Teagasc Spring Webinar Series

New Zealand Approach to Catchment Management and Water Quality

Noel Meehan & Ivan Kelly
Joint Study Trip to New Zealand

- **Participants**
  - Jenny Deakin – EPA
  - Bernard Harris – DAFM
  - Margaret Keegan – LAWPRO
  - Noel Meehan - Teagasc

- **Purpose of Trip**
  - Learn how New Zealand manages agricultural pressures on water
  - To assess mitigation measures and new technologies
  - To enhance collaboration between EPA, DAFM, LAWPRO and Teagasc

- **Itinerary**
  - FLRC Conference and Catalyst Workshop – Massey University & farm visits
  - Land & Water Challenge – Lincoln University and Canterbury RC
  - Lincoln Agritech – Research Update
  - Bay of Plenty RC and farm visits
Farming in New Zealand

- New Zealand = 286,000 km², Ireland = 84,500 km²

- Weather:
  - moist and warm, can have drought in summer
  - long growing season and out wintering of cattle
  - Rainfall ranges from 0.6m -10m per year (Athenry Ave = 1.2m)

- 52800 Farms/Holdings in 2016 down from 69500 in 2002

- Other: pigs, poultry, deer, forestry,

Source Stats NZ
Farming in New Zealand

- 15,000 dairy farmers and employ ~30,000 people on farms with thousands more in support employment
- Dairy is NZ largest single export industry providing 25% of export income
- Ave herd size is 376 cows producing 1.4 billion kgs milk solids
- Irrigation a major part of south island farming, less so in north island
Farming in New Zealand

- Farm subsidies removed ‘over night’ in early 1980’s due to economic problems
- Survival of the fittest – ‘no frills farming’
- Large scale expansion and intensification
- Lack of input controls/regulation
- Engine of economic recovery
- Agriculture has suffered recently from bad press over environment issues
- Is addressing water quality issues, GHG progress at similar stage as Ireland
- Major nutrient of concern – Nitrogen
Farming in New Zealand

Why is Nitrogen the concern?

- Stocking rates can be very high
- Out wintering of cows with little or no housing
- High concentrations of urine patches in a paddock
- Free draining volcanic soils
- High intensity rainfall
- Over use of irrigation
- 1990 – 59,000 T N
- 2015 – 429,000 T N
Central New Zealand Government set National Policy Statements (NPS)

NPS for Water = NZ version of WFD

Set out water quality targets for the country

16 Regional councils responsible for compliance with the NPS for their region

16 different plans for complying

Councils responsible for regulation of farming - Consents
Water Quality Plans

- Regional council decides parameters of plans
  - Set targets for level of Nitrogen loss permitted
  - Land Use Capability (LUC) used to decide on levels of loss
- Use ‘Overseer’ to aid farmers to reach targets
- Overseer is a decision support tool for farmers – uses modelling and is complicated and continually changing
- Farmers must prepare a Farm Environment Plan on Overseer
  - optimisation of nutrient use & mitigation actions
  - designed to help farm meet targets over 15 years
- Plan must be approved by council and a ‘Consent’ is given to farm
- Plan subject to audit every 3 years
Issues

- Output Risk based approach vs. Input based approach
  - N loss from farm vs. limits on N use
- Some targets are set low compared to level of intensity
- Some farms will not be able to reach target set by council by mitigation and optimisation alone
- Hoping to ‘Innovate’ way out of problem
Mitigation ideas

- Very similar to Irish mitigation
- Bio reactors, use of natural attenuation in ground water, constructed wetlands and riparian margins, optimisation of nutrient use, capture drainage water in ponds and reapply
- On/off grazing in late summer – drought conditions, to reduce N load during poor growth
- Use of soil moisture readings to decide on soiled water application
Mitigation ideas

- **Technological solutions:**
- Spikey – treat urine patches
- Digital analysis of weather, growth and crop/soil to provide advice to farmers on when to apply fertilisers
- Improved irrigation management
- Cleartech – separates out solids from water in dairy washings
Mitigation ideas

- Use of detainment bunds
- Animal diet management
- Use of smart fencing
- Soil moisture sensors
- Flushing ground water to dilute N concentration
- Multiple species grassland – Plantain and traditional grasses

Example of a Detainment Bund in Rotorua
Farmer Perspective

- Project Rerewhakaaitu, Rotorua – Bay Of Plenty Farmers Mac Pacey and Chris Sutton

- Issues with P loss
- Farmers formed a ‘collective’
- Part of the problem - part of the solution
- Developed a plan and provided support
- Farmer access to science – debated
- Use of Overseer and FEP
- Key to success – Good Facilitator between Farmers and Council
Farmer Perspective

We want to work with BOPRC.

If we are part of the problem then we need to be part of the solution.

We believe that if farmers are fully involved in the process they will take ownership of the solution.

Challenges:
- “Take control of our destiny.” B Bayfield.
- “Take ownership of the Project.” W Murray.
- “Ensure that farmers understand the science so they can understand the solutions.” M Barton.
- “Hunt as a pack and get ahead of the wave.” D Leeder.
- “You have to be in the black to deal to the green,” T Hamilton.
What is The ASSAP?

- **Agricultural Sustainability Support and Advisory Programme**
- Focus is on water quality in 190 Priority Areas for Action (PAA)
- Provides free farm advice and acceptance is voluntary
- 30 Advisors - 20 Teagasc, 10 from Dairy Co-ops
- Work in collaboration with Local Authority Catchment Assessment Teams
- Under the Water Framework Directive Ireland is required to have all water at ‘Good Status’ 🌟🌟🌟🌟

### River Quality - (Q value)

<table>
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<th>Year</th>
<th>Percentage and number of water bodies</th>
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<td>2014-2017</td>
<td>618 (943) 790 596 420 2</td>
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<tr>
<td>2013-2015</td>
<td>359 (1009) 977 540 393 5</td>
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<tr>
<td>2010-2012</td>
<td>394 (1032) 938 500 336 10</td>
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<tr>
<td>2007-2009</td>
<td>335 (977)  494 330</td>
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<td>2004-2006</td>
<td>392 (938)  535 378</td>
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<tr>
<td>2001-2003</td>
<td>460 (840)  513 452</td>
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<td>1995-1997</td>
<td>528 (747)  442 517</td>
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<td>1991-1994</td>
<td>507 (826)  439 512</td>
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<td>1987-1990</td>
<td>618 (790)  343 483 91</td>
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How does it work?

- Public information meeting
- Farmer information meeting
- Letter sent to each farmer in the PAA on behalf of the ASSAP by the DAFM
- Provide information on water quality in stream and the farm assessment
How does it work?

- Catchment Assessment Teams assess stream – desk study, chemical, biological, hydromorphology etc.
Advisor Farm Assessment

- Farm assessment will focus on 3 areas
  - Farmyard management and practices
  - Nutrient management, application practices and pesticides use
  - Farmland and stream management

- Nutrient loss from farms:
  - Point Sources
  - Diffuse Sources

- Mitigation actions designed to ‘Break the Pathway’ and prevent nutrient loss from farms
What Causes Diffuse P & Sediment Loss?

1. Most losses from low permeability soils
2. Heavy rainfall leads to overland flow of water
3. P and soil sediment washed off into drains & streams
What Causes Diffuse N Loss?

1. Most N losses from free draining soils
2. N does not bind tightly to soil
3. Leaching occurs where more N applied than plant needs
4. Excess N is *leached* by rain to waters
Thank You