Making the connection between healthy waterways and healthy catchments

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Moreton Bay Waterways and Catchments Partnership
Outline

• Background to the study region: Moreton Bay catchment in eastern Australia - rapidly expanding population

• Development of partnership (science, managers, policy makers) to deal with issues affecting coastal waterways

• Development of science and monitoring program

• Communication with stakeholders

• Implementation of actions
Background to the study region

- 15 major catchments
- 22,672 km²
- 19 local government areas
- Population 2.5 m
- Fastest growing region in Australia
Importance of the region’s waterways:

- High conservation significance (Ramsar)
- Major commercial and recreational fisheries
- Water supply (urban and rural)
- Recreation & transport
The human footprint:

Since European settlement:
- 20% of original vegetation remains - less adjacent to streams
- Altered hydrology - dams & weirs
- Declining water quality (nutrients & sediment)
- Declines in aquatic diversity
Catchments drain into Moreton Bay

**Catchment to Bay Ratio:** 14:1

Brisbane River

**Residence Time**

- Highest in rivers and western embayments (months)
- Lowest in eastern Bay (days)

Abal *et al.* (2005)
Key drivers for change

• Fast growing population
• Security of water supply (quantity and quality)
• Concerns about industry viability - tourism, fishing and agriculture.
• Increasing community expectations about improving water quality and ecosystem health

Recognition - cheaper to protect than to restore ...
Formation of the Partnership

3 levels of government
• Local councils (6; 19)
• State Government agencies (6)
• plus Federal funding

Strong research support
• 3 Universities
• CSIRO
• 3 Cooperative Research Centres

Community & industry advisory groups (>40)
• indigenous
• conservation
• catchment & landcare
• commercial industry
• rural industry
“South-east Queensland’s catchments and waterways will, by 2020, be healthy living ecosystems supporting the livelihoods and lifestyles of people in South-east Queensland and will be managed in collaboration between community, government and industry.”
Achieving the vision:

Set values that reflect the vision
  • numerous workshops with stakeholders

Measurable water quality or ecosystem health objectives that protect the values
  • underpinned by sound science

Management actions to achieve these objectives
  • working with policy makers
A staged approach was adopted by the Study, with each stage having a different focus, targeted objectives and clear outcomes.
Sewage Plume Mapping (using $\delta^{15}N$)

Marine Botany, University of Queensland
CSIRO Mathematical and Information Sciences
CSIRO Marine Research
Sediments in Moreton Bay and seagrass loss

Sediments in the Bay

Turbidity

Seagrass distribution

losses
A staged approach was adopted by the Study, with each stage having a different focus, targeted objectives and clear outcomes.
Stage 3 Scientific Tasks

Stage 3 task architecture, showing the integration and linkages of tasks aimed at providing input into the development of the SEQ Regional Water Quality Management Strategy.
Sources of sediment in Moreton Bay

- Where does it come from?
- What are the processes that generate it?
Source of sediment in Moreton Bay

Modelling suggests 70% sediment in Bay comes from <30% catchment area

Tracer study confirms that most sediment comes from soils on Marburg formation rocks

Caitcheon & Howes (2005)
Dominant processes generating sediment?

Hillslope erosion
Key issue in steeper pasture and intensively cropped floodplain

Solutions:
• promote ground cover
• maintain soil structure
• trap eroded sediments
Dominant processes generating sediment?

Channel erosion
Promoted by high stream energy, riparian vegetation clearing, and floodplain degradation

Solutions:
- protect riparian vegetation
- re-establish riparian vegetation
- control stock access
Channel erosion dominates in the region

- Channel erosion is source of most sediments delivered to the lower Brisbane & Logan Rivers
- Other source is cultivated surface soils

Model prediction

Hillslope:channel erosion ratio
- 0-1 (channel erosion dominates)
- 1-10 (hillslope erosion dominates)

Tracer study

Caitcheon & Howes (2005)
About 50% of the 48,000 km of streams in SEQ has poor riparian condition.

Riparian condition also has a large influence on stream ecosystem health.
Recommendations for riparian management

Streams are dry most times of the year.

Riparian rehab. for:
- filtering sediments & nutrients
- stabilisation
- altering water flows

Streams are dry most times of the year.

Riparian rehab. for:
- stream health
- stabilisation
- wildlife corridor
- habitat protection

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SQIDS/Wetland
Using Decision Support Software

EMSS

• Synthesise process understanding of the system (links catchment to water)
• Facilitates decision making process to select actions to best protect waterways

What to do?

Land use and land management change

Wastewater Treatment (city)

Wastewater treatment (industrial)

Stream bank re-vegetation

Environmental Management Support System
Using Decision Support Software

EMSS

Receiving Water Quality Model

Vertessey & McAlister (2005)
Scenario testing

Predicted total N load to Moreton Bay

Current TN loads

2020 “do nothing” scenario

2020 achieve objectives for future urban land

2020 achieve objectives for future urban land
+ SQID retrofit

2020 achieve objectives for future urban land
+ SQID retrofit + riparian management

Vertessey & McAlister (2005)
Ecosystem Health Monitoring Program

Assess effectiveness of environmental protection measures (e.g. stormwater controls, STP upgrades, riparian vegetation)

Estuarine and marine EHMP
- Designed stage 2
- Implemented Stage 3

260 sites (sampled monthly)
Ecosystem Health Monitoring Program

Freshwater EHMP
- Designed stage 3; Implemented 2002

120 freshwater sites
(sampled 2x/yr)
Adaptive management framework

- ongoing knowledge acquisition
- critical role of monitoring
- continuous improvement in the identification and implementation of management.
- effective communication of knowledge for policy/planning
Improvement of understanding

Continual refinement and testing of conceptual models
Links to policy

Strong link between science and policy makers
Targeted management actions

Sewage Treatment Plant upgrades

Riparian Rehabilitation

Stormwater Quality Improvement Devices
Effectiveness of management actions

~$500M commitment by local government to reduce wastewater

δ¹⁵N Sewage Plume 1998 (summer)

δ¹⁵N Sewage Plume 2001 (summer)

Summary of Nitrogen Discharges from Recently Upgraded South East Queensland WWTPs
Riparian rehabilitation experiments

**Echidna Creek case study**

- Fences
- Road
- Access track
- Catchment
- Property boundaries
- Low level crossing
- Stock trough
- Solar generator

**Temperature regimes**

**Sediment yield**

Echidna Creek, a tributary of the South Maroochy River, is a focal catchment in the riparian rehabilitation demonstration projects.
A staged approach was adopted by the Study, with each stage having a different focus, targeted objectives and clear outcomes.
Subcatchment scale - 'priorities'

Ex. Lockyer Scoping Study
We can identify the areas which are exporting more sediment
What restoration is required?

- riparian revegetation?
- channel/bank restoration?
- gully stabilization?

Also can provide this advice now.
Where in the landscape?

Where in the landscape?

- e.g. high sediment yield
- e.g. low riparian shade

What is the optimum size and spatial arrangement of restoration?

- e.g. one large continuous section or several small ones?

Cannot fully answer this
Summary - Key lessons

Common Vision

Committed Individuals
Defensible science and effective communication
Science involvement in cultural celebration

Annual Riverfestival and International Riversymposium

'Managing rivers with climate change and expanding populations'
4th - 7th September 2006

www.riversymposium.com
Science book - 2005

Thankyou

http://www.healthywaterways.org