Understanding land use impacts on water quality and river values

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‘In every respect the valley rules the stream’ – Hynes (1975)

River health = Catchment health
Motueka – a highly valued river
Water Quality Sampling Network

- 23 Sites throughout the catchment
- Contrasting land use
- Contrasting geology
- Patterns along the river
- Measured – oxygen, conductivity, pH, nutrients (NO₃, DRP), faecal bacteria, pathogens, turbidity, suspended solids, clarity

More detailed work in the Sherry

- Issues raised at community group
- Key people involved
- Faecal bacteria – major concern
- More detailed studies
- More farm house meetings
- Action
- Celebration!!
- Monitoring

Land-Sea linkages

Suspended Sediment during a flood
7/12/01 – 730 m$^3$/s

Changes in concentration with flow

Flow at Woodmans Bend (m$^3$/s)

Date

E. coli (cfu/100 ml)
Stream Invertebrate Sampling

- Common indicator of river health
- 46 Sites throughout the catchment
- Contrasting land use
- Contrasting geology

- Interesting geol/landuse interactions
- Small pastoral streams in poor health
- Headwaters and mainstem healthy

Very Poor
Poor
Satisfactory
Good
Very Good
Intensive water temperature monitoring

![Intensive water temperature monitoring](image)

The graph shows the temperature (°C) over different months for various locations. The chart includes data for Motupiko@Christies, Motueka@Gorge, and Graham River. The x-axis represents the months from March to February, and the y-axis represents the temperature in °C. The data is color-coded to indicate suitable and unsuitable temperature ranges:

- **Orange** for Motupiko@Christies
- **Blue** for Motueka@Gorge
- **Green** for Graham River

The suitable temperature range is up to 20°C, and the unsuitable range is above 20°C. The map on the right side of the page shows the geographical locations of these monitoring sites.
Fish Surveys – Drift Diving

Brown trout abundance at Woodstock 1985-2005

- Long-term data set
- Only at 1 site
- Is it representative?
- 10 random sites
- Trends consistent
Flow-Habitat linkages

- Flow-habitat modelling
- Tested quick-smart method for small streams
- Utility of 1-D and 2-D modelling
- Tracking fish movement around catchment
- Groundwater connections
- Flow versus juvenile trout production study

Minimum flow after abstraction
Natural minimum flow

Flow (m³/s)

WUA (m²/m)

Habitat

- Longfin eel
- Brown trout yearling
- Brown trout juvenile

0.0 0.2 0.4 0.6 0.8 1.0

0.00 0.20 0.40 0.60 0.80 1.00
Summary

• River health a good indicator of catchment health
• Maintaining river values – central to ICM
• A variety of studies conducted
• Many lessons that may be applicable elsewhere
  - Importance of working with the community
  - Getting information out there is vital
  - Site selection and spatial coverage important
  - Some indicators more effective than others
  - Effects of land use influenced by geology
  - The value of integration