



# Lough Melvin

a participatory approach to protecting a unique habitat:

a case study for agri-environmental partnership

Rogier Schulte, Donnacha Doody, Paul Byrne, Owen Carton



# Acknowledgements



Project Leaders: Northern Regional Fisheries Board  
Emer Campbell, Harry Lloyd, Milton Matthews



Teagasc team:

Donnacha Doody, Paul Byrne, Owen Carton, Rogier Schulte, Cathal McNulty and Paul Quinn,  
Teagasc Advisory



Project Partners: AFBINI

Bob Foy, Donnacha Doody



Project Partners: Queen's University Belfast

George Hutchinson, Claire Cockerill



Funding:

INTERREG IIIa, administered by Environment & Heritage Service, Dept of Environment, NI

Farmers and stakeholders

Images: Doris Ammann



# Background

- Lough Melvin is a cross-border lake (Leitrim – Fermanagh)
- 26,500 ha catchment
- 58% RoI
- 42% NI



# Background

- Ecologically unique:
  - Artic char
  - Salmon
  - 3 subspecies of trout
- No zebra mussel (yet)
- Angling and tourism central to local economy



Sonaghan



Ferox trout



Gilaroo



# Background

- Lough Melvin is mesotrophic - eutrophic
  - P-level: 36  $\mu\text{g/l}$  (2001) and rising
- Algal blooms have been limited:
  - Shallow depth allows mixing
  - Peat staining prevents light infiltration
  - Sustainability: ?
- Potential sources of P:
  - Domestic: Kinlough, Rossinver, Garrison
  - Agriculture
  - Forestry



# The Lough Melvin Nutrient Reduction Programme

- Objective: to develop a catchment management plan (CMP)
- Specific for the Lough Melvin Catchment
- Cross-sectorial:
  - Domestic
  - Agriculture
  - Forestry
- Multi-disciplinary:
  - Physical Science
  - Socio-economics
- Including cost estimates



# Strand 2 - Agriculture

- Objective:  
to develop a suite of agri-environmental measures to minimise P-loss to water.
- Criteria:
  - Targeted to high-risk areas / practices
  - Scientific evidence of effectiveness
  - Cost-effective (low € / kg P saved)
  - High impact (large reduction in P)
  - Acceptable and practical !



# Materials and Methods

- Risk Assessment
  - 50 farms selected, 4-5 visits per farm
  - Farmer interviews: farm management surveys
  - P-ranking scheme (Magette *et al.*, 2006)
  - Soil sampling >400 fields
- Identify potential measures
  - Literature review
  - Farmer interviews
- Evaluation of potential measures
  - Farmer interviews
  - Stakeholder workshops
  - Impact assessment
  - Assessment of costs



# Risk assessment

- Background data:
  - Agriculture central to local communities
  - Large number of part-time farmers
  - <40% in REPS
  - Mainly sucklers / weanlings and sheep

Livestock numbers in the catchment (sources: CSO & DARDNI)

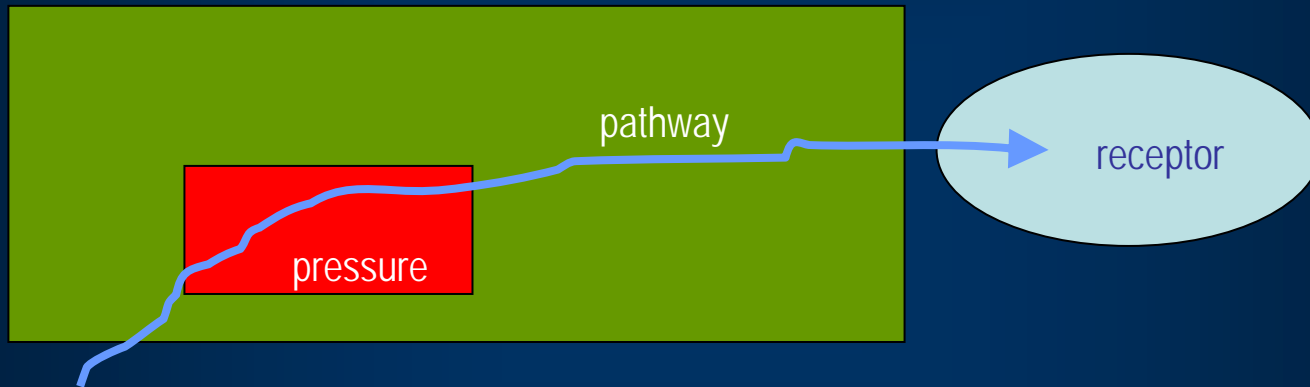
	RoI	NI	Total	LU's
Cattle	3891	3635	7526	5074
Sheep	12199	1342	13541	1896
Mean stocking rate (LU / ha)				0.5

- What is the problem?



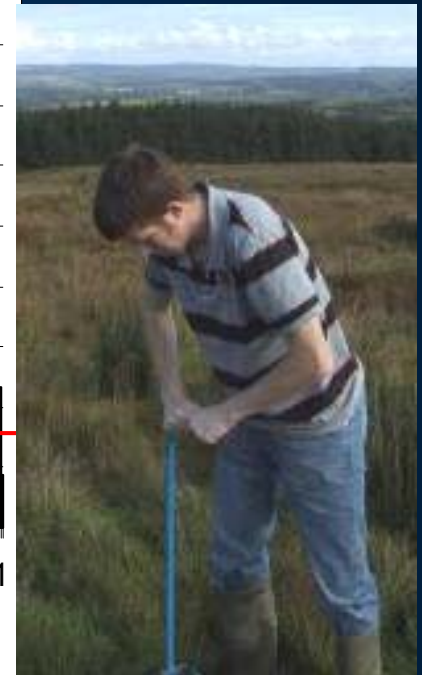
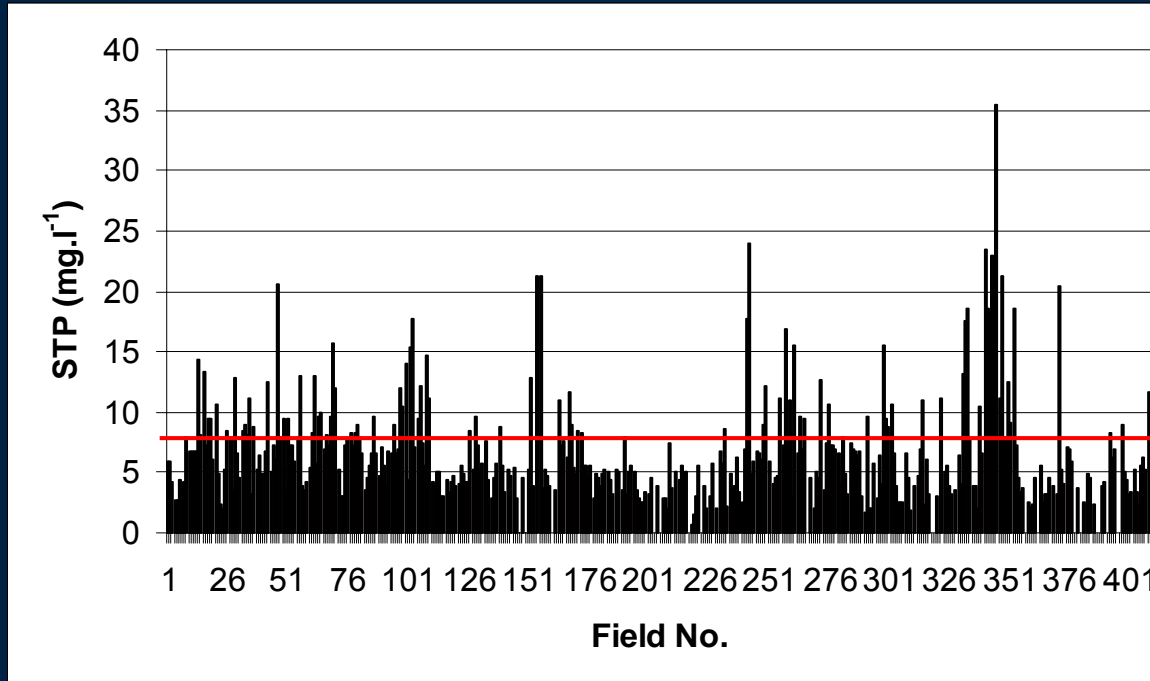
# Risk assessment

- Concept: pressure x pathway



# Risk assessment

- Concept: **pressure** x pathway

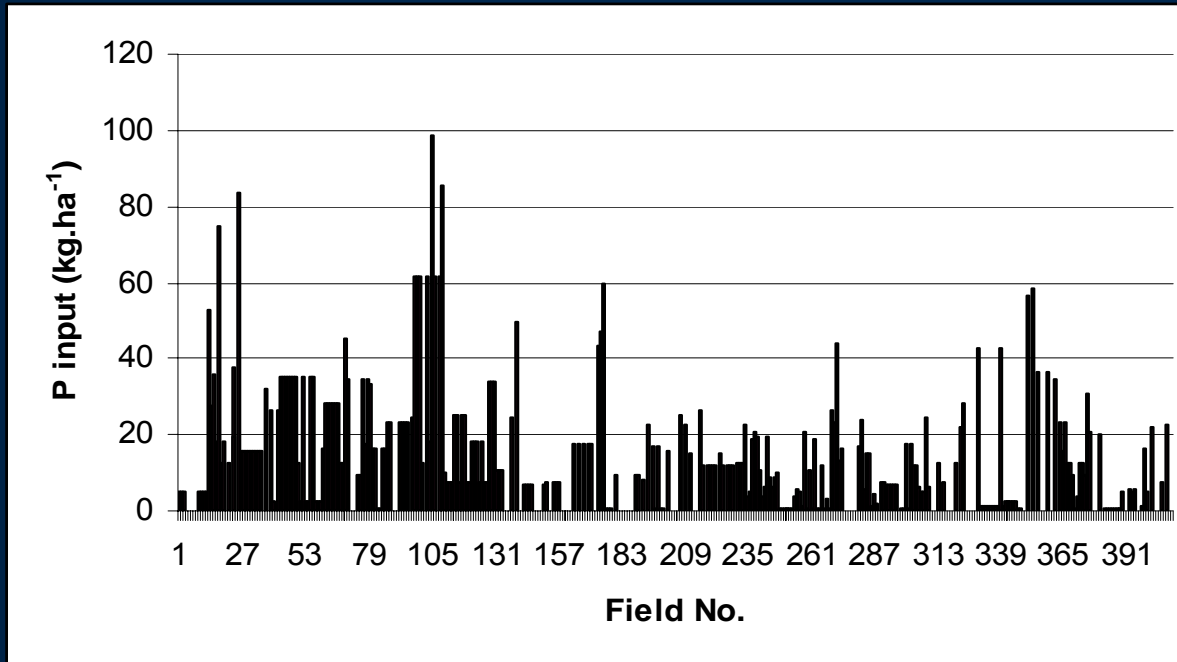


Soil P levels in >400 fields surveyed



# Risk assessment

- Concept: **pressure** x pathway



Annual total inputs on > 400 fields surveyed



# Risk assessment

- Problem 1: Lack of support structures / Nutrient Management Plan



# Risk assessment

- Concept: pressure x **pathway**
- 40% peat:
  - Poorly drained
  - Low P-sorption
- 47% gley:
  - Poorly drained
  - Overland flow
- High connectivity
- Drainage operations



# Risk assessment

- Problem 1: Lack of support structures / Nutrient Management Plan
- Problem 2: Very high connectivity between agriculture and water



# Risk assessment

- Concept: **pressure x pathway**
- Slurry storage compliant with nitrate regulations, but:
- Limited spatial availability of suitable spreadland
  - Large commonage area
  - Suitability for spreader
  - STP > Index 4
- Limited temporal window for slurry spreading
- Heavy reliance on contractors



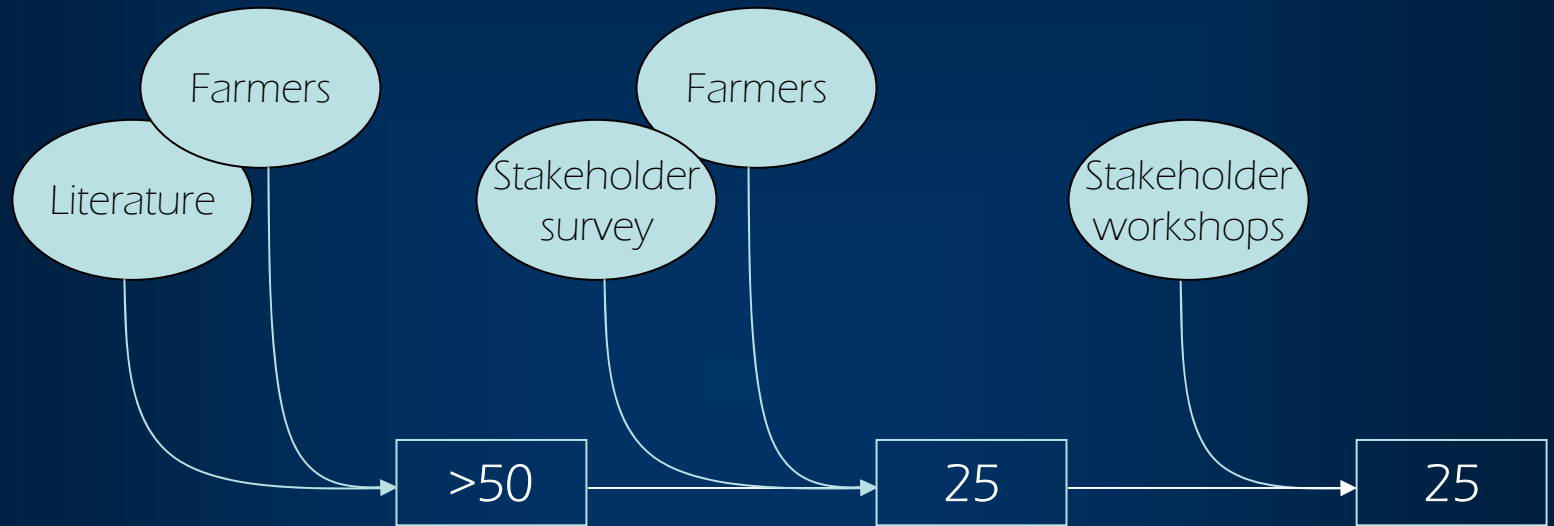
# Risk assessment

- Problem 1: Lack of support structures / Nutrient Management Plan
- Problem 2: Very high connectivity between agriculture and water
- Problem 3: Limited availability of suitable spreadlands and spreading windows → repeated applications on same fields
- P-ranking scheme:

<b>Risk Class</b>	<b>% of area</b>
High	31
Medium	30
Low	39



# Potential measures



# Potential measures

## Pressure:

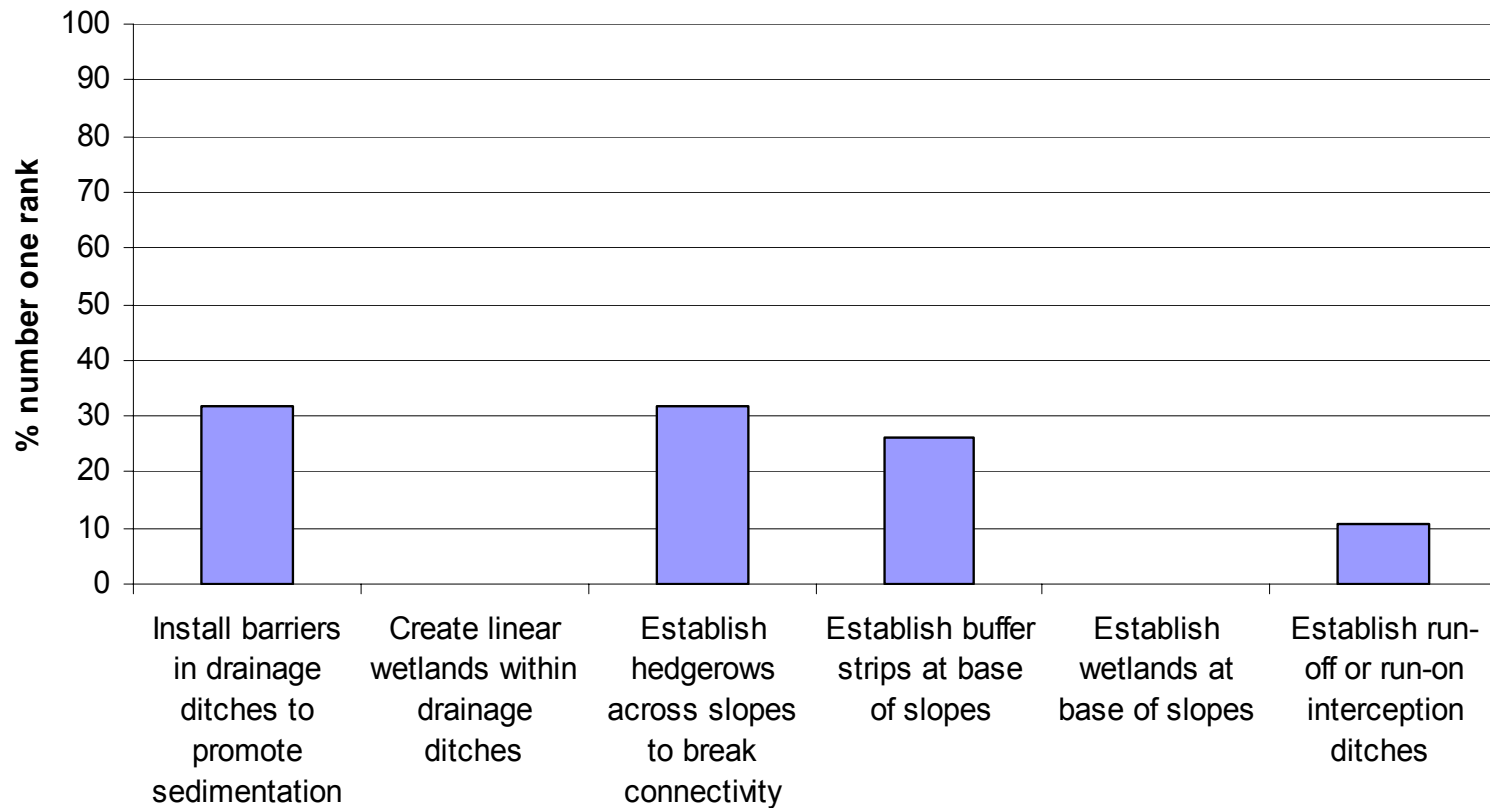
- Nutrient management:
  - Nutrient management plan and soil test
  - No P on Index 4 silage area
  - Feed low P-concentrates
  - Only buy fodder produced in catchment
- Reduce stock
  - Reduce stock (suckler cows)
  - Sell calves in autumn
  - Reduce stock (sheep)
- Remediation
  - Plough Index 4 soils

## Pathway:

- Slow down water
  - Barriers in drainage ditches
  - Linear wetlands within ditches
  - Wetlands at base of slope
  - Hedgerows across slopes
- Buffer strips:
  - Buffer strips (1.5, 2.5, 5.0 meters)
  - Fence of water courses
  - Fence of water courses + buffer strip
- Prevent / remediate high risk areas:
  - Gravel hardcore around troughs / gates
  - Move troughs / gates to low risk areas
  - Move troughs regularly
  - Reroute road runoff to sediment traps



# Evaluation of measures



Preference for measures to address risks from high hydrological connectivity



# Evaluation of measures

## Impact of barriers in drainage ditches:

Hauge (2005): P-loss reduced by 44%

Maguire *et al.* (2008): - 35%

Average P-loss in catchment: 0.59 kg P/ha

Impact of measure = 35% x 0.59 = 0.21 kg P/ha



# Evaluation of measures

## Costs of barriers in drainage ditches:

Materials and labour: EUR 500 per ditch

Ditches per farm: c. 5

Number of farms: 300

Total installation costs: EUR 750,000

Depreciation: 20% p.a.

Annual costs: EUR 750,000 x 0.20 = EUR 150,000

Cost per ha = EUR 11.05

**Cost-effectiveness = EUR 11.05 / 0.21 = EUR 53 / kg P**

# Evaluation of measures

- Costs and impacts are very rough estimates !
- Banding of results in orders of magnitude

	Cost Effectiveness EUR / kg P	Total Costs EUR	Total impact kg P	Popularity farmer's preference
A	< 10	< 10,000	> 1,000	Popular
B	10 – 100	10,000 – 100,000	100 – 1,000	Acceptable
C	100 – 1,000	100,000 – 1,000,000	10 – 100	Not acceptable
D	> 1,000	> 1,000,000	< 10	N/A



# Evaluation of measures

Top 3 measures:

	Cost effectiveness EUR / kg P	Total Costs EUR	Total impact kg P	Popularity farmer's preference
Feed low P concentrates	A	A	B	A
No P on index 4 silage areas	A	A	C	B
Nutrient management plan	A	B	A	A



# Evaluation of measures

Next 3 measures:

	Cost effectiveness EUR / kg P	Total Costs EUR	Total impact kg P	Popularity farmer's preference
Reduce sheep numbers	B	B	A	B
Sediment traps in ditches	B	C	A	A
Reduce cow numbers	B	C	A	B



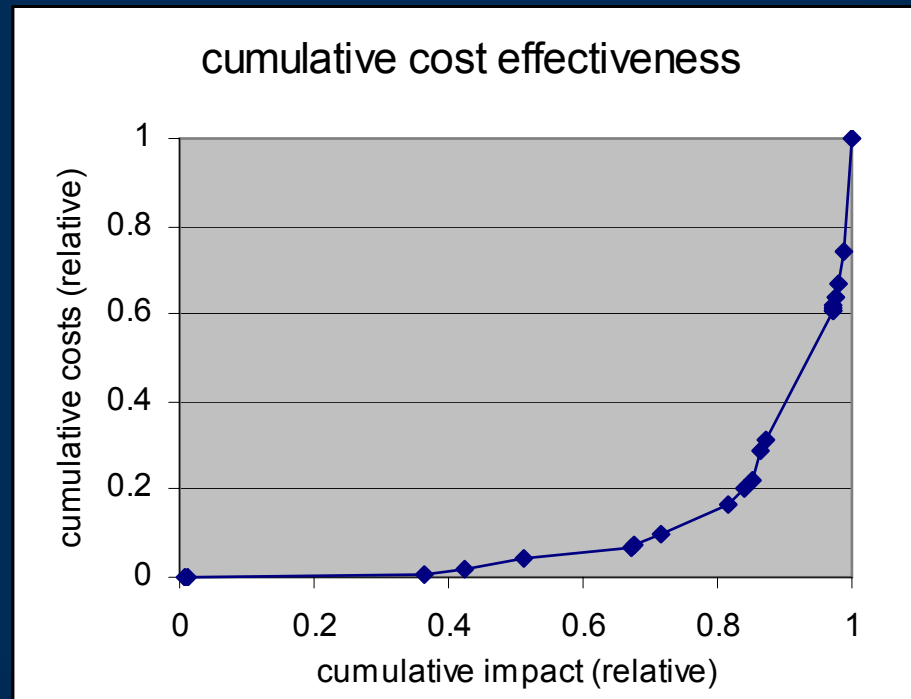
# Evaluation of measures

Some non-starters:



# Evaluation of measures

- Large variation in effectiveness of measures
- First 5 measures account for 50% of P-reduction, at 5% of max costs



# Recommendations

1. Provision of Nutrient Management Plan and soil test (long-term)
  - Reduce slurry / fertiliser rates to agronomically optimum levels
  - identification of Index 4 soils and peaty soils
  - low P concentrates
  - Removing P in silage and not replacing the P off-take on Index 4 soils
  - through subsidised /free advisory service ?
2. Reduce pathways (immediate effect)
  - Sediment barriers in ditches
  - Buffer zones (2.5 m)
  - Hedgerows

**Less cost-effective as stand-alones,  
but already available (and paid for)  
under REPS**

Potential P-reduction 1+2: 50%  
Total costs: c. 6% of potential maximum



# Recommendations

3. Where 1 and 2 do not lead to sufficient reduction in P-loss:
  - Provide compensation for reduction in SR
  - Provide compensation for reduction in SR in winter (selling calves in autumn)

Potential P-reduction 1+2+3: 80%  
Total costs: c. 16% of potential maximum



# Recommendations

## 4. Review of regulatory “loop holes”:

- Withhold slurry applications from Index 4 soils
- Identify Index 4 soils and peaty soils
- Review the sustainability of animal B&B arrangements
- Review potential of slurry export / separation
- Potential benefits of outwintering?



# To be continued...

- Outputs:
  - Integrated catchment management plan
  - Partnership agreement arising from participatory process.
- Follow-up plans (INTERREG IV):
  - Establishment of agri-environmental cooperative
  - Project led by farmers, in collaboration with researchers and policy makers
  - Implementation of catchment-specific measures from CMP
  - Links environmental sustainability with economic sustainability



# Concluding considerations

- Lough Melvin project successfully identified measures that are:
  - Cost effective
  - High impact
  - Targeted at risk areas
  - Are popular with farmers
- Lot of common sense, and a few surprises
  - Focus on NMP and giving farmers access to full information and support
  - High visibility solutions are not always the most effective ones!
  - Regional approach v “one size fits all”
  - Template for RBD management plans?
- Participatory approach central to the success of CMP
  - Thank you to all farmers for access, information, time, ideas, hospitality
  - Thank you to all stakeholders
  - Thank you to project team

