THE SCIENCE OF INTEGRATED CATCHMENT MANAGEMENT:
Implications for Dairy Farming

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with thanks to the whole ICM research team 2000-2011
QUESTIONS ABOUT THE FUTURE

1. Are there limits to where we can intensify land use in NZ?

2. How can I comply with catchment water quality limits if I’m just one contributor?

3. What about those other activities that cause the problems downstream?

4. How can I minimise costs that come with regulations around water?
ICM – offering solutions

• Managing multiple issues in an integrated way
• Ridge tops to the sea
• Economic benefit while maintaining environmental, social and cultural values
• Working with communities
What ICM means

Integrated
Catchment
Management

...together
...scale
...action

ICM is a **process** driven by **issues**
2 pillars for ICM

Community Resilience
Networks – trust – awareness – collaboration – wellbeing – high social capital

Ecosystem Resilience
Biophysical sustainability – robustness – environmental targets met
Motueka catchment
‘5 Big Picture’ ICM Themes

1. Managing Land Uses in harmony with Freshwater
2. Water Allocation & Governance
3. Catchment – Coastal Interactions
4. Integrative Modelling to Manage Cumulative Effects
5. Build human capital, Facilitate community action
Managing land uses in harmony with freshwater
Contaminant losses from the Sherry

From data collected by Rob Merrilees & Bill Booth
Thanks to Rob Davies-Colley NIWA for this data

• Compared to low flows, **floods** carried
  92% of bacteria (98% in lower Mot)
  74% of total phosphorus
  63% of ammonia

during 9.5% of the year Oct 08-Oct 09
Contaminant losses from the Sherry

• But low flows carried away
  55% of total nitrogen
  78% of nitrate
  during 90.5% of the year Oct 08-Oct 09
Contaminant losses from the Sherry

• Compared to dairy catchments in Southland, Taranaki, Waikato... Sherry has lower nutrient and bacterial losses

• Bacteria flushed with first rain (some stored in river channel) but where do they go?
E. coli in lower Motueka River

98% of faecal pollution from the Mot Catchment is transported in stormflows

180 km² river plume depositional area based on composites of multiple benthic indicators.
Faecal pollution mitigation (BMPs)

- **Dairy shed effluent**
- **Artificial drainage**
- **Appropriate soil type**
- **Constructed wetland**
- **Bridge**
- **Direct deposition**
- **Pond treatment Standard/APS**
- **Wetland protection**
- **Timing, location of grazing**
- **Surface runoff**
- **Subsurface flows**
- **Timing, volume location of irrigation**
- **Riparian management**
- **Wellhead protection**

Native plants & soil reinforcement

Riparian Plant Trial, Sherry River

Chemical weed control cheapest and most effective

Ledgard & Henley 2009: Best bet guidelines for riparian planting.
Collaboration & Science encourage farmers to improve water quality
Cows crossing streams

- 400% increase in *E.Coli* during cow crossings
- Cows 50x more likely to defecate in water
Bridges replace cow crossings

Bridge over troubled waters

Farmers and scientists join up to sweeten the Sherry River

While farmers are frequently criticised for the effects of dairying on the environment, positive developments are often ignored. Simon Towle reports on work along the Sherry River in Tasman District, where farmers have joined forces with scientists and the district council.

Dairy farmers have traditionally locked horns with local councils and Fish and Game New Zealand for contaminated the district’s waterways. However, compelling science has now persuaded farmers in Tasman District to invest considerable effort and money to clean up the Sherry River in a way that could prove a model example for the rest of the country.

The long-running dairy souring campaigner Bryan Johnson, Director of Fish and Game, enthusiastically describes the project as “a great success.”

New information in December 2013, “the Sherry farmers undertook to take action. In a short period of time, the crossing on Paul and Lisa White’s property where the equipment was carried out has now been built. In addition, another farmer, Rod (??), is using a bridge instead of taking his cattle through the river.”

He says two other bridges are being designed and substantially funded to help stock on ‘Tasman Cheese’ future decisions.”
.. and Landowner Environmental Plans aim to reduce contamination by 80% ..
Example LEP actions

Stream fencing
Riparian planting
Stream culverts
Wetland protection
Stock Troughs
Nutrient Management
Erosion plantings
Stormwater control
Deferred effluent irrigation
So why did landowners participate?

7 ingredients for collaborative success

1. Institutional encouragement & support (incl $$)

“We need support from Council and science to reach our goal”

“The independent facilitation by NZ Landcare Trust kept us on track”
7 ingredients for collaborative success

2. Good relationships between stakeholders

“Working together shares the load and helps to keep everyone focused.”

“The landowners here regard this valley as our place and our home.”

“ICM works with landowners; offending farmers doesn’t.”
3. Clear roles and goals

“We want our children to be able to swim in the river again.”

“We want to minimise farming’s impact on the environment. I want our farming business, in the dairy industry 50 years from now.”
7 ingredients for collaborative success

4. Quality of leadership

“Leadership emerged from the landowners rather than being dictated by any formal election process.”

“Council rules need to be in place to pull up major transgressions.”
5. **Good information & communication**

“The information on existing water quality and where it was worst, surprised some landowners”

“The objectivity and non-judgemental nature of the advice was appreciated”

“having a field day or meeting meant we discussed a wide range of issues beyond those for which the event was organised.”
6. **Opportunities to develop common understanding, and share knowledge and skills**

“Field days were opportunities to see what the neighbours are doing, to talk about environmental issues among different land-use types, and to air differences.”

“Best Practices can only minimise adverse environmental effects, not remove them entirely.”
7 ingredients for collaborative success

7. **Measure and celebrate success**

“Our community has seen measurable results from the efforts of the local catchment group and I think that inspires us to keep working at it.”

“This project has helped lessen our environmental impact – and many have also been practical business investments.”

“Expenditure (without labour) over the past five years totalled $270,000, plus ‘thousands of dollars’ by forestry landowners. For the next two years, planned expenditure is about $150,000.”
ICM – a model for sustainable land & water management
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10 ICM ‘Lessons’
ICM is about people, people, people
Catchments extend off the coast
Everything is connected to everything else

“All is One” Tegan Lamont, Motueka High School
Look at different scales – zoom in, zoom out

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Even long-time dirty-dairying campaigner Bryce Johnson, director of Fish and Game, enthusiastically describes the project as “a good news story for dairying and the envi...
Relationships take time
Collaboration beats confrontation

DEM difference 2004-2005

Volume change (m³)
DEM -11,346
Cross sections -3500
Manage expectations
Critical events have long lasting consequences
Communities need to design their future not wait for it to happen
Long-term datasets are critical for understanding changes in the environment.