater Long-eared Bat, and Pink Cockatoo.

Project goals

Research is confined to the southern half of the bioregion (i.e. the southern brigalow). The aim of the project is to determine whether the remaining fragmented vegetation remnants are worth keeping for their ecological, economic and/or social values:

1. Define ecological services provided by threatened vegetation communities.
2. Assess certain identified ecological services at regional and local scales.
3. Develop a framework for sustainable vegetation management and land use planning as it relates to the native vegetation of the Brigalow Belt.

Project components and concepts

1. Landscape context e.g. patch size, shape and landscape configuration.
2. Ecosystem 'health' - concept, definition and assumption of a reference point, surrogate indicators of health/condition and function.
3. Ecological services - the variety of services provided by remnant vegetation both for humans and for sustaining ecosystem processes (e.g. soil maintenance, biodiversity retention etc).
4. Sustainable land use/management practices - e.g. fire and grazing regimes.
5. Community values assessment - perceptions and opinions of values and services provided by native remnant vegetation.

Project methods

Divided into three main components:

1. Landscape analysis at the bioregional scale.
    - Derived from herbarium data;
    - Bioregional analysis of endangered vegetation communities as a basis for site selection;
    - Overall %s of current and pre-clear;
    - Analysis of size and shape attributes (e.g. Area:Perimeter); and
    - Remnant configuration (e.g. nearest neighbour analysis).
2. Experimentation at the remnant scale.
    - Measurements of ecosystem condition and function using indicators e.g. birds, vegetation structure, soil biota (microbial activity), soil seed banks; and
    - Distance function analysis i.e. distance from the edge of a patch of remnant vegetation and ecological function.
3. Community surveys at the property scale.
    - Land manager perceptions of ecosystem values and services; and
    - Include land use history (e.g. fire and grazing).

Summary

A combination of assessments of ecosystem 'health' and function, ecosystem services at different scales and community values will lead to the formulation of a series of sustainable management options for vegetation remnants of the southern brigalow.

Special Guest Presentation

Special Guest Presentation

Carl Binning, Principal Research Economist, CSIRO Sustainable Ecosystems

Developing Markets for Ecosystem Services

Carl Binning, Principal Research Economist, CSIRO Sustainable Ecosystems,
GPO Box 284, Canberra, ACT, 2601.

This paper is adapted from the Executive Summary of: Binning, Baker, Meharg, Cork and Kearnes (2001), Making Farm Forestry Pay - Markets for Ecosystem Services, Rural Industries Research and Development Corporation, Canberra.

Could a typical sheep/wheat farming system be adapted and diversified over time to include an agroforestry business that sells environmental services to a number of government and non-government investors? (Table 1).

Table 1. A farm of the future?

Commodity	Share of farm business	Potential Client
Wheat	35%	World Market
Wool	15%	World Market
Timber	25%	Specialty and World Market
Carbon Credits	10%	Steel Company
Salinity Credit	5%	Catchment Management Authority
Water Filtration Credit	7.5%	Urban Water Authority
Biodiversity Credits	2.5%	Philanthropic Trust

The focus of this paper is to assess the potential to create markets for the environmental services provided by vegetation. Key examples of these services include carbon sequestration, water purification, control of ground water recharge (salinity) and the conservation of biodiversity. Providing a direct financial return for the environmental values provided by native vegetation has the potential to provide incentives for the protection of

remnant native vegetation and/or to complement and supplement the commercial viability of tree planting, particularly in low rainfall regions.

It is unlikely that markets for environmental services will ever be the sole "driver" for improved vegetation management. Rather, interest in the development of markets of this kind is to evaluate their ability to "top-up" existing returns (both financial and moral) that may not otherwise provide an adequate incentive for protecting or re-establishing vegetation.

A conceptual framework for how ecosystem services may track through to commodities and markets in the future is presented in Figure 1. The figure shows that there are multiple benefits flowing from the provision of ecosystem services that are inputs to a variety of commodities and markets. Markets are only well defined for a sub-set of these commodities, including timber and agricultural commodities. However, markets for environmental services are less well defined. The result is an inappropriate mix of land-uses in our landscapes.

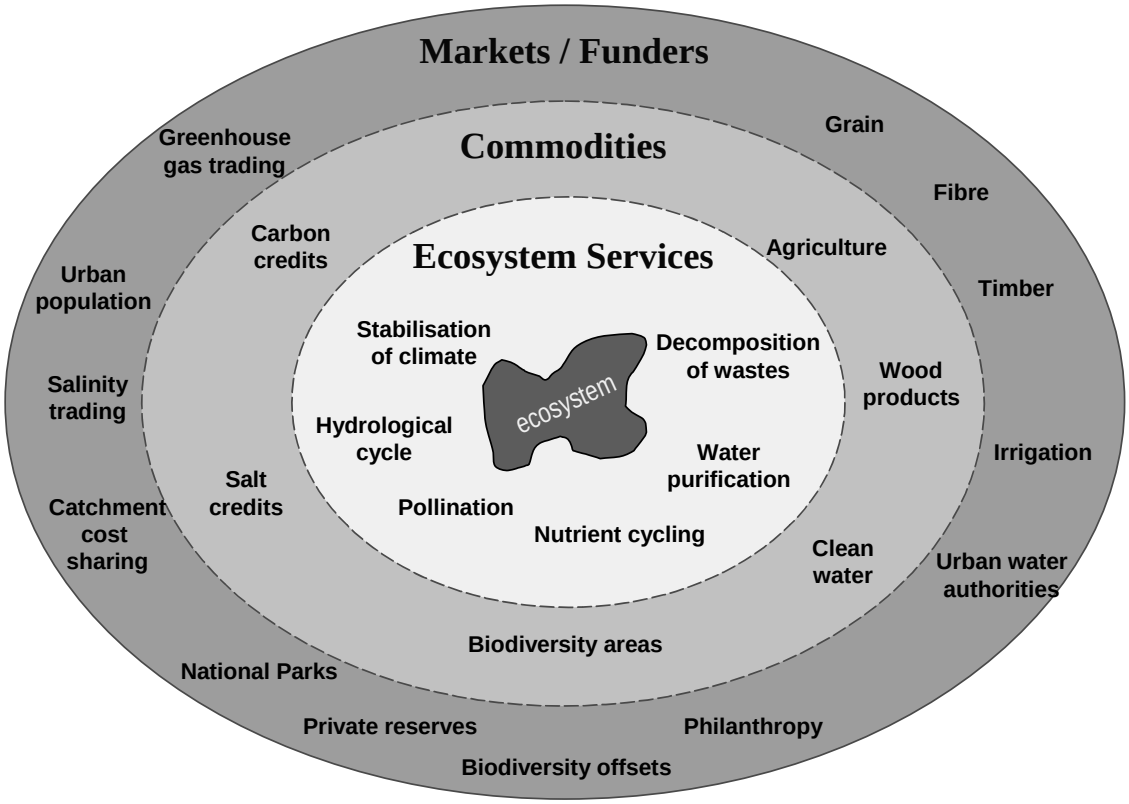

Figure 1. Linking ecosystem services to commodities and markets in the future - a conceptual framework. Benefits flow from ecosystem services as commodities to markets. Markets are only well defined for a sub-set of these commodities (those on the right-hand side).

To design and create markets for those commodities on the left-hand side of the figure is a major challenge. A particular challenge is to harness the multiple benefits of vegetation. For example, in low rainfall regions it is unlikely that the returns from any single commodity will be sufficient to secure large-scale investment in agroforestry. It is estimated that carbon credits may be worth up to $40 per tonne in the future (Shea, 1998). This will provide an important supplementary source of income, however, it will not be sufficient to sustain a viable farm business. So, there is a need to have mix of ecosystem service markets including "carbon", "water", "salt" and "biodiversity" to supplement the existing mix of timber markets.

Key issues and research questions for testing the potential of markets for environmental/ecosystem services are identified in this paper.

A conceptual framework

The challenge is to create structures that allow landholders to capture the full suite of values that arise from maintaining vegetation on-property including commercial and environmental values. Figure 2 provides a conceptual framework for linking potential buyers of ecosystem services with landholders (sellers) who undertake on-ground projects that deliver these services.

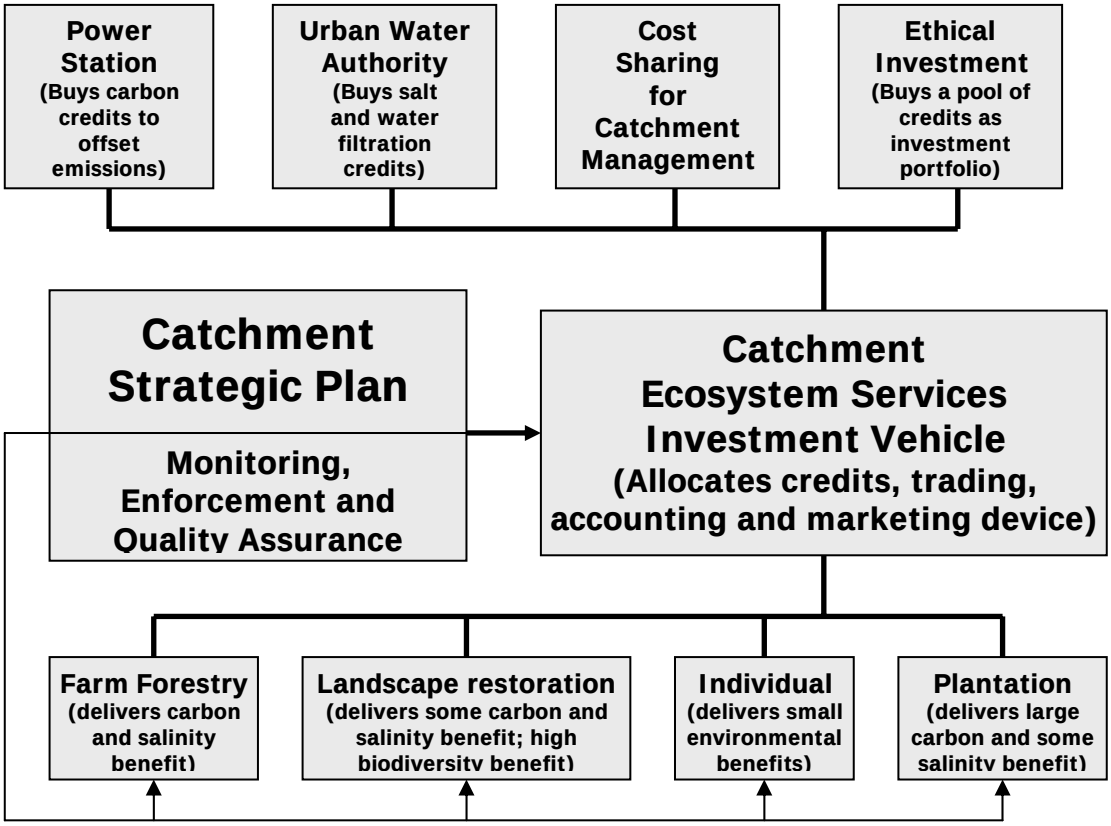

Figure 2. A buyer-investment-seller framework for ecosystem services.

In the figure, buyers create a demand for ecosystem services or commodities through the provision of financial capital. Landholders undertake projects that deliver ecosystem services and commodities to buyers. In the context of this conference landholders undertaking to protect native vegetation or re-establish vegetation that has biodiversity benefits are the sellers of environmental services. This provides an additional economic return for an enterprise.

Finally, a link between buyers and sellers is required. This is the investment vehicle, which is able to draw on many funding sources (buyers) and distribute financial capital to projects. In return for funding, projects provide one or more ecosystem services. The investment vehicle would allow for contracts with many landholders to be entered into and, having acquired rights to ecosystem services on various parcels of land, would then on-sell that pool of credits to larger firms. This allows dealers or brokers to pool small amounts of an ecosystem service associated with each project into volumes of interest to buyers.

The buyer-investment-seller framework outlined above provides a basis for understanding and reviewing many existing or proposed models for trading in environmental services. Three key questions arise from this model:

1. How are buyers secured?
2. How are landholders engaged in projects to supply ecosystem services?
3. How are buyers and sellers linked through an investment vehicle?

Securing buyers

Three mechanisms for securing investment in environmental services can be identified:

1. *Direct Government Investment:* As is currently occurring through programs under the Natural Heritage Trust. Key issues here relate to improving the targeting and efficiency of government expenditure.
2. *Voluntary Private Investment:* A number of motivations for voluntary investment exist ranging through philanthropic, enhancing corporate identity, ethical investment and maximising return from natural assets.
3. *Regulated Private Investment:* Caps or limits on resource use have the potential to create scarcity and encourage trade in environmental resources, as has been the case with tradeable water entitlements. Government regulation and enforcement is needed to back any cap and trade system.

It is most probable that direct government investment will continue to be the major source of funding for environmental services in the short term. The potential role of voluntary investment is likely to be modest, although the future growth of ethical investment is difficult to gauge. Voluntary investment could, however, have a demonstration effect that will give governments the capacity to more effectively regulate resource use.

It can be concluded that large-scale markets for environmental services will only emerge with the support of government-backed restrictions on resource use and access. The current policy issue is to determine how existing government and voluntary private investments can be used to test and experiment with design of new market structures.

Securing sellers

Successfully engaging landholders to change land-use and invest in protecting and/or re-establishing vegetation is a challenging task. The need to use an appropriate policy mix is that balance between regulatory and incentive based approaches is critical.

Figure 3 provides an overview of the range of instruments that can be used to implement policies for the conservation of native vegetation. The toolbox is divided into the following broad categories.

- People - the tools that can be used to motivate and retain landholders support for vegetation programs.
- Finance - the incentives that can be provided to share the costs of managing vegetation.
- Security - the regulatory, legal and voluntary property right instruments that can be used to provide secure adaptive management of vegetation.

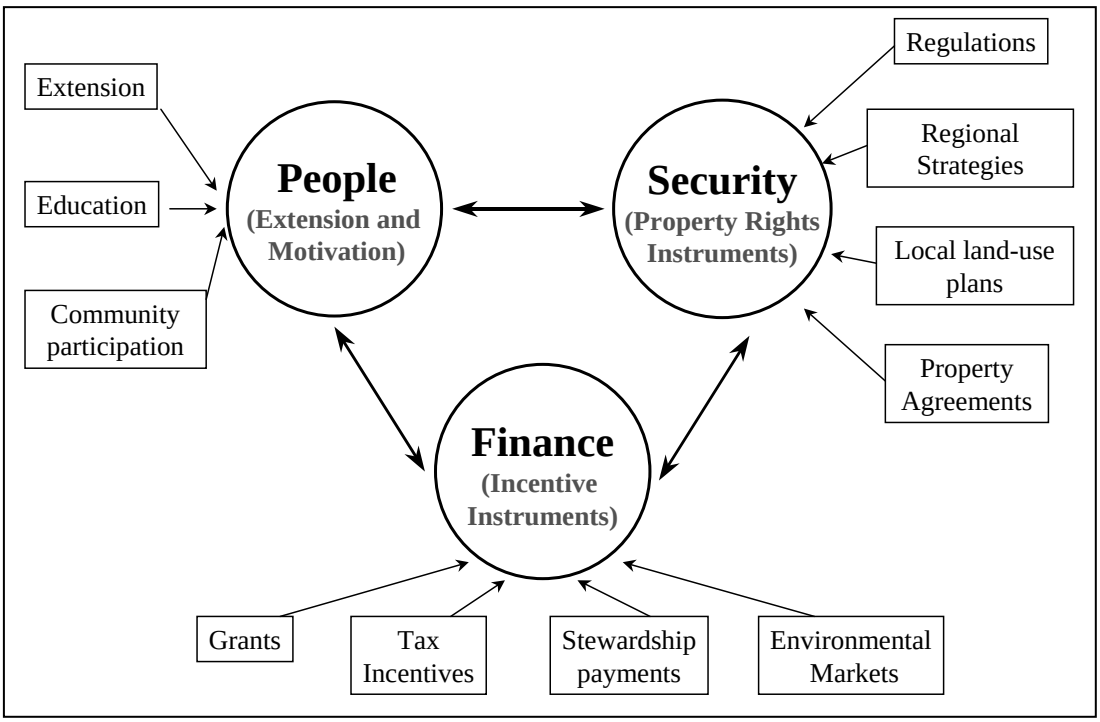

Figure 3. The policy mix.

The tools identified in Figure 3 provide a powerful framework for the development of policies that translate strategic planning into on-ground action. There is considerable evidence that policies that harness the synergies between: educational (people), regulatory (security) and economic incentives (finance) are likely to be more effective both in terms of cost and environmental outcome.

Policy ordering is also important when considering how to engage landholders. In general, awareness raising through education is a necessary first step, followed by incentives that reinforce landholder motivation and achieve behavioural change, and then, finally, property right based tools that secure environmental outcomes at an appropriate scale. However, the emphasis and ordering of policy may shift. For example if dramatic structural change is required in a short time frame, regulatory changes imposed by central government coupled with incentive payments that facilitate transition may be justified.

Engaging landholders as sellers of environmental services will require this mix of both positive incentives and a regulatory safety net. For demonstration purposes catalytic incentives tied to strong extension programs will be most effective. Larger scale up-take may require larger incentives that may then be more efficiently allocated through auction-based systems where the lowest bidder wins the incentive payment.

Investment vehicle

An investment vehicle is any mechanism through which buyers and sellers of environmental services are brought together. The existing administrative arrangements surrounding the delivery of government programs are an example of an investment vehicle - albeit restricted in its focus.

An investment vehicle could be as simple as donating to a charity such as the *Australian Bush Heritage Fund* that in turn directly invests in landscape restoration, in this case through the purchase and management of high conservation value properties. Alternatively it may be as complex as a trading desk for carbon futures with complex verification and quality assurance processes.

Each investment vehicle distributes a range of costs, risks and security between the different players. A major challenge is to design simple and administratively lean investment vehicles that can grow in their complexity as markets themselves grow.

Key challenges

There are a number of challenges associated with the buyer-investment-seller framework. These include the ability to "count" and "credit" ecosystem resources such as carbon, salt, water, and biodiversity, and to develop a rigorous and transferable accrediting framework. This is not an easy task and there are a plethora of methods suggested for this type of ecological accounting.

Implementation also represents a significant scientific challenge, as the measure chosen must have credibility in the market place. For example, measuring and monitoring carbon credits or biodiversity credits demands rigorous, efficient and practicable methods that are still being developed.

Another issue that needs to be considered is the setting of regional targets and caps for the use of ecosystem resources. This is required as a regulatory measure to create scarcity and hence an economic demand.

The mechanics of any trading system are yet to be fully devised, leading to questions on the rules for trading. The issue of property rights is also an important issue. For example, what are the consequences of clearing land owned by several parties? Additionally, monitoring, enforcement and quality assurance are needed for successful implementation.

Key challenges and research questions in creating markets for ecosystem services.
Key Research Question 1: Defining, accounting and crediting ecosystem commodities. Accounting standards for the environmental services provided by vegetation including carbon sequestration, biodiversity conservation, ground water balance (salinity) and water quality are yet to be developed and operationalised. Scientifically credible environmental accounting systems are a key step to achieving recognition of the environmental benefits of vegetation management.
Key Research Question 2: Disciplined regional planning. Markets for environmental services will need to be developed in the context of appropriate regional natural resource management targets that can be used target environmental expenditure. Ensuring consistency between market-based tools and regional planning is a considerable challenge.

Key Research Question 3: Leveraging private investment. Governments cannot provide adequate funding for environmental services alone. Government investments in incentives for improved environmental management will increasingly need to be targeted at leveraging private sector investment. A major challenge is to develop new innovative mechanisms that secure greater non-government participation.
Key Research Question 4: Designing the investment vehicle. Different investment vehicles for environmental services will have different levels of risk and security associated with them. The design of new and innovative investment vehicles will require increased interaction between researchers and the financial sector.
Key Research Question 5: Coordination with environmental management systems and environmental certification. The role of environmental accreditation will need to be effectively integrated with markets for ecosystem services. Environmental certification and best-practice management systems are potentially a critical first step in developing the quality assurance processes required to successfully create markets for ecosystem services.
Key Research Question 6: Caps and regulations. Any market for ecosystem services will ultimately require caps on resource use to be regulated to create scarcity in environmental goods. To create a market, property rights need to be assigned and trading rules developed. Hence markets are in fact highly regulated. The design and implementation of flexible and adaptable trading regimes is critical.
Key Research Question 7: Transition - moving from rhetoric to reality. How do we move from rhetoric to reality? How should risk be shared? How do we attract new investment? These are all key questions. The process of establishing ecosystem accounting standards and undertaking more disciplined regional planning is a necessary starting point. The issue is whether this process can be married with one of market creation. What is required is a process of participatory research in a number of regions to facilitate a process of policy learning.

Rhetoric or reality - can markets for environmental services be created?

Market creation is hard work. Markets for environmental services will take time to develop - risk taking and experimentation will be required.

Governments face a number of legal and political constraints in establishing new markets. As new markets emerge there will both be successes and failures. The key research issues identified in this paper also highlight that a number of important technical issues need to be resolved, such as developing a robust and credible accounting framework for environmental services. This will in turn require the systems developed to be adaptable. However, resource users generally require certainty from governments.

Markets for environmental services are not a panacea. They will only supplement established incentives for vegetation management. They will not provide a magical solution to

Australia's pressing environmental problems. However, markets for environmental services have the potential to add value and complement the broader suite of policy tools available. The role of markets for environmental services remains under-explored.

The concept of developing markets for environmental services is not focussed on privatising the environment or giving unfettered reign to markets. The role of government will remain critical. Irrespective of who invests (government or private interests) the key steps involved in market creation will facilitate more effective on-ground delivery and uptake of native vegetation conservation by landholders.

Pragmatic research of market structures for environmental services will allow two critical issues to be addressed:

1. The contribution of different on-ground vegetation projects to meeting natural resource management targets can be quantified and ranked, allowing more effective targeting and integration of government programs.
2. The potential to leverage private sector investment can be tested through either voluntary action or by regulating resource use by placing caps on the use of key environmental assets.

Because of the constraints on governments it is useful to consider whether markets for ecosystem services and commodities could be created at arm's length from government. One potential model for the growth and transition into markets for ecosystem services and commodities is for regions to take the initiative. Such an approach would require regional communities to work with "early adopters" from the non-government sector who voluntarily invest either for philanthropic reasons or because they have a strategic interest in helping to define how markets for environmental services will emerge.

The objective would be to drive government support and, ultimately, regulatory backing. Such an approach is risky but has the potential to turn academic thinking into action and is the focus of a new CSIRO study.

Local Government Initiatives and Innovations

Innovation in Action: The Crows Nest Shire Natural Resource Management Program

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Implementing the biodiversity conservation "Toolkit for Councils"

In 1999, Environment Australia released the landmark research report *Beyond Roads, Rates and Rubbish: Opportunities for local government to conserve native vegetation* (Binning & Young, 1999). One of a series of reports from the National Research and Development Program on Rehabilitation, Management and Conservation of Remnant Native Vegetation, *Beyond Roads, Rates and Rubbish* highlights the key role that local government can play in the achievement of biodiversity conservation outcomes.

Beyond Roads, Rates and Rubbish identified a comprehensive conservation "Toolkit for Councils" comprising:

Core functions of local government:

- *Strategic land use planning and development approvals*. In regions undergoing significant land use change through urban or agricultural development, local government responsibilities for land use planning and development approvals are the most significant way in which they can contribute to the conservation of native vegetation.
- *Managing publicly owned lands*. In their role as managers of public lands, local governments can make a substantial and direct contribution to conserving native vegetation. By breaking away from their traditional focus of managing public lands exclusively for recreation, there is an opportunity for councils to actively manage these lands for conservation.
- *Managing environmental risks*. Councils are responsible for the management of a wide range of environmental risks, including flood and fire, which may have a direct impact on the management of native vegetation.

Discretionary functions of local government:

- *Facilitating community involvement*. Because local government is the level of government closest to the community, it is in a strong position to support community-based programs for the protection and management of native vegetation.
- *Financial incentives and market mechanisms*. Financial incentive and market-based mechanisms are a primary means of supporting land use planning outcomes on private lands through voluntary participation of landholders in conservation activities.

- *Providing financial and administrative support*. Because local governments are elected and directly accountable to their communities, have a statutory basis, and have highly professional financial administration systems in place, they are ideally placed to manage the collection and expenditure of public funds for regional natural resource management.

Crows Nest Shire Council is one of the first small rural Councils in Australia to comprehensively implement the "Toolkit for Councils" from *Beyond Roads, Rates and Rubbish*. Supported by funding from the Commonwealth Government Natural Heritage Trust, the "Holistic Natural Resource Management of Crows Nest Shire" Program is implementing a wide range of the recommended policy options from the "Toolkit".

Strategic land use planning and development approvals

> *"In regions undergoing significant land use change through urban or agricultural development, local government responsibilities for land use planning and development approvals are the most significant way in which they can contribute to the conservation of native vegetation."*
>
> (Beyond Roads, Rates and Rubbish).

Crows Nest Shire has the third highest population growth rate in Queensland and has also embarked on a new economic development program. The negative environmental impacts of this growth and development can be clearly seen. For example, the destruction of areas of "endangered' Regional Ecosystem in the Highfields area to make way for residential development, and in the Hampton area to make way for avocado farms. Because growth and development are impacting heavily on the Shire's biodiversity, Crows Nest Shire Council can make a significant contribution to biodiversity conservation through improved land use planning and new development assessment mechanisms.

Crows Nest Shire Council has recently commenced the preparation of a new Planning Scheme under the Queensland *Integrated Planning Act 1997*, and is proposing to include:

1. Mapping layers showing significant native vegetation habitat and corridors, with associated development assessment codes and policies. Proposed developments in significant habitat or corridor areas will need to demonstrate that there are no adverse impacts on biodiversity. These measures will be based on similar measures in the Gatton Shire Planning Scheme (see "Managing Biodiversity Through the Gatton Shire IPA Planning Scheme" in these proceedings).

2. Mechanisms to match land uses with land capability, where land capability is assessed on the basis of landform, soils and vegetation. This will mean that, for example, a land use such as intensive horticulture is encouraged on gently undulating land with fertile soils and no significant remnant vegetation, but discouraged on steep land with infertile soils and areas of significant remnant vegetation (for more information, see "The Use of Land Resource Information in the Sustainable Management of Natural Resources and Conservation of Biodiversity" in these proceedings).

3. Fire management mechanisms, where proposed developments in fire prone areas will be required to prepare and implement fire management plans that achieve both biodiversity conservation and the protection of life and property. These mechanisms will be based on

similar measures in the Gatton Shire Planning Scheme (see "Managing Biodiversity Through the Gatton Shire IPA Planning Scheme" in these proceedings).

4. Possible bonus development rights in some areas, where development proponents are given increased subdivision yields in return for protecting areas of significant remnant vegetation through a conservation covenant that is binding on property title. These measures would be based on similar measures in the Gatton Shire Planning Scheme (see "Managing Biodiversity Through the Gatton Shire IPA Planning Scheme" in these proceedings).

Managing publicly owned lands

> *"In their role as managers of public lands, local governments can make a substantial and direct contribution to conserving native vegetation. By breaking away from their traditional focus of managing public lands exclusively for recreation, there is an opportunity for councils to actively manage these lands for conservation."*
>
> (Beyond Roads, Rates and Rubbish).

Publicly owned lands for which Queensland local governments have management responsibility include roadsides, unmade roads, public parks, and reserves. Crows Nest Shire Council is implementing a range of initiatives to conserve the values of all of these areas.

After carrying out an ecological study of the reserves under its control, Crows Nest Shire Council is working with the Queensland Department of Natural Resources and Mines (DNR&M) to conserve and manage reserves identified as having conservation significance. In conjunction with the Shire's Landcare and Catchment Management Groups, Council has initiated weed control and strategic replanting in a number of reserves. One of these areas is Bullocky's Rest - Hartmann Park, an area of high biodiversity conservation significance located directly adjacent to the Crows Nest town centre. Most recently, Council has constructed an interpretive Nature Trail in the Charles and Motee Rogers Park Bushland Reserve at Highfields, which is the part of the Shire facing the most development pressure. This park could easily have been developed for recreation, but Council has recognised its conservation significance and is actively conserving and managing its values. The construction of the Nature Trail means that Highfields residents can learn to appreciate the values of the Reserve, and also learn about bushland conservation and management issues.

The reserve management activities are being carried out by Council's Natural Resource Management (NRM) Work Crew, which consists of a light truck equipped with a weed spray unit and tools, a Field Supervisor, and a crew of trainees. Establishing the NRM Work Crew has represented a major resource commitment for Council, but the demonstrated benefits have well and truly justified the expense. Without the provision of this labour force, it would be impossible to tackle key management issues such as environmental weeds. The NRM Work Crew also maintains the Crows Nest Community Nursery, which supplies local provenance native plants for revegetation projects on public and private land.

The other major component of Council's management of public lands is the preparation of a Code of Environmental Practice for Council Activities. Issues that the Code of Environmental Practice will address include the management of conservation values and weeds on roadsides; and the environmental impacts of roadworks, water supply works, sewerage works and drainage works. For example, the roadsides in Crows Nest Shire feature several plant species listed as threatened under the Queensland *Nature Conservation Act*

1992. The Code of Environmental Practice will identify these plants, the locations where they are found, and management actions to protect them. Other roadside areas have infestations of environmental weeds that are being spread by current management activities such as slashing. The Code of Environmental Practice will develop and implement alternative management activities aimed at preventing weed spread.

Managing environmental risks

> *"Councils are responsible for the management of a wide range of environmental risks, including flood and fire, which may have a direct impact on the management of native vegetation."*
>
> (Beyond Roads, Rates and Rubbish).

Approximately half of the land area in Crows Nest Shire falls within the catchments of Toowoomba City Council's three water supply dams - Cooby, Cressbrook and Perseverance. Most of the remaining half of the Shire falls within the catchment of Wivenhoe Dam, which supplies water to Brisbane. These factors make water quality management a critical issue in Crows Nest Shire. Direct links have been established between water quality and the health of native vegetation in catchments, particularly riparian vegetation. Crows Nest Shire Council is working with Toowoomba City Council, the Moreton Bay Waterways and Catchments Partnership and the South-East Queensland Body for the National Action Plan for Salinity and Water Quality (NAPSWQ) to develop and implement conservation and management programs for this native vegetation.

The other major environmental risk associated with native vegetation in Crows Nest Shire is fire. The management of fire for biodiversity conservation is being addressed at a regional level by the South-East Queensland Fire and Biodiversity Consortium (see "The South-East Queensland Fire and Biodiversity Project - An Update and Reasons for its Success" in these proceedings). Fire management in Crows Nest Shire will be addressed through the application of Fire and Biodiversity Consortium products, which include Ecological Guidelines and an Individual Property Fire Management Planning Kit.

Facilitating community involvement

> *"Because local government is the level of government closest to the community, it is in a strong position to support community-based programs for the protection and management of native vegetation."*
>
> (Beyond Roads, Rates and Rubbish).

The Crows Nest Shire NRM Program has actively worked to build partnerships with landholders and community groups. Landcare and Catchment Management Group representatives and other key community representatives were participants on the NRM Reference Group that prepared the Crows Nest Shire NRM Strategy, and are now participants in the various NRM Strategy implementation processes. Recognising the importance of Landcare and Catchment Management Groups in NRM, Crows Nest Shire Council is actively supporting their conservation management efforts through material and labour assistance. When the NRM Program commenced in early 2001, Landcare and Catchment Management Groups did not cover some of the Shire. So that there would be full coverage, Council assisted the establishment of the Ravensbourne and District Landcare Group and initiated the formation of the Highfields and Cooby Catchment Landcare Group.

A major component of the NRM Program has been a Community Attitude Survey (refer "Public Participation in Natural Resource Management in Crows Nest Shire" in these proceedings), which has:

- Determined community views in relation to a number of NRM Program policy options;
- Highlighted the range of values within the community and how these values affect the views towards NRM held by various members of the community;
- Assisted the community to gain an understanding of NRM issues; and
- Assisted with building partnerships between Council and the community.

Financial incentives and market mechanisms

> *"Financial incentive and market-based mechanisms are a primary means of supporting land use planning outcomes on private lands through voluntary participation of landholders in conservation activities."*
>
> (Beyond Roads, Rates and Rubbish).

The report *Beyond Roads, Rates and Rubbish* gives the following examples of financial incentive programs:

1. Financial incentives:
    - Grants to landholders and community groups; and
    - Rate rebates and concessions.
2. Market-based mechanisms:
    - Land acquisition and revolving funds; and
    - Management agreements.

Crows Nest Shire Council is implementing three of these four examples, with Council deciding against land acquisition or a revolving fund because of the prohibitive cost in relation to the very small rate base of the Shire, which is approximately 4000 ratepayers. Financial incentives are being funded from a levy on rates, assisted in the first two years by Natural Heritage Trust funding. The levy is currently $10 per year per rates assessment, which is raising approximately $40,000. The levy may be increased to $25 per year over time, which would be consistent with the approximate value of environmental rates levies in Queensland and is considered to be the maximum levy that would be acceptable to the Crows Nest community. If increased to $25, the levy would raise approximately $100,000. While clearly not adequate to support land acquisition or a revolving fund, this level of income is considered sufficient to fund the remaining three examples in *Beyond Roads, Rates and Rubbish* - grants to landholders and community groups, rate rebates/concessions and management agreements.

Council has initiated a small grants program for NRM works on private land, with the first round conducted at the end of 2001 and subsequent rounds to be conducted at six-monthly intervals. Landholders can apply for funding to assist with a range of NRM issues including fencing off areas of significant remnant vegetation and replanting or restoring areas of degraded native vegetation.

Landholders who enter into management agreements to protect areas of significant native vegetation will be eligible for rate rebates. The level of rebate will be proportional to the level of management agreement. Three levels of management agreement will be available in Crows Nest Shire - Land for Wildlife, Voluntary Conservation Agreements (VCAs), and Voluntary Conservation Covenants (VCCs). The Land for Wildlife program for the region including Crows Nest Shire is administered by the Queensland Parks and Wildlife Service in Toowoomba (see "Land for Wildlife" in these proceedings), while the VCA and VCC programs will be administered directly by Crows Nest Shire Council. VCCs are the highest form of agreement - they are binding on property title and remain in place even if the property is sold. Landholders who register their properties as Land for Wildlife will be eligible for a base level of rebate, landholders who enter into a VCA will be eligible for a higher level of rebate, and landholders who enter into a VCC will be eligible for the highest level of rebate.

Providing financial and administrative support

> *"Because local governments are elected and directly accountable to their communities, have a statutory basis, and have highly professional financial administration systems in place, they are ideally placed to manage the collection and expenditure of public funds for regional natural resource management."*
>
> (Beyond Roads, Rates and Rubbish).

The report *Beyond Roads, Rates and Rubbish* recommends that Councils should be encouraged to provide financial and administrative support to community and catchment groups. Crows Nest Shire Council is actively supporting the Landcare and Catchment Management Groups in the Shire by providing them with a range of support including free herbicide, labour assistance from the NRM Work Crew, and photocopying.

Other examples of Council's high level of financial and administrative support to community and catchment groups include the considerable staff and administrative support provided to the 2001 Southern Queensland Biodiversity Recovery Conference - the subject of these proceedings - and providing the Toowoomba and Region Environment Council (TREC) with free use of the Highfields Cultural Centre for a Renewable Energy Home Show.

Conclusion

Crows Nest Shire Council is one of the first small rural Councils in Australia to comprehensively implement the "Toolkit for Councils" from *Beyond Roads, Rates and Rubbish*. Many other similarly sized Councils in Queensland are saying that their small size is an obstacle to implementing the "Toolkit" or key aspects of the "Toolkit". However, Crows Nest Shire's innovative program proves that where there is a will, there will be a way.

References

Binning, C. and Young, M. (1999). *Beyond Roads, Rates and Rubbish: Opportunities for local government to conserve native vegetation.* National R&D Program on Rehabilitation, Management, and Conservation of Remnant Vegetation, Research Report 1/99, Environment Australia, Canberra.

The Use of Land Resource Information in the Sustainable Management of Natural Resources and Conservation of Biodiversity

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Sustainable land management is implementing a land management regime that provides an acceptable income but does not degrade the environment or decrease biodiversity. The decision as to what management techniques are sustainable for a particular area of land is determined by the natural resources present and their suitability, or non-suitability, for various land uses. Thus the importance of high quality natural resource information in the decision making process.

Crows Nest Shire is at the forefront of natural resource management with a successful application to the Natural Heritage Trust for funding, and the subsequent hiring of a Land Resources Officer to undertake the project - "Facilitating Access and Use of Natural Resource Information in Crows Nest Shire". The outputs from this project should aid landholders in their decisions on sustainable environmental management, and act as an information base for the proposed Shire Planning Scheme and the legislative aspect of environmental management. Some land types for instance, are most suitable for the conservation of biodiversity, whilst others are suitable for cropping, but may also contain the last vestiges of a once extensive ecosystem and should be preserved.

Sustainability

What is sustainable management of natural resources? A definition of sustainability could be "a process or rate of activity that is able to be continued or maintained for the foreseeable future (or indefinitely)", but for people earning their livelihood from the land, a better or more appropriate definition would be "a land-use management regime that brings in enough money to live on, and that can be maintained for indefinite generations to come (e.g. for their grandchildren's grandchildren).

This view of sustainability has been noted and enshrined in United States law [Food, Agriculture, Conservation, and Trade Act of 1990 (section 1603)] which has defined sustainable agriculture as "an integrated system of plant and animal production practices having a site-specific application that will, over the long term:

- Satisfy human food and fibre needs;
- Enhance environmental quality and the natural resource base upon which the agricultural economy depends;

- Make the most efficient use of non-renewable resources and on-farm resources and integrate, where appropriate, natural biological cycles and controls;
- Sustain the economic viability of farm operations; and
- Enhance the quality of life for farmers and society as a whole."

However, when deciding on what is sustainable for a particular activity, one should always consider "THE PRECAUTIONARY PRINCIPLE". This states that if one does not know exactly the level of activity (low, medium, or high) that is sustainable, one should undertake the lowest rate of activity until it is proven that this low rate is sustainable. Only then should one consider increasing the rate to a better-defined sustainability threshold. This principle has rarely been implemented, with political decisions usually resulting in decisions midway between that wanted by the environmental lobby, and that wanted by the resource users. There are examples where this "compromise" rate was too high and the decision only delayed the collapse of the resource-based industry. Hopefully these examples can be used to "scare" at risk industries and politicians into identifying more sustainable management practices and alternative income streams.

Crows Nest Shire initiatives

Crows Nest Shire Council intends to undertake the sustainable management of land within the Shire by the implementation of a Natural Resource Management Program. This program consists of three parts:

1. Holistic Natural Resource Management of Crows Nest Shire.
2. Facilitating Access & Use of Natural Resource Information in Crows Nest Shire.
3. Natural Resource Management Field Supervisor - on staff.

Holistic Natural Resource Management of Crows Nest Shire

This program is an NHT funded project, which takes an overall view of the Shire's natural resources, and will attempt to put into effect a mechanism for the sustainable management of these resources. This is being approached through:

- The preparation of a Natural Resource Management (NRM) Strategy, and
- The establishment of action plans to address Shire NRM issues.

The Natural Resource Management Strategy addresses NRM issues via:

- Input into the Shire Planning Scheme on issues such as vegetation and habitat corridor protection;
- Encouraging a change in Shire policy with the adoption of environmentally aware initiatives such as an environmental rates levy, and a code of practice for Shire operations;
- The advancement of strategically sited on-ground works such as the fencing of and revegetation of riparian zones, or removal of declared weeds, through the introduction of a "small grants scheme" accessible by landholders and community groups; and
- The promotion of financial incentives to protect biodiversity, such as "Voluntary Conservation Agreements" in exchange for rate rebates / deferrals.

Natural Resource Management issues addressed by the action plans are:

- Weeds and pest animals;
- Nature conservation;
- Water quality and quantity;
- Rural land use and management;
- Tourism, recreation, scenic amenity, and cultural heritage; and
- Air quality, energy efficiency, renewable energy, and waste management.

Facilitating Access and Use of Natural Resource Information in Crows Nest Shire

The "Facilitating Access & Use of Natural Resource Information in Crows Nest Shire" program is an NHT funded project, which will provide the technical background information that underpins the natural management of Crows Nest Shire. The program has only just been initiated with the employment of a Land Resources Officer in September 2001 (only eight weeks ago). The desired outcomes of this project are:

1. Resource planning and decision making based on reliable, well-documented land resource information and on sound and sustainable economic principles.
2. Land resources identified and protected for their preferred use.
3. Land resources managed wisely through the adoption of integrated planning and management at a catchment scale.
4. Encourage the adoption of good management practice by all industries and stakeholders.

The main actions of this project are:

- The compilation of natural resource and land use management information (such as soils, landscape, geology, groundwater, erosion, weeds, and vegetation);
- The publication of a "Land Management Manual for Crows Nest Shire" including CD-ROM and internet based products);
- To document appropriate environmentally sustainable land management practices, which maintain economic viability for landholders;
- To provide a technical foundation for property management planning;
- To provide a technical foundation for the Shire Planning Scheme;
- To investigate and document the suitability of the Shire's natural resources in relation to both current, and innovative future horticultural, silvicultural and agricultural crops; and
- To provide technical support to economic development planning within the Shire.

Due to time and human resource constraints, it will not be possible to undertake a detailed soil survey of the entire Shire. Instead, computer modelling of the geology and landscape relationships in previously mapped areas adjacent to the Shire, and the subsequent extrapolation of this modelling to unmapped areas within the Shire, will be used to better define the land resource area boundaries. Some priority areas may have detailed soil investigations carried out, but it is anticipated that not many auger holes will be dug.

Natural resource data to be collected

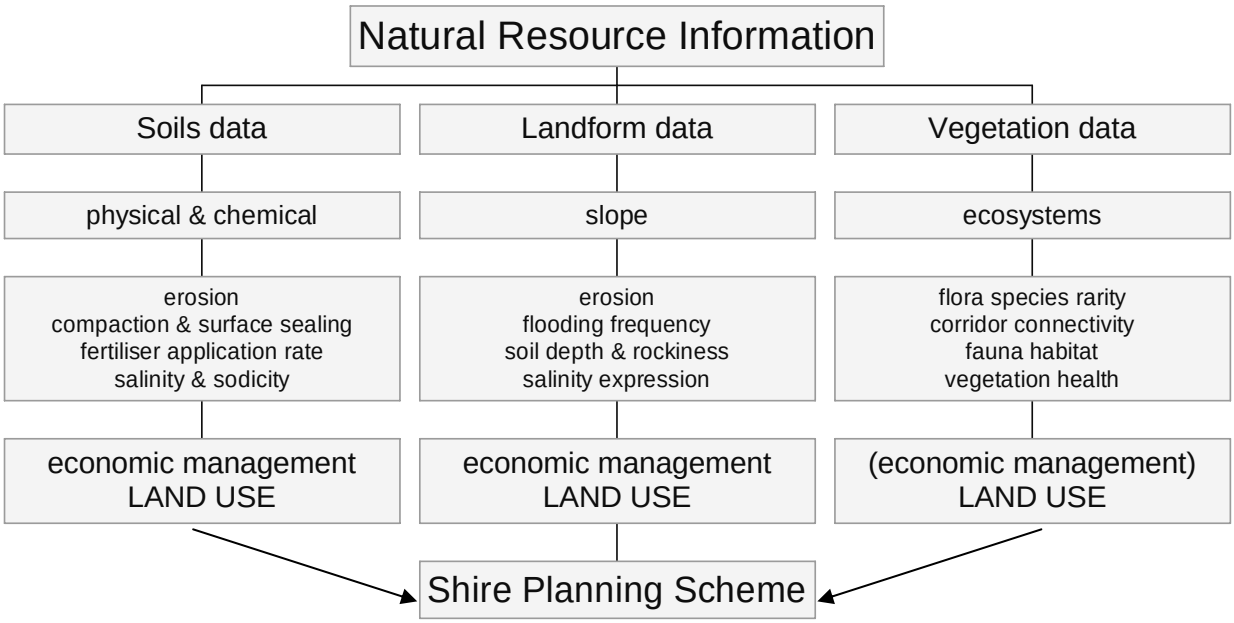

Figure 1. Aspects of natural resource information to be collected.

Almost all aspects of natural resource data collected have impacts upon the economic management of rural properties. For example:

- The chemical nutrient status of a soil has an impact on the amount of fertiliser applied - which has a cost attached;
- Steep slopes are prone to soil erosion and need the construction of contour banks - which has a cost attached;
- Sodic soils are prone to soil erosion (particularly tunnel-gully erosion) and require particular management techniques (spelling areas, revegetation, engineering works) to prevent and/or ameliorate erosion;
- Different soil types respond differently to different cultivation/tillage processes. A self mulching soil will rapidly recover surface soil structure, while a sandy clay loam may form a hard setting surface which surface seals and causes problems with seed strike/germination - which has a cost attached;
- Shallow soils cannot hold enough water (Plant Available Water Capacity - PAWC) for a crop to survive through the growing season;
- Rocky soils damage cultivation implements - costly repairs and replacements; and
- Salinity outbreaks and rising groundwater requires particular management techniques (fencing-off areas, revegetation, engineering works) to ameliorate the problem.

Biodiversity protection via the use of natural resource information

Biodiversity can be protected using this information, mainly by:

- Identifying areas where cropping and/or improved pastures is not an economically viable land use/management regime;

- Identifying areas where retention of habitat is the preferred land use; and
- By prioritising areas that need to be protected for biodiversity.

For example, the destruction of biodiversity within native grass communities is strongly linked to the addition of fertiliser (improved nutrient status) and/or cultivation (soil disturbance):

1. Some soils (e.g. some sodic duplexes) are very nutrient poor and would require an uneconomically viable amount of fertiliser to grow improved pasture. These soils should be left as is, with managed grazing of the native grasses.
2. Some soils are too shallow to hold enough water (PAWC) for a crop to survive through a typical growing season. These soils should not be cultivated as better returns are likely through other land uses.
3. Rocky soils also should not be cultivated as the cost involved with repairing and replacing damaged tines may make cultivation on this land type uneconomic when compared to grazing of native pastures.

For example, the "improvement" of one area of a farm may result in the lowering of value of another area, or lowering the overall profit for the property:

1. Removing vegetation (for improved grazing) in groundwater intake areas may cause salinity outbreaks elsewhere on the property, possibly on the more valuable cropping areas. Vegetation (biodiversity habitat) should be thus left intact in intake areas.
2. Cropping in low-lying areas adjacent to creeks and rivers may have a crop loss risk associated with flooding and an increase in soil erosion. Vegetation (biodiversity corridors and habitat) in low-lying riparian zones should not be cleared, and in some areas revegetated.

Some land types within the Shire may have suffered from almost complete habitat destruction, usually because these areas are the most viable for agriculture (e.g. alluvial flats). Whilst other land types may still retain significant amounts of habitat, usually because they are steep, hilly, rocky, or inaccessible. A priority should be placed on retaining and protecting all viable biodiversity habitats that remain in the most affected areas.

Planning Scheme goals

One of the major mechanisms for controlling inappropriate land use and thus the protection of biodiversity habitat is regulations under the new Shire Planning Scheme. The Planning Scheme goals are the:

- Protection of Good Quality Agricultural Land from urban encroachment and incompatible use;
- Identification of priority areas for biodiversity protection - vegetation corridors, endangered species habitat;
- Identification of very poor quality land that should be left in its natural state;
- Identification of land types that should have limits on subdivision; and
- Determination of minimum lot sizes for a number of different land types - based on economically viable farm sizes for various crops, or, differing capabilities of soil adsorption of nutrients from septic sewerage systems.

Natural resource information in Property Management Planning

The other major mechanism for controlling inappropriate land use and maintaining biodiversity is through improved "property management planning". The availability of accurate and well-documented natural resource information is a necessary requirement for this.

Improved property management planning may:

1. Significantly decrease inappropriate land use, such as:
    - The clearing of steep slopes (erosion hazard) and groundwater intake areas (salinity hazard); and
    - The cultivation of shallow (low PAWC) and rocky (implement damage) soils.
2. Preserve vegetation as buffer zones, wind-breaks, and wildlife habitats and corridors for economic benefit, such as:
    - Remnant vegetation corridors and habitats harbour many insectivorous birds, bats, marsupial mammals, spiders and reptiles which make a significant impact on pest insect populations;
    - Remnant vegetation corridors and habitats harbour numerous birds, snakes and other animal life which make a significant impact on pest animal populations (especially mice);
    - Wind-breaks have been proved to increase overall crop yields; and
    - Vegetation buffer zones reduce noise and chemical spray drift onto neighbouring properties, thus decreasing health risk concerns and increasing lifestyle pleasure and possibly even property prices.
3. Identify and document alternative "more economically viable" land uses for poorer quality land, for example, instead of complete clearing, perhaps introduce supplementary income streams such as:
    - Selective logging;
    - Silviculture;
    - Voluntary Conservation Agreements in exchange for rate rebates / deferrals
    - Eco-tourism;
    - Carbon credits (near future);
    - Water quality credits (future);
    - Biodiversity credits (far future); and
    - Government compensation for vegetation retention (?).
4. Better fire regime management, for example:
    - Not burning during the limited time-period of the fruiting of endangered wildlife fodder trees.

The natural resource information currently available

The natural resource information currently available consists of:

- Land Resource Areas (fig 2) - which is not a soil map as such but a map of associations of land types, based mainly upon geology;
- Remnant Vegetation (fig 3) - Queensland Herbarium Regional Ecosystem (RE) mapping;
- Vegetation Corridors (fig 4) - some of which need significant rehabilitation before being deemed a viable corridor;
- Land Use (fig 5) - but only for southern part of the Shire;
- Vegetation Condition (fig 7);
- Geology; and
- Climate - broad rainfall data only.

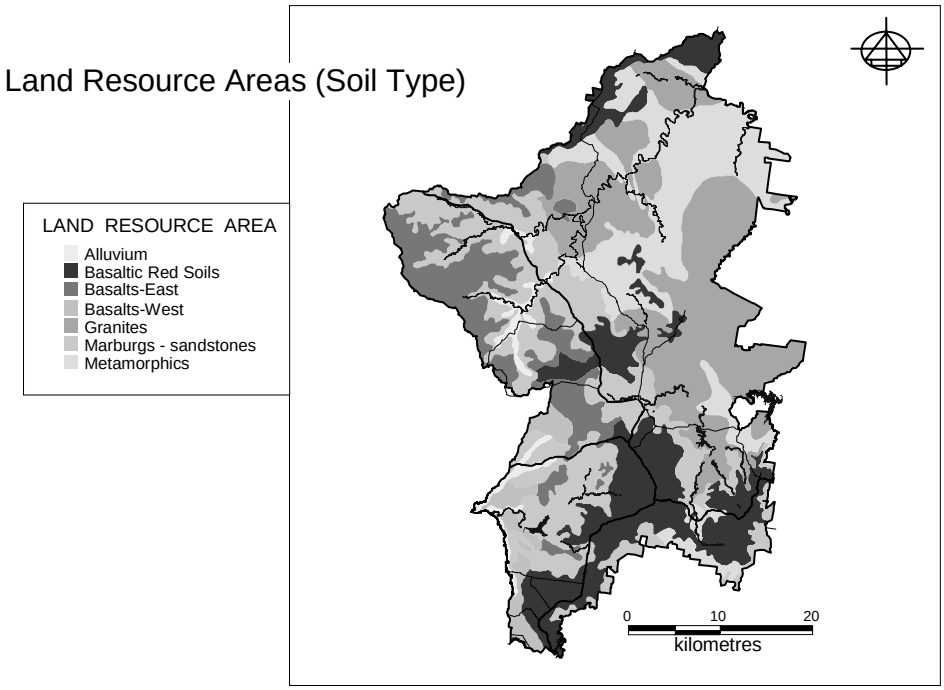

Figure 2. Land Resource Areas of Crows Nest Shire (map taken from Dept. of Primary Industries publication "Land Management Field Manual – Crows Nest District by J. Bierenbroodspot & J.A. Mullins, 1983).

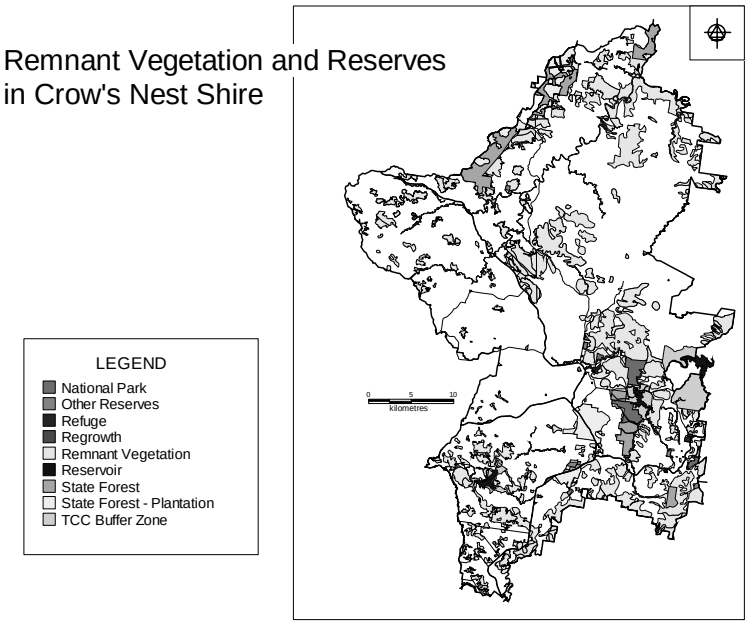

Figure 3. Remnant Vegetation and Reserves in Crows Nest Shire (data from Qld Herbarium Regional Ecosystem vegetation mapping and Toowoomba City Council Land Use Study).

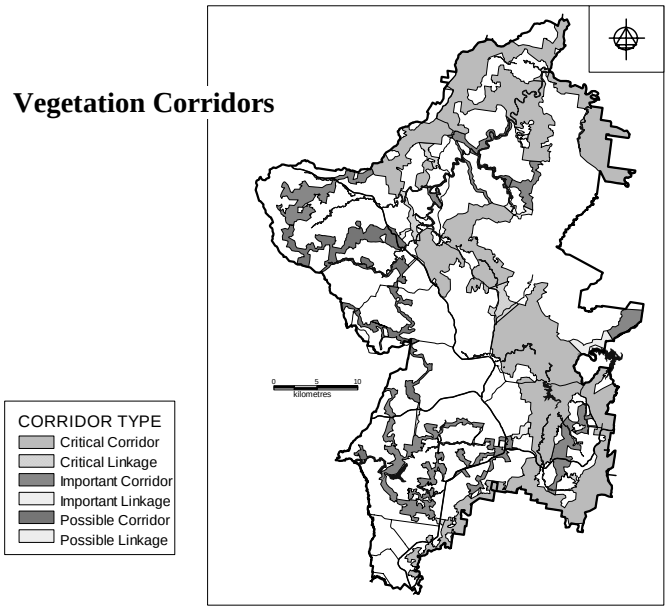

Figure 4. Vegetation Corridors in Crows Nest Shire (map compiled data from "Remnant Vegetation Corridor Strategy" by K. Campbell & R. Galbraith, for Crows Nest Shire Council).

The advantage of using Geographic Information Systems (GIS) is that the data can be viewed spatially and overlain with other datasets, and often the relationships between datasets can be readily interpreted.

For example, Figure 5 shows land use overlain onto land resource areas (LRA). It can be seen that the "Marburg" LRA is predominantly used for beef grazing, with a National Park in one particular area, whereas the "basalts-east/basalts-west" LRA is used for beef grazing and dairying, and the "basaltic red soils" LRA is used for beef grazing, dairying, horticulture and plantation forests. The "granites" and "metamorphic" LRA's are both used for beef grazing and vegetation reserves.

Figure 6 shows vegetation corridors overlain onto land resource areas (LRA's) and Figure 7 shows vegetation condition overlain onto land resource areas (LRA's). From these diagrams, it can be seen that most of the critical corridors (those of greatest extent and in best condition) occur mainly on the "granites" and "Marburg" LRA's in the south, with a smaller amount on the "red basaltic soils", and on the "metamorphics" LRA in the north. The "alluvium" and "basaltic-east/basaltic-west" LRA's have very little good quality vegetation corridors / wildlife habitat remaining, and thus are priority areas to preserve any vegetation that remains. Critical linkages between areas of good habitat (critical corridors) are also priority areas for preservation and/or regeneration.

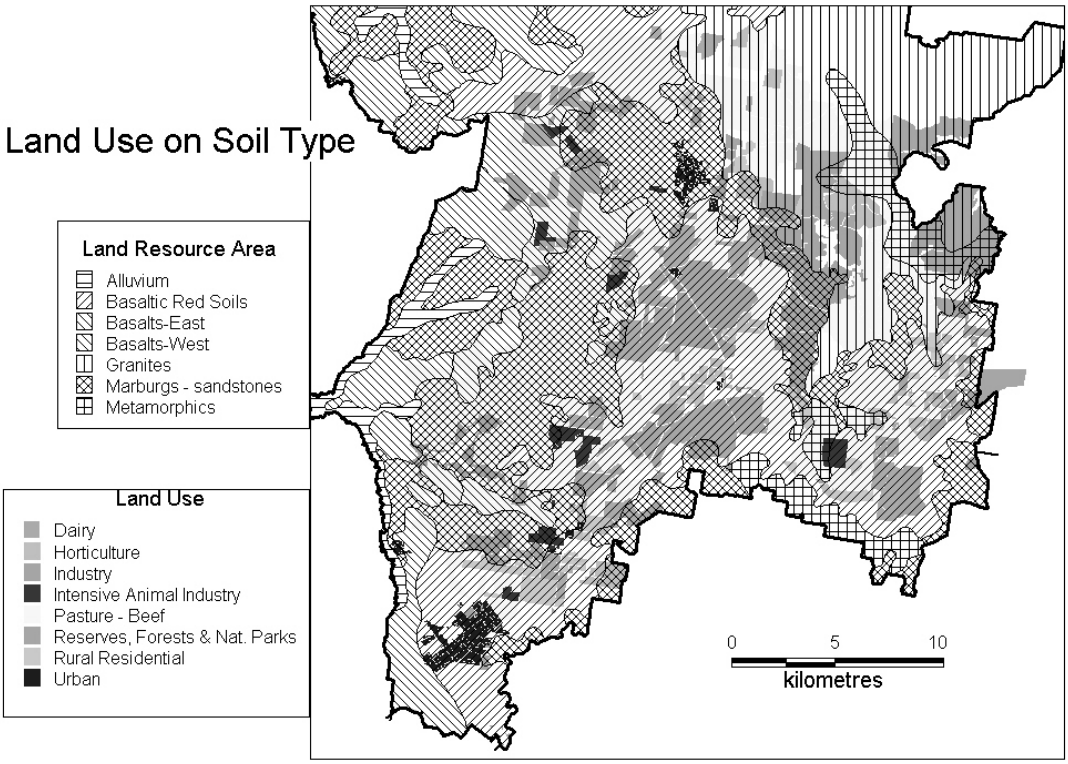

Figure 5. Land Use on Land Resource Areas in Crows Nest Shire.

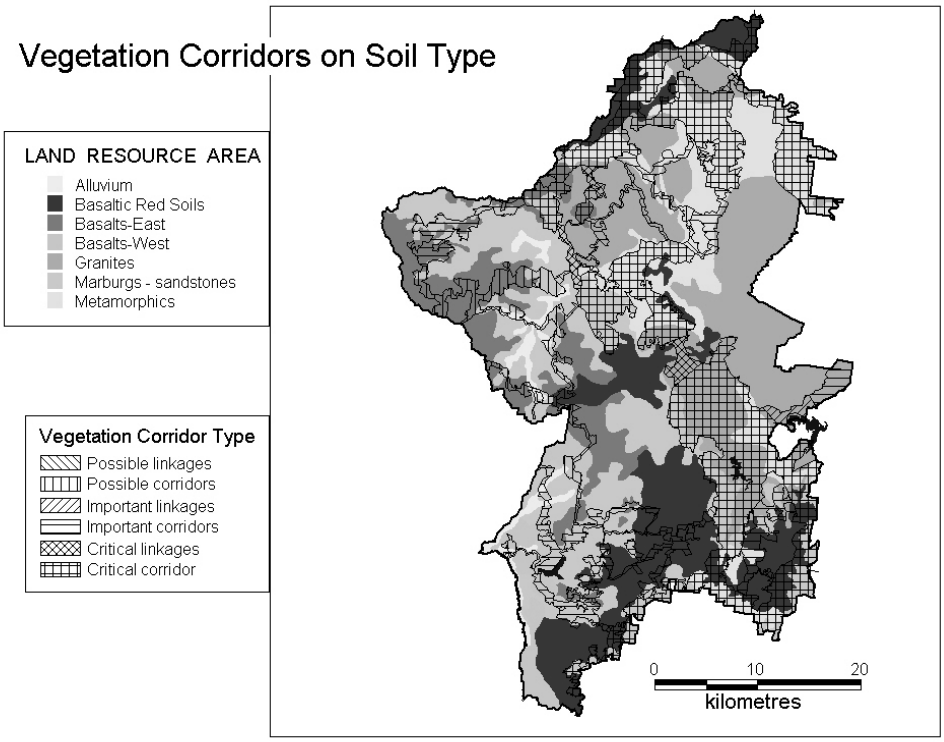

Figure 6. Vegetation Corridors on Land Resource Areas in Crows Nest Shire.

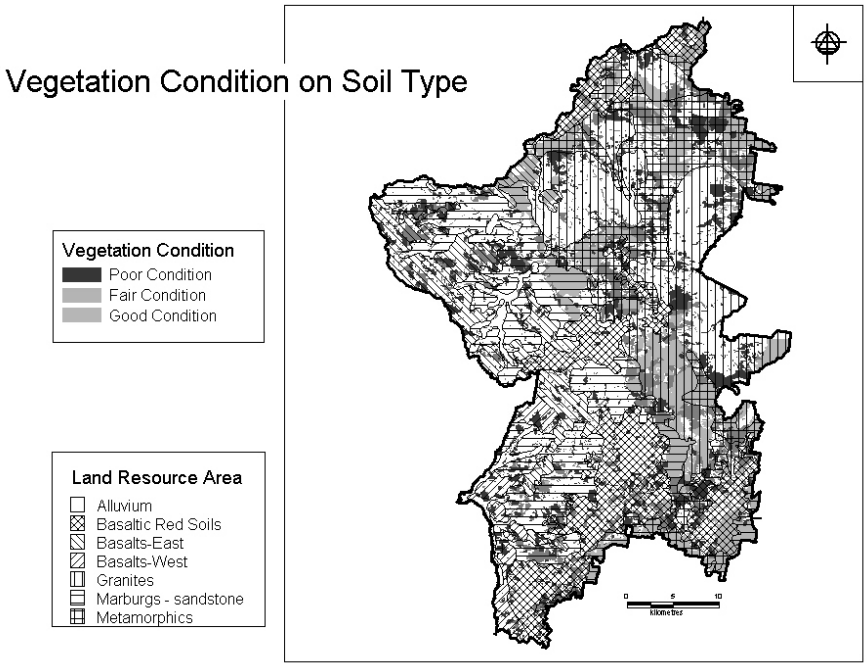

Figure 7. Vegetation Condition on Land Resource Areas in Crows Nest Shire.

Economic drivers and consequences

One of the reasons that land degradation has occurred in the past is because the environmental costs were not put into the economic balance sheet. The environment reacts slowly to human influenced changes to the ecological and hydrological systems and at first, when the processes of environmental degradation were not understood and the effects had not yet surfaced, environmental costs were not even considered. Even when the processes were understood and degradation was known to be occurring, it was deemed too difficult to calculate the actual monetary costs involved and so they were left out of the balance sheet. With an electoral system having elections every three years, and politicians being able to retire on an extremely good superannuation scheme after serving only nine years in parliament, the long-term view of government is often significantly different to that of environmental scientists. However, the true costs of any land management regime must include the long-term costs of sustainably managing the environmental systems affected by that land management regime, and long-term must mean "inter-generational" - centuries rather than 5, 10 or 20 years. Environmental costs include (but are not limited to):

- Lost primary production due to salinity;
- Land lost to agriculture due to soil erosion and salinity;
- Damage to infrastructure due to salinity;
- Cost to health and infrastructure due to poor water quality;
- Decrease in tourism money due to environmental damage (e.g. siltation of Great Barrier Reef); and
- Increased costs to maintain trafficable waterways (dredging).

Only when such costs are included in the balance sheet for all to see, and therefore cannot easily be ignored, will significant action take place. This is now starting to occur with salinity and the introduction of the National Action Plan for Salinity & Water Quality, and the call from some lobby groups for the introduction of a Federal environmental tax levy similar to the Medicare levy.

Following on from this is that there is also a cost involved with the loss of biodiversity, and this cost is even more difficult to put a monetary value on. Researchers are only just getting to grips with the role various ecological systems have in maintaining the environment in a condition suitable for human habitation, and what the threshold impact levels might be that may cause the destruction of these systems. Also, there may be vast benefits to mankind in the as yet undiscovered pharmaceutical products hiding within the biodiversity.

Again, only when the full cost of the loss of biodiversity is included as a monetary value in the long-term economic balance sheet will significant action take place. However, as much of this cost is in social "well-being" and "possible" future benefits, the full costs are not likely to be known for some time to come, if at all. Hopefully we can learn from past lessons and employ the "Precautionary Principle" in biodiversity protection.

Most landholders will not change to an environmentally sustainable land management system unless it is economically viable for them to do so. Once the full costs involved with sustainable land management are known, it may be that many of our current farming practices will not be economically viable. If landholders are "forced" to manage their land in an

environmentally sustainable way - which virtually all landholders want to do anyway - then vast areas of Australia may be abandoned by the farming industry, with catastrophic effects to Australia's economy and social structure. It is up to the scientific community, government, and the general public to support and aid landholders in their search for economically viable land management systems. This might include:

1. Researchers and landholders developing new or better techniques for managing the land.
2. Researchers developing new crops that give greater returns for the same environmental inputs, perhaps including genetically modified organisms (GMO).
3. Researchers developing new crops that have significantly lower environmental degradation, perhaps including GMO.
4. Payments from Federal, State and local government for maintaining ecological systems (e.g. water quality) rather than for primary production.
5. Payments from manufacturers for carbon credits.
6. Government imposed tariffs on agricultural imports from areas that are not undertaking sustainable environmental management.
7. The public may be asked to pay much higher prices for agricultural products in the supermarkets - prices that reflect the true cost of agriculture in Australia.

(The views portrayed in this paper are personal and do not necessarily represent those of Crows Nest Shire Council or the Natural Heritage Trust)

Managing Biodiversity Through the Gatton Shire IPA Planning Scheme

Michelle Milton, Planning Officer, Gatton Shire Council, PO Box 82, Gatton, Q, 4343.

Local government and biodiversity conservation

Commonwealth, State and Regional planning initiatives place greater responsibility on local governments to conserve Australia's biodiversity. Local governments are recognised as being in a good position to support and facilitate biodiversity conservation because of their ability to influence landuse outcomes at regional and local levels.

At a national level, the National Local Government Biodiversity Strategy 1998 recognizes the important role that local governments play in biodiversity conservation. The strategy recognizes that conservation and sustainable use of natural resources will be achieved through local area planning and management and community consultation. To achieve this it requires a willingness of local governments to take a lead role and develop a cooperative partnership between the three spheres of Australian government.

In Queensland, the major legislation affecting planning scheme development is the *Integrated Planning Act 1997* which seeks to achieve ecological sustainability through the integration of local, regional and State dimensions in local government planning schemes. The *Vegetation Management (VMA) Act 1999* also provides statutory requirements to conserve biodiversity values through control of clearing. However, the legislation is limited to dealing with only endangered regional ecosystems and does not take into account other pressures on remaining vegetation types, connectivity of corridors or fauna. The *Nature Conservation Act 1992* provides statutory requirements for protection of threatened fauna and flora.

The provisions of State and Commonwealth legislation could be viewed as a piecemeal approach, and which place a greater responsibility on local governments to conserve biodiversity. The responsibility of local governments is therefore to develop a framework, which encompasses all legislative requirements and responds more fully to local pressures on biodiversity. The holistic approach of the Gatton Shire to biodiversity conservation seeks to encompass all of these requirements.

Gatton Shire - A Shire of rich biodiversity

Gatton Shire, located one hours drive from Brisbane, is situated within the South East Queensland Bioregion, which is recognised as being one of the most biodiverse areas in Australia. Gatton Shire has a high level of biodiversity due in part to the high level of vegetation cover which remains (65% of the Shire is vegetated) and that the vegetation comprises some of the largest continuous bushland areas in South East Queensland. However, there is almost no native vegetation on the alluvial flats. Almost three-quarters of the remnant vegetation of the Shire are contained in private ownership (freehold land).

The Shire's vegetation includes very distinctive flora and fauna, and there are a large number of species found outside their range. There is also a high level of endemism, particularly in the Helidon Hills area where species are only found in that particular habitat. The Shire, which has an area of 1,575 square kilometres, also contains a large number of rare and threatened species as follows:

- Threatened ecosystems - 8 endangered Regional Ecosystems (REs) (VMA status);
- Threatened flora - 36 species; and
- Threatened fauna - 46 species.

There are a number of threats to the biodiversity of Gatton Shire, summarised as follows:

- Vegetation clearance (past & present);
- Invasion of exotic flora & weeds;
- Habitat modification (grazing & timber);
- Fire regimes;
- Feral animals;
- Lack of conservation data;
- Lack of conservation awareness; and
- Availability of resources.

Gatton Shire's Biodiversity Strategy – A holistic approach

Gatton Shire has taken a holistic approach to biodiversity conservation including:

- Planning scheme provisions;
- Landholder incentives (mostly contained within the new IPA Planning Scheme);
- Community support and cooperation; and
- Conservation management on public lands.

The existing planning scheme, which was gazetted in 1995, has served the Shire well. It was one of the first performance-based schemes in Queensland. However, it contains no provisions of policies to protect the biodiversity of the Shire or regulate clearing.

By comparison with the existing planning scheme, the new IPA Planning Scheme is a significant tool in the biodiversity strategy for the Shire. The planning scheme has been developed from a variety of background studies which have provided the data on which to base the new provisions, and which are summarized as follows:

1. *Helidon Hills Management Plan:*
    - Managed by WESROC (Western Subregional Organisation of Councils) - links to RFGM (Regional Framework for Growth Management) and funded by the Natural Heritage Trust (NHT);
    - Area has significant conflicting values;
    - First foray into environmental planning;

- Conflicting values for the area - mineral resources, explosives industry & environmental issues;
- Focused on vegetation management, landuse, biodiversity issues & indigenous cultural heritage;
- Outcomes - Management Plan, Working Groups; Educational Programs; Landholder Assistance (devolved grants); and
- The area now is impacted on by the SEQ Forest Agreement process.

2. *Biodiversity Strategy 2000:*
   - Undertaken by Gatton Shire Council (GSC) and Lockyer Catchment Centre (LCC) in 1999;
   - Recommends a holistic approach to biodiversity conservation;
   - Planning scheme issues;
   - Incentives for landholders;
   - Infrastructure management;
   - Management of publicly owned land (eg roads); and
   - Basis for seeking funding for further studies & on-ground works.
3. *Vegetation Mapping 2001:*
   - Funded by Environmental Protection Agency (EPA) and NHT;
   - Commenced in 1999 and completed in early 2001;
   - Identification of remnant vegetation and RE status;
   - RE status based on State's position for Bioregional Ecosystems (Sattler & Williams); and
   - Led to actions in the new Integrated Planning Act (IPA) Planning Scheme (PS) for the Biodiversity Code.
4. *Recovery Plan (draft 2001):*
   - Presupposes that protection of habitat will lead to preservation of flora and fauna;
   - First local area recovery plan;
   - Aims to protect biodiversity through habitat protection instead of single species preservation;
   - Looks at role of vegetation in habitat/species protection;
   - Protection of habitat will lead to protection of flora & flora;
   - Identifies 36 flora, 46 fauna and 10 ecological communities; and
   - Draft due for completion later this year.

Gatton Shire IPA Planning Scheme - Integrated approach

The new IPA Planning Scheme for Gatton Shire takes an integrated approach to biodiversity conservation on the basis that a single code alone will not protect the biodiversity of the shire. Many of the land areas with biodiversity values also have other significant values such as steep and/or unstable land, and bushfire risk.

The planning scheme support alternative low impact uses, such as rural based eco-tourism or bed & breakfast activities and provides for bonus reconfiguration development rights in the Flagstone/Stockyard area of the Shire in return for conservation provisions (voluntary conservation agreements).

Biodiversity Code

The Biodiversity Code is the primary code in the planning scheme. The provisions of the code are summarized as follows:

1. Regulatory Map identifies Significant Habitat Areas which include:
    - Areas of endangered and/or of-concern RE; and
    - Other areas of RE which potentially provide habitat for threatened species and wetland habitat area.
2. Code applies to development which is <u>within or adjacent</u> to a significant habitat area.
3. Does <u>not</u> preclude development in these areas <u>but</u> requires that the values be maintained.
4. Measures in Code include:
    - Habitat areas are retained, or are rehabilitated;
    - Development impacts are minimized (requires preparation of an Environmental Management Plan (EMP) and survey of area for populations);
    - Development maintains unfragmented nature of native vegetation;
    - Development maintains or re-establishes corridors;
    - Development layout minimizes “edge effects” on native vegetation;
    - Development layout minimizes impact on waterways and wetlands; and
    - Significant Habitat Areas are given secure protection (e.g. Nature Refuge, covenant agreements, VCAs).

Planning Scheme Policies

Two Planning Scheme Policies support the code as follows:

1. PSP No. 1 - Biodiversity:
    - Identifies REs, Vegetation Types, Threatened Species;
    - Based on recovery plan; and
    - Identifies land management principles for overall habitat and specific species which development should achieve.

2. PSP No. 2 - Conservation Agreements & Preparation of Land or Environmental Management Plans:
    - Outlines conservation agreement tools and process for preparation of an agreement; and
    - Guidelines for preparation of plans including detailed description of the vegetation/habitat and of the development, measures and proposed course of action for containment of impacts, monitoring and reporting regimes.

Other Planning Scheme measures

Other planning scheme measures, which support the biodiversity code, include:

1. Steep & Unstable Land Code:
    - Limits extent of clearing for development;
    - Natural landforms and vegetation to be maintained; and
    - Minimizing changes to natural drainage patterns.
2. Bushfire Risk Code:
    - Development preferred in existing cleared areas or on areas without ecologically significant vegetation;
    - Development preferred on slopes less than 20%; and
    - Firebreak areas around house planted with fire retardant vegetation.
3. Reconfiguration of a Lot:

    General requirements:
    - To respond to physical characteristics of land and maintain areas of ecological significance and scenic values; and
    - Location of new lots not fragment areas of ecological or scenic value and maximizes connectivity between areas.

    Specific area requirements:
    - Allows for community title development (maintaining density of zone); and
    - Bonus development rights for Flagstone/Stockyard area (additional bonus lot and smaller lot size) where providing a conservation agreement.

Other non-statutory measures to support the IPA Planning Scheme

In support of the holistic approach to biodiversity conservation, there are a number of non-statutory measures that Gatton Shire is taking or participating in as follows:

1. Landholder incentives:
    - Land for Wildlife; and
    - VCAs.

2. Infrastructure Management:
    - Rehabilitation of existing quarry sites in Helidon Hills area.
3. Public Lands Management:
    - "Managing Roadsides" Project with LCC; and
    - Staff education.

Conclusion

Local governments are recognised as having a positive and leading role to play in biodiversity conservation. Gatton Shire's holistic approach provides for a range of statutory and non-statutory measures to achieve biodiversity conservation. Several issues remain a threat to the biodiversity measures of local governments including resourcing, especially for smaller rural local governments, and a lack of environmental data.

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Managing Natural Areas in Logan City

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Logan City

Logan City is situated between Brisbane and the Gold Coast. It is Queenslands third largest city by population. There are 177 bushland parks covering an area of over 1000 acres. These parks range in size from 1 acre to over 370 acres.

We would never be able to actively manage all of our 177 parks with our existing resources. So our parks have been prioritised as either 'A' profile or 'B' profile based on the recreational potential and the conservation significance of a park.

So those parks that have a number of built structures, contain significant riparian lands, form part of a corridor or have rare and threatened wildlife are classified as 'A' profile parks. 'A' profile parks account for over half (97) of the 177 bushland parks.

Bushland Management Unit

To actively manage Logan's natural areas Council established a Bushland Management Unit in 1995.

The objectives of the unit are:

1. To manage Council's natural areas towards achieving sustainable levels of biodiversity.
2. To develop and nurture conservation values within Logan's community through education, participation and by providing nature based recreational opportunities.

The unit is made up of a small team of 8 highly qualified and skilled staff.

There are two sub programs within the unit:

1. *Bushland Operations Program* - which looks after the day to day management including construction and maintenance of firebreaks and walking tracks, weed control and fire management activities
2. *Community Bushcare Program* - launched in 1998, the bushcare program provides an opportunity for interested residents to become actively involved in helping to care for their bushland parks. Over 120 volunteers have joined one or more of the 17 bushcare groups across the city.

Contractors are also used for weed control and firebreak maintenance.

Five work programs

Natural area management has been divided into five work programs:

1. Bushland Restoration.
2. Weed Management.
3. Fire Management.
4. Nature Based Recreational Facilities.
5. Education.

Bushland Restoration

Bushland restoration is a management practice used to help restore degraded bushland. Bushland restoration involves controlling or removing the 'things' which threaten the conservation values of our bushland. This may be achieved through the removal and control of rubbish and weeds and replacing, if necessary, plants to improve the land's conservation values.

The aim of bush restoration is to create a natural system, which can maintain itself in a suitable condition with minimum human intervention.

There are three bushland restoration techniques that can be used to achieve this aim:

1. *Bush Regeneration* - remove weeds or stop mowing to provide for plants to naturally regenerate from the dormant seedbank in the soil or from seed from surrounding vegetation.
2. *Revegetation* - planting trees usually in degraded areas that won't naturally regenerate to stabilise the site, create a protective barrier or for aesthetic reasons.
3. *Direct Seeding* - sowing seeds directly into/onto the soil.

For the Bushland Operation Program 'A' Profile parks are the focus of restoration works with 5 parks being identified as the priority for the next 5 years:

1. Alexander Clark Park.
2. Usher Park.
3. Meakin Park.
4. Murrays Environmental Reserve.
5. Riverdale Park.

Of these parks four are home to the endangered plant Angle-stemmed Myrtle (*Austromyrtus gonoclada*) and the other is home to a significant flying fox colony.

Council has been successful in receiving Natural Heritage Trust (NHT) funding to help restore the habitat for Angle-stemmed Myrtle. There are now five councils involved in the recovery of this plant: Logan, Brisbane, Gold Coast, Ipswich and Redland. All of these councils are represented at the Recovery Team meetings for the plant and have planted young trees in their council boundaries.

Council has also been successful in a joint application with Brisbane and Ipswich City and The Hut Environmental and Community Association (THECA) for funding to restore five bushland remnants containing flying fox camps and to plant suitable native food species in the surrounding areas. The project is entitled 'Food for Wildlife' and a project officer is to be appointed.

Council has also been successful in applying for Green Corp projects which along with Community Job Participants (similar to Green Corp/LEAP) help to restore our bushland parks.

The volunteers in the Community Bushcare Program also help to restore bushland parks. The parks that these groups work on are dictated by where residents have an interest in being actively involved in the parks management therefore they may work on either 'A' or 'B' profile parks. Although it may be desirable for all bushcare groups to work on 'A' profile parks, the good community relations that Council builds, the sense of community ownership of public parks and the community pride in Logan far outweighs this.

Funding from NHT is helping the Moffatt Park Bushcare Group to restore the vegetation community containing *Melaleuca irbyana* or Bush-house Paperbark. This NHT funding is also helping the Jimboomba Bushcare Group.

Weed Management

A weed is a plant growing in the wrong place at the cost of the surrounding vegetation. Weeds can be classified as either a Declared Plant or Environmental Weed. Declared plants are those plants that have or could have a serious economic, environmental or social impact, have the potential to spread over large areas and are targeted for control under legislation. The control of declared plants is the management responsibility of Council's Health Branch. Environmental weeds are plants that can detrimentally alter existing ecosystems by destroying bushland and clogging waterways. Environmental weeds in council managed natural areas are the management responsibility of Councils Parks Branch.

Under Logan City Councils Weed Strategy, environmental weeds are classified as either having a low or high risk of threatening the conservation values of a park.

Parks Branch weed control strategies are targeted towards high-risk environmental weeds. These are those weeds which:

- Successfully invade bushland through natural dispersal or garden escapes or dumping garden waste; and
- The potential impact on the natural system is high i.e. plants possess invasive tendencies which smother and/or suppress native endemic vegetation; and/or
- Favour damp environments or have the potential to clog waterways; and
- Require ongoing control until all viable vegetative material is exhausted; and
- Are currently abundant in Logan's bushland; or
- Are currently not abundant but have the potential to become abundant given their status in nearby areas.

By spending our limited resources on the control of high-risk weeds we will not only contain these weeds from spreading beyond our means of control, which would result in greater costs to council, but we are also preventing potentially irreversible destruction of the conservation values of our parks.

Two strategies have been developed to control high-risk weeds:

1. *Priority High Risk Vine and Groundcover Control* - Of the high risk weeds the following vines and groundcovers are considered priority high risk weeds due to their superior aggressive colonisation abilities, they are highly suppressive of native species and are extremely difficult to control: Singapore Daisy, Madeira Vine, Cats-claw Creeper, Balloon Vine, Mile-a-minute and Morning Glory.

   Regardless of whether the park is an 'A' or 'B' profile park, if the above weeds are present they are targeted for control. The weed's priority for control is also dependent on its position within a catchment i.e. weed infestations at the head of a catchment have a greater potential for spread throughout the catchment and therefore should be controlled first.

2. *High Risk Woody Weed Control* - Woody Weeds consist of trees and shrubs and include: Camphor Laurel, Chinese Elm, Cassia, Ochna and Cadaghi.

   Woody weed control consists of an initial control followed by reinspections to ensure a high target rate for each management area.

Fire Management

To assist Council in meeting its obligations as a landowner under the *Queensland Fire and Rescue Authority Act 1990*, a 'Bushland Parks Fire Management Action Plan and Guidelines' and 40 individual fire management plans were developed for bushland parks.

Bushland Parks Fire Management Action Plan and Guidelines

The 'Bushland Parks Fire Management Action Plan and Guidelines' provides guidance for Council's Parks Branch to manage fire as a component of the Branch's overall bushland parks management program. This document aims to:

- Protect life, property and the environment;
- Maintain or enhance biodiversity within all vegetation associations;
- Assist in the protection of rare and threatened species of wildlife;
- Ensure the long term viability and survival of populations of native wildlife;
- Fulfil Council's obligations and compliance with the *Queensland Fire and Rescue Authority Act 1990* and Councils local laws; and
- Minimise impacts on regional air quality.

Fire Management Plans

In addition to the 'Bushland Parks Fire Management Action Plan and Guidelines', 11 detailed fire management plans have been prepared for specific Management Areas as identified in Appendix 2, and a further 29 'short' fire management plans for other selected bushland parks within the City.

These Fire Management Plans were developed for Council's Parks Branch as part of a City wide fire management planning process to enable Council to meet its obligations under State Legislation, its duty of care to park visitors and neighbours and to provide a safe bushland environment to the community.

These plans identify the fire management constraints (fire hazard present in the parks, the fire risk to residential property and adjacent bushland along the parks borders) and provide suitable and sustainable management prescriptions and actions (establishing and maintaining existing firebreaks, conducting prescribed burns) to address the fire management constraints.

The recommendations from the fire management plans have been compiled into three categories to be implemented over the next five years:

1. *Firebreak Construction Program* - identifies where firebreaks are required and the type of firebreak needed. To be constructed by contractors and staff.
2. *Prescribed Burning Program* - this is the first year that a prescribed burn program has been undertaken. Five blocks were successfully burnt by council staff.
3. *Fire Management Issues* - this includes neighbour liaison/education and key acquisitions.

Firebreak Maintenance Brochure and Thankyou Calling Card

To assist in maintaining our firebreaks free and clear of any obstructions or increased fuel loads from dumped household rubbish or building materials, we developed a simple calling card brochure that asks the owner to clear up the firebreak and provides Council with a detachable section for reinspection.

Also developed was a Thankyou Calling Card. This lets people know we have followed up on our initial request and thanks them for removing the obstructions.

Nature Based Recreational Facilities

In our fast changing world of ever increasing stress, people look towards nature based recreation as a way of escaping from life's everyday pressures. As the demand for nature based recreational opportunities grow, so does the visitor impacts on existing facilities and the community pressure to provide more facilities.

Our bushland parks are special places. The native remnant vegetation contained within them provides us with a reminder of what the landscape was once like. Our bushland parks are also home to a multitude of plants and animals, some rare or endangered. Although some of our bushland parks are fragile, not all of them should be 'closed' to the public. We need to find a balance between conservation and recreation and what better way for people to appreciate, value and learn of our natural environment than by providing quality nature based recreational opportunities.

Existing nature based recreational facilities in Council managed parks are limited. However, an enormous opportunity exists to provide a range of quality nature based recreational facilities.

The Bushland Operations Program currently maintains approximately 17km of walking tracks on nine bushland parks and 15km of concrete pathway/bikeways on another two bushland parks.

Bushland Parks Brochure

The 'Explore Your City Bushland - a guide to discovering Logan's bushland parks' brochure was recently developed to inform residents of the locations and opportunities of a number of Logan's more significant bushland parks.

Education

Nearly all the 'threats' to the conservation values of our bushland parks stem from people. Threats to our bushland parks include:

- Dumping of rubbish and garden waste;
- Invasion of weeds which smother and suppress native plants;
- Disturbance of areas by too frequent fires or diminished biodiversity due to too infrequent fires;
- Straying dogs and cats which kill native wildlife;
- Urban storm water run-off;
- Picking wildflowers and removing native plants, soil or bush rocks;
- Trampling of vegetation by horses, 4WDs, trail bikes, BMX bikes and mountain bikes; and
- Illegal encroachments onto parkland including storing of building materials and construction of sheds.

Through an active public awareness and education program we should be able to significantly reduce a number of these threats facing our bushland parks and thereby reduce the amount of council resources required to address these threats. Educational strategies are also required to educate and inform the public of the recreational opportunities and the conservation values of our bushland parks.

The implementation of these strategies will be conducted through both the Community Bushcare Program and the Bushland Operations Program.

Rubbish Dumping Brochure

Another brochure has been developed to assist council in reducing the instance of rubbish being dumped on our parks. Both Council staff and bushcarers use these brochures.

Logan Bushland Friendly Nurseries

The Logan Bushland Friendly Nursery Program was launched in October 1998 during Weedbuster Week. Today, fourteen (14) nurseries in Logan have made a commitment not to sell certain environmental weeds in Logan. Participation is free and voluntary with nurseries being provided with a metal sign, brochures, weed posters and advertising.

There has been considerable interest in Logan's Bushland Friendly Nursery Project from other organisations, with Ipswich City Council, Northern Rivers NSW Weeds Advisory Council, Canberra and Melbourne launching similar projects.

A weed poster and brochure on the project was developed and is available from participating nurseries.

Logan Environmental Olympics (LEO)

The Logan Environmental Olympics (LEO) is a fun competition aimed at primary school students in Logan to actively remove four (4) environmental weeds from their school grounds and local community. Bags of weeds are then exchanged for points that go towards winning great prizes.

LEO was launched in October 2000 during Weedbuster Week and was run again in 2001.

Sponsors including Dreamworld, McDonalds, Clarks Buses, Dominoes and David Fleay Wildlife Park have supplied prizes, with a total value of over $4,000.

Bushland Management Sponsorship

Alison Buchanan, Conservation Partnerships Officer,
Noosa Shire Council, PO Box 141, Tewantin, Q, 4565.

What is Bushland Management Sponsorship?

Bushland management "sponsorship" is funding (or in-kind contribution) from corporate bodies and other non-government or non-NHT funded organisations that provides support on an ongoing basis for bushland restoration works and management on community bushland reserves.

"Sponsorship" within Noosa Council consists of on-going, in-kind contribution of funds and/or resources on an annual basis to the management of bushland reserves. Contributions from the corporate bodies involved are usually financial while Council provides resource contributions (such as labour and tools). Contributions from each party are equally matched dollar-for-dollar and are made up to a specified amount on an annual basis. Usually the Sponsorship Agreements will last for around five years, with a review of the Sponsorship at the end of this time period.

The Sponsorship Agreements are not legally binding and are a "gentlemen's agreement" rather than a legal document. Each party can withdraw from the Sponsorship Agreement at any time. However, because of financial contributions made by the parties in the past, each party has a vested interest at least to ensure that previous restoration and weeding works are maintained. The Agreements simply set out the roles and expectations of each party within the Agreement and how the management arrangement will best operate.

There is no hard and fast rule to Sponsorship - but in Noosa, the funding for the management of bushland comes from outside the government sector and NHT sources. Funding and support is from sources external to "traditional" conservation industry supporters.

There may be opportunities in the future for contractual arrangements between Council and corporate bodies to fund bushland restoration and management works in compensation for past or future damage to ecosystems caused by these organisations (such as damage caused by construction works).

Why do we need sponsorship?We need sponsorship because:

- Sponsorship is a more consistent, long-term and more guaranteed source of funding that assists in overcoming the often ephemeral nature of funding from Government and NHT sources;
- Sponsorship provides extra funding and resources to be specifically allocated to the long-term management of particular conservation projects - this allows for more intensive and extensive reserve management and allows for tackling of bushland management problems sooner rather than later; and

- Sponsorship is an excellent way to involve the community and non-traditional supporters of bushland management (e.g. corporate bodies) in management of community lands - it creates a vested interest in reserve management by the community.

There is a tendency for NHT and Government to fund projects on a short-term (1 to 3 year) basis. While many of these types of projects have initially resulted in short-term restoration success, they have failed to develop and implement long-term maintenance activities.

Sponsorship allows bushland managers to tailor funding to longer-term management by arranging corporate sponsor financial or resource assistance of a specified amount for a specified time - in the case of Noosa Council at least for five years. Extra funding and resources provided allows for the more intensive management of large areas of land and allows for the management of areas sooner rather than later (when they may have developed larger, more complicated and expensive problems).

Additionally, contributions made by both parties ensures that each party has a vested interest in ensuring works are carried out and maintained.

Sponsorship involves the community in reserve restoration. Programs like Voluntary Conservation Agreements and Land for Wildlife involve private landowners in management of private lands. Bushland management sponsorship involves the community in taking responsibility for management of community lands. Not only do they fund the works, but they also take "ownership" of the area being restored or managed and become the eyes and ears of the reserve - reporting restoration progress and any signs of vandalism, plant death or damage etc. This effectively increases "on-ground" staff resources for Council and ensures the quality of works is maintained.

Benefits

Sponsorship:

- Creates extra, more targeted financial and resource support for active management activities;
- Raises awareness of environmental problems and the resources required to combat these problems within the local community;
- Enhances communication between Council and non-council organisations;
- Promotes awareness of environmental restoration and provides demonstration sites of the benefits of environmentally sound bushland management;
- Enhances public "ownership" and responsibility in public reserve management;
- Provides excellent opportunities for training and skills development in a wide variety of areas - from weeding to corporate/private organisation liaison and communication;
- Enhances aesthetics, increases the contributions of the corporate body to sustainable development and best practice environmental management - provides a green image and is also good for tourism;
- Increases awareness of business/corporation impacts upon the environment - internalises environmental costs of development; and
- May have tax advantages to the participating business or corporation.

Public participation is essential to the long-term success of reserve restoration and management activities. Benefits include:

- Creating support for active management activities within reserves through labour force, resource and financial support;
- Raising awareness of environmental problems and methods used to manage these problems;
- Enhancing communication between community and government, and between traditional and non-traditional industry bodies (e.g. commercial business organisations);
- Promotion of environmental restoration through community information channels and channels external to usual Government avenues - word of mouth - authentic and cheap!;
- Providing opportunities for local residents to become the "eyes and ears" for the reserve - enhancing public "ownership" and responsibility for reserve management;
- Providing opportunities for training and skills development of volunteer and employment scheme organisations;
- Enhancing aesthetics of area and allowing businesses to participate in environmental management best practise - good for tourism;
- Depending upon where the business funding is coming from (e.g. donation) - may have tax advantages to the participating business;
- Increasing awareness of business impacts upon the environment - helps to internalise environmental development costs; and
- Assisting in both the development and implementation of long-term and ongoing management regimes for the reserve.

Drawbacks

The drawbacks can include:

- Unreasonable expectations from participants - process of restoration and natural regeneration versus the perception that changes happen overnight ("Backyard Blitz");
- In the past it has been unclear what responsibilities each party has had and this had led to misunderstandings;
- Initially, the business or corporate body may have unreasonable expectations of restoration capacities of the natural environment, the influence weather has on restoration success and the labour force required to undertake and maintain restoration processes;
- There may also be quite considerable "devastation" caused to an area by weeding - this may appear unsightly for some time;
- Organization and supervision of works crews; and
- Prioritisation of areas.

Restoration can be a slow process and is dependant upon weather conditions and the initial integrity of reserve vegetation. Weed removal is not often "pretty" and can be an eyesore if too much is removed at one time - further slowing the process.

The process of restoration must include extensive liaison and education with the organisation involved. Explaining and demonstrating the processes of restoration, has in the past, seemed to assist corporate sponsors in coming to an understanding the often slow and complicated task of restoration.

It is critical that the responsibilities of both parties are clearly outlined and understood before any works take place. In Noosa Council, a Cooperative Management Agreement document clearly sets out the obligations and responsibilities of both parties - and must be signed by both parties before any works takes place. Noosa Council also develops a Management Plan for the area to be restored. This Management Plan further outlines the actions to be taken within the restoration area. It may take some time for development of a Management Plan and the negotiation of a Cooperative Management Agreement between the two parties - however, experience has taught that it is better to be safe than sorry!

Sourcing and supervision of labour needed to undertake the restoration activities may prove difficult in some circumstances. Generally, Council uses employment scheme volunteers, correctional services and international ACTV members. While these are "cheap" sources of labour, a trade off is sometimes made with the quality of work - "casualties of war" are indirectly proportional to the experience of the labourers! Noosa has found that, so far Green Reservists (work for Dole Scheme for over 40 years of age) are an excellent source of reliable labour - needing little supervision and bringing much experience to the task. Green Corp and correctional services have also given good results, however they require substantially more supervision and training. Council has recently employed a two-person (full-time) bushland management team that will help with training and supervision of labour volunteers. From time to time Council will use funds to pay contractors to carry out works that are otherwise too difficult or dangerous for volunteers to carry out. The relatively high costs of employing contractors are usually balanced by high quality work that is often carried out with some sort of guarantee.

Some areas where businesses or organisations are keen to undertake restoration may not fit with ecological priority areas. However, Noosa feels that it is better to encourage public participation where possible - and beginning restoration in a lower priority area is better than not undertaking restoration at all! Additionally, Council has found that restoration begun in areas selected by the groups themselves creates greater "ownership" of management and provides excellent peer pressure for other organisations to come on board.

Noosa's Cooperative Management Agreement - Castaway Cove Resort

First sponsorship agreement was between Noosa Council and Castaway Cove Resort, Marcus Beach:

- Started in 1998 and continuing today;
- Aim is to re-establish native bushland vegetation community that requires minimal management input;
- Covers an area of approximately 3 ha - outside the front (ocean side) of the Resort; and
- Estimated 10 years to reach aim.

Other examples of sponsorship include:

- Noosa Council and The Retreat Resort, Peregian; and
- Ipswich City Council and Powerlink (for details contact Ipswich City Council).

Example Cooperative Management Agreement

Below is shown a typical Cooperative Management Agreement:

Cooperative Management Agreement

Management Parties

1. Parties agreeing to this Cooperative Management Agreement are The Noosa Council (hereinafter called the 'Council') and XXX (hereinafter called XXX).

Management Site

2. Council and XXX agree to enter in to a Cooperative Management Agreement for the environmental restoration site as described within Schedule One: XXX - XXX Environmental Restoration Site Management Plan. Council and XXX also agree to abide by those management directions contained within Schedule One: XXX - XXX Environmental Restoration Site Management Plan.

Management Plan Contents and Time Frame

3. Council and XXX agree to enter into a cooperative management agreement for the Site specified in Clause 1, Schedule One, for a period of five (5) years, beginning at the date this Agreement commences. However:
   i. The period of the cooperative management agreement may be altered at any time, provided that both parties agree to the alteration.
   ii. The agreement may be continued after the end of the agreement period, provided that both parties agree to the extension of the period of agreement.
4. Council and XXX agree to enter into a Cooperative Management Agreement for the Site that will seek to achieve those management goals, aims and objectives as specified within this Site Management Plan. However management goals, aims and objectives may be altered, revised, added or deleted according to management needs at the time and provided that both parties agree to the alteration, revision, addition or deletion of the management goals, aims and objectives.

Access to Site

5. Where access to the site is required through land owned by XXX, XXX will allow contractors, community groups or any other groups or individuals officially associated with the carrying out of management activities within the reserve, access to the Site - provided reasonable prior notice is given to XXX by Council or those officially associated with Site management.
6. The Council, or any Council approved persons, contractors, community groups etc, using private land of XXX to access the Site, shall not cause any damage to that land or any property on that land. If damage is caused to that land or property on that land, then Council shall take appropriate action to rectify the damage.

Cost Sharing

7. The Council and XXX will equally share costs associated with the management of the Site. The monetary amount required to be contributed by either XXX or Council shall not exceed the limit specified within this agreement. However, where both parties agree, the specified limit within this agreement may be altered at any time. Any changes in specified monetary amounts required, must be detailed and approved by both parties in writing.
8. Each party will contribute to related management expenses up to an amount of $ XXX each per financial year.
9. At the end of the financial year, XXX shall be invoiced for 50% (fifty percent) of all costs (including Goods and Services Tax expenses) incurred through the management of the Site during that financial year.

Authorisation of Works

10. Council must approve all works undertaken by persons, contractors or community groups etc, undertaking management activities within the Site, before any works can be carried out. Where unapproved works are carried out or are being carried out, Council may cause the activity to cease and/or may not be liable for any expenses incurred through the unapproved activity.
11. Any management works carried out within the Site will be done so according to those guidelines and management strategies specified within this site management plan and the Bushland Management Principles document.
12. Where significant and previously unspecified works are to be carried out, Council agrees to consult with XXX as to the development and implementation of any management activities.

Location of Materials and Equipment

13. During the lifetime of the agreement, XXX will allow the storage of materials and equipment within the defined Storage Areas (located on private or Council controlled lands) as specified on the Site Plan and as agreed to by both parties. XXX will allow access to these materials, but shall not be responsible for the management of these materials or equipment.

Health and Safety Considerations

14. Council must approve all persons, contractors or community groups etc, undertaking management activities within the Site, before any works can be carried out. Where works are carried out or are being carried out by unapproved persons etc, Council may cause the activity to cease and/or may not be liable for any expenses incurred through the use of unapproved persons, contractors or community groups etc.
15. All persons, contractors or community groups etc, undertaking management activities within the Site, shall adhere to all health and safety requirements and regulations as required by the *Health and Safety Act 1993* (Qld).

16. All persons undertaking management activities within the Site shall:
    i. Be suitably qualified to carryout required management activities in regard to health and safety regulations.
    ii. Be suitably qualified and skilled in regard to efficiently and effectively carrying out required management activities (i.e. appropriately licensed, trained etc.).
    iii. Be appropriately supervised by a trained or qualified group leader or supervisor, particularly where persons are of limited qualifications and/or skill levels.
    iv. Have appropriate public liability insurance and other insurances that will cover them for personal or other injury, either personally or through the organization for which they are working or represent.
    v. Follow all management activity instructions administered to them by their supervisor or project leader.

Education and Promotion

17. XXX and Council agree to partake in or support, to an extent and type of support as agreed to by both XXX and Council, any education or promotion program carried out by Council in relation to activities carried out within the Site.

The future

Public participation through sponsorship plays an extremely important role in ensuring the ongoing, long-term maintenance of ecological systems within bushland reserves. Sponsors provide valuable on-ground resources, they also act as the "eyes and ears" for bushland protection and also play an important role in maintaining communication between Council and private businesses, corporations and individuals. Council will encourage and promote the establishment of sponsorship programs throughout the esplanade reserve area of the Shire now and in the future.

Through the Agreements, groups can become actively involved and obtain some community "ownership" of reserve management, under the guidance and assistance of Council and best practice environmental management methods. Through the Agreements Council has already established and is supporting this guided management activity and has consequently developed a number of small site management plans in order to guide and assist both parties in reserve restoration activities and development and implementation of common management goals and aims.

Striking the Balance - Achieving Biodiversity Conservation Outcomes in Local Government

Gerard Brennan, Director Technical Services and Rick Galbraith, Environmental Officer,
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Introduction

"At the dawn of a new century, we have the ability to change the vital ecosystems of this planet, for better or worse. To change them for the better, we must recognise that the well-being of people and ecosystems is interwoven and that the fabric is fraying" (Brown, Topfer, Wolfensohn and Lash, 2000).

Crows Nest Shire has taken an active role in natural resource management over the last decade in partnership with elected representatives, Council officers and the community. The elected representatives of Council and Council officers often find themselves walking a tightrope, balancing between conservation outcomes, development pressures and budgetary constraints.

The position of local governments

Local governments were identified in the publication "*Beyond Roads Rates and Rubbish"* as key players in natural resource management and particularly the conservation of native vegetation. Two primary reasons identified were:

1. As the level of government that is closest to the community they are able to translate the policies of Commonwealth and State Governments into on-ground projects for the conservation of native vegetation; and
2. As managers of public land and land use planners, local governments are responsible for regulating a wide range of activities that may impact on native vegetation.

(Binning, Young and Cripps, 1999).

A number of local governments in Queensland have embarked upon significant and far-reaching programs in the area of natural resource management. The perception is that these Councils are chiefly those that have large populations and rate bases and significant resources to address natural resource management issues. Many small local governments (including those in western Queensland) are however in a similar position to Crows Nest Shire Council and have been quietly developing and achieving significant NRM programs and outcomes (LGAQ 2001).

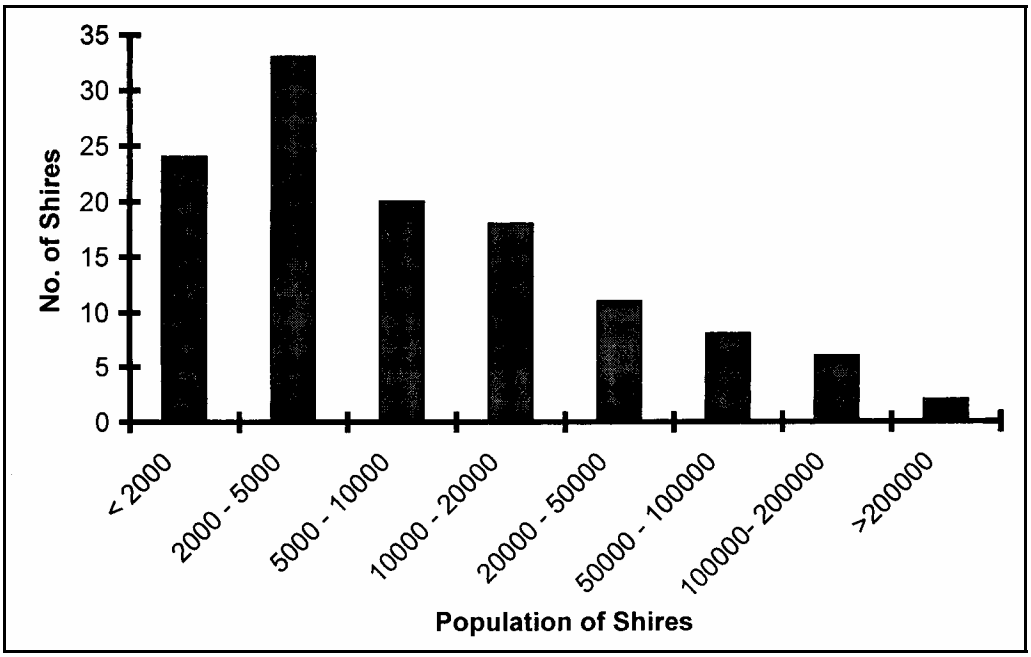
The majority of the landmass of the State of Queensland falls under the jurisdiction of local government with small populations usually with small rate bases and very limited resources

for undertaking the many responsibilities expected of local government. They range from large and complex organisations, such as Brisbane City Council with a population of 820 590, a budget of $1157 million and covering 1218 square kilometres, to remote and rural areas, such as Bullo Shire in south-western Queensland, with a population of 600, a budget of $5 million and covering an area of 73 620 square kilometres (Binning, Young and Cripps, 1999). Despite this, local governments can potentially have a huge impact on NRM issues, particularly through their planning processes and a range of other activities that they must regulate. Additionally, as an authority responsible for the operation and maintenance of extensive infrastructure networks, Councils in their own right have the capacity to significantly impact on the environment and ultimately biodiversity conservation. Conversely, these Councils also have an enormous potential to benefit from and assist natural resource management processes in their local areas.

In Queensland, there are 122 local government areas and 33 Aboriginal and Torres Strait Islander Community Councils. The population structure of these local government areas is as follows:

Population of local gov't area	< 2 000	2 000 - 5 000	5 000 - 10 000	10 000 - 20 000	20000 - 50000	50 000 - 100 000	100000 - 200000	> 200 000
No. of local gov'ts	24	33	20	18	11	8	6	2

Graphically, this is represented below:



It is significant to note that only two local government areas in Queensland contain a population of in excess of 200,000 people (Brisbane City and the Gold Coast), yet at the same time manage approximately 1% of the total land mass area of the State.

Challenges for rural local governments

Typically staff in rural local governments are multi-disciplinary in nature, both in terms of the role of local government and more particularly, the roles of individual officers. Often the boundaries between these roles are ill defined. By comparison with an urban authority, the rural constituent has traditionally had a production focus aimed at the maintenance of the livelihoods which support the community.

Over the last decade, the "Decade of Landcare", it has become evident that land managers and primary producers are constantly seeking to maintain and improve all aspects of land management, however a major limiting factor to improving practices seems to commonly point towards a lack of knowledge. This is certainly the case with biodiversity and conservation related issues.

Another challenge facing some local governments is the difficulty of working across two or more bioregions. In the case of Crows Nest Shire, portions of both the South-East Queensland and Brigalow Belt Bioregions lie within the Shire boundary. Both of these bioregions have different processes in place for developing regional vegetation management plans (RVMP) run by different regional offices within the Queensland Department of Natural Resources and Mines.

What is the core business of Council? Roads Rates and Rubbish?

Traditionally, local governments have been concerned with the delivery of services to their constituents, the so-called essential functions of roads, rates and rubbish. Over the past ten years, local government has undergone profound changes with many roles and responsibilities being devolved to them from Federal and State Governments in conjunction with changing community expectations of the role of local government. Its role in natural resource management, whilst recently coming into sharper focus, is just one of the many emerging new responsibilities of local government. Biodiversity conservation is now considered in both planning and operational contexts.

What is biodiversity?

As Council comes to grips with this question, they are identifying competing and often conflicting priorities that fall under the responsibility of the local government. Local governments are, by necessity, undergoing a change of culture in order to meet new community expectations and emerging new legislative responsibilities.

Crows Nest Shire Council background and achievements

Crows Nest Shire Council is undergoing rapid growth, especially in the urban residential and rural residential sectors. Currently Crows Nest Shire is ranked third within the top ten local authorities in Queensland with a growth rate of 3.5 percent for the preceding five years (DCILGPS 2000). Whilst the Shire has rapid urban growth, the actual area of the Shire that is urban is proportionally quite small. The population of Crows Nest Shire is a mixture of rural and young urban communities, that combined with high levels of education (second highest percentage of university graduates within the State) has led to an expectation of responsible natural resource management by the Shire Council. This is reflected in an extensive and growing network of Landcare and Catchment Management groups operating throughout the Shire and in adjoining areas.

The Shire covers an area of 1,706 square kilometres and has 46% woody vegetation cover (23% remnant vegetation cover as mapped by the Queensland Herbarium). It contains a complex and interesting mixture of geology, flora and fauna being located at the junction of the Southern Brigalow Belt and South-East Queensland Bioregions and the temperate and tropical climatic zones.

Crows Nest has undertaken a number of previous studies looking at both remnant vegetation and vegetation corridors within the Shire. Natural resource management has developed considerably over the years, having progressed from one Shire based landcare group covering the whole Shire to five landcare groups, based on catchments, that are taking an active interest in what happens in the Shire.

Operational activities of the Council are continuing to evolve with changes in work practices and culture, for example, the development and implementation of Environmental Management Plans for roadworks, revegetation, weed control, etc. A balance between essential service provision and biodiversity conservation is the tightrope that must be continually walked.

Learnings and experiences

Through active involvement over recent years, elected representatives and Council staff have gained a significant level of experience concerning the role of local government in a broad spectrum of NRM issues including biodiversity. The State of Environment Advisory Council (SoERAC, 1996) identified three key elements of the environment which require maintenance in order to achieve sustainable development. These are:

- Biodiversity;
- Ecological integrity; and
- Natural capital.

Council quickly identified that both regional partnerships such as the newly formed *Moreton Bay Waterways and Catchments Partnership*, Regional Organisations of Councils such as the Eastern Darling Downs Regional Organisation of Councils (EDROC) and local community groups such as the five local catchment groups are all important in addressing the natural resource management issues particular to our local area.

It soon became apparent that when acting in isolation, processes derived from legislation or local laws were only partially effective. A good example is the declared weed notice system under the *Rural Lands Protection Act* whereby landholders are required to prepare a property pest management plan for their properties and to control or eradicate declared plants on their property. It has become evident that in order to fully implement the desirable processes, Council is required to lead by example and join forces with community organisations and other groups of interest with common goals. To that end, Crows Nest Shire in its Corporate Plan identified numerous goals to encourage sustainable development compatible with our natural beauty and resources.

These goals include:

- Maintain an equitable rating structure with consideration of environmental levies and other special purpose levies where appropriate;
- Expand our quality assurance system to cover all facets of Council operations;

- Develop a community based integrated planning scheme that provides for continuing development while maintaining the amenity for existing residents and addressing the needs of ecological sustainability and economic development;
- Encourage new residential, rural residential and rural developments where compatible with Council's planning strategies and the natural environment;
- Develop a natural resource management strategy that provides ecological sustainability to all areas of Council operations and community life by implementing the strategy through action planning processes; and
- Foster the Shire's tourism industry with particular emphasis on nature based and eco-tourism operations.

(CNSC 2001).

Mechanisms

Crows Nest Shire Council is using the following mechanisms to achieve positive and hopefully sustainable outcomes for the benefit of the Shire community:

- Development of a planning scheme in compliance with the Integrated Planning Act that uses a land systems approach - to date a Statement of Proposal has been prepared and released to the community for consultation and input;
- Development of a Natural Resource Management Strategy and associated action planning processes to address a wide range of natural resource management issues for the Shire;
- The encouragement of sustainable residential, rural and economic development for the Shire taking into account the natural values of the area;
- Review of environmental factors prior to undertaking major civil works or approval of town planning development applications;
- Development of a database of the Shires natural assets through the Natural Resource Inventory Program as well as flora and fauna data sets which can be used in the assessment of development and planning activities; and
- Commencement of a biodiversity recovery planning process for Shire.

Conclusion

Local government, particularly in rural areas, is likely to remain service orientated. However, change can be achieved in the long term through the influence of community, elected representatives and Council officers. Along with this responsibility of providing services comes the logistical and operational complexity required to run a service-providing organisation. Councils must, however, grasp the emerging responsibilities and opportunities to achieve long term sustainable biodiversity outcomes whilst ensuring that adequate attention and resources are made available to achieve these outcomes.

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The Human Factor in Biodiversity Conservation

Keynote Presentation

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Processes and Mechanisms for Integrating Research and Management

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Note: Full paper submitted for publication elsewhere.

Introduction

Local resource managers often struggle to solve their environmental problems - having to avoid unintended consequences, without comprehensive information and a workable understanding of the systems surrounding their activities. Scientists are similarly confounded because the knowledge they create is rarely integrated with the implicit systems of the manager(s). Further, much scientific information is focused on single issues and limited scales. While ecological science has become increasingly systems based in recent years, it needs effective linkages to human dimensions such as primary industry production and land management goals in order to contribute to the types of integrated strategies needed.

The two cycles

Researchers follow a cycle of identifying research questions, developing and testing hypotheses, obtaining results, and publishing their interpretations (Figure 1). The management cycle consists of deciding on and implementing a management strategy or policy to achieve a particular goal, monitoring the outcomes, and adapting the strategies or policies if required.

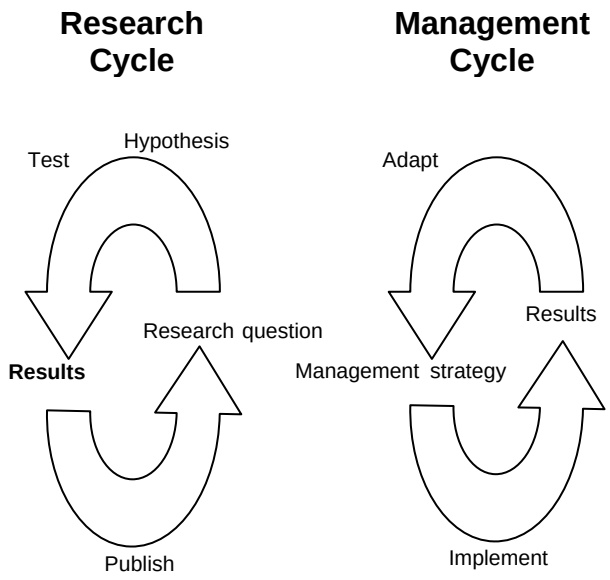

Figure 1. The two cycles: Research and Management.

A lack of integration between the research and management cycles has led to various problems in achieving sustainable systems:

- Knowledge develops in separate domains - each party is denied the feedback loops of the other - the scientists' learning through repeated experimentation, and managers' learning through observation of outcomes of applying knowledge;
- Local and traditional ecological knowledge and experience are not valued (or even collected);
- Land managers are expected to integrate information to achieve their management goals (even further complicated by an inability to integrate across a range of scales);
- Absence of end-user input in identifying research questions could lead to irrelevant research - researchers seek generic understandings (e.g. robust theories), managers generally seek the best solution for a particular context;
- Land managers have limited say in where and in what form scientific knowledge and understanding is kept;
- Neither party acting alone has sufficiently comprehensive mechanisms to build on what is known, leading to a lack of 'ownership' by land managers of scientific knowledge, and vice versa;
- There is a lack of mutual understanding of and frequently caricaturisation of each others' viewpoints and beliefs; and
- Land managers and policy makers have difficulty selecting relevant information for the development of management strategies and policies, let alone integrating it to examine the consequences of management ideas.

These examples centre around two main issues: learning and information management. Figure 2 illustrates how research and management can be linked more effectively through the creation of collaborative learning environments and better information management.

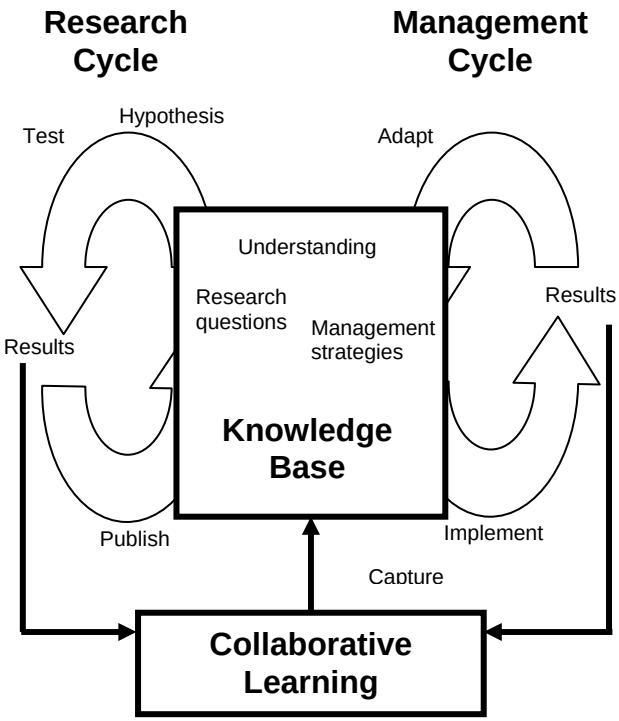

Figure 2. Linking research and management through collaborative learning and better information management.

The benefits of collaborative learning environments and better information management are:

- Researchers and end-users are provided with the opportunity to share their research results and the outcomes of management with each other;
- All involved have a chance to debate and "make sense" of each other's findings, in this way learning from each other;
- The outcomes from the "making sense" process are used to continually build and update the knowledge base, making it available to all those that can potentially benefit from it; and
- The making sense process also reveals knowledge gaps, involving the end-users of research in identifying the new research questions.

Basic requirements for linking science and management

Involvement of stakeholders:

1. Many different types of people and organisations manage environments, through different roles as users and owners of natural resources, and influencers of how others use them - they are not unified in their goals in using and modifying landscapes, and in the perspectives, values, and assumptions underpinning their goals and strategies.
2. Stakeholders' different intentions or hopes for the same environments need respect and integration for coordinated and widely supported action to occur.
3. Managers also base their actions on different forms of knowledge - traditional ecological knowledge, knowledge from observation and experience, scientific knowledge - which may be embedded in wider systems of beliefs about the world and the way it works.

4. Failing to involve stakeholders risks designing proposals that will not work for all, begs lack of support for implementing a solution, and also excludes information that could be highly useful in reaching good decisions.

Systems thinking:

1. Systems thinking provides scientists and managers with a mechanism to help understand the causes and effects in systems and to identify the core problems and refine management goals. It further enables scientists and managers to 'predict' the possible consequences of management actions to achieve these goals. Systems thinking also brings in factors outside the immediate topic, and can force different viewpoints.
2. Systems thinking, used within a collaborative learning environment, enables different people to contribute their awareness of linkages to the recognition of an enriched system. Everyone learns more of the system by exposure to one another's personal systems frameworks.
3. A system for linking science and management needs to include each relevant actor's ways of viewing the management issue and its context, and the formal or informal knowledge about these.

Adaptive management approaches:

1. Natural systems are complex, and their management takes place against a dynamic background where change is continuous and unpredictable.
2. The adaptive management approach has become a useful alternative to deal with such systems. Adaptive management (AM) requires collaboration across disciplinary and professional boundaries (Dovers & Mobbs, 1997) and therefore forces the *creation of linkages* between science, management and policy.
3. AM leads to greater participation and stakeholder engagement in management and policy, and improves reciprocal valuing of different forms and sources of information. This integrative nature of the adaptive management approach has become a useful framework for linking research and management.

Integration approaches

Mechanisms are required for creating a collaborative learning environment and knowledge-building process. The following two reflective case studies describe approaches and insights from our own experiences.

Case study 1: Linking science with management

The issue: An aggressive weed species (*Hieracium pilosella*) has spread significantly throughout much of the high country of New Zealand, with a detrimental impact on farming enterprises and conservation values (Bosch et al., 1996b). There have been no clear explanations to account for the dramatic increase of this weed. Two major explanations offered by scientific opinion appear to be in conflict. One explanation focuses on its aggressiveness as an invader, the other sees it as directly related to the degree of degradation caused by such pastoral impacts as grazing and fire (Rose 1992; Treskonova, 1991). The farming community was also divided and disturbed by the explanations, the first offering little hope, and the second seeming to blame current pastoral practices. These conflicting

viewpoints made it difficult to identify possible solutions to the problem (Bosch et al., 1996b).

A new approach was required to deal with the challenges that Hieracium posed to sustainable land management. Such an approach required a greater emphasis on linking science with management and policy, and on maximising the use of current community knowledge. The Integrated Systems for Knowledge Management (ISKM) process was used to meet the requirements outlined above (Allen et al., 1998; Bosch et al., 1996a). This participatory approach builds on the principles of experiential learning and systems thinking, and is a cyclical and highly iterative process with four main steps (Figure 3).

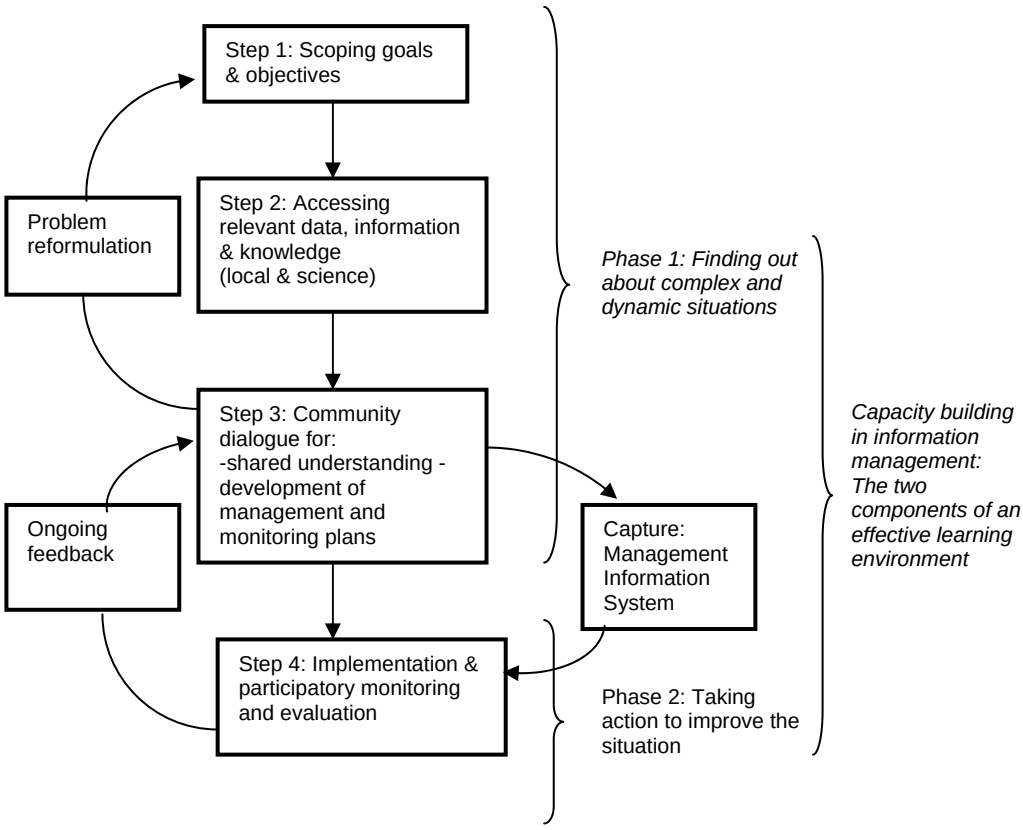

Figure 3. ISKM - a participatory research framework to help identify and introduce more sustainable resource management practices. The two phases interact to create an effective learning environment (Adapted from: Bosch et al., 1996b).

The scoping phase revealed the need to treat Hieracium as an important part of the wider, more complex set of difficulties facing sustainable pastoral management in the high country of New Zealand. The weed needed to be considered in a systems context. Management goals were therefore not focused on the weed itself, but rather on how to best manage the vegetation to maximise the availability of palatable species for production purposes.

Accessing the available local and scientific information: Farmers were given the opportunity to provide information on all main management activities related to their enterprises, and their perceptions of the ecology and management of their vegetation (including Hieracium). The information base developed by the farmers was used as a framework to collate and synthesise relevant scientific information.

Community dialogue: Workshops were used to make sense of the complexity and different perceptions that surround the Hieracium/vegetation management problem - developing the "useful knowledge" needed for practical decision support. The shared understanding of the ecological, social and economic factors and management implications that arise from these were captured in a Management Information System that is hosted on the Internet.

Adaptive management and ongoing knowledge building: If the Hieracium project had finished at this point, it would only have achieved the development of some workable hypotheses. Furthermore, due to the high degree of complexity involved, many uncertainties remained around what management strategies would lead to sustainable systems. The ISKM process recognises this, and has been designed so that the first "finding out" phase forms the base for an ongoing process of adaptive management, critical evaluation, and feedback (Bosch et al., 1996a) - that is, taking action to improve the situation and learning by doing (Walters and Holling, 1990). Land managers and policy makers are now implementing the useful knowledge (management strategies), and as they monitor the outcomes of their actions or policies they continually gain new "experimental results". These results provide new information, that in collaboration with scientists and other stakeholders, re-evaluate and expand (through ongoing community dialogue) the collaboratively derived Management Information System (MIS) developed through the third step of the ISKM process. The prototyping approach inherent in the ISKM framework encourages an interactive process where MIS developers and users collaboratively discover new requirements and refinements that are then incorporated in succeeding versions. Not only is there likely to be greater commitment on the part of users to a system they have co-developed, but also a greater understanding of any changes needed to make it work. The fact that the MIS is hosted on the Internet simplifies the knowledge updating and refinement processes. Feedback opportunities through hot email links to information managers of different modules and themes in the MIS, and the use of discussion forums on the Internet, resulted in an effective additional collaborative learning tool. An information system in this sense cannot be usefully regarded only in terms of its transfer component (often seen as a computer-based system). Rather, it is a "social system", within which people interact to create new knowledge and broaden their perspective of the world (Land & Hirschheim, 1983).

Conclusions: The project has highlighted how ecological, social and economic issues are inexorably linked, and that the goals of stakeholders are different. Farmers do not manage for Hieracium alone, but are primarily concerned with managing for increased stock production or available forage supply, without degrading the system. Conservation managers are mainly concerned about biodiversity and cultural values. Policy makers are concerned about wider issues such as watershed and regional management.

The approach created an environment and processes for effective collaborative learning and ongoing creation of knowledge through adaptive management, monitoring and feedback - prerequisites to link science and management more effectively. The various steps of the ISKM approach particularly improved co-learning, valuing of local knowledge, relevance of research, and the management, ownership and access of useable knowledge. However, there is still a clear lack of appropriate methodologies and guidance to fully involve the community in the research process, especially for them to become knowledge providers and learners through ongoing monitoring and feedback. Various factors are involved, such as mistrust in sharing of information, institutional barriers (e.g. ownership of MIS, continued funding for longer-term knowledge-building approaches such as adaptive management), slow response to new knowledge, and conflicting ecological, economic and social values of different stakeholders. The latter *emphasises a continued lack of systems understanding amongst all*

those involved, and in particular an appreciation of each other's viewpoints and perceptions. There is a need for different stakeholders to enlarge their own frameworks within which they operate to accommodate the systems views of other stakeholders. Ways to address this need are illustrated by our second case study.

Case study 2: Systems thinking by communities for better understanding

The issue: Abel and Ross (Abel et al. 1998, Abel and Ross 1998, Ross and Abel 2000) set out to address the issue of *communication between scientists and managers* by looking at their implicit and explicit systems - 'mental models' - of hydrological processes occurring in landscapes and how management affects these.

The theory: They based their underlying theory on a combination of Personal Construct Theory, and a less developed but ultimately more flexible body of theory in the emerging field of 'mental models' (Johnson-Laird 1983, Rogers et al. 1992). Mental models theory brings in a dynamic aspect neglected in Personal Construct Theory by focusing on how people anticipate consequences of possible actions by running 'mental models' of a system before taking actual action.

The approach: The method was developed in two comparable sheep and beef grazing landscapes near Canberra. It involved walking with each interviewee down a slope, asking carefully prepared sets of open-ended and highly specific questions at different sites on the way. At each stopping point the team started by asking 'can you tell me what is happening here', an open-ended question, which had most respondents describing for about ten minutes the landscape elements and processes they observed. They then asked specific questions customized for each point such as 'what would happen if you over-grazed this area?'; 'what would happen if you cut these trees down?'; 'what would happen if you planted trees here?'; and 'why was this dam put here?' These probing questions were to ensure that each person had the opportunity to articulate any important environmental linkages they may have neglected to mention when responding to the open-ended question for that site.

The interviews were recorded and transcribed verbatim, then analysed according to a 'content analysis' framework (Abel et al 1998). The analyses produced diagrams of all the linkages seen by the combined membership of each stakeholder group. Each group's results could be shown separately, or on a combined influence diagram which showed which links were unique to a group, and which were shared with one or both other groups

The results: By and large, the graziers' mental models were least complex, while the research scientists identified the most linkages, among a more complex set of landscape elements.

Implications for mutual understanding: Rather than scientists and managers talking past each other, by using the mental models approach (adapted for different situations, scales and stakeholders) it should become possible for each party to understand where they are making different assumptions or have different knowledge about environmental (or other) processes, and to adjust their communication accordingly. The method suggests communication on a common basis. While it cannot overcome differences in terminology, it makes explicit the main logical pathways followed by each party, and opens them for exploration. If both parties are sincere about improving their communication towards better management, further discussion should help both parties to clarify their understandings. It integrates experiential and scientific knowledge into a common system (for instance, how soils affect vegetation growth, and what that means for management options). Further, the systems linkages should

simplify the managers' task of selecting intelligently from among apparently unlinked information and enable it to be applied in a locally specific way (what do I need to know about *this* soil, what consequences will my combination of soil and slope have for pasture growth and water retention? Therefore what should my grazing strategy be?). Mutual understanding of each other's mental models leads to potential convergence of the systems understandings of different stakeholders.

The way forward

Our case studies bring together four vital points:

1. The need for a systems view.
2. The need to cater for divergent views and values.
3. The need to recognise interdependence.
4. The need to adapt to context.

Across these, the challenge of bringing management and science closer together is to achieve better synthesis of goals and bodies of knowledge. Achieving better information management and effective co-learning requires *direct involvement of all stakeholders* in complex problem solving processes. A *systems approach* is needed to ensure that each stakeholder group's relationships to environmental issues and other parts of the system (such as political influence) are well understood. *Adaptive management* is a valuable experimental framework for accommodating the diversity of treatments necessary for evaluating approaches, measuring progress and building a capacity to resolve highly complex resource management issues through continual knowledge building. Combining these elements for linking science and management more effectively provides a useful model for developing more sustainable resource management.

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Keynote Presentation

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Community Initiative in the Conservation of Biodiversity

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Our roles in biodiversity conservation

Biodiversity may be quite a new term, but the concept is surely ancient. For every culture on earth, it has represented a varied diet and resilience of our food supplies, as well as psychological well-being through experiencing healthy and attractive environments. Peoples who live directly from the land have always had some concept of ecological complexity and diversity, since it was the source of their livelihood. It is no surprise that many cultures celebrate their relationships with natural systems, take a custodial role towards natural resources and hold detailed traditional knowledge about them.

The Aboriginal peoples who first nurtured and shaped the natural resources of Australia are famed for their traditional ecological knowledge, which historically was their way of living well off the land. Their knowledge of animal behaviour and habitats enabled them to catch and collect food. They have systems of landscape classification which enable them to know where to go at different times of year, in times of drought and plenty, to find food. They have land management practices, seated in their traditional knowledge and spiritual system of beliefs, to maximise biodiversity and ensure the abundance of particular foods they favour. For instance, their technique of fire management creates plant responses, attracting animals and hence increases food availability. Using fire on a ‘mosaic’ basis by burning to maintain patches of land at different stages of regrowth maintains diversity of food sources within an accessible area. Where European settlers commonly thought of themselves as ‘taming’ a harsh landscape, Aboriginal land management is seated in an ethos of being part of the landscape and responsible for it functioning well. In the Kimberley where I worked for some years, the best compliment Aboriginal people could pay one another - or me - was to admire their country.

In this presentation I want to explore and open discussion on some of our roles in conserving biodiversity, and what it takes to work together for greater effectiveness in managing our natural resources. I am deliberately stepping outside the common ways of looking at 'public participation' - a rather depersonalised concept - to put the emphasis on our opportunities for individual initiative and personal choices.

In the mind

First lets think about how we consider our relationships with the non-human parts of our ecosystem. Different societies have different ways of thinking about their natural environments, and themselves. Some societies (and individuals) think of themselves as *part* of biodiversity, having a place of some responsibility in the system. They recognise an *interdependence* with biodiversity, for instance as the direct or indirect source of their livelihoods, or as having 'existence rights' of their own. Others see themselves as *apart* from biodiversity, as having privileged rights over other species, as *independent*. This is a 'top down' view of human relationships with natural environments, assuming the right to control and dominate them, putting environments into human service.

An important theme of this conference is how we 'value' biodiversity, both in the economic sense of measuring 'ecosystem services' (free services provided by the presence of natural ecosystems, such as forest cover ensuring water quality in a storage area for urban water supplies, preventing erosion or landslides, providing windbreaks) and in the social sense of 'value', meaning appreciate.

If we recognise biodiversity as providing resilience in a complex system - helping the system to remain sustainable - we should also appreciate diversity among ourselves. On the theory of 'two heads are better than one', we could recognise that people with diverse experience and views increase the richness of the pool of ideas towards sustainable management of our lands. This is part of the resilience of our system. Diversity in culture, gender, ages and skills, knowledge and reasons for working with natural systems, all help this pool of ideas and effort.

We need good knowledge to decide on the best ways of managing natural resources, and also need to recognise that there are many different and valuable ways of 'knowing'. The natural and social sciences can answer some questions, but not all. The traditional ecological knowledge of Aboriginal people, developed for survival purposes, looks at the landscape in different and useful ways. Farmers' observational knowledge contributes different aspects again, of the land's responses to different types of intervention.

We are gradually seeing a transition from Australians thinking of natural resources exclusively in 'private property' terms - the landholder has absolute rights over actions on his or her land - to include a 'common property' view. Rural people are coming to recognise that actions on one property can affect another, for instance in the spread of salinity. They are thus coming to think in terms of shared responsibilities for some aspects of land management.

Valuing biodiversity

I was recently involved in a research project in Northern Thailand, where we discovered that farmers in the impoverished mountainous areas lamented recent reductions in forest cover because they were strongly aware that the forests on their valley slopes provided free insect control (thanks to birds), moderation of the water balance throughout the year (rather than rain

running off rapidly in the wet season and being unavailable in the dry), replenishment of soil fertility as humus moved down the slopes, erosion control, a place to graze cattle, and forest products such as edible fungi, hunted animals, and wood. Their observational knowledge of what forests contributed to their farm functioning had created a strong sense of what western scientists have started to call 'ecosystem services'. They knew that having good forest cover nearby *complemented* their farming: it did not just represent land to clear for more farming. They had discovered the cost of paying for insect and weed controls that formerly were provided free, courtesy of the surrounding natural system. These farmers were also highly conscious of protecting their crop genetic diversity, by maintaining seed banks of different rice and other crop species. Each family carefully maintained distinct variants of rice, handed down as part of the family's heritage.

We are now seeing species diversity as good agribusiness, being able to bring different food species onto the market at different times, selling the scarcer, novelty species at premium prices, and developing new 'natural' products from plant and animal species for a health and environment-conscious market.

In groups and our communities

Just as we are learning together to value biodiversity, I'd like us to think of ourselves as sharing in the enterprise of becoming better custodians of our shared landscape. We need to respect where one another are 'coming from' in this, and to trust that the diversity of our aims, know-how and capacities will enrich our potential to achieve our aims.

We are all environmental managers, in our different ways. Some manage natural resources by handling the land directly, others by creating policy, regulating, educating, or providing financial incentives. In a business, a strong management team has a mixture of skills and knowledge, and teamwork to work together. We have these ingredients in our communities too. We could think of maintaining biodiversity and creating sustainable futures as a shared enterprise, requiring different contributions from each of us according to our abilities.

Our ways of cooperating

It is hard to achieve big changes at landscape scale alone, but many people pulling together (whether in groups or contributing individually to a common cause) can make huge differences. Shared goals such as wishing to manage farmland for biodiversity, and shared social connections - such as the NSW tennis club whose members were also the landcare group - can bring us and keep us together. It is useful to identify these shared goals and bonds, to bring people together for common purposes, and make their interactions personally rewarding.

How do we plan, negotiate, or manage for different purposes? It is useful to get to know what working arrangements work well in different circumstances. Our experience with self-selected voluntary groups such as Landcare, and formed committee processes (also including volunteers!) such as in Vegetation Management and Integrated Catchment Management, can help us to reflect on what approaches to choose in different circumstances, and what to do to help them to work. For instance, what social and decision-making processes help to make structures work smoothly or struggle?

Our activities - and what shapes them

I'd like each of us to think about how to direct our initiative, how to make personal choices about our roles in the conservation of biodiversity. What are our goals? What can each of us do, to fulfil ourselves personally and complement the roles of those with other interests and skills? How can we decide how to use our efforts best? Then, how can policies and government programs support landholders and community groups' activities?

What are our goals?

Building shared effort from common purpose requires becoming (reasonably) clear about our goals. People may have somewhat different personal and group goals, but can recognize common goals among these. The negotiation literature recommends negotiating from people's underlying interests rather than their stated positions - for instance what a wage rise represents to employees (greater security? Respect? Parity with other workers?) rather than becoming bogged down in argument about the positions themselves. (Is there another way of achieving the underlying interest?) In natural resource management, different parties such as landholders, government agencies and conservation groups can also 'negotiate' a shared set of goals which focuses on their underlying interests. This usually involves developing 'higher order' goals, for instance conservation *with* (rather than at the expense of) viable industry and livelihoods, and social equity. This involves integrating the sets of goals.

A good example of this is the Timber-Fish-Wildlife Agreement in Washington State, USA. Indian groups, conservation groups and the timber industry spent years fighting in the courts over forest practices and their impacts on rivers and salmon, which brought the government regulators into most cases too. The Indians were winning most of the cases, but realized this was not saving any fish. All these parties negotiated, and set up an agreement based on common goals which met their combined needs. This included a viable timber industry, since if the industry failed the land would be sold for real estate, far worse for the fish habitat.

It is important to check progress towards the combined goals through adaptive management. Adaptive management treats every management intervention (on the land, or a policy) like a hypothesis, not as a truth guaranteed to work. One tries the intervention, reviews the results to see if it did work in the way intended, and modifies the approach for next time - over and over. Checking progress towards reaching shared goals can involve both reviewing the success of actions, and reshaping the goals for greater focus or new needs if necessary.

What can each of us do?

There is much emphasis on participatory approaches to natural resource management, but relatively little advice for the individuals participating! My personal advice is to:

- Follow your passions and interests (I take the idea of 'passion' from Ernesto Sirolli's book *Ripples in the Zambezi*, where he describes community-based economic development based on finding and supporting people with good ideas and the passion to pursue them);
- Use and develop your skills, observe, learn;
- Show leadership, encourage and support others (e.g. people like Doug Cook, who joked yesterday that people would never point him out in the street as a person who looks after his frogs);

- Accept your limitations;
- Join with others; and
- Don't 'burn out'.

How can each of us decide how to use our efforts best?

If we think of ourselves as part of a shared effort, what role does each of us decide to play? Individually, we can focus on the ideas I have presented above. What do I *want* to contribute, what do I do best, in both my professional and personal roles (landholder, public servant, volunteer)? Together, we can use our combined knowledge - scientific and other forms such as traditional and observational knowledge - to target our efforts. We can use our effort - and those of others - wisely by having clear goals and priorities. And as I have urged above, we can practise adaptive management to build on our knowledge and keep ensuring our efforts are meeting the goals.

How can policies and government programs support landholders and community groups' activities?

The relationship between governments, communities and non-government bodies is changing in natural resource management, as in other sectors. The notion of 'top down' directive management is giving way to a more equal concept of 'partnership', in which each party has different roles. Governments can offer supportive enabling arrangements for private and community action, through policy, financial supports (such as the NHT) and sometimes the form of legislation. It can support community initiatives and provide vital stability through key financial supports, such as the salaries of coordinators and running costs of coordinating bodies to provide guidance and coordination for community-based initiatives. These individuals and organizations help to provide strategic directions and repositories of knowledge, as well as hubs of social networks, for voluntary action.

On their side of partnerships, governments could be more effective by integrating their management of related purposes. For example vegetation management, water management and catchment management are related in landscape ecology, but somewhat separated within government - and hence within community-government partnerships also. The need for 'whole of government' coordination is very real.

Government agencies are in a strong position to offer knowledge management, provided it is accessible to all users. They have the stability, and greater (if hardly abundant) financial and human resources to collect information, integrate it into databases such as geographical information systems, and provide librarians and their scientific equivalents to help people access and use it. Ideally, government-community partnerships should have access to sufficient and well-integrated knowledge to make informed decisions.

How can we integrate?

Communities and individual landholders are well positioned to take integrative views of the social, economic and environmental dimensions of rural and urban life, since these are immediate to their existence. Rural people, for instance, are very conscious of changes in land use (farm to plantations, for instance) that affect their social lives by altering demographics leading to reductions in services. The challenge is to integrate conservation of biodiversity with other responsibilities in environmental management, the ways we gain our

livelihoods, and the social futures we seek to develop. To do this, we need to be conscious of where choices lead - what are the opportunities and costs of a conservation strategy, for social and economic issues?

In order to achieve better conservation of biodiversity, we need to integrate this goal with social and economic needs. To achieve these combined goals, we need to integrate our individual efforts with those of others, and the efforts of communities and industries with those of government. In turn, these partnerships need support from our three levels of government, capable of acting in an integrated, 'whole of government' way to enable each party's efforts to be effective.

Understanding Human Perspectives and Values: The Key to Achieving a Balance Between Agricultural Production and Biodiversity Conservation

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Values underpin the actions and decisions we make. In landscape planning, values play an important part. How we 'see' a landscape is, in many ways, influenced by the values of our heritage, family, society and own experiences.

> "The power of individual attitudes and values in biodiversity management is significant for they provide the framework from which scientific information is constructed." (F.M. Frost, 2001)

The most important reason for understanding human values is that, at the end of the day, it is the individual who undertakes the activity and therefore it is the individual we need to understand. Groups are an excellent means by which whole of landscape approaches may be developed as well as a means to share information. However, groups don't guarantee that we understand the person.

An individual's values filter their perceptions and visions. Education, awareness and extension programs can only succeed if those filters are understood and accounted for in delivery of information and learning experiences.

So what are some of the filters that influence our perceptions?

The following set of filters were identified by a group of NRM extensionists, scientists and producers at a recent workshop on the north-eastern Darling Downs:

Environmental

Personal value systems, upbringing, comfort zone, traditions, perception of beauty/balance/aesthetics, scale - farm vs. landscape, person vs. group.

Social/cultural

Peer values/pressure, conformity, desire to avoid conflict, stage of life/perception of current role, aspirations/acceptable practice.

Economic

Cost vs. benefit, availability of resources, viability, level of understanding (in extension staff and scientists) of drivers on producers.

Knowledge/skills

Educational background, technical knowledge/skills, exposure to media, learning styles, acceptance/recognition of problems.

Elicitation of values and perceptions

Numerous methods have been used to explore peoples' perceptions and values (e.g. attitude surveys and questionnaires, interviews, workshops). The "photo elicitation technique" is a relatively new method, developed by Dr. Fionnuala Frost for Greening Australia's "Living Landscapes" program in the WA wheatbelt. This method is achieving increasing acceptance, having been used in similar programs in southern New South Wales, and has recently been adopted by the Best Practice Agricultural Landscapes project on the north-eastern Darling Downs. In the latter case, the pilot group under that project received the photo elicitation technique very favourably.

There are several reasons for undertaking the photo-elicitation activity:

1. Photos provide a focus for conversations and to share thoughts and impressions. The photos afford a common understanding of how people perceive a situation, and they enable others to talk about these situations and issues using these images.
2. Photos are an effective record of the current health of the landscape, as well as the attitudes and perceptions of those who live and work in it.
3. The information recorded during workshop discussions helps us understand how people think about the activities, recommendations and predictions for their catchment. In turn, it enables those developing these recommendations and predictions to better respond to the attitudes and perceptions of those who live and work in the landscape.

Participants undertaking the activity are asked to take photos that address the following questions/topics:

1. What parts of your landscape/farm do you most like?
2. What parts of your landscape/farm do you least like?
3. Capture images that best describe sustainable farming to you.
4. Capture images that best describe what you hope to be your legacy (i.e. What will you leave your children? What do you hope to pass on to the next generation?)

The group members then combine all their photos for each question in a workshop forum. Addressing one question at a time, the group then discuss the issues raised by the photos and selects two or three images that best represent the group consensus for that question. These discussions, and the final photo set, can then be used to formulate NRM strategies or refine the group's catchment vision and goals for sustainable NRM.

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The Australian Network for Plant Conservation

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The Australian Network for Plant Conservation (ANPC) is a network of over 400 organisations and individuals who are involved in plant conservation in Australia. ANPC's mission is "to promote and develop plant conservation in Australia". To this end the ANPC has an active program of coordinating the exchange of information on the conservation of plant biodiversity. Integrated conservation is the focus of the network and members represent the range of stakeholders involved in plant conservation, including scientists, conservation agencies, botanic gardens, local government, land managers, community groups, industry and individuals. ANPC's activities are broad and diverse and include producing a quarterly newsletter Danthonia, which contains information about results of research, recovery programs, events, publications etc; facilitating networking through a biennial conference and regional groups which carry out ANPC objectives at a regional level and foster local action; and promoting best practice plant conservation through the production and distribution of conservation guidelines. In addition the ANPC offers training through its Plant Conservation Techniques Training Courses.

Introduction

Approximately 1200 of Australia's plant species are currently threatened with extinction. In addition, 27 plant communities are listed as threatened (*Environment Protection and Biodiversity Conservation Act 1999*). There is a diverse range of individuals and organisations working to conserve these species and communities. For example, government agencies are funding and conducting research and recovery programs; botanic gardens are cultivating, researching and educating; universities are undertaking research into a range of aspects; industry is funding and carrying out research into rehabilitation; farmers and other landholders are conserving species on their properties and becoming actively involved in rehabilitation; and a multiplicity of local community groups has sprouted, enthusiastically fencing, planting and protecting native vegetation.

The many different approaches being taken to plant conservation by such varied groups is argument in itself for the need for a national network to coordinate and integrate the work being done. Coordination and information sharing can help make the whole greater than the sum of the parts and reduce duplication of effort and waste of precious resources. This is the role of the Australian Network for Plant Conservation (ANPC), whose mission is *"to promote and develop plant conservation in Australia"*.

The ANPC was founded in 1991 in response to a conference which discussed the state of play in plant conservation in Australia, and the need for coordination (Butler et al., 1992).

Integrated conservation is the focus of the network. Such an integrated approach ensures that all aspects of conservation (genetics, restoration ecology, site management etc.) are all linked, with the ultimate goal of conservation and restoration in the wild.

ANPC's membership reflects this approach, with over 400 members representing the range of stakeholders from government, industry, community, *in situ* and *ex situ* conservation, including scientists, conservation agencies, botanic gardens, local government, land managers such as the NSW Roads and Traffic Authority, community groups, industry and individuals (Figure 1).

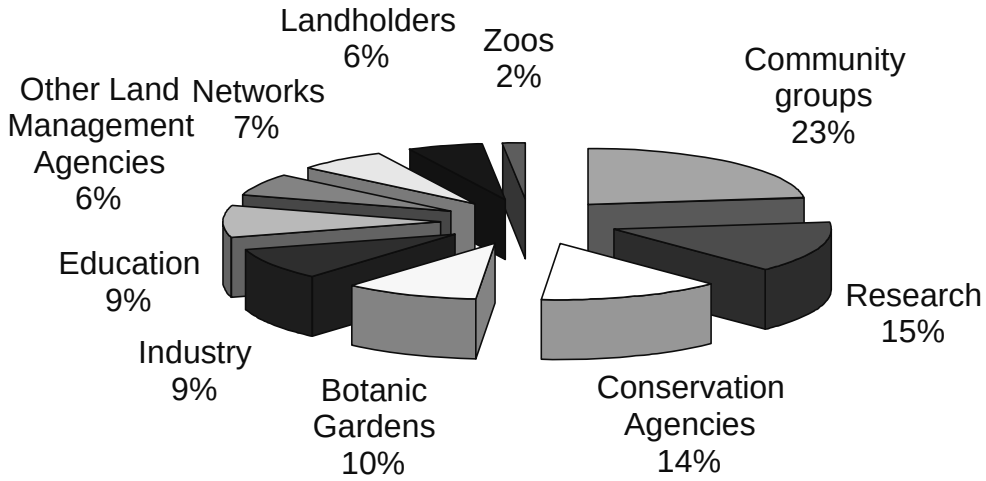

Figure 1. Membership categories of the Australian Network for Plant Conservation.

Activities of the ANPC

ANPC's activities are broad and diverse, focusing on networking, information sharing and the promotion of best practice through education, training and guidelines.

Networking and information sharing

The ANPC helps to bring together all those involved in plant conservation through a number of means, including biennial national conferences, regional groups, and seminars. The ANPC has several regional groups that play a key role in allowing those with an interest or involvement in plant conservation to get together and share information through activities organised in their regions. The groups enable efficient communication of best practice information on plant and ecological community conservation to be spread to agencies and groups active in on-ground works. Voluntary coordinators coordinate the regional groups, and activities include seminars and workshops, field days, practical activities such as threatened plant surveys and weeding.

The ANPC also facilitates information exchange through its quarterly newsletter *Danthonia* and an email listserver.

Training

The ANPC promotes the application of best practice in all aspects of plant conservation. For example, the ANPC has developed an intensive Plant Conservation Techniques Course,

inspired by the International Diploma Course in Plant Conservation Techniques run by Royal Botanic Gardens, Kew. The course includes topics such as:

- Principles and ethics of conservation;
- Levels of biodiversity;
- Assessing rarity;
- Restoration;
- Education, community awareness and partnerships;
- Gathering new information, monitoring and surveying;
- Conservation management techniques; and
- Accessing existing information, databases and literature.

The course is suitable for those involved or planning to be involved in practical plant conservation projects including:

- Community volunteers;
- Community support staff;
- Land managers, farmers and graziers;
- Industry staff;
- Government staff;
- Botanic gardens staff; and
- Facilitators and extension officers.

Figure 2. Joe McAuliffe, Nursery Manager at the Australian National Botanic Gardens, conducts an ANPC workshop on propagation of the threatened *Hakea pulvinifera*. Photo: Jeanette Mill, ANPC.

ANPC also organises practical, shorter workshops on themes such as ecological restoration and orchid conservation.

Best Practice Guidelines

Best practice guidelines for the collection of seed and other plant material

Soon after the formation of the ANPC, members noted that there were many groups conducting activities such as seed collection, storage, viability testing and dissemination. But it was apparent that there was little coordinated policy regarding the collections.

In order for the collection of seed and other plant propagation material (collectively termed germplasm) to benefit threatened species, close attention must be paid to such aspects as collection techniques and documentation. Basic genetics tell us that species vary across their range in their genetic make-up; collecting protocols must ensure that this genetic variation is reflected in the collection. It is also important to first explore whether propagation material is available from another source; needless collection will only threaten a species further.

One response by the ANPC was to develop a database of *ex situ* collections of endangered plants to enable material to be sourced from existing collections. This database is called the National Endangered Flora Collection (ANPC, 1993). It is also an invaluable tool for accessing information and contacts with researchers and storage facilities.

ANPC also formed the Germplasm Working Group, led by Dr. Kingsley Dixon, Director of Science at Kings Park and Botanic Garden. Dr. Dixon's program has conducted extensive research on such techniques as seed banking of threatened plants and using smoke to promote seed germination. Members of the working group were drawn from research institutions, forestry and primary industry seed laboratories, botanic gardens research centres, and conservation agencies.

The working group developed a set of guidelines (Figure 3), the *Germplasm Conservation Guidelines for Australia, Introduction to the principles and practices for seed and germplasm banking of Australian species* (ANPC, 1997) which include such topics as:

- Objectives and methods of germplasm storage;
- Germplasm collection protocols and methods;
- Seed storage;
- Vegetative propagule storage;
- Documentation and databasing of collections;
- Dissemination; and
- Seed orcharding.

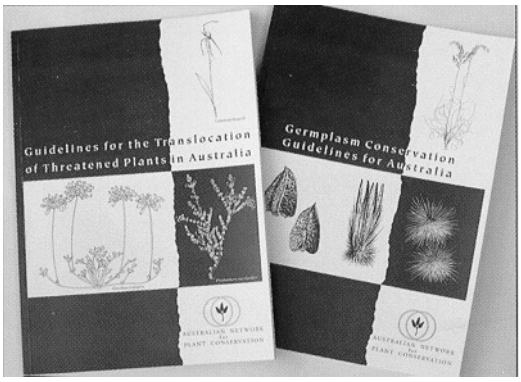

Figure 3. ANPC Translocation and Germplasm conservation guidelines.

Cutting edge methodologies developed by member organisations, such as cryostorage of threatened plant germplasm, are covered in the guidelines, as well as in ANPC conferences and courses.

Guidelines for translocating threatened plants

Occasionally it becomes necessary to move threatened plants from one site to another, whether for re-introduction, introduction, or re-stocking. This 'translocation' should never be considered as a substitute for *in situ* conservation because it is a complex conservation measure which rarely succeeds, requiring good planning, correct prioritisation and long term monitoring. However, it may be the last option for the survival of critically threatened plant species, where efforts to conserve wild populations are failing (due to disease, land degradation, salinity etc). Translocation is a complex conservation measure which can be either beneficial or detrimental to the long-term conservation of the species, and the habitat into which it is being translocated. If a translocation is unsuccessful it may be impossible to retrieve the habitat.

Translocations often fail. Some reasons for the lack of success are:

- The original threats are not adequately controlled;
- The biological and ecological requirements for the species have not been adequately considered;
- The assessment of genetic variability is often neglected; and
- Ongoing commitment of resources to monitoring and follow-up maintenance is often lacking.

As one example, Dr. Andrew Young of CSIRO Plant Industry in Canberra has been studying the genetics of populations of the endangered *Rutidosis leptorrhynchoides*. He found that the isolated Victorian populations have a slightly different genetic make-up to the populations in NSW and the ACT (Young and Clarke, 2001). The implications of this are that if the Victorian population was used for translocation in NSW or ACT, and the populations were mixed, the result would be sterile progeny, leading to the demise of the species. This type of knowledge is vital if translocation is to succeed.

For these reasons, it was felt that best practice technical guidance was needed for those undertaking reintroductions and other types of translocations. The ANPC formed a Translocation Working Group, comprising specialists from conservation agencies, botanic

gardens and research institutions. It is chaired by Maria Matthes of the NSW National Parks and Wildlife Service.

The Working Group developed the *Guidelines for the Translocation of Threatened Plants in Australia.* These focus on techniques and issues once a decision to translocate has been made, and cover:

- The translocation process from project development through to monitoring;
- Biological, ecological, *ex situ* and logistical considerations;
- Case studies; and
- Community participation.

The Australia and New Zealand Environment and Conservation Ministerial Council's (ANZECC) Standing Committee on Conservation supports both sets of guidelines, and has recommended adoption across all jurisdictions. They have been successfully incorporated into management practices and are influencing funding, policy and legislation implementation. For example, in NSW where the *Threatened Species Conservation Act (1995)* has a strong focus on the development process, land managers proposing translocations are being directed towards the Guidelines. Groups proposing translocations in funding applications to the Federal Environment Department, Environment Australia, are being required to use the guidelines in order to qualify for funding. This will be of increasing importance as changes in legislation require more stringent development application assessments for proposals which may impact on State or Federally listed threatened species or ecological communities.

The South-West Slopes Regional Group

This final example demonstrates how the different elements of integrated plant conservation can come together in practice. The ANPC has a number of regional groups throughout Australia. The ANPC South West Slopes Regional Group (NSW) is coordinated by Paul Scannell, Curator of Albury Botanic Gardens. This regional network mirrors the national membership make-up of ANPC, having developed to include farmers, urban and rural landcare groups, TAFEs and universities, the State conservation agencies, and local volunteers. It has been very active in implementing recovery actions for the Crimson Spider Orchid (*Caladenia concolor*). A small population of this threatened species is surviving in the Albury area. The South West Slopes Regional Group uses its networking skills and links with other ANPC members to take a best practice approach to the orchid's conservation which involves both *in situ* and *ex situ* conservation.

Almost five years of community-based *in situ* conservation activities, including fencing, dealing with weeds and rabbits, and fire management, are now bearing fruit. The orchid's habitat is starting to show signs of recovery. Erosion prone areas have begun to regenerate and bird and mammal activity appears to be on the increase. However, regular surveys and population counts have revealed only up to 11 flowers of *C. concolor* in the best season. Such low numbers mean that coordinated networking has been urgently needed to seek expert advice for the best conservation approach. Monitoring, research and discussions with other *Caladenia* recovery enthusiasts is helping to develop a better understanding of the species' requirements.

In situ work is being complemented by *ex situ* work. Using contacts developed via ANPC, a small percentage of seed has been collected and sent to Kings Park and Botanic Garden in Perth for germination trials. Two seedlings have been successfully grown at KPBG after building up the mycorrhizal associate for the species. These plants will act as backup for the small Albury population and may be cross-pollinated by hand to obtain seed for future trials and possible reintroductions. A Recovery Plan, currently being finalised by the NSW National Parks and Wildlife Service, will guide the future management of this species.

Conclusion

In conclusion, the challenges facing plant conservationists in Australia are many and the available resources few. But there is excellent work being done and a vast amount of knowledge out there. If we can keep talking to each other, and learning from each others' experience we can make the best of what we have and slowly start to make a difference.

Details of the ANPC Plant Conservation Techniques course and other shorter courses are available on our website (http://www.anbg.gov.au/anpc), or can be obtained from the ANPC office.

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Another Weed Poster!

Arnold Rieck, Secretary, Society for Growing Australian Plants (Ipswich Branch)
PO Box 59, Rosewood, Q, 4340.

Release date

In Weedbusters Week in 1999, Ipswich Society for Growing Australian Plants (SGAP) released its poster "Garden Escapees Become Environmental Weeds" along with an A4 sheet accompanying the poster.

The concept of "What Not to Plant"

Our SGAP branch has a display of native plants and flowers at the annual Ipswich Show. A display one year featured "weed" trees - Chinese celtis, Cadaghi, Camphor laurel, etc. The display created lots of comments.

A group decided to produce a list of Ipswich's twenty worst environmental weeds and spent much time deciding on three plants indigenous to our area as possible replacements. The three replacements were:

1. One obtainable at most nurseries.
2. One that not all nurseries would have.
3. One to be found only in specialist nurseries or from SGAP folk.

Our first "What Not to Plant" sheet came into being. We added "in Ipswich" to the title when a Greening Australia liaison officer was distributing our sheets on the Atherton Tableland.

The title "What Not to Plant" is rather dictatorial, so Bruce Tinworth the coordinator suggested "Garden Escapees Become Environmental Weeds" would be a better title - more meaningful.

We need a poster

Ipswich City Council decided to print and distribute our "Garden Escapees" sheet. But the sheet was all text, and few would read the two pages. We live in a visual world. Bruce Tinworth took on the huge task of obtaining photographs of the twenty 'escapees' and the three alternatives. A keen native plant photographer, Barry Jahnke from Brisbane, was asked to help. He provided the bulk of the photos, nearly all we photographed in the field. Some difficulty was experienced in finding suitable flowering specimens.

Funding

We had to find nearly $4,000 for the initial print run. West Moreton Landcare and Ipswich City Council each gave $1,500, and our SGAP branch provided the balance. Bruce Tinworth placed on computer - Autocad R14 - to save printing costs. For visual effect the poster had to

be A1 size. Queensland Herbarium staff checked taxonomic details. We left the Cassia, and did not use the latest Senna. Ipswich City Council decided to fund an extra 2000 copies.

Release in 1999

The poster just took off! Copies have been distributed to schools, other Councils in South-East Queensland, other SGAP groups in South-East Queensland, other States, Greening Australia, and local nurseries. Even developers were given a copy. Requests for copies have come from TAFE colleges and Councils from Atherton to the Blue Mountains. Tim Lowe (author of *Feral Future*) took a couple of copies to a weeds symposium in Africa in 2000. The Australian National Botanic Gardens has copies, and so does Kew Gardens in England.

Land Management Expo

At the Ipswich City Council Land Management Expo, our members had a big display of many of the alternatives on our poster, and gave away over 300 posters.

Local nurseries

Some of our retail nurseries have to be encouraged to stock the alternatives. There's a long way to go.

Revision

A new reprint will be required early in 2002. We are going to revise our 'escapees' and include lantana, and delete Dutchman's pipe. We'll also revise some of the alternatives.

The challenge

Our SGAP branch believes that each region in Queensland should list its worst garden escapees and suggest local alternatives. Some areas have begun producing their own posters.

The future

In gardens there are a lot of plants that have the potential to become acclimatised in our bushland and become environmental weeds. All of us have to become assertive and alert to future threats to our bushland by garden escapees.

The South-East Queensland Fire and Biodiversity Project - An Update and Reasons for its Success

Cuong Tran, Fire and Biodiversity Project Coordinator,
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The Southeast Queensland Fire and Biodiversity Consortium aims to gather and disseminate information on fire management practices that will support conservation of the region's biological diversity. The Consortium includes representatives from local authorities, the Rural Fire Service, the Queensland Parks and Wildlife Service, State government departments concerned with Forestry, community groups and universities. We have four working groups that guide the various aspects of the Consortium's National Heritage Trust funded project. Outputs have included a literature review to assist in determining ecologically appropriate fire regimes, guidelines for managers, PowerPoint presentation on fire ecology and its implications for management, and fact sheets. A kit to help private property owners write fire management plans addressing property protection and biodiversity conservation values is being distributed through a series of field days and workshops. The messages we hope to convey include: fire plays a vital role in renewing many SEQ ecosystems; that both too frequent, and too infrequent, burning can cause species to become locally extinct; that different vegetation types are adapted to different fire frequencies; and that fire should be considered in a landscape context. Factors contributing to the project's success include the Consortium's cross-disciplinary nature, the existence and ethics of local networks, and the fact that the group is not tied to any particular political, bureaucratic or legislative framework.

Introduction

The South-East Queensland Fire and Biodiversity Project is an NHT-funded project which aims to gather and disseminate information on fire management practices which will support conservation of South-east Queensland's biological diversity. We cover the area from Noosa to the NSW border, and out to the Great Dividing Range.

The project operates under the wing of the Fire and Biodiversity Consortium, which came into being in 1998. This group includes representatives from many South-east Queensland local governments, the Rural Fire Service, Landcare (notably the Lockyer Catchment Centre), Greening Australia, and State land management agencies - the Department of Natural Resources and Mines (DNR&M), the Department of Primary Industry (DPI), and the Queensland Parks and Wildlife Service (QPWS).

This impressive group came together because they perceived a number of 'gaps': an information gap, and a consequent gap in natural area management. The Rural Fire Service provides a wealth of information about minimising risk to life and property. However very

little local information has been available on fire management practices to support retention of native plants and animals.

One of the first steps was to gather as much widely available information on fire ecology and consider its relevance to this region, where it has been perceived that not much work had been completed. Researchers from Griffith University completed a literature review (Tran and Wild 2000) which summarised studies from other areas which may provide useful information on ecologically appropriate fire regimes for major South-east Queensland vegetation types. It includes information from approximately 150 published studies, and a number of unpublished studies, as well as input from people with practical experience. Tran and Wild (2000) found that there was indeed some published research from the southeast Queensland region, but that it was relatively scant in comparison to work done in some other parts of Australia. The next step for aspect of the project was to produce an "Ecological Guidelines" which synthesises what we know from here and elsewhere into a series of "best estimate" recommendations for ecologically sustainable fire regimes - and in particular, to generate suggested fire frequencies for a range of broad vegetation types. These Guidelines were completed in July 2001, and have been distributed to over 180 conservation staff and extension offices from the local southeast Queensland region and other areas in Australia. Follow-up conversations have shown that this document has been very useful in providing valuable information about suggested fire regimes and guiding and prescribing the use of fire in the management of many local government administered lands.

The literature review was funded by contributions from twelve of the Consortium's member agencies. The Consortium received NHT funding, allowing the creation of my position of Project Coordinator to be filled in March 2000. The project is managed by Logan City Council, on behalf of the Consortium. The NHT funding is for two years, so we're almost finished. The project has a number of components, which sits with the various Consortium Working Groups. These groups cover Research and NHT, Monitoring, Fire Management Planning, and Education.

The Education Working Group is focussed on ways to disseminate the information we have gathered. We had two fact sheets planned. The first of these titled 'Fire and Nature Conservation' provides some introductory material on fire and fire ecology, especially in relation to biodiversity conservation. The response to these brochures was quite overwhelming. We placed orders for well over 20,000 brochures throughout southeast Queensland. The second fact sheet, which will be ready by December 2001, contains much more detailed information about the role of fire in the landscape. In addition to these fact-sheets, all landowners involved in the Land for Wildlife program will have received a copy of the Land for Wildlife Tech Note "Fire as a Wildlife Habitat Management Tool" which was developed collaboratively by the Consortium and Land for Wildlife (Moran and Watson 2000). We have also developed a PowerPoint presentation on fire ecology and its implications for management, which we show to community groups in a workshop atmosphere, that we run in conjunction to the Individual Property Fire Management Planning Kit, which is explained in further detail below.

Key messages

In all the products that the Consortium has produced, the main messages we hope to convey have included:

1. That **fire plays a vital role in renewing many SEQ ecosystems.** Even after some considerable time since the inception of the project, this basic point appears to require further emphasis. We want to help people to appreciate the role of fire, and encourage them to value it as an integral part of our fire-adapted ecosystems.

2. That **both too frequent, and too infrequent, burning can cause species to become locally extinct.** This is a clear message from the literature (Gill and Bradstock 1995, Keith 1996) and remains unchanged. For example, some Shrub species that rely on seed regeneration after a fire and can take years to reach reproductive maturity are one vulnerable group. Some fabaceous plants that require heat to break seed dormancy are also at risk. Animals and birds which are dependent on denser vegetation of the later years in the fire cycle can't find a home when burning is very frequent. Conversely, if a fire-adapted system is left without a burn for too long, some disturbance-dependent short-lived species may disappear, while others get shaded out. In this region, some vegetation types will be taken over by other vegetation types in the absence of fire, and some examples include wet sclerophyll forests, and some *Themeda* woodlands. Animals dependent on these vegetation types will also be lost from these areas.

3. That **different vegetation types are adapted to different fire frequencies.** The Ecological Guidelines (Watson 2001) provide suggested fire frequencies for the major vegetation types in southeast Queensland. These include:

Table 1. Suggested Fire Intervals for Vegetation Types in SEQ.

Vegetation Community Type	Suggested Fire Intervals
Rainforest.	Fire exclusion (i.e. no fire).
Wet-Sclerophyll Forest.	20–100+ years.
Dry Sclerophyll Forest & Woodlands.	3–6 years (***grassy*** understorey). 7–25 years (***shrubby*** understorey).
Heathlands.	7–20 years (coastal heath). 15–50 years (rocky heath).
Melaleuca quinquenervia (Paperbark) woodlands.	15–30 years.

Adapted from Watson (2001)

4. That **variability in the intervals between fires is important.** This is another clear research finding, both from field (Morrison *et al*. 1995) and modelling studies (Bradstock *et al*. 1996). Logically, it makes sense: even within one community, different species favour somewhat different fire regimes, and variability provides opportunities for all elements of the community.

5. That **encouraging a mosaic of vegetation in different stages of post-fire development will help provide habitat for a range of fauna species.** Different fauna species will prefer different stages of post-fire regeneration (Hannah *et al.* 1998, Woinarski 1999). Some species will favour young growth in the initial months and years post-fire while others feed on shrub flowers and seeds in the middle stages, and others require the dense vegetation that develops some years after fire for shelter. Having a range of stages of post-fire regeneration allows a higher and more diverse population of birds, mammals, reptiles and invertebrates to be supported. Mosaics need to be planned across a fairly broad landscape, for practical reasons.

6. That **there are ways to minimise risk to both life and property, and biodiversity.** If people who build their homes "amongst the gum trees" make sure the appropriate property protection measures are in place in and around their home, then nearby bushland can be more confidently managed through fire regimes appropriate for biodiversity conservation. The regimes would generally involve longer inter-fire intervals than those appropriate for property protection purposes.

Products and outputs

We are completing the Fire Management Manual in modular form, with three "levels": strategic, individual property, and operational, which is guided by the Fire Management Planning Working Group.

The "Strategic Level" of the Manual will be targeted to those working at a landscape scale, such as Landcare and catchment groups, and local councils. It includes information about planning and development measures that councils can put in place to minimise conflict between life and property and biodiversity across a city-wide landscape. This is the highest level document that we are producing. The idea is to assess the fire proneness of potential development sites, and to link assessments to planning scheme provisions. These may include excluding buildings from high fire-hazard areas, which has occurred in some areas of southeast Queensland. This document will also suggest subdivision designs and building construction that are appropriate for bush-fire prone areas, i.e. following the Australian Standards. This level of the manual will also include some general information on fire ecology and its implications for management, on fuel and fire-line management, and on cooperation in fire management.

The second element of the Manual is an Individual Property Fire Management Planning Kit, primarily targeted to private landholders and managers, although it will also be useful to those responsible for public natural areas. This Kit assists landowners to produce a fire management plan for their property, with consideration of property assets and biodiversity values. The original version of this document was developed by the Yarra Ranges Shire Council in Victoria (Hunt and Gooding 1998), as a way to handle conflicts around fuel management on private property. Aspects involving biodiversity have been added to this document and we have since conducted a number of workshops, mainly to Land for Wildlife volunteers using the Kit and additional fire-ecology presentations to assist these landowners write a fire management plan for their property. Presentations from representatives of the Rural Fire Service and the Department of Primary Industries provide a balanced view of the fire management procedures in Queensland. These workshops have been well attended and participation is always enthusiastic. In the six months following the first workshop, we have conducted total of 9 more workshops, attended by over 230 landowners.

Recently, we conducted a "Presenters Workshop" where we invited Conservation Officers and Extension Staff from the region to be 'trained' to present and guide a workshop centred on the different aspects of the Individual Property Fire Management Planning Kit and the fire-ecology presentation. This was also very well attended, with 30 local and State government officers at the workshop. The workshop would allow each of the conservation staff to organise and lead future workshops on the Individual Property Fire Management Planning Kit. In the evaluations following the workshop, staff indicated that in the next 12 months, between 40-70 workshops would be organised in SEQ. This would reach a potential of between 1,000 and 1,750 landowners!

Our third element of the manual is the 'operational manual' which covers the practical side of fire management. This manual accompanies the Individual Property Fire Management Planning Kit. Following the production of a fire-management plan using the Kit, the next step is the implementation of fuel-reduction or ecological burns on the property. The manual will cover aspects such as fire-weather, fire-behaviour, and weather prescriptions for burning, maintenance and construction of fire-lines, coordination (between neighbours and agencies), and emergency procedures. Similar to the Individual Property Fire Management Planning Kit, we also intend to include a presenters-type workshop to step through the procedures of the operations manual.

This project also has a research and monitoring component, which is the responsibility of the Monitoring Working Group. We have produced an Access database that lists past and current fire-ecology research in the region. This has been distributed to relevant State and local agencies. Following the production of the Literature Review and the Ecological Guidelines, we had a number of workshops to discuss the top priority research topics in the major vegetation types in southeast Queensland. After the meetings, a list of potential fire-ecology research projects was produced and made widely available, and subsequently, we have distributed this list to all universities in southeast Queensland and northern New South Wales. To encourage and assist with relevant fire ecology research in the region we recently invited applications for research projects to be funded from the project. The Consortium decided to support a fire-frequency research study on North Stradbroke Island.

In addition to encouraging fire ecology research and identifying current monitoring and research study sites, another main aim of this group has been to develop a simple guide which can be used by those who wish to monitor fire events and their effects on vegetation and fauna habitat. This document of methodologies is targeted towards local government responsible for the management of council land and wishing to monitor the effects (of weeds for example) following fire. The advantages and disadvantages of the methods available will be discussed. The Consortium has taken a strong stance on the need to recognise that there are recognised limitations on monitoring and that it is useful only when there are well-defined questions. Our message here is that: monitoring cannot do everything!

The key to the Consortium's success

Many factors have contributed to the project's success: they include:

- The Consortium's cross-disciplinary nature;
- The existence and ethics of local networks; and
- The fact that the group is not tied to any particular political, bureaucratic or legislative framework.

The cross-disciplinary nature of the Consortium is undoubtedly its major strength, giving a ready access to a wide range of expertise and knowledge. The mix of local government and State agencies and community groups ensures our approach to fire management acknowledges the needs of all stakeholders.

The project has also caught a tide of interest. Community and agency focus on biodiversity conservation is generally high in Southeast Queensland, providing fertile ground for the specific messages the Consortium wants to convey. We have been fortunate with the timing of the Project, which has fortuitously 'benefited' from the region experiencing a series of unplanned fires in late winter and spring 2000. As a result, there is no longer a prevailing attitude, found in the project's infancy, that bushfire is not an issue in this part of the world.

The project structure and procedures have also assisted. The working groups provide a forum for busy Consortium members to have input, and gain information and links, in the areas most relevant and interesting to them. Venues are rotated through the region so the burden of travel is shared, and importantly, the host agency generally provides refreshments. The close involvement of Consortium members in all aspects of the project through the working group structure should help ensure initiatives are maintained and developed once external funding ceases.

The project has also benefited greatly from the existence and nature of local networks. These networks have allowed for a focus on resourcing those already working with landholders, rather than trying to reach individual landholders directly. Initiatives such as Landcare, catchment coordination, Bushcare and Land for Wildlife have been instrumental in developing networks and encouraging ethics which encompass co-operation, openness to information, and respect for the bush and its inhabitants. A concerted effort has been made to connect with local networks, but they have also come to the Consortium. Again, the involvement of existing networks in the project should help ensure information on the role of fire in biodiversity conservation is still available after the project officially ends.

And finally, so far the project's work has been remarkably unhampered by political considerations. This may be partly a by-product of the Consortium's nature. The group includes representation from two levels of government and from the community, and does not belong exclusively to any particular interest group, agency or government. It may also gain some benefit from the fact that in Queensland cross-agency cooperation with respect to local fire management planning is not mandated by legislation. Similarly, landholders may be encouraged to consider how best to manage their bushland for fire, but are not required to adopt a particular course (other than ensuring they have a valid permit if they wish to conduct a burn). The Consortium is therefore able to present our input in a 'non-threatening' and educational framework.

Conclusion

The SEQ Fire and Biodiversity project is supporting landholders, those that work with them, and the wider community to develop the knowledge and attitudes needed to implement and support appropriate fire management for biodiversity conservation. It is a first step in a long and complex journey, which may need to include more directive strategies in years to come. However, cooperative educational approaches such as this Consortium's will always have a role in translating research findings into a form that land managers can apply, and in encouraging the dialogue that is essential in fire management. The role of local government in the remarkable success of the project to this point and the determination of local

government to support the project after the NHT funding ends shows their commitment and willingness to see this important topic reach the widest possible audience and have the greatest influence.

To keep people up to date with Consortium activities, we produce a newsletter, distributed primarily by e-mail. We also have a wide range of information brochures and documents freely available. If you would like to get on the mailing list or obtain these materials, please contact Kathy Julian from the Queensland Parks and Wildlife Service on Ph. (07) 3202 0259 email kathy.julian@env.qld.gov.au, or myself on Ph. (07) 5552 8140 email c.tran@mailbox.gu.edu.au.

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Community Nature Conservation - Practical Biodiversity

James McKee, Greening Australia Queensland, PO Box 952, Toowoomba, Q, 4350.

Greening Australia is a vegetation management specialist organisation whose focus is on providing vegetation management advice and assistance through a variety of programs. One of these programs is the NHT Bushcare funded Community Nature Conservation Program. This program has particular relevance to biodiversity as the primary aim is to conserve strategic remnant vegetation patches.

Aim

Reclamation and conservation of remnant vegetation for biodiversity.

Reclamation and conservation

Reclaim and conserve areas of high biodiversity value for conservation by:

- Fencing out stock and providing off stream watering points on riparian zones;
- Management and maintenance (including some weed control) of protected area;
- Physically planting trees and grasses in badly degraded areas; and
- Management agreements by landholders ensuring ongoing conservation of areas.

Background

1. Landholders are invited to submit applications to protect remnant vegetation.
2. Applications are assessed against criteria, including biodiversity values.
3. Applicants are given financial support to carry out works.
4. Technical advice is given to applicants to maximise outcomes.
5. Landholders sign an agreement protecting the agreed land.
6. Monitoring and evaluation (M&E) is carried out to determine the extent to which biodiversity has increased and goals met.

What has been achieved? (QLD since 98)

- 120 000 ha remnant vegetation protected;
- 25 000 native trees planted;
- 1400 km fencing completed; and
- 500 ha riparian zone protected.

Ground cover

- Increased ground cover; and
- Decreased erosion (anecdotal).

Riparian zones

- Increased biodiversity within riparian zones;
- Decreased water turbidity levels (anecdotal increase in aquatic biodiversity & health); and
- Increased vegetation cover and bank stabilisation along riparian zones.

Wetlands

- Wetland protection.

Other outcomes

- Increase in native fauna species;
- Decreased weeds;
- Increased viability and regeneration of native tree and grass species variety;
- Change in density of trees;
- Greater awareness of biodiversity values and benefits;
- Integration of those values as a part of a farming/grazing system on many properties;
- Capacity of many landholders to plan on the basis of biodiversity values has been enhanced; and
- Landholders given skills to undertake the reclamation/conservation work.

Practical biodiversity

- We need the science, but biodiversity will only truly increase when the values and value is recognized by landholders; and
- Practical biodiversity requires changing ways of thinking and providing practical assistance to carry through the new way of thinking (financial and technical).

Conclusion

Greening Australia Queensland, through NHT Bushcare funding, has successfully helped change the thinking of many landholders, provided assistance to help make practical biodiversity happen and developed helpful models for others to use in doing the same thing.

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Oral History in the Field

Sue Pechey, “Listening Ridge”, MS 1073, Crows Nest, Q, 4355.

About eighteen months ago I was contracted by the Environmental Protection Agency (EPA) to undertake 15 interviews to gather anecdotal material about water use in the upper Brisbane catchment - 5 each in the Esk, Kilcoy and Crows Nest Shires.

These interviews were part of a larger project, which is collecting similar material in the other catchments in southeast Queensland, with the idea of creating a body of research material - and perhaps a publication in the future. Most of my informants were farmers, contacted through my personal network, and through Landcare and local government.

The subject matter of the interviews was wide enough to place each person in a landuse context, and then we talked about water use, so the interview ran the following subject areas:

1. Biodata of informant - especially family connections to the area, sources of income over more than one generation, some questions about ownership and inheritance/acquisition by marriage/other forms of acquisition/history of financial investment.
2. Land use by family, with similar questions about neighbouring land use. I interpreted land use as patterns in clearing, cultivation, stocking, forms of agriculture, attitudes to stocking rates, cropping intensity, and revegetation. Changes in native flora and fauna (density of birds, animals, reptiles, and introduced species), steps taken to promote natives or remove pests.
3. Water use, including rainfall patterns, artificial water catchment, stream management, erosion.
4. Changes in practise over generations - driving ideology, attitudinal changes, use of chemicals (herbicides, pesticides, fertilisers - include health & safety practices), areas of tension/indecision between ideology and pragmatism.
5. Sources of advice - neighbours, private companies, government, research institutions.
6. Recreational use of land - gardening, aesthetics, native versus exotic flora and fauna, personal tastes in landscape, favourite places, flora, fauna, sentimental attachments.
7. Community - interaction with neighbours, co-operative working parties/project, areas of agreement and disagreement.

Questions varied a little from informant to informant, depending mostly on how long the same family had owned the land, what sort of farming was in practice, and what the informant seemed to want to talk about.

Much of the material collected was not unexpected, but I did get one or two really interesting surprises. One informant told me about learning to become a water diviner; another described a dam on his property, possibly 150 years old, whose core material was not anything that could be locally identified (and in fact remained unidentified).

Now, it has occurred to me sitting here at this conference for the last two and a half days, that there are a large number of people in this room who spend their lives in the pursuit of scientific information in the areas in which I worked collecting anecdotal material about water use, and other matters. We have covered much of the same territory, except that you do not keep the material you hear unless it is of scientific interest to you.

This seems to me to be a great pity. And I have a solution. I suggest you all come to one of the workshops run by the Oral History Association (or we can run one specifically for you), and take on board the skills of collecting material for permanent deposit in an appropriate place.

This is not to say that I want to replace oral historians, but it seems to me that you have ready access to people and are in a good position to collect material about the past (and present), in a way that will not impinge much on what you are already doing - in my opinion, it would be an excellent contribution to the permanent history record.

Public Participation in Natural Resource Management in Crows Nest Shire

Nigel Kimball, Industrial Placement Student with Crows Nest Shire Council,
The University of Queensland Gatton Campus, Gatton, Q, 4343.

Public participation is an important process when addressing natural resource management. A 'grass roots' level of management is needed to facilitate successful natural resource management outcomes, and conducting a survey is just one way to evoke and encourage 'grass roots' engagement.

This paper will briefly examine the importance of public participation, and touch on some of the issues and principles identified during the conduct of a Community Attitude Survey for the Crows Nest Shire Natural Resource Management Program.

Public participation: An introduction

Public participation refers to the involvement of the community in the decision-making process. It can be considered as a simple process, however achieving the "right" level of participation and ensuring that the program achieves its objectives is difficult. Public participation in the wrong form may do more harm than good, so it is important to understand the benefits and challenges of achieving an appropriate and effective program.

Generally speaking, to ensure that public participation is useful to both the community and the proponent (in this case the Crows Nest Shire Council) programs need to be tailored to suit the individual aspects of the targeted community. Clear objectives need to be tailored very early in the program to ensure the widest opportunity is provided for public concerns and input to be fed into the decision-making process.

Public consultation or participation?

Public consultation sees the decision-maker *informing* the community about decisions that are likely to be made. Some people can see this process as the sharing of information but not necessarily of power. Public participation refers to the *involvement* of the community in the decision-making process. These two concepts can be used loosely and the differences become obscure, making it important to ensure the level of public involvement is clear at the beginning of any decision-making process.

Benefits of public participation

Ultimately, involving a wide range of stakeholders in the decision-making process has the potential to improve the process and the quality of decisions made. Benefits of public participation include:

- Promoting a better understanding of the objectives and benefits of a process;
- Engaging and empowering the community by giving them some control over decisions that will affect them;
- Identifying and addressing the concerns of all the different stakeholders; and
- Encouraging transparency and trust and promoting co-operation and partnerships with the decision makers and the community.

Criticisms of public participation

No decision-making process is free of criticisms and public participation is no exception. Some criticisms of public participation include:

- Domination of the process by interest groups - grandstanders etc.;
- Expense in cost and time;
- Difficulty in gaining a representative sample of views;
- It does not necessarily bring social change;
- Economic interest may dominate;
- Technical issues may be beyond the understanding of some people;
- Local people lobby for local interests and may ignore the bigger picture;
- It may be difficult to determine the extent to which public input should be considered in "weighing up" various factors when a decision is made;
- Not all participants will "play fair" - some may present selective information; and
- The results of some forms of public involvement are unpredictable and processes can be difficult to control.

Principles for consideration when creating a public participation program

The following list of principles was identified when designing and conducting the Community Attitude Survey for the Crows Nest Shire Natural Resource Management Program:

1. Public participation is an integral part of the decision-making process.
2. To ensure its appropriateness, public participation must be specifically designed for each intended audience.
3. The objectives of the public participation need to be clearly stated to avoid complications arising from misinterpretation of information and the portraying of a "leading by the nose" stance.
4. People need to be aware of the level of potential influence of their responses.

5. Representativeness is essential - there must be recognition of a high degree of involvement of community members to incorporate the wide range of values within a community.
6. It is important to recognise the value of the different types of knowledge that a community possesses.
7. The public participation process needs to evolve to address the volatility of public responses - there is a need for a fluid approach.
8. Public input should be sought as early as possible in the development of any proposals.
9. "Scoping" helps to gain a contextual understanding of the targeted community and the likely main issues to emerge early on in the planning process.
10. The information content of the public participation program must be thorough, clear, balanced, not patronising, accurate and accessible.
11. Public participation programs must expect, and be designed to deal with, controversy.
12. A high level of expertise and specialised techniques are required for contentious or complex situations.
13. Public participation is not a stand-alone process - a long-term commitment and a sense of continuity are needed to ensure a good foundation of trust is laid down between the community and the decision-makers.
14. The timing of the process is crucial, not only fitting the program in with in-house operations, but the public at a particular point in time may have better things to do. There needs to be an opportunistic element to a public participation program, to make the most of every opportunity that arises in order to capture people's different values and views.

Conclusion

Many considerations need to be taken into account when designing and implementing a program to involve the public in the decision-making process. The level of involvement, consultation or participation needs to be pursued and a good understanding of the benefits and criticisms needs to be developed. The crux of the public participation process is the need for a tailored, fluid and opportunistic approach to accommodate the needs of both the proponent and the community.

Appendix A
Conference Participants

Conference Participants

LAST NAME	FIRST NAME	POSITION	PROPERTY/ORGANISATION/GROUP
Anderssen	Geoff	Technical Officer Creek Management	Lockyer Catchment Centre
Ashford	Douglas	Natural Resource Management Trainee	Crows Nest Shire Council
Barber	Dennis	District Environmental Officer	Department of Main Roads
Beal	Diana		North East Downs Landcare Group
Binning	Carl	Principal Research Economist	CSIRO Sustainable Ecosystems
Birkett	Peter	Trainee	Toowoomba City Council
Blackburn	Kathryn		
Blackley	Roxane	Natural Resource Monitoring Officer	Taroom Shire Landcare Group Inc.
Bosch	Prof. Ockie	Professor of Natural Systems Management	The University of Queensland School of Natural & Rural Systems Management
Bourne	Liz		
Boyes	Bruce	Coordinator	Southern Queensland Biodiversity Network
Bradley	Berlinda	Environment Management Officer	Logan City Council
Bradshaw	John	Community Representative	South Coast RVMP Working Group
Brennan	Gerard	Director Technical Services	Crows Nest Shire Council
Buchanan	Alison	Conservation Partnerships Officer	Noosa Shire Council
Burkett	Graeme		
Burnett	Valmai	Trustee - Estate Graham C. Burnett (Dec'd)	Rathburnie Estate

LAST NAME	FIRST NAME	POSITION	PROPERTY/ORGANISATION/GROUP
Burton	Grahame	Coordinator Landholder Nature Conservation Project	Western Subregional Organisation of Councils (WESROC)
Carter	Steven	Natural Resource Management Trainee	Crows Nest Shire Council
Chamberlain	Jill	Hon. Secretary	Wildlife Preservation Society of Queensland (WPSQ) Caloundra Area Inc.
Clayton	Dr. Paul		Environmental Protection Agency
Collard	Stuart	PhD Student	University of Southern Queensland (USQ) Land Use Study Centre
Cook	Douglas		
Cooper-Hayter	Stephen	Trainee	Toowoomba City Council
Cordingley	Evan	Owner	Kipper Creek Fauna Sanctuary
Crawford	Alistair	Natural Resource Management Trainee	Crows Nest Shire Council
Creagh	Robert	AgForce Representative & Property Owner	Inland Burnett RVMP Working Group & “Japarra”
Curtis	Alison	Environment Planning Project Officer	Toowoomba City Council
Davey	Elinor	Project Supervisor	Friends of Lagoon Creek
Drabsch	Gayle	Assistant Project Officer Creek Management	Lockyer Catchment Centre
Duffy	Laurie	Ranger	Toowoomba City Council
Fielder	Darren		Environmental Protection Agency
Filet	Piet	Strategic Environmental Officer	Toowoomba City Council
Finch	Neal	Technical Officer (Wildlife Biology)	The University of Queensland School of Animal Studies
Fitzsimmons	Larissa	Project Officer (Environmental Management)	Queensland Parks & Wildlife Service (QPWS)
Ford	Greg	Project Officer	North East Downs Landcare
French	Sharyn	Bushland Management Officer	Logan City Council

LAST NAME	FIRST NAME	POSITION	PROPERTY/ORGANISATION/GROUP
From	Eric		
From	Fred	Patron	Lockyer Catchment Association
Galbraith	Rick	Regional Land for Wildlife Coordinator	Queensland Parks & Wildlife Service
Gietzelt	Adam	Principal Biodiversity Planner	Environmental Protection Agency
Glass	Gloria		North East Downs Landcare Group
Goodland	Alison	Project Officer	World Wide Fund For Nature (WWF)
Gower	Matthew	Natural Resource Management Trainee	Crows Nest Shire Council
Hall	Bill	Operations Manager	Department of Natural Resources & Mines
Hammero	Peter		
Harris	Paul	Vegetation Management Coordinator	Department of Natural Resources & Mines
Heslop	Neville	Ranger in Charge (Cressbrook/Perseverance)	Toowoomba City Council
Hogbin	Patricia	Training Coordinator	Australian Network for Plant Conservation (ANPC)
Holman	Jan		“Casuarina”
Holt	Lindsay	Vice-President	Sunshine Coast Environment Council
Hoobin	Sean	Queensland Murray Darling Basin Officer	World Wide Fund For Nature (WWF)
Johnson	David	Acting Ranger-In-Charge Crows Nest Falls National Park	Queensland Parks & Wildlife Service
Johnston	Dougal		“Laterite”
Kenway	Barry	Waterwatch Officer	Department of Natural Resources & Mines
Kenway	Nancy		
Kerr	Jim		
Kidell	Lisa	Environmental Scientist	AustralAsian Resource Consultants

LAST NAME	FIRST NAME	POSITION	PROPERTY/ORGANISATION/GROUP
Kimball	Nigel	Conference Assistant	Crows Nest Shire Council
Kraschnefski	Kate	Acting Regional Bushcare Facilitator	Queensland Parks & Wildlife Service
Langford	Fleur	Reserve Management Officer	Redland Shire Council
Laurie	Mark	Project Officer, Regional Landscape Unit	Environmental Protection Agency
Lawrie	Bruce	Regional Bushcare Facilitator	Queensland Parks & Wildlife Service
Lazzarini	Peter	Vegetation Management Officer	Department of Natural Resources & Mines
Legg	Gary		"Sutton Park"
Long	Phillip	Extension Officer	Department of Primary Industries (DPI)
Lord	Bruce	Project Officer	Brisbane Valley Kilcoy & Rosalie North Landcare
MacDonald	Jim		
MacQueen	Peter	Teacher	Southern Queensland Institute of TAFE
Manning	Dr. David	Land Resources Officer	Crows Nest Shire Council
Marks	Cr. Tina	Councillor	Crows Nest Shire Council
Martin	George	Senior Conservation Officer	Environmental Protection Agency
Mayr	Heather		South Coast RVMP Working Group & Landholder
McDermid	Michael	Ranger in Charge	Toowoomba City Council
McEvoy	David	Chief Executive Officer	Crows Nest Shire Council
McKee	James	Extension Officer	Greening Australia
McLeod	David		Inland Burnett RVMP Working Group
McPherson	David	Team Leader Conservation	Maroochy Shire Council
Melville	Seonaid	Environmental Consultant	
Michael	Cr. Julie	Councillor	Crows Nest Shire Council

LAST NAME	FIRST NAME	POSITION	PROPERTY/ORGANISATION/GROUP
Middleton	Craig	Regional Extension Officer	Queensland Parks & Wildlife Service
Mill	Jeanette	National Coordinator	Australian Network for Plant Conservation (ANPC)
Milton	Michelle	Planning Officer	Gatton Shire Council
Moffatt	Nicole	Environmental Planning Officer	Redland Shire Council
Moore	Jim		“Sunset Charolais”
Moran	Ann	Director	Jaeger-Moran Environmental
Morrison	John	Natural Resource Management Trainee	Crows Nest Shire Council
Murray	Daniel	Postgraduate Student	Griffith University
Murray	David	Principal Officer	Toowoomba City Council
Murton	John	Community Representative	Brisbane Valley RVMP Working Group
Neilson	Raelene	Field Supervisor	Toowoomba City Council
Neuendorf	Cr. Dave	Councillor	Gatton Shire Council
Newbury	Veronica	Bushcare Officer	Toowoomba City Council
O'Dea	Bernie		
Patch	Cr. Geoff	Mayor	Crows Nest Shire Council
Pechey	Sue		“Listening Ridge”
Peterson	Anne	Principal Conservation Officer	Environmental Protection Agency
Pfitzner	Christine	Conservation Officer	Logan City Council
Pijpers	Jack	Technical Officer - Design and Subdivision	Crows Nest Shire Council
Quinn	Kelvin	Bunya Mountains National Park	Queensland Parks & Wildlife Service
Rayner	Carole	State Bushcare Coordinator	Queensland Parks & Wildlife Service
Rayner	Jeff	Ranger Crows Nest Falls National Park	Queensland Parks & Wildlife Service

LAST NAME	FIRST NAME	POSITION	PROPERTY/ORGANISATION/GROUP
Ready	Mark	Ranger in Charge (Cooby Dam)	Toowoomba City Council
Reardon-Smith	Kate	Research	University of Southern Queensland (USQ) Land Use Study Centre
Rebb	Matthew	Natural Resource Management Trainee	Crows Nest Shire Council
Rhodes	Monika	PhD Student	Griffith University
Rieck	Arnold	Secretary	Society for Growing Australian Plants (SGAP) (Ipswich Branch)
Roberts	Brett	Bunya Mountains National Park	Queensland Parks & Wildlife Service
Ross	Prof. Helen	Professor of Rural Systems Management	The University of Queensland School of Natural & Rural Systems Management
Samnakay	Nadeem	Extension Officer	Queensland Parks & Wildlife Service
Schilling	Veronica	Manager Planning & Development	Gatton Shire Council
Scotney	Tom	Senior Policy Officer	Environmental Protection Agency
Seiler	Col		Killara Cattle Co.
Sharpe	Jenny	Trainee	Toowoomba City Council
Shelley	Glenda	Project Officer (Queensland Bushcare Program)	Environment Australia
Shewell	Christine	Senior Biodiversity Officer	Environmental Protection Agency
Sigley	Bernice	Bunya Mountains National Park	Queensland Parks & Wildlife Service
Snelling	Craig	Rangers Assistant	Toowoomba City Council
Sparshott	Peter	Naturesearch Coordinator	Queensland Parks & Wildlife Service
Stephens	Sally	Bush for Wildlife National Coordinator	
Stiller	Ivan	Chair Calliope Landcare, RVMP	“Hilldale”
Sutton	Malenna	Natural Resource Management Trainee	Crows Nest Shire Council

LAST NAME	FIRST NAME	POSITION	PROPERTY/ORGANISATION/GROUP
Tanner-McAllister	Sherri	Project Officer - Forestry & Wildlife Management	Queensland Parks & Wildlife Service (QPWS)
Thompson	Dr. Jeremy	Manager Biodiversity Planning	Environmental Protection Agency
Thorpe	Richard	Project Officer	Central Downs Landcare
Thorpe	Jayne	Project Officer	Central Downs Landcare
Tran	Cuong	Coordinator	SEQ Fire & Biodiversity Consortium (FABC)
Turkington	Russell	Community Representative	Brisbane Valley RVMP Working Group
Turner	Doug	Teacher	Southern Queensland Institute of TAFE
van Baalen	Kaori	Technical Officer	Lockyer Catchment Centre
Voller	Peter	Vegetation Management Coordinator	Department of Natural Resources & Mines
Walbank	Sarah	Landcare Education Officer	Department of Natural Resources & Mines
Wardell-Johnson	Grant	Senior Lecturer	The University of Queensland School of Natural & Rural Systems Management
Waters	Heather		
Wattz	Howard	Fire Management Officer	Griffith University
Weaver	Mark	Bunya Mountains National Park	Queensland Parks & Wildlife Service
Withers	Kylie	Habitat Brisbane Officer	Brisbane City Council
Zigterman	Robert	Planning Manager (Wide Bay Burnett District)	Environmental Protection Agency

Appendix B
Excerpt from Regional Nature Conservation Strategy for South-East Queensland

Excerpt from Regional Nature Conservation Strategy for South-East Queensland

Part B of the draft *Regional Nature Conservation Strategy for South East Queensland* (released in February 2001) is reproduced in this Appendix. The contents of Part B are:

1. Approaches for identifying nature conservation significance.
2. Use of the Common Conservation Classification System to identify areas of regional and sub-regional significance in South East Queensland.
3. Results [of application of Common Conservation Classification System to identify areas of regional and sub-regional significance in South East Queensland].
4. Areas of nature conservation significance compared with local government landuse allocations.
5. A process for managing areas of nature conservation significance.
6. Decision support processes to achieve positive outcomes in areas of nature conservation significance.
7. Sub-strategies, performance indicators and actions.
8. Actions for each sub-strategy.

PART B

Identification of areas of regional and sub-regional nature conservation significance, sub-strategies and actions

1 Approaches for identifying nature conservation significance

1.1 Introduction

During the past decade, conservation of biodiversity has received considerable attention through initiatives such as *The National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia 1996b) and *The Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia* (JANIS report) under the National Forest Policy. This has benefited nature conservation planning in general as considerable attention has been given to identifying those components of biodiversity considered to be significant and to the definition of planning principles and decision rules. The potential for conservation planning to produce more robust and transparent outputs has also been expanded by the ready availability of geographic information systems (GIS), which allow large data sets to be integrated and analysed.

1.2 The National Strategy for the Conservation of Australia's Biological Diversity

The *National Strategy for the Conservation of Australia's Biological Diversity* (Commonwealth of Australia 1996) defines a set of key components that can be used to identify priority areas for biodiversity conservation, including:

- ecosystems and habitats containing high diversity and/or large numbers of endemic and/or threatened species;
- habitats required by migratory species;
- species and ecosystems that are rare or extensively depleted by threatening processes, and/or remain at risk from threatening processes;
- ecosystems, habitats and species of social, economic or scientific importance; and
- those components of biodiversity not adequately protected in reserves.

The national strategy recommends that conservation planning be undertaken using a bioregional approach.

1.3 Nationally Agreed Criteria for the Establishment of a Comprehensive, Adequate and Representative Reserve System for Forests in Australia (JANIS report)

While the JANIS report is directed specifically at developing a conservation reserve system for forests on state lands, it contains details of conservation planning principles and criteria that have general applicability. Under JANIS the objectives of biodiversity conservation are:

- maintenance of ecological processes and dynamics of ecosystems in their landscape context;
- maintenance of viable examples of ecosystems throughout their natural ranges;
- maintenance of viable populations of species throughout their natural ranges; and
- maintenance of the genetic diversity of species

JANIS also recommends:

- using bioregions as the appropriate framework for focusing conservation planning;
- giving priority to rare, vulnerable and endangered ecosystems and species; and
- dedicating areas to nature conservation based upon the principles of:
  - comprehensiveness (ensuring that all components of biodiversity are sampled);
  - adequacy (ensuring that there is sufficient area to maintain ecological processes and dynamics); and

– representativeness (ensuring that the geographic and ecological ranges of species and ecosystems are sampled).

1.4 State and regional conservation planning

1.4.1 State bioregional planning

Bioregional planning in Queensland has been developed and refined during the past 25 years (Stanton & Morgan 1977; Sattler 1986; Sattler & Williams 1999). The approach is based upon using mapped land resource information (land systems and vegetation mapping and more recently regional ecosystems that reflect the interaction of vegetation/plants with geology, landforms, soils, climate) as a surrogate for biodiversity. The mapped information at a scale of 1:100 000 to 1:250 000 is digitised, making it amenable to analysis using a GIS and other computer-based approaches (e.g. Purdie 1987; Wilson & Young 1992; Queensland CRA/RFA Steering Committee 1998).

1.4.2 Local government biodiversity planning

Local governments' conservation assessments have traditionally used a locally-prepared vegetation map as the base layer for assessment and planning, with available plant and animal data incorporated to varying levels. Mapping compiled as part of these studies is at a relatively large scale (1:25 000 to 1:50 000) enabling incorporation of higher levels of resolution and detail than is possible in the regional-scale mapping used by the EPA. The work completed to date uses broadly comparable approaches and takes into account the state bioregional framework and associated information such as regional ecosystems.

1.4.3 SEQ 2001 regional biodiversity planning

Maps indicating nature conservation values and environmental constraints across South East Queensland have been included as part of the RFGM (1994, 1995, 1996, 1998). The maps were based largely on expert opinion to overcome the then incomplete status of inventory at the time. The Regional Organisations of Councils (ROCs) are developing, in conjunction with a range of interest groups, a nature conservation planning approach known as the Common Conservation Classification System (CCCS) (Chenoweth 2000) for use in South East Queensland. It incorporates the principles and criteria outlined in national strategies as well as the state biogeographic regional framework. The CCCS has been adopted by the RNCS as the approach used to update and refine the spatial delineation of areas of nature conservation value within the region and will be used to upgrade the mapped information for the RFGM.

The requirement for nature conservation to be addressed in local government planning has highlighted a number of recurring issues that have limited the effectiveness of conservation planning to date. To address these issues, the CCCS seeks to:

- develop a standardised methodology for defining areas of nature conservation value in a way that is relevant for local government;
- address biodiversity at the scale needed by local government planning (i.e. where information is required at a higher level of resolution than bioregional planning);
- provide for differences in the capacity of local government to resource nature conservation assessment and planning; and
- provide for differences in the way data have been collected.

The major strengths of the CCCS include:

- it works through three levels of significance — state, regional and local — and consequently should be able to satisfy the needs of both state and local governments;
- the data sets required for defining regional and sub-regional significance are currently available and it uses an expert opinion approach to resolve any queries that may arise from available data;
- it is open-ended in its scale of application and while the RNCS uses it for a region-wide analysis, it could be applied to a single site subject to a development application; and

- it facilitates data exchange between agencies, guides future data collection and provides a mechanism for ensuring that existing data sets are made compatible with each other.

2 Use of the Common Conservation Classification System to identify areas of regional and sub-regional significance in South East Queensland

The CCCS classifies the significance of mapped remnant vegetation units for nature conservation purposes, with standardised criteria and levels of data collection that can be consistently applied throughout the region. The system is robust, objective, transparent and reliable, and although the number of options appears initially complex, the outputs are easy to understand and capable of flexible use in regional and local government planning and conservation management (Chenoweth 2000).

The CCCS provides a set of criteria (Table 1) for assessing the conservation value of all remnant areas of vegetation within a specified geographical area. To determine relative conservation significance, a series of sequential data queries is required. Because of the large and complex data sets used in analysis, computer-based analyses have been specifically developed to enable the methods to be applied across the entire region.

Table 1
Diagnostic criteria used in the Common Conservation Classification System to define conservation significance

Diagnostic criteria		Supplementary criteria	
Criteria	**Description**	**Criteria**	**Description**
A	Essential habitat for 'at risk' species	H	Other habitat for 'at risk' species
B	Ecosystem value	I	Habitat for other species
C	Remnant size	J	Localised contribution to biodiversity
D	Relative size of ecosystems	K	Corridor links
E	Integrity	L	Geomorphological variation
F	Community diversity	M	Other ecosystem values
G	Context and connection		

The rationale for the criteria and the way they are applied are described in detail in Chenoweth (2000). The analysis in the RNCS is restricted to identifying regional (i.e. South East Queensland using the broader Southeast Queensland bioregion for context) and sub-regional (province) significance. Local conservation significance can be determined by individual local governments through incorporating data gathered for use at local government level in the CCCS data sets and generating CCCS queries for local conservation significance.

2.1 Mapping of remnant units

The primary source of data identifying remnant vegetation was provided through Queensland Herbarium regional ecosystem mapping. This provides regional ecosystem maps across the region at a consistent scale of 1:100,000 using standardised techniques to produce a seamless coverage of pre-clearing vegetation and remnant regional ecosystems. This data layer was chosen because of the lack of any other seamless digital product covering the entire study area at a larger scale at the time of analysis. Remnants are used as the base unit for assessment in the CCCS.

2.2 CCCS criteria

Criteria A: Essential habitat for "at risk" species
The presence of breeding populations of endangered or vulnerable species within a remnant is one of the criteria used to determine regional or sub-regional significance. Flora and fauna data that meet a set of defined standards are included in the assessment[1]. At risk fauna and flora taxa will be comprehensively examined by mapping habitat distribution and value using expert knowledge and accurate records.

Criteria B: Ecosystem value
Regional ecosystems (REs) and important wetlands have been defined and mapped across the Southeast Queensland bioregion. An RE is a mappable vegetation community that is consistently found to be associated with geology, soils and topography attributes[2]. An indication of conservation significance of an ecosystem is based on how much remains in the bioregion relative to its initial distribution, together with its condition and the presence of threatening processes (JANIS 1996; Sattler & Williams 1999). Based on this information, a conservation status of endangered, of concern, or no concern at present is assigned to each ecosystem. The CCCS assesses remnants on the basis of:

- bioregional conservation status and reservation status (based upon proportion currently within conservation reserves); and
- sub-regional or province conservation and reservation status.

The RE conservation status applied in analysis is based upon Sattler and Williams (1999), modified where necessary, to conform with the status indicated in the *Vegetation Management Regulation 2000.*

Criteria C: Remnant Size
Remnant size classes provide thresholds for determining conservation significance. The number of remnants in South East Queensland within each of the classes is provided in Table 2. This information was derived from an analysis of the remnant RE data layer (refer to Criteria B).

Table 2
Number of remnants in various size classes in the strategy area

Remnant size (hectares)	Conservation significance
<55	Low
55.1-324	Medium
324.1-3750	High
> 3750	Very High

Criteria D: Relative size of regional ecosystems
Remnants are assessed on the size of the patches of each RE they contain relative to the size of patches elsewhere in the region. This identifies the largest representative patches i.e. those considered to be of high quality from a size perspective. The RE data layer has been analysed to define and map the biggest patches based upon this criterion.

Criterion E: Integrity
Integrity, like size, is an indicator of the quality of the occurrence remnant. A mapping coverage compiled by Catterall and Kingston (1993) has been used to check the integrity of areas in the analysis. Despite its age, this is the best available information.

Criterion F: Community diversity
This part of the analysis enables identification of remnants containing high levels of habitat diversity and ecotones (boundaries/transition areas). These areas are generally species-rich. The RE map has been analysed using 1x1km-grid cells to identify remnants or parts of remnants with the highest numbers of REs present.

[1] Detailed information about at risk and other fauna will be available at the EPA's web site.
[2] For a full description and an account of the derivation of REs refer to Sattler and Williams (1999).

Criteria G: Context and connection
Provision is made in the CCCS for consideration of spatial context (e.g. buffering) and the importance of connectivity.

Supplementary Criteria
The CCCS allows for consideration of some additional criteria to refine the assessment. There are six additional parameters (Table 1) that require expert interpretation of non-uniform data to modify the '1st cut' rankings. Flora and fauna values including habitat important for at risk taxa, local species richness and the presence of endemic and disjunct species are included in this context[3]. This part of the assessment has commenced and will involve an ongoing process of refinement as new data become available.

2.3 Data limitations

Information used by the CCCS to define regional and sub-regional conservation significance has some limitations that restrict the spatial precision and level of detail in the mapped output. These include:

- The RE mapping used to define remnant vegetation in the region generally does not identify remnant patches <20 ha because of constraints imposed by the mapping scale (1:100 000).
- The mapping scale (1:100 000) imposes limitations on the level of detail that can be presented on maps (e.g. where there is high habitat diversity within small areas).
- There is a lack of accurate records for at risk fauna.

The RNCS recognises that the level of information is incomplete for the region and allows for additional levels of analysis to identify conservation significance and produce further iterations of the maps when and where data are available. For example, the following will be incorporated into subsequent analyses:

- more detailed information for some of the more complex parts of the region (e.g. coastal lowlands);
- more detailed mapping of small remnants, which is likely to be undertaken by the Queensland Herbarium or local government for parts of the region;
- point location data derived from comprehensive fauna surveys, conducted as part of the South East Queensland Regional Forest Agreement process; and
- more detailed fauna and flora information involving the identification of important habitat areas, based on expert knowledge and extrapolation from accurate point records.

3 Results

The output of analyses (Figure 7) **[Note - Figure 7 has not been included in this excerpt]** to define regional and sub-regional nature conservation significance (referred to by the EPA as a biodiversity planning assessment) has been developed using a consistent and transparent methodology that will meet the requirements of state and local governments and withstand peer review. Although there has been little refinement of the output, the RNCS Advisory Group is sufficiently confident about initial results to support the inclusion of a map in this document, subject to some caveats, including:

- No detailed checking of the areas indicated as being of regional and sub-regional nature conservation significance has been undertaken.
- Further iterations of the map will have access to improved data for some parts of the region.

[3]Data will be available at the EPA's web site.

4 Areas of nature conservation significance compared with local government landuse allocations

DCILGPS (1999) has compiled the amount of land in comparable landuse allocations in local government strategic plans in the region. The landuse allocations are a composite of the local government planning scheme landuse intents for the region (Appendix 2). Areas of identified regional and sub-regional nature conservation significance (Figure 7) coincide with several landuse allocations. Landuses associated with the allocations have varying levels of compatibility with conserving the biodiversity values of these areas.

Areas of regional nature conservation significance

In areas of regional nature conservation significance (Figure 8), 14.3 percent of the land is designated as conservation, having a high level of biodiversity protection. A further 14.8 percent is included in an open space category, which may afford protection to biodiversity values.

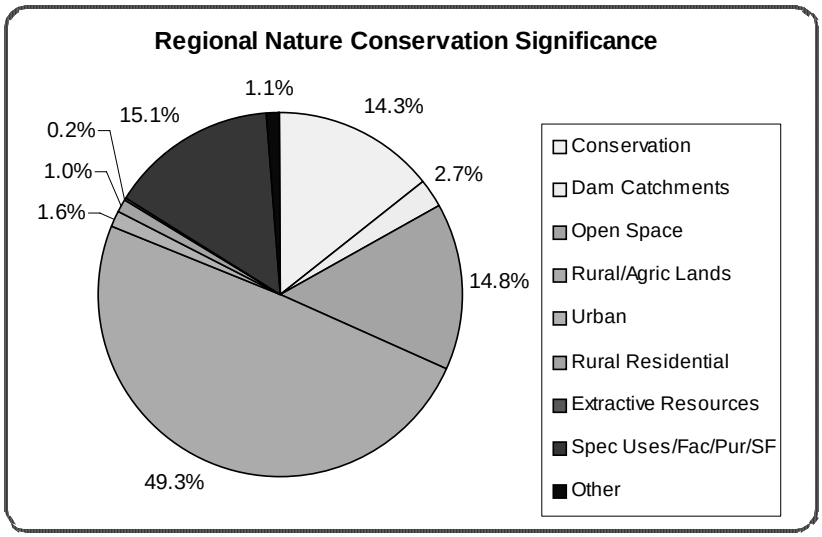
However, future development of areas designated for urban, extractive resources and some of the special uses/facilities/purposes lands (16·9 percent) may result in extensive vegetation clearing. Lands designated as rural/agricultural and rural residential comprise an additional 50.3 percent and may contain landuse activities which subject biodiversity to a range of threatening processes.

Areas of sub-regional nature conservation significance

In areas of sub-regional nature conservation significance (Figure 9), conservation landuse allocations cover approximately 15 percent of the area, with open space allocations accounting for a further 14.2 percent. Rural/agricultural lands account for about 51 percent of these areas, with urban and rural residential covering about 4 percent.

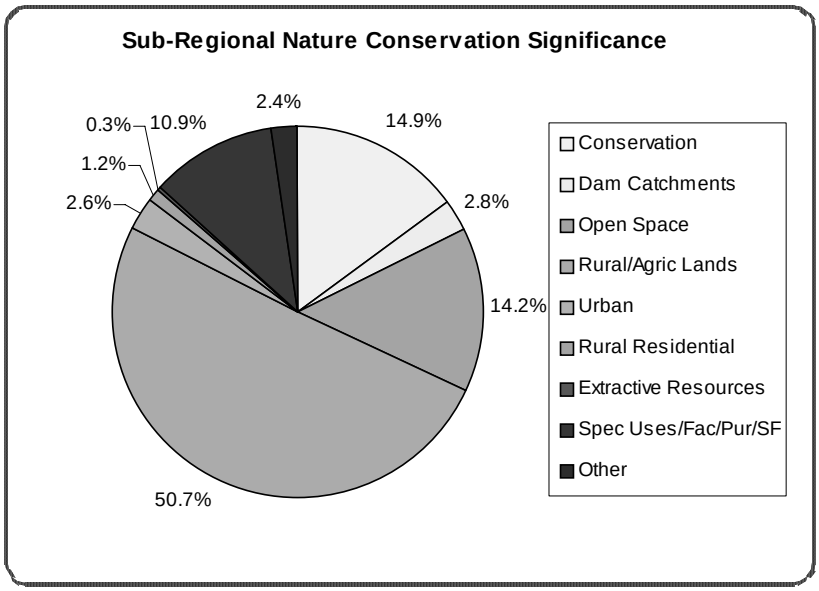
Areas of other remnant vegetation

Land designated as other remnant vegetation (Figure 10) has 4 percent designated as conservation and a further 12.4 percent designated open space. The main use which occurs in these areas are rural/ agricultural lands (53.8 percent).



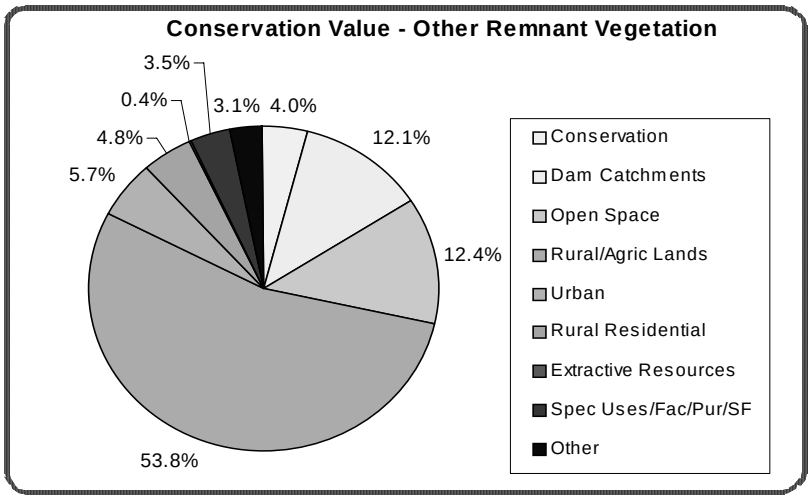
Broad Hectare Study Landuse	Area (ha)	Area (%)
Conservation	95840	14.3
Dam Catchments	17760	2.7
Open Space	99119	14.8
Rural/Agric Lands	329699	49.3
Urban	10564	1.6
Rural Residential	6620	1.0
Extractive Resources	1049	0.2
Spec Uses/Fac/Pur/SF	101342	15.1
Other	7341	1.1

Figure 8 Landuse allocations in areas of regional nature conservation significance



Broad Hectare Study Landuse	Area (ha)	Area (%)
Conservation	13859	14.9
Dam Catchments	2627	2.8
Open Space	13236	14.2
Rural/Agric Lands	47225	50.7
Urban	2470	2.6
Rural Residential	1141	1.2
Extractive Resources	320	0.3
Spec Uses/Fac/Pur/SF	10148	10.9
Other	2197	2.4

Figure 9 Landuse allocations in areas of sub-regional nature conservation significance



Broad Hectare Study Landuse	Area (ha)	Area (%)
Conservation	934	4.0
Dam Catchments	2810	12.1
Open Space	2879	12.4
Rural/Agric Lands	12459	53.8
Urban	1330	5.7
Rural Residential	1101	4.8
Extractive Resources	90	0.4
Spec Uses/Fac/Pur/SF	815	3.5
Other	721	3.1

Where * includes remnant vegetation where values fall below thresholds for regional and sub-regional significance. These areas could be upgraded through application of supplementary criteria.

Figure 10 Landuse allocations in areas of other remnant vegetation

5 A process for managing areas of nature conservation significance

The RNCS aims to promote conservation mechanisms and strategic actions for the protection and better management of identified areas. It is unlikely that one mechanism, or action alone will be sufficient to effectively implement the RNCS. For example, planning mechanisms on their own are likely to be ineffective in achieving sustainable outcomes where existing use rights occur. Reliance on market forces alone may be ineffective, especially where land is under development pressure. Education strategies as a sole solution may have limited effectiveness in the short term as attitudes may take a long time to change. Regulatory mechanisms may provide an essential safety net, playing an important role when biodiversity loss has reached critical thresholds, but are unlikely to be a sole solution (Young *et al.* 1996). Thus, a combination of implementation mechanisms and actions is needed to suit particular social, economic and political circumstances and the time frame for implementation. Achievement of the RNCS's outcomes requires a co-ordinated and integrated approach to implementation (Figure 11).

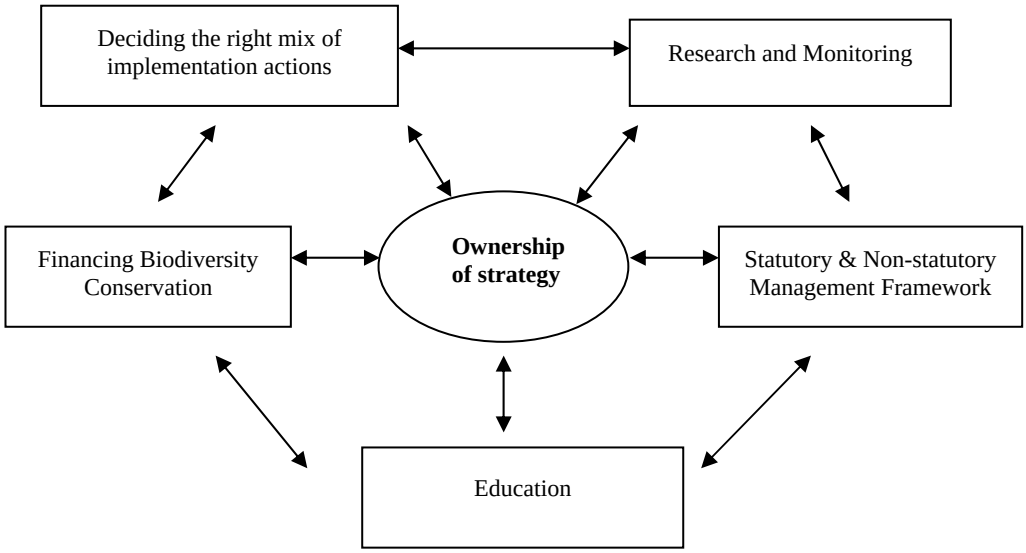


Figure 11 Links between and among the mechanisms and actions of the RNCS

6 Decision support processes to achieve positive outcomes in areas of nature conservation significance

At the strategic and regional level local government has an important role to play, particularly in the development of planning schemes that provide for the conservation of biodiversity values in the areas identified of regional and sub-regional nature conservation significance. A decision support process for local governments that are preparing and reviewing corporate plans, biodiversity strategies[4], planning schemes and local laws is presented in Figure 12.

At the property or development site level land managers and development proponents need to be aware of an area's biodiversity values and associated conservation and management requirements. A decision support process is also provided (Figure 13) to assist in the process of determining appropriate planning and management responses in developing property vegetation management plans and assessing proposals for changes or intensification of use in areas of regional and sub-regional nature conservation significance. In determining appropriate responses to conserving the biodiversity values, assessors and land managers should identify and apply an effective "mix" of implementation tools or mechanisms to better protect and manage the areas of nature conservation significance. Table 3 lists a selection of implementation mechanisms for use in protecting areas identified of regional, sub-regional and local conservation significance.

[4] *National Local Government Biodiversity Strategy* (Thorman 1999) provides guidance.

Step 1
Assessment of values in local government area and adjacent lands

Step 2
Address in local government strategies and plans

Apply the CCCS at the local level to identify the range of nature conservation values in the local government area.

Consider the diagnostic criteria:

A. Essential habitat for 'At Risk' species
B. Ecosystem value
C. Remnant size
D. Relative size of ecosystem
E. Integrity
F. Community diversity
G. Context and connection
H. Other habitat for 'At Risk' species
I. Habitat for other species
J. Localised contribution to biodiversity
K. Corridor links
L. Geomorphological variation
M. Other ecosystem values

1. Corporate plan includes biodiversity conservation objective

2. Develop a local government biodiversity strategy

The strategy will:

- identify local biodiversity and identify threatening processes;
- set local priorities and implementation mechanisms (e.g. acquisition, voluntary management measures; and refer to Table 3);
- develop management strategies for local government conservation reserves;
- set up partnership agreements; and
- provide biodiversity status data to the local government State of the Environment Report.

3. Develop planning scheme to provide for the conservation of biodiversity values in the local government area

Within the range of planning matters that a planning scheme must consider, include:

- DEOs & policy intents at appropriate levels, (e.g. scheme, local area plan, structure plan, theme) to adequately reflect the identified nature conservation values;
- Include identified areas as a conservation overlay and ensure planning scheme provisions provide for an assessment of the potential impacts and conservation of the areas' values;
- Include nature conservation significant land in appropriate landuse allocations aimed primarily at protecting nature conservation values:
  - areas with high conservation value as a conservation landuse allocation;
  - areas with high conservation value and where low intensity development is possible as an environment protection landuse allocation;
  - complementary provisions aimed at protecting nature conservation values in other landuse allocations (e.g. rural, rural residential or urban allocations);
  - specific protection mechanisms in areas identified with regional, sub-regional or local nature conservation significance (e.g. biodiversity, wetland, waterways codes);
  - at the local area planning level identify the extent of locally significant areas to be protected balancing nature conservation, social and economic factors;
- Development assessment requirements that address the nature conservation diagnostic criteria for the areas through:
  - code assessment; or
  - impact assessment.

  Develop performance criteria, acceptable solutions and appropriate measures;
- Planning scheme policies, e.g.
  - schedules of rare, threatened & notable species;
  - requirements for flora & fauna studies;
  - guidance for the content of ecological assessments, impact assessments and EMPs;
  - guidance for conservation & management (e.g. maintaining wildlife corridors; landscaping with endemic species); and
  - compensatory habitat requirements ('no net loss');
- Performance indicators that measure the effectiveness of the planning scheme in protecting nature conservation values.

4. Extend & promote planning and management mechanisms & local laws that cover vegetation clearing (not covered by the VMA 1999)

Figure 12 Decision support process for local government planning to provide for the conservation of areas of nature conservation significance

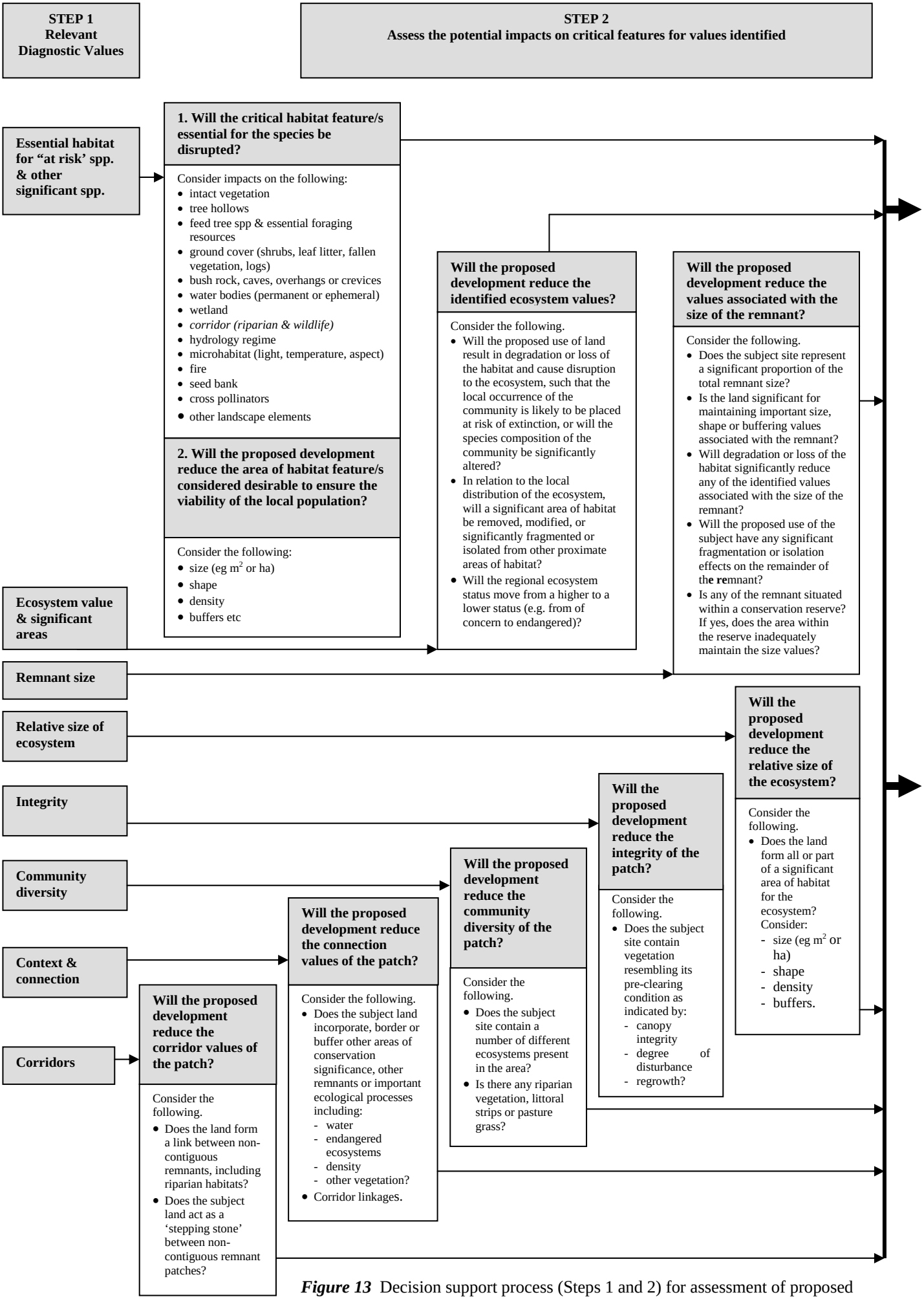


Figure 13 Decision support process (Steps 1 and 2) for assessment of proposed changes/intensification of use in areas of nature conservation significance

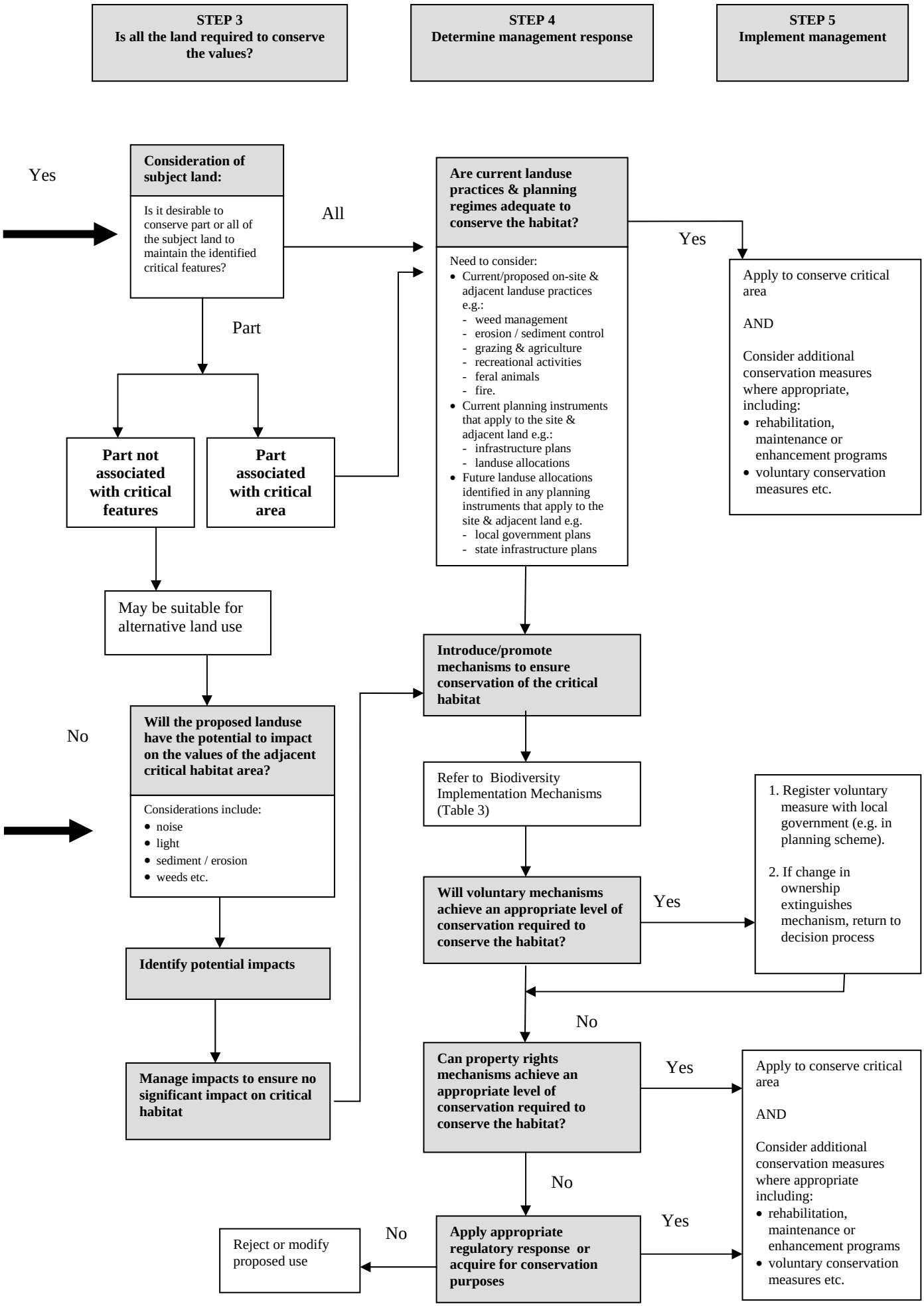


Figure 13 *(contd)* Decision support process (Steps 3, 4 and 5) for assessment of proposed changes/intensification of use in areas of nature conservation significance

Table 3
Biodiversity conservation implementation mechanisms to protect areas of regional, sub-regional and local significance

Implementation mechanism	Regional	Sub-regional	Local	Responsibility
Tenure/Property Rights Related				
Covenant	X	X	X	DNR
Easement (e.g. drainage)	X	X	X	LG
Transferable development rights	X	X		State & LG
Binding voluntary conservation agreement	X	X	X	LG
Land surrender in exchange for development rights	X	X	X	State & LG
Nature refuge	X			EPA
Land swaps	X			State & LG
Land Trust	X	X	X	State
Use rights over leasehold land	X	X	X	DNR
Acquisition/Purchase of land on a voluntary basis (e.g. open market transactions and pre-emptive purchase) and dedication as: - protected area estate (e.g. national park, conservation park) - local government conservation reserve	 X X	 X X	 X	 EPA LG
Revolving funds - purchase of land and resale or lease-back with conservation protection mechanisms in place over all or part of the land	X	X		State & LG
Statutory				
Commonwealth:				
Recovery plan (species, ecosystem, region)	X	X		Comm, EPA
Threat abatement plan	X	X	X	DNR
Add to the national estate	X			Comm.
State:				
State Planning Policy	X	X	X	DCILGPS
State interest planning policy for nature conservation	X	X		EPA
Conservation plan (under the NCA)	X	X		EPA
Declare as critical habitat or an area of major interest	X	X		EPA
State infrastructure plans (identify & protect biodiversity)	X	X	X	State
Tree clearing permits	X	X		DNR & LG
Regional vegetation management plans: - declaration of areas of high nature conservation value; - regional assessment code for the clearing of vegetation in the region; and - solutions to regionally-specific vegetation management issues	X	X		DNR
Local government:				
Local government planning schemes identify and protect valuable features (areas of regional, sub-regional and local significance)	X	X	X	LG
Local government policies	X	X	X	LG
Planning scheme policy	X	X	X	LG
Local law (vegetation protection, domestic animal control, earthworks & drainage, noxious weeds etc)	X	X	X	LG
Development assessment process recognizes, protects and manages biodiversity	X	X	X	LG
Resource allocation plans include biodiversity requirements	X	X	X	LG
Environmental performance bonds	X	X	X	LG

Implementation mechanism **Voluntary Management**	Regional	Sub-regional	Local	Responsibility
Land for Wildlife	X	X	X	EPA, LG
Non-binding voluntary conservation agreements	X	X	X	EPA, LG, land holders
Property management plan	X	X	X	land holders, EPA, DNR, DPI
Compensatory habitat (e.g. no net loss) agreements	X	X	X	State & LG
Co-ordinated open space management	X	X	X	State agencies, LG
Best-practice advice and guidance on management for biodiversity protection (e.g. fire, weeds)	X	X	X	State agencies, LG, conservation groups
Management plans (pests, reserved areas, open space)	X	X	X	DNR, LG, land holders
Farm forestry	X	X	X	land holders, DNR, DPI,
Partnership agreements	X	X	X	All stakeholders
Voluntary codes of practice (e.g. farming organisations)	X	X	X	Industry stakeholders
Accreditation schemes (e.g. tourism providers)	X	X	X	Industry stakeholders
Revenue raising mechanisms:				
Environmental levies				
Developer contributions				
Economic incentives:				
Relief from certain State government charges	X	X		State
Rate relief (including differential rates) tied to biodiversity protection & management actions	X	X	X	LG
Stewardship payments	X	X		State & LG
Subsidies	X	X		State & LG
Grants	X	X		State & LG
User pays (recover costs of access to and use of resources)	X	X		All stakeholders
Non-financial incentives				
Local awards				State & LG
Community recognition				State & LG
Training (e.g. for property management/whole farm planning)				State & LG
Technical support (e.g. weed control, plants)				State & LG
Education and awareness raising				
Specific tools identified in sub-strategy 2	X	X	X	All stakeholders
Other				
Corporate plans include conservation goals	X	X	X	State, LG & industry

7 Sub-strategies, performance indicators and actions

Wide ownership of regional nature conservation priorities and issues is the basis for achieving the RNCS's vision, objectives and outcomes. Four sub-strategies have been identified to help achieve the overall objectives. These are:

1. Facilitate improved integration of conservation planning and management mechanisms through developing partnerships, biodiversity information management and decision support processes, and integrated actions for biodiversity conservation in the region.

2. Continue to improve understanding, awareness and capacity within the community, government and industry of the status and values of biodiversity, threatening processes and sustainable land management practices.

3. Continue to expand biodiversity research and monitoring effort.

4. Develop strategies that will secure the level of funding needed to conserve biodiversity in the region.

The **Sub-strategies**, which represent ways of achieving the outcomes, will include:

- **Performance indicators** that will be used to evaluate the success of each sub-strategy in achieving its stated outcomes; and

- **Actions** that detail specific ways to implement each of the sub-strategies. For each action the following are indicated:
  - **Priority** for the action's implementation. The action's status is indicated as key (essential) or high (desirable). Where applicable, priority areas for the implementation of the action are also indicated; and
  - **Responsibility**, which identifies the lead agency and any supporting agencies responsible for implementation of the action

The format of the sub-strategies is shown in Table 4.

Table 4
Format for presentation of Sub-strategies, Performance Indicators and Actions

Sub-strategy No.:	Performance Indicators
The specific sub-strategy stated	*Performance indicators for the sub-strategy listed:* 1. 2.

Context:
Why is the sub-strategy important; identify gaps in information and opportunities

Required Actions:

Actions	Priority	Responsibility
This column contains a number of actions related to the relevant sub-strategy. For example – For sub-strategy 1, Action ?: "*Identify ecosystems under current threat of loss or degradation or which are already degraded.*"	e.g. key or high and where applicable, priority areas	Indicates responsible agency(s) or organisation(s).

Note: The following action tables are to be used as a basis for further discussion with the community to refine: sub-strategies; performance indicators; action statements; and the priority areas for implementation. Some action statements have been more comprehensively addressed than others at this draft stage.

8 Actions for each sub-strategy

Sub-strategy 1: Statutory & non-statutory management framework	Performance indicators
Facilitate improved integration of conservation planning and management mechanisms through developing partnerships, biodiversity information management and decision support processes, and integrated actions for biodiversity conservation in the region.	1. Action groups convened. 2. Current inventory data and mapped outputs available on the web. 3. Biodiversity values maintained or improved. 4. Status of regional ecosystems and threatened species maintained or improved. 5. Management plans for all protected areas and conservation reserves in the region. 6. Conservation plans/recovery plans implemented for all threatened communities and species in the region.

Context

Governments and the community are undertaking a wide range of initiatives to protect, restore and manage biodiversity within South East Queensland. The Commonwealth Department of Defence is developing environmental management plans for its properties. The State Government has negotiated the South East Queensland Forest Agreement, is developing a National Park Master Plan, is establishing a comprehensive, adequate and representative reserve system, and relevant environmental protection and management legislation and administrative structures. The State Government has also implemented legislation to regulate clearing on freehold land in order to protect biodiversity and prevent land degradation. Regional vegetation management plans will be developed to facilitate regional outcomes under this legislation.

Local government is involved in the purchase of land for nature conservation, developing and expanding voluntary programs such as Land for Wildlife and voluntary conservation agreements, investigating incentive schemes such as rate rebates and developing planning schemes under the *Integrated Planning Act 1997*. At the community level, the existing network of Landcare, Bushcare and catchment management groups in the region provides one of the most effective mechanisms for delivery of on-ground biodiversity outcomes. (Refer to Appendix 3 for existing major initiatives).

Currently 4·81 percent of the region is protected within the park system, with much of the region's biodiversity being found on land outside the protected area system. The RNCS encourages a co-operative approach among stakeholders, based on equitably implementing ecologically sustainable management practices across the entire region, and taking into account the social and economic framework of the region's communities. The RNCS will strengthen and improve existing initiatives (e.g. on-ground activities, legislation, policies and extension), provide direction for future action and encourage landuses that are compatible with nature conservation.

The RNCS includes a range of tools (e.g. multi-objective decision support systems, adaptive environmental assessment and management, modelling tools and geographic information systems) (Mayfield 1995, Hooper 1997) to provide integrated information management systems to assist decision-makers. There is a continuing need for co-operative, ongoing development and testing of diagnostic criteria, and updating of data when the Queensland Herbarium and local governments complete vegetation mapping.

Actions	Priority	Responsibility
1.1 Co-ordinate strategies and implementation programs to conserve and manage biodiversity including: • updating the CCCS and decision support process and its use by all stakeholders, as a basis for conserving biodiversity in the region; • reviewing existing information management systems and best-practice guidelines to increase the capacity for integrated and cost-effective information exchange on biodiversity in SEQ; and	Key	RNCS Advisory Group with all stakeholders including EPA, state and local government, DoD, industry sectors and community

	Actions	Priority	Responsibility
	• developing and implementing nature conservation management partnerships, strategies and programs.		
Information management			
1.2	Report on existing information management systems and best-practice guidelines and continue to develop an effective integrated biodiversity information management system. This will make collecting, collating and exchanging biodiversity information easier, at the regional, sub-regional and local levels with a range of stakeholders (including local government, consultants, universities, conservation groups, rural landholders and students) and will include: • resolving any institutional requirements for information sharing, confidentiality requirements and developing information sharing protocols and integrated mapped products; • investigating cost-effective options for data dissemination to ensure data costs are not prohibitive and hence accessible to all users at reasonable or no cost (including investigating the establishment of an on-line data directory); • evaluating the reliability and coverage of data sets and resolution required for detailed on-ground planning; • investigating the use of information in environmental impact studies and other relevant data derived in the development assessment process; and • promoting the use and updating of the regional ecosystem classification (Sattler & Williams 1999) in all relevant activities associated with nature conservation planning, management and education.	Key priority — current and ongoing	EPA with stakeholders
1.3	State and local governments continue to develop the CCCS and refine the work undertaken to support the RNCS and RFGM. This will include convening of expert panels (comprising people familiar with both the flora and fauna of the region and local government area) to undertake an assessment of the CCCS and its mapped outputs, in a structured, consistent and transparent manner. Recommendations from expert panels will be forwarded for ratification by the RNCS Advisory Group.	Key priority — current and ongoing	EPA, DNR, local government and CCCS steering committee
1.4	Ensure the CCCS mapped output is comprehensive and current. This will include: • providing regular updates of Environmental Protection Agency (EPA) digital maps of areas of nature conservation significance: ‣ free of charge to local governments and other state agencies; and ‣ at cost for digital and hard copy versions of the map (without cadastre) to members of the public. • regularly convening the RNCS Advisory Group to allow timely updating of the digital maps of nature conservation significance, based on additional information, using accredited processes established by the EPA in	Key	EPA, DNR and local government

Actions	Priority	Responsibility
conjunction with local government and which will include: ‣ regional ecosystem mapping regularly refined by the Queensland Herbarium and more detailed or more recent regional ecosystem mapping completed by local government; ‣ local governments' regional ecosystem mapping data in the areas indicated as "cleared land" in the draft strategy (Figure 7), which may include remnants of conservation significance under the CCCS; and ‣ advice from expert panels comprising people familiar with both the flora and fauna of the region and local government area, where assessment is undertaken in a structured, consistent and transparent manner; and • resourcing inventories and consistent mapping across the bioregion.		
Regional partnerships		
1.5 Investigate strategies for developing partnership agreements between/among individuals, community groups, agencies and government bodies to facilitate integrated resource and environmental management on private and public lands. Strategies may include: • improving integration of biodiversity conservation and management priorities in areas of identified nature conservation significance with existing natural resource management processes, programs and incentive schemes (e.g. regional vegetation management plan, catchment planning, Natural Heritage Trust, the Greening Australia fencing incentives program, property management planning, Future Profit, Land for Wildlife, Land Trust, Commonwealth vegetation management incentive packages etc); • building partnerships between government and community to manage areas of regional and sub-regional nature conservation significance, with consideration of community needs, aspirations and contributions to conservation, especially with respect to communities which are adjacent to these areas; • facilitating indigenous and broader community participation in conservation planning and management (e.g. recovery plans for threatened species and ecosystems, conservation plans, vegetation management plans, protected area management plans, catchment plans, regional natural resource management and conservation strategies and fire management plans); • building partnerships and negotiating management agreements between EPA and traditional owners to involve traditional owners in protected area management and to renew their ties with the land; and • encouraging new and existing industries/activities that have the potential to protect or restore regional	Key	RNCS Advisory Group with all stakeholders including EPA, DNR, DPI, DSD, local government, DoD, industry sectors, research organisations, community groups and landholders

Actions	Priority	Responsibility
biodiversity (e.g. farm forestry, nature based recreation and tourism), and industries/activities that reduce demand on native species, such as commercial production of native species; and • using existing forums (e.g. Landcare and catchment management committees) where possible, to identify relevant and effective implementation strategies.		
Local government planning policies and practices		
1.6 Ensure local government planning schemes comprehensively address biodiversity conservation through: • identifying and mapping of areas of regional, sub-regional and local nature conservation significance (and linkages between them) at a scale appropriate to the local government area and using the CCCS; • recognising and seeking compatibility with approaches towards nature conservation by neighbouring local governments; • developing policy intents at all levels of the planning scheme that adequately reflect the nature conservation outcomes identified; • using landuse allocations (e.g. precincts, zones etc.) for nature conservation significant areas that are appropriate and specific to retaining nature conservation values, e.g. ‣ areas with high conservation value as a conservation designation; ‣ areas with high conservation value and where low intensity development is possible as an environment protection designation; and ‣ complementary provisions aimed at protecting nature conservation values in other landuse allocations (e.g. rural, rural residential or urban allocations); • using assessment mechanisms that discourage deleterious and unsustainable development in significant nature conservation areas through: ‣ assignment of development assessment (e.g. code or impact assessment) status; and ‣ assessment criteria and acceptable solutions for development; • implementing planning scheme policies and measures that provide technical support to other planning scheme provisions. Planning scheme policies could include: ‣ schedules of rare, threatened and notable species; ‣ requirements for flora and fauna studies; ‣ guidance for the content of impact assessments and environmental management plans; ‣ acceptable solutions for development in areas of conservation significance e.g. group-title, multiple-occupancy and cluster development; and ‣ compensatory habitat requirements (“No net loss policies”) which ensure that any loss of biological diversity values in areas of identified regional and sub-	Key	Local government with DCILGPS and EPA

Actions		Priority	Responsibility
	regional nature conservation significance are adequately compensated by commensurate biodiversity gains in other areas; and • using performance indicators that measure the effectiveness of planning scheme measures in protecting nature conservation values in significant nature conservation areas.		
1.7	Include biodiversity conservation objectives in corporate plans. Develop and implement local government area conservation strategies or biodiversity action plans that reflect the intent and purpose of the RNCS. The strategies/plans should assess threatening processes, set local priorities and indicate how to effectively address these issues, including in the planning, construction and management of pipelines, dams, roads and other local government infrastructure.	Key	Local government with community
1.8	Extend and promote planning and management mechanisms (e.g. tree preservation and pest management local laws, vegetation protection orders and planning scheme codes for nature conservation) to protect significant natural areas where appropriate, and investigate laws which require vegetation permits for clearing in areas of regional and sub-regional nature conservation significance, where not covered by the *Vegetation Management Act 1999.*	High	Local government
Activities conducted by the State and Commonwealth			
1.9	Ensure State and Department of Defence (Cwlth) policies, programs, plans and guidelines provide an adequate framework for nature conservation in areas of regional and sub-regional nature conservation significance. This would include: • regional vegetation management plan; • identification of areas to be declared of high nature conservation value under the *Vegetation Management Act 1999*; • Strategic Guide for Natural Resource Management in South East Queensland (SEQ RSG 2000); • SEQ Regional Coastal Management Plans; • SEQ Regional Water Infrastructure Plan; • SEQ Integrated Regional Transport Plan; • EPA's State Interest Planning Policies and supporting guidelines; • DCILGPS's guidelines for planning scheme preparation and rural residential development; • management of lands under the *Land Act 1994* in the region;	Key	State government including EPA , DCILGPS, DNR, QT, DSD, DPI, DMR, DoD etc.

Actions	Priority	Responsibility
• management of public lands identified by the State for industrial development in the region; • management of Commonwealth Department of Defence lands in the region; • planning, construction and management of powerlines, pipelines, water impoundments, roads and rail lines and other State infrastructure; • development and implementation of an Agricultural Development Strategy for South East Queensland; and • development and implementation of compensatory habitat requirements ("No net loss policies") which ensure that any loss of biological diversity values in areas of identified regional and sub-regional nature conservation significance is adequately compensated by commensurate biodiversity gains in other areas.		
Off-park conservation		
1.10 Ensure local government and community acquisition programs target key sites of nature conservation significance, including lands that consolidate and link these areas, to protect and restore biological diversity at the regional, sub-regional and local levels (Refer Table 3 for implementation strategies).	High priority for highly threatened regional ecosystems and habitat of rare and threatened species	Local governments, conservation agencies, community groups, individuals and Land Trust
1.11 Encourage the use of covenants in areas of regional and sub-regional conservation significance, which will bind landholders either for a fixed period or in perpetuity in conjunction with property management plans/agreements and revolving funds.	High	DNR, EPA, local government, community groups and Land Trust
1.12 Focus efforts to obtain voluntary conservation agreements (binding and non-binding, short-term to in-perpetuity), including Land for Wildlife on areas of nature conservation significance, and link such agreements, where possible, to property management plans that promote sustainable use and appropriate developments.	High	Local government, DNR, EPA, DPI and community groups
Protected areas and other reserved lands		
1.13 Continue to establish a comprehensive, adequate and representative reserve system by extending the area of national parks and conservation parks to include poorly conserved examples of landscape elements and regional ecosystems within the region. Additions to the park system should be consistent with the criteria established by the CCCS and based on effective consultation with indigenous groups. Management of the park system will incorporate: • continued development and implementation of management plans for all protected areas in the region; • establishing representative Advisory Committees to assist in protected area management; • measures to minimise the effect of threatening processes	High — current and ongoing	EPA

	Actions	Priority	Responsibility
	and maximise the conservation role of the park in the surrounding landscape; and • implement the SEQ Forest Agreement.		
1.14	Target the nature refuge program to land of identified regional and sub-regional nature conservation significance. Provide financial and technical assistance to landholders with nature refuge agreements (e.g. through the establishment of a nature refuge assistance scheme, a devolved grants process linked to management agreements).	High — current and ongoing	EPA
1.15	Continue to develop and implement management plans for areas reserved for nature conservation by local government.	High	Local government
Biodiversity management			
1.16	Develop and implement recovery plans and conservation plans for the region, including: • species-specific conservation actions for threatened wildlife and their habitat, relative to their level of threat; • ecosystems (multi-species) conservation actions, particularly for threatened ecosystems in which threatened species are found (*Note: Conserving whole ecosystems may be more efficient and cost-effective than single-species plans*); and • regional plans, with a focus on examining listed species and regional ecosystems within a region, identifying and reducing common threats and encouraging community involvement in the process.	High	EPA
1.17	Identify sites with weed/feral animal infestations in areas of regional and sub-regional nature conservation significance; understand the causes of weed/feral animal invasion; and develop, promote and implement ongoing weed/feral animal control strategies using an ecosystem approach. Implement the control strategies as regional plans and local government pest management plans and within protected area management plans. Investigate the inclusion of a wider range of pest species occurring in the region as "declared species" under the *Rural Lands Protection Act*.	High priority for areas of regional and sub-regional nature conservation significance	DNR, DPI, DMR, local government, EPA and DoD
1.18	Identify priority areas for restoration and protection of habitat in areas of nature conservation significance. Empower stakeholders to protect, monitor, revegetate and regenerate habitat by providing resources and technical advice on appropriate methods and priorities. These priorities should be included in the *Strategic Guide to Natural Resource Management in South East Queensland* (SEQ RSG 2000).	High	EPA, DNR, local governments and community groups
1.19	Implement buffers and impact mitigation measures between areas of nature conservation significance and areas of development.	High	All stakeholders

	Actions	Priority	Responsibility
1.20	Develop and encourage the application of guidelines, for use by state and local governments, Department of Defence, industry, community groups and individuals, which assist in planning and managing areas of regional and sub-regional nature conservation significance and in developing regional vegetation management plans. These should include guidelines and policies for: • managing the integrity of natural bushland (e.g. fire, weed, feral animals, grazing); • managing native forest, including traditional land management practices; • determining appropriate buffer widths to effectively protect areas of high biodiversity value, including riparian areas, from adjacent threatening processes; • protecting, restoring and rehabilitating (efficiently and cost effectively) identified priority ecosystems to improve their conservation status; • protecting, managing and rehabilitating riparian areas, riverine habitat and wetlands; • establishing and maintaining wildlife corridors; • landscaping with endemic species; • managing domestic animals; • managing and protecting biological diversity in road and rail reserves; • managing native wildlife on sites prior to construction and during the construction phase; • property management planning; • impact assessment; and • establishing sustainable industries (e.g. farm forestry, ecotourism enterprises etc.) and undertaking farming practices (e.g. integrated catchment management, no tillage etc).	High	All stakeholders including state and local governments, DoD, industry sectors and community groups
1.21	Develop and adopt industry codes of practice and accreditation programs to ensure industry practice maintains areas of nature conservation significance.	Key	Industry sectors with DPI, EPA, DNR and DSD

Sub-strategy 2: Education	Performance indicators
Continue to improve understanding, awareness and capacity within the community, government and industry of the status and values of biodiversity, threatening processes and sustainable land management practices.	1. Action groups convened. 2. Number of awareness workshops/field days and attendee levels for property management planning, weed control, fire and vegetation management. 3. Level of access to web sites providing nature conservation information.

Context

Successful implementation of the RNCS will require a community that is both informed about biodiversity issues and encouraged and supported to participate in conserving it. Thus, education is critical for promoting sustainable development and improving stakeholders' capacity to address biodiversity and development issues. Both formal and non-formal education are indispensable in changing people's attitudes so that they have the capacity to assess and address biodiversity issues in contexts relevant to them. Such education should be accessible from primary school age through to adulthood and to all groups of people.

The RNCS aims to ensure that education and extension programs are comprehensive in terms of the range of stakeholders included (e.g. land holders, school students, households, clubs, industry, public land managers and opinion leaders) and are targeted at and developed in response to the specific needs of the particular audience. This may involve developing a range of tools and training programs (e.g. for elected representatives, technical staff, outdoor staff etc.). Because the strategy recognises that much practical knowledge in protecting and managing biodiversity rests with landholders, the education strategy will be designed around sharing, extending and consolidating this knowledge and experience. Where possible, group-based and action learning principles will be used to enhance biodiversity awareness. This will enable the group to share information and experiences and will provide an effective way to introduce research-based information through contact between researchers and users. A further focus will be on identifying, documenting, sharing and promoting "best practice" in on-ground biodiversity conservation and management and on identifying areas where current best practice falls short of what is required for ecologically sustainable management.

Education and extension programs also require tools and products such as information kits. These will be developed and implemented in partnership with relevant agencies (e.g. local and state governments, regional organisations, industry, developers and landholders); will include a range of products (e.g. information sheets, guides, booklets, pamphlets); and will be formatted in a style to suit the target audience. (Refer to Appendix 3 for existing major initiatives).

	Actions	Priority	Responsibility
2.1	Identify appropriate strategies and implementation mechanisms that will help raise the awareness and understanding of biodiversity issues within the region. The purpose is to better integrate biodiversity education resources, programs and strategies provided by state and local government agencies, industry and community groups in relation to biodiversity education. An integrated approach will avoid duplication of services and provide a more effective response to stakeholder needs. Develop an action plan for improving awareness and understanding among stakeholders of biodiversity issues and management strategies. Issues to be addressed include: • identifying stakeholder information requirements about biodiversity issues, programs and incentives; • creating strategic partnerships between relevant agencies and groups to develop programs and materials aimed at specific audiences;	Key priority — expand current action group and meet monthly to develop Action Plan	RNCS Advisory Group with all stakeholders including EPA, DNR, Education Qld, DPI, DMR, Queensland Museum, QFF, industry sectors, local government, community groups and universities

	Actions	Priority	Responsibility
	• reviewing existing educational materials/resources, practices and professional development needs of formal and community educators involved in biodiversity education; • identifying effective mechanisms for establishing and maintaining a database of past, current and proposed biodiversity education activities and resources; • developing and promoting education materials/ resources relevant to the needs of the target audience; • identifying and promoting examples of "good practice" in biodiversity management (e.g. case studies, newsletters, local papers); • developing and implementing accredited training programs to enhance the skills of those involved in facilitating biodiversity education and extension programs (e.g. teachers, administrators, government and industry extension officers and non-formal educators in all sectors); • identifying procedures to form and expand information-sharing networks at the regional level (e.g. EPA, DNR and DPI/rural landholders, Education Queensland/ community, EPA/industry); • identifying and disseminating information on incentives offered by commonwealth, state and local governments to encourage biodiversity conservation within the region; • producing and disseminating information to stakeholders on the broad range of mechanisms available to enhance biodiversity conservation in the region; • developing a timetable or calendar of biodiversity-related events within the region and including these dates in existing calendars; and • assessing ways to increase the level of community participation in existing education and extension programs and biodiversity conservation activities (e.g. national parks programs, integrated catchment management, native wildlife carers, Bushcare, Landcare, Coastcare, field days, property management planning, local shows, monitoring).		
2.2	Incorporate relevant biodiversity educative components into all natural resource management projects (e.g. ICM, Landcare) and information displays (e.g. QPWS, DNR etc), where possible.	High	All stakeholders
2.3	Identify sites where education facilities (e.g. interpretation) can be established within areas of regional and sub-regional nature conservation significance and establish appropriate extension mechanisms for these sites.	Medium	All stakeholders

Sub-strategy 3: Research & monitoring	Specific performance indicators
Continue to expand biodiversity research and monitoring effort.	1. Action groups convened. 2. Number of research projects specific to SEQ priority needs. 3. Areas of nature conservation significance monitored annually. 4. Regional State of the Environment Reports produced and updated annually. 5. Number of local government State of the Environment Reports produced and updated annually.

Context

The value and useability of mechanisms and actions for the conservation of areas of high nature conservation significance identified in the RNCS need to be evaluated through a strong and effective research capacity that provides input into management, as well as ongoing monitoring of the RNCS. (Refer to Appendix 3 for existing major initiatives.)

Actions	Priority	Responsibility
3.1 Facilitate: • a co-ordinated, collaborative research program relevant for SEQ; and • a co-ordinated monitoring system to provide information and ongoing feedback on biodiversity values within the region.	Key priority - current and ongoing	RNCS Advisory Group with all stakeholders including EPA, with DNR, DMR, ROCs, universities, Museum and other research organisations and community groups
Research		
3.2 Provide direction to a collaborative research program which is relevant for SEQ. Research priorities for the region which could include: • reviewing likely distribution, overall population size and ecology of selected species and threatening processes as part of biodiversity inventories appropriate for local government planning and action (This may include: applying a form of population viability analysis to define minimum population sizes and model species habitat for some priority fauna species; and investigating the need for targeted surveys for selected threatened plants to evaluate search effort and predictions about suitable habitat.); • researching methods of assessing the age of vegetation and including consideration of this factor in assessing the conservation significance of a remnant patch; • investigating the relationship between fauna, flora and regional ecosystems to quantify the ability to use regional ecosystems as a surrogate for biodiversity; • investigating the establishment of a “sub-set” of the regional ecosystems (e.g. land facet), as defined by Sattler and Williams (1999), to provide a higher level of	High	All stakeholders with universities and other research organisations

Actions	Priority	Responsibility
resolution for application at the sub-regional and local levels; • investigating management requirements of threatened species; and • identifying corridor and buffer requirements.		
Monitoring		
3.3 Maintain and continue to develop a co-ordinated system to provide information and ongoing feedback on biodiversity values within the region. The monitoring system will be based on the GIS outputs of the CCCS; will utilise the latest DNR land cover and tree density mapping for the region, where appropriate; and will include available performance indicators which effectively assess the condition of biodiversity, the impact of threatening processes and the effectiveness of management responses.	Key	EPA, DNR and local government
3.4 Implement a regional reporting system to establish a comprehensive database on the condition and trends of growth in the region and its implications for biodiversity conservation.	High	SEQ2001 and EPA
3.5 Prepare local government State of the Environment reports to provide information on the environmental assets in the local government area and to monitor environmental change.	High	Local government
3.6 Include high quality, simple monitoring and evaluation activities as an integral part of any development in areas requiring nature conservation management.	High	All stakeholders including EPA, local government, industry sectors and community

Sub-strategy 4: Funding	Performance indicators
Develop strategies that will secure the level of funding needed to conserve biodiversity in the region.	1. Action group convened. 2. Level of collaborative and cost-sharing arrangements for biodiversity action. 3. Level of incentive funding for conservation of areas of nature conservation significance in the region.

Context

Conservation of the region's biodiversity will require a commitment to continued financial support by governments to implement a comprehensive, adequate and representative reserve system and to encourage private landholders to become partners in conserving biodiversity as part of sustainable land management and farm production (Bateson 2000). The success of the RNCS will rely primarily on the strategy's partnerships delivering more efficient use of resources for biodiversity conservation from state and local government and community groups, and targeting funding to the region's nature conservation priorities. (Refer to Appendix 3 for existing major initiatives.)

Actions	Priority	Responsibility
4.1 Identify and promote funding for biodiversity conservation in the region. This could include: • investigating mechanisms for implementing economies of scale in government biodiversity program delivery in the region (e.g. through cost-sharing arrangements, sharing environmental officers, collaborating on community education and consultation, biodiversity auditing and mapping, developing integrated statutory instruments and integrating monitoring and environmental reporting programs); • surveying target groups (e.g. Landcare, peak farming organisations, traditional owners, catchment management and community-based environment organisations) to determine the type of incentives, methods of providing them, and other support that would encourage these groups' participation in biodiversity conservation strategies; • identifying ways local government can fund biodiversity conservation, including supplementing rate rebate schemes; • investigating the application of market-based mechanisms currently being developed by the Commonwealth and States to promote biodiversity conservation via environmental banking and payment for environmental services (e.g. maintenance of water quality, salinity levels, carbon sequestration); • encouraging corporate involvement in biodiversity conservation, including possible emerging initiatives in carbon credits; and • encouraging governments to remove any inappropriate disincentives to biodiversity conservation.	Key	RNCS Advisory Group with all stakeholders, including EPA, DNR, Treasury, DSD, local government, Commonwealth, industry sectors and community groups

4.2	Investigate and encourage funding for studies, employment and projects in biodiversity conservation, targeting the region's nature conservation priorities.	Key	All stakeholders
4.3	Investigate and encourage the use of vegetation management incentive funding, targeting the region's priority areas for nature conservation.	Key	All stakeholders, including Commonwealth, EPA, State and local government and industry sectors