Sediment and Water Quality

Daire.ohuallachain@teagasc.ie

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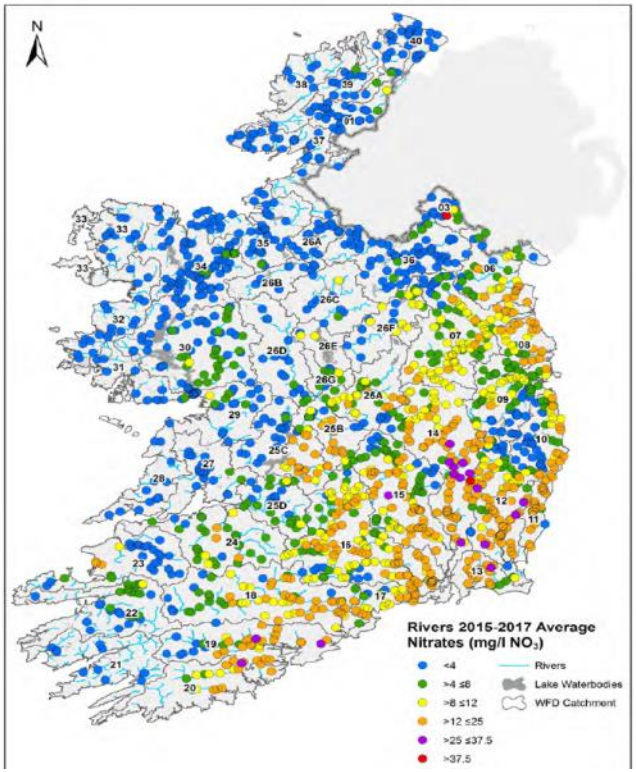
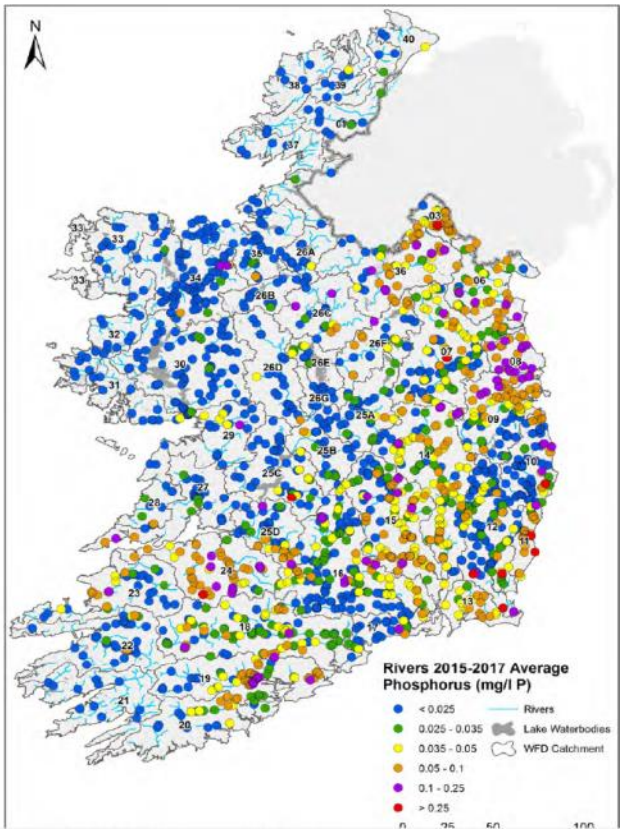
Water quality

- Decline in water quality
- Various pressures impacting water quality

Nitrates



Phosphorus



Sediment

?

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Sediment

- Sediment - natural phenomenon
  - Weathering of rock, mineral, organic, soil material
- Land-use can accelerate soil erosion and delivery of excess sediment to watercourses

- What constitutes excess sediment?

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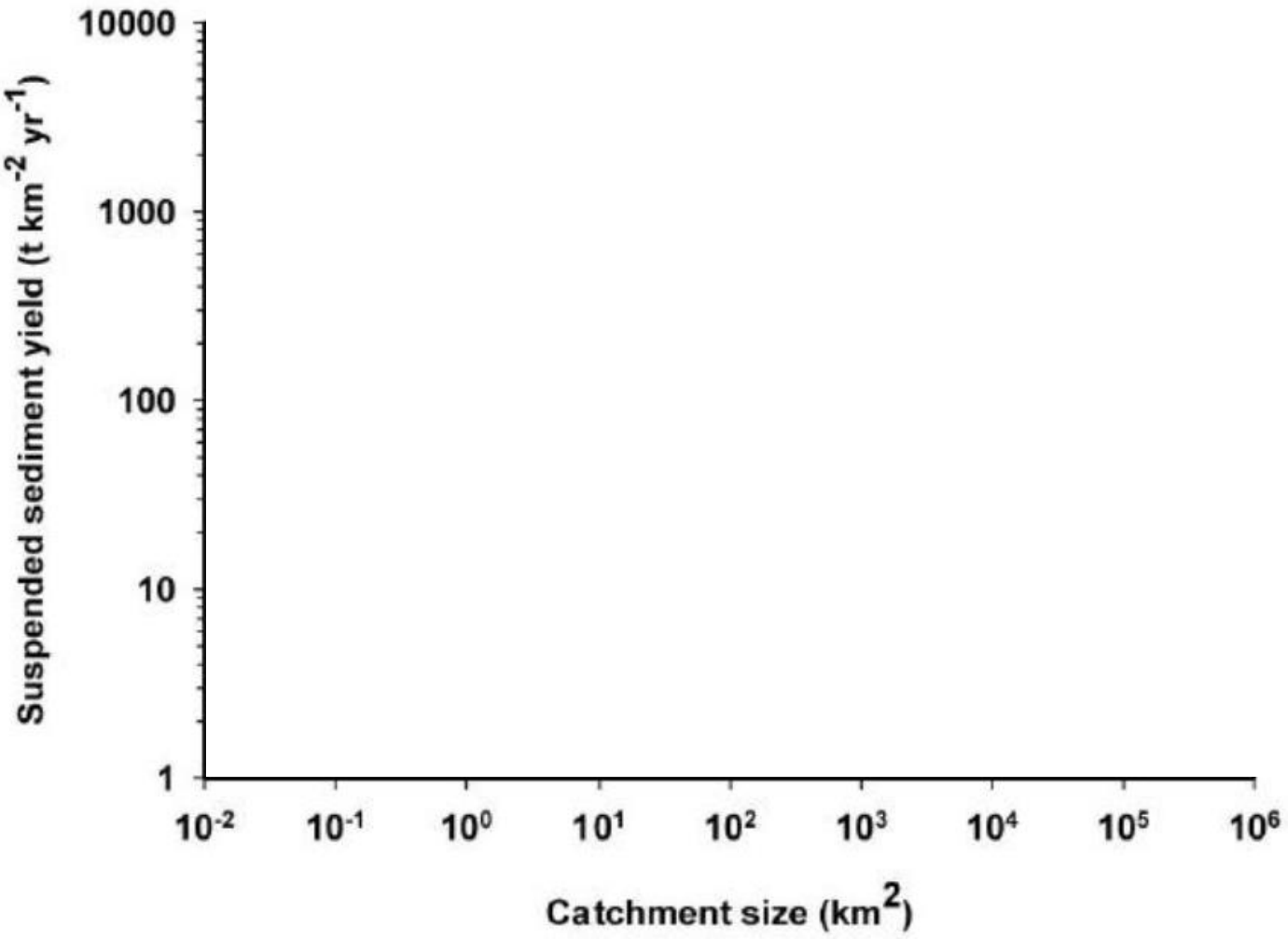
Sediment yield from catchments



25t km^2

8t km^2

<3t km^2

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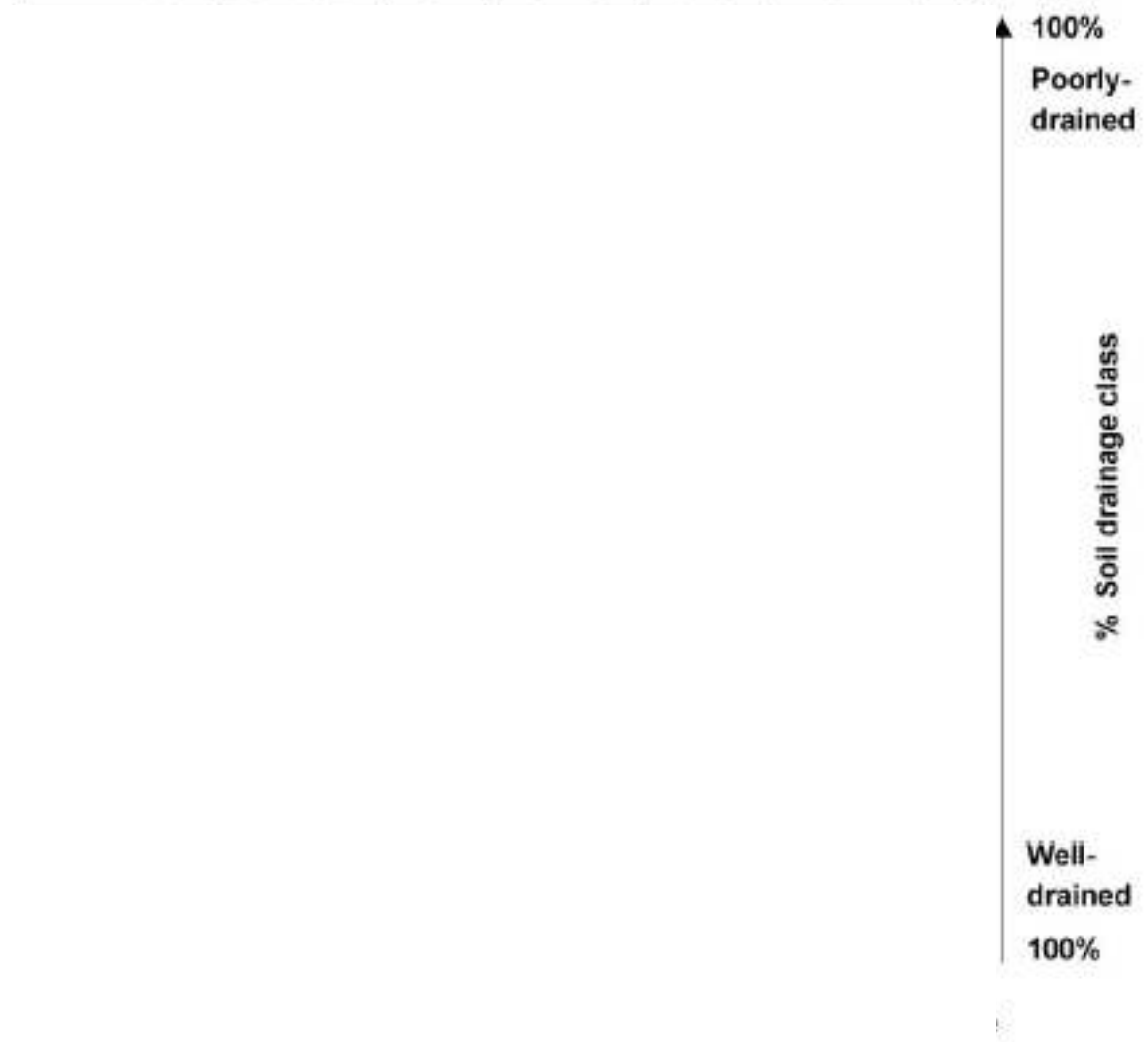
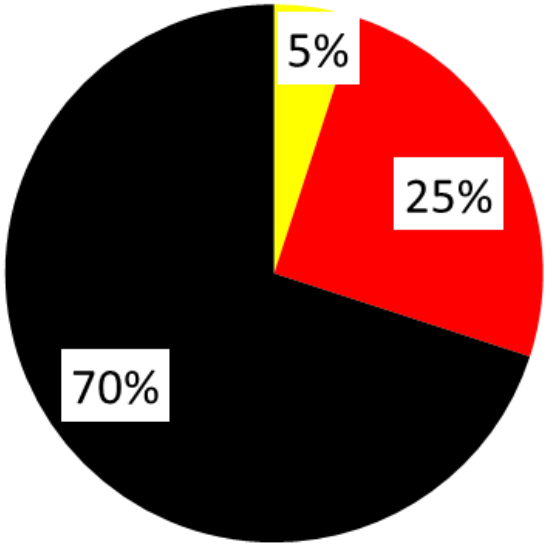
Sediment yield – intensive catchments (ACP)

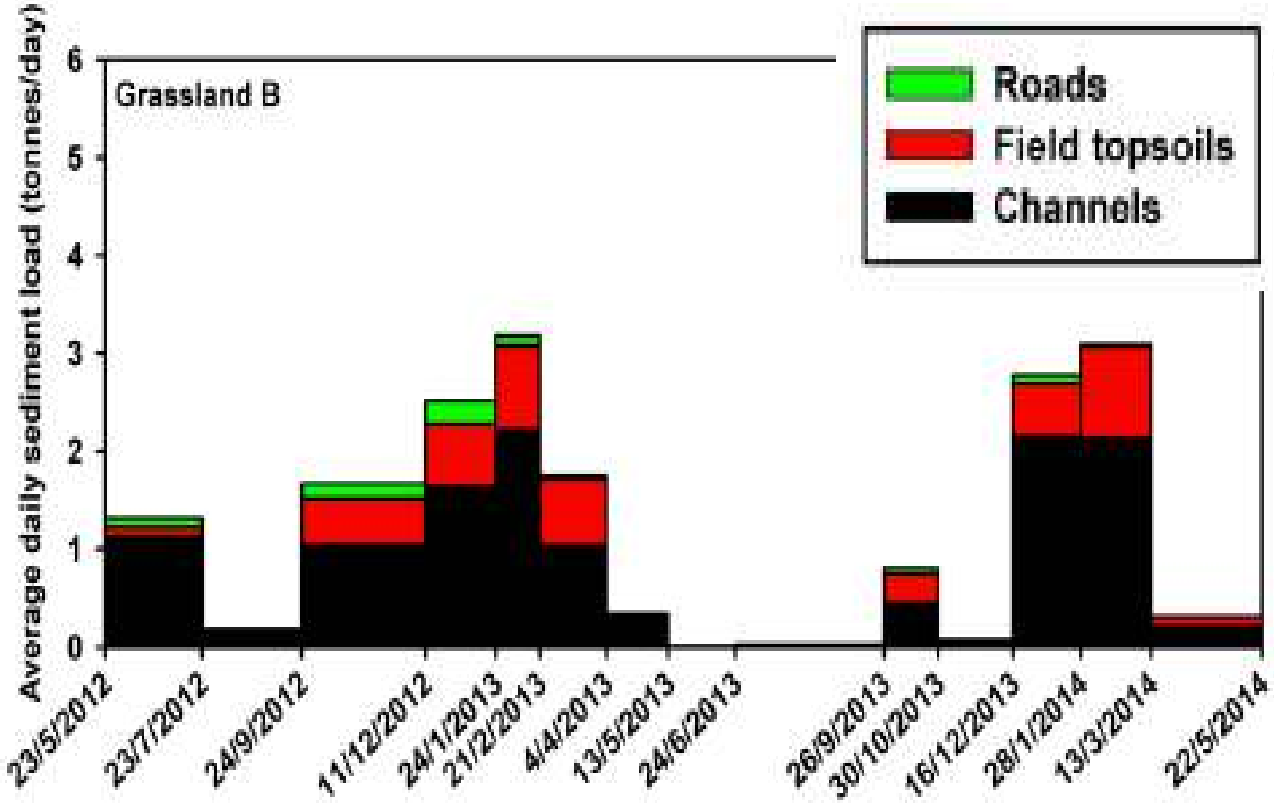


Sediment sources – intensive catchments

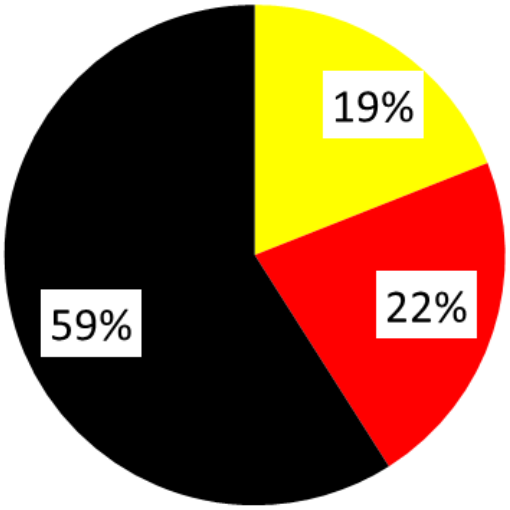
Grassland- Poorly-drained



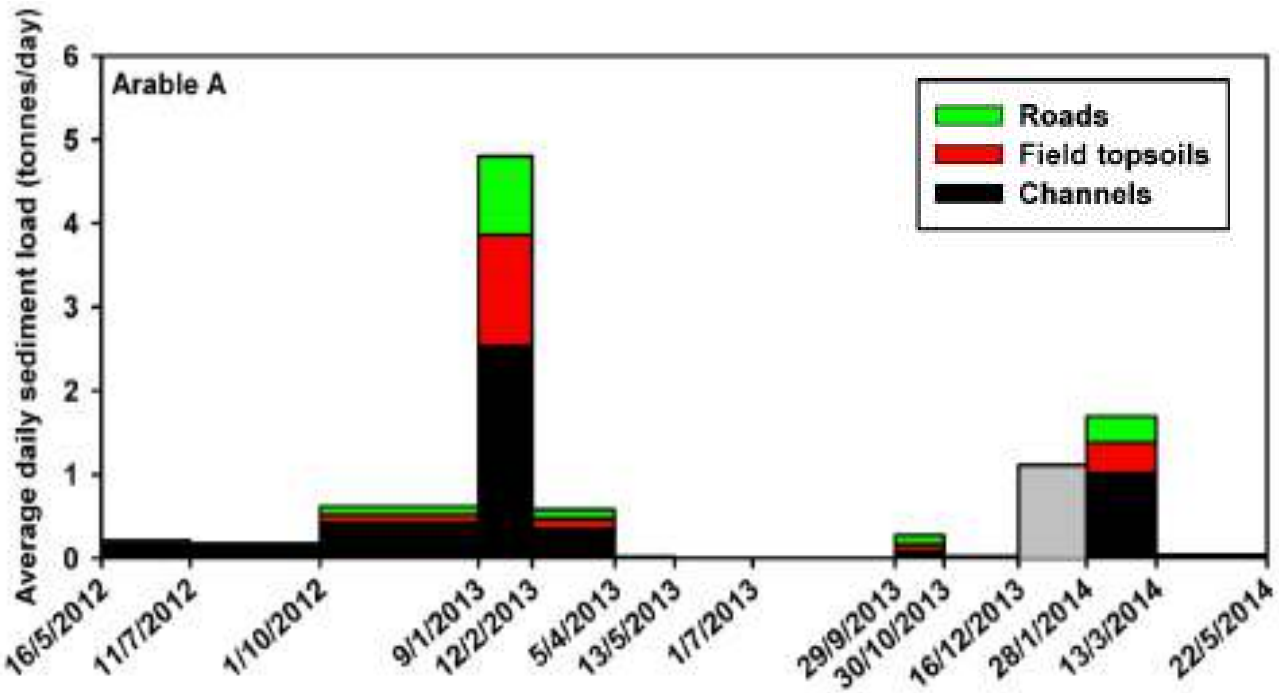
24 t km^2



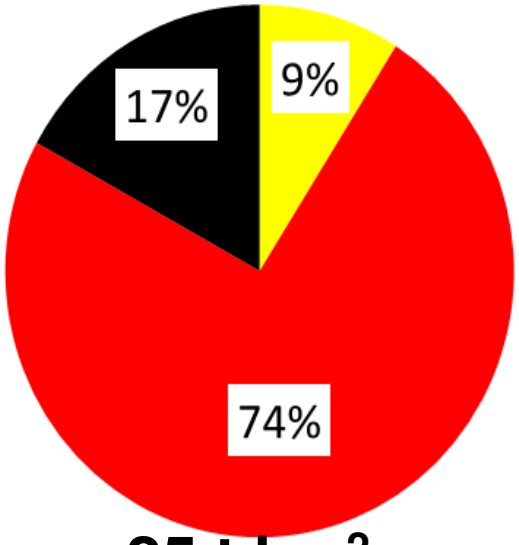
Arable- Well-drained



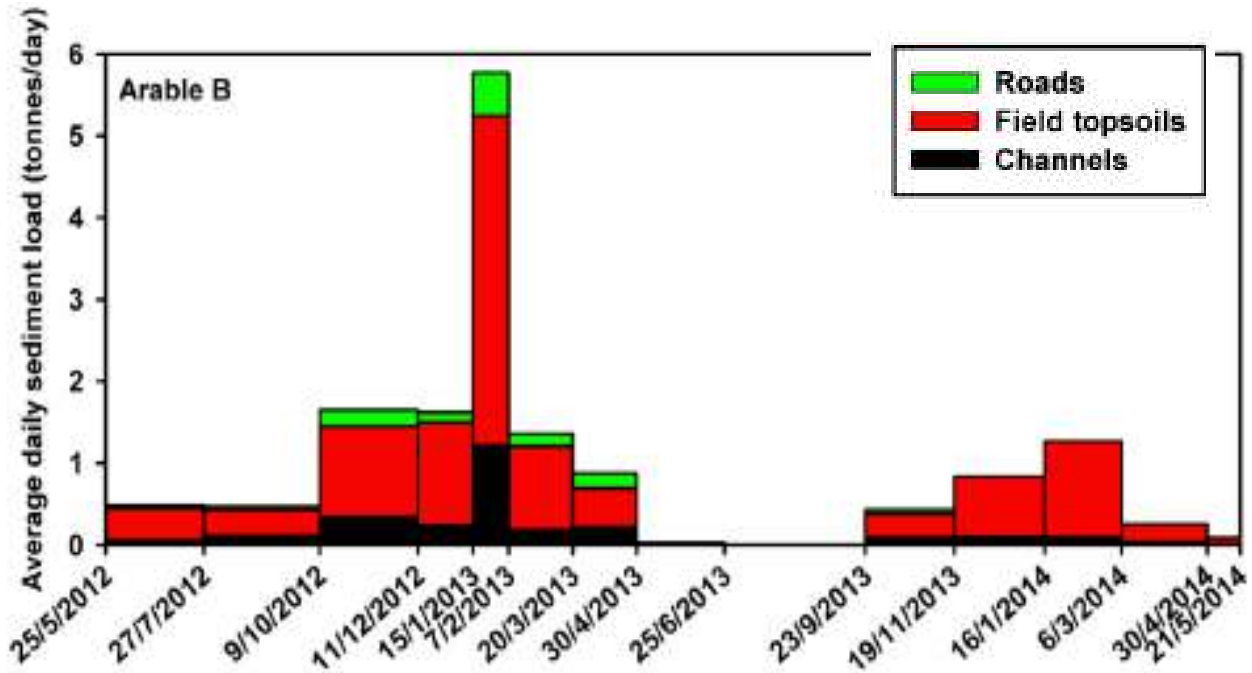
12 t km²



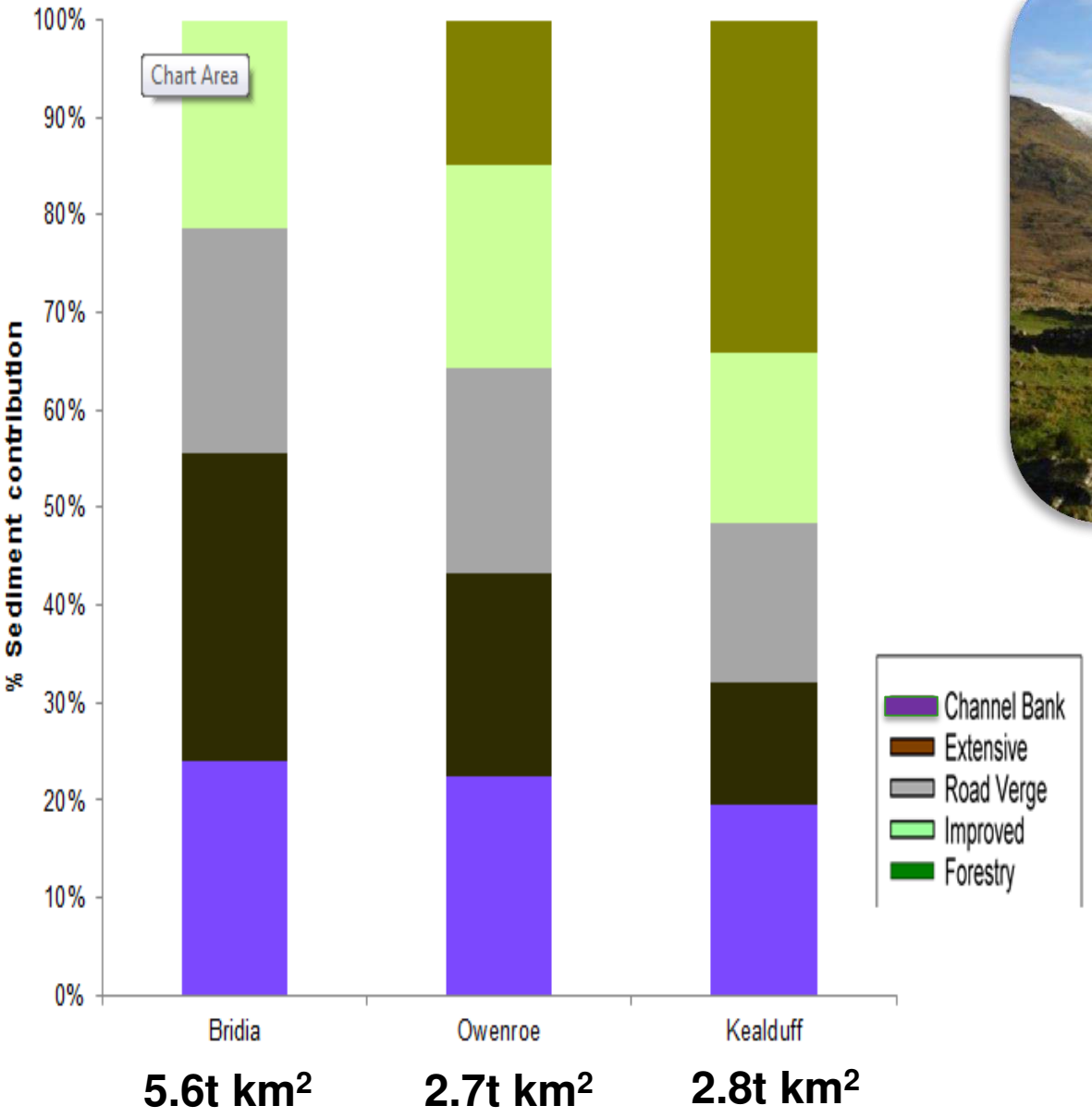
Arable- Poorly-drained



25 t km²



Sediment sources – Extensive catchments



5.6t km² **2.7t km²** **2.8t km²**

Intensive Grassland
- 20% input; 5% area

Forestry – significant
- Established, historical

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Sediment impact: ecology

- Riverbed habitats
  - Clogging gravels
  - Reducing dissolved oxygen
- Turbidity
  - Reduce light penetration
  - Impact on feeding

Sediment impact: multiple stressors

Experiment to assess multiple stressors on aquatic invertebrates

- Sediment, Phosphorus and Nitrogen, individually + combined

- Response of aquatic invertebrates

Conclusion:

- Sediment was the most significant stressor on aquatic ecology.

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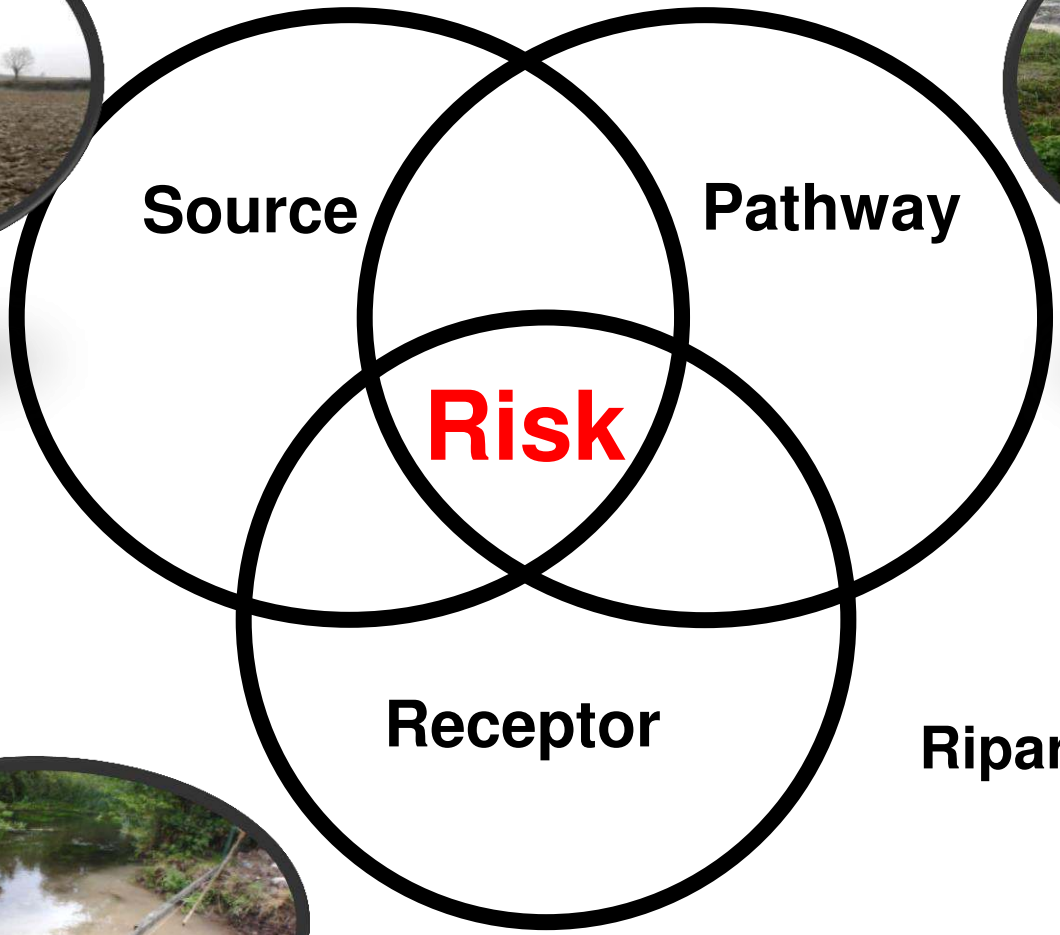
Sediment mitigation



Riparian buffer strips

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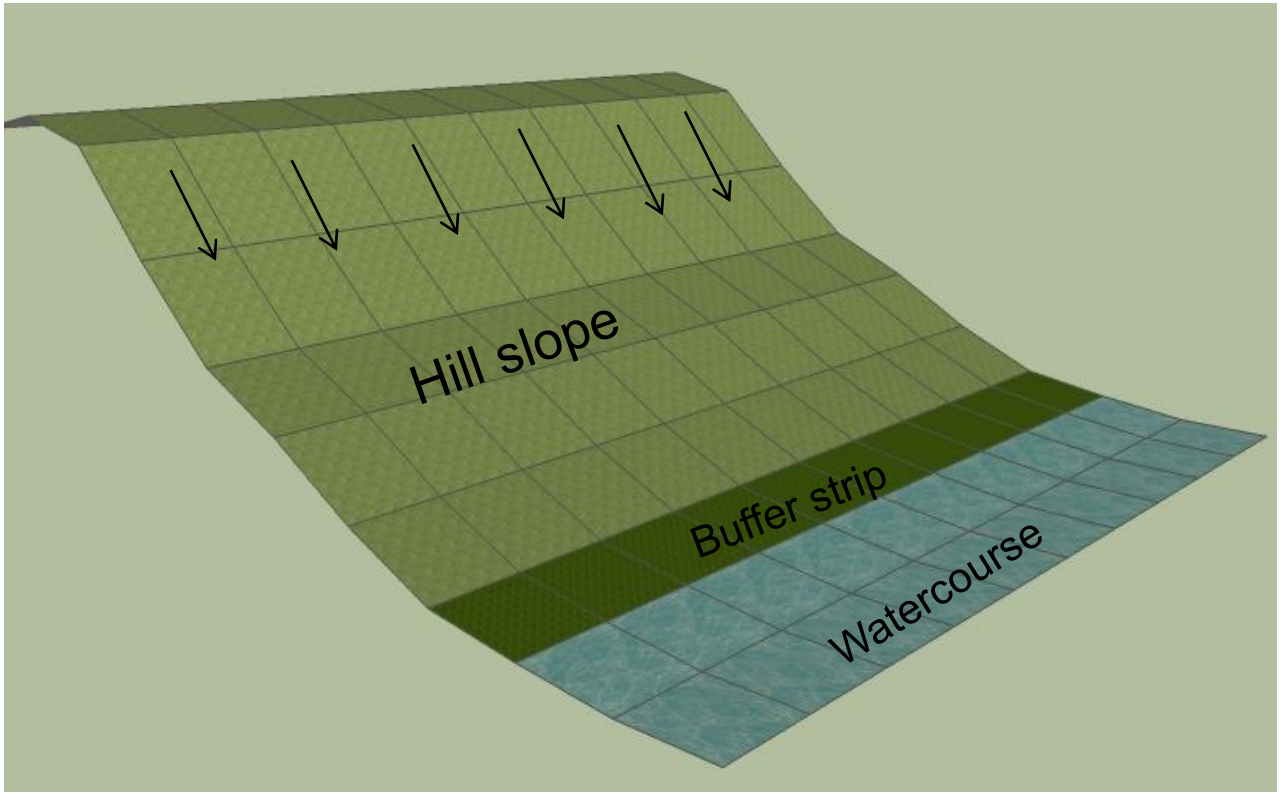
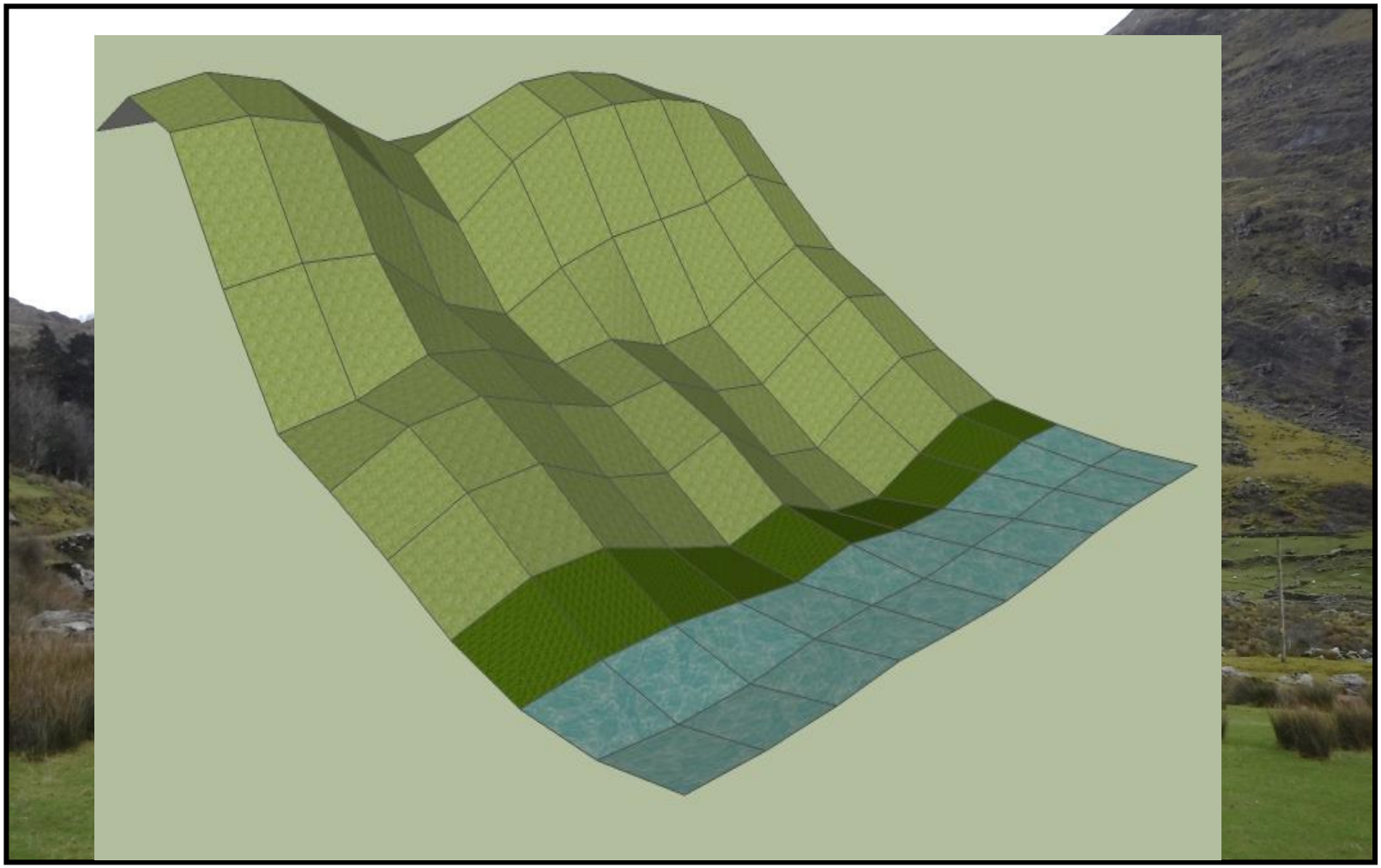
Riparian buffer strips

Bands of land adjacent to water bodies that are planted with permanent vegetation





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SMARTER_BufferZ

- Designed and managed buffer strips, targeted to Hydrologically Sensitive Areas
- Right Measure – Right Place

Environmental Protection Agency

The James Hutton Institute

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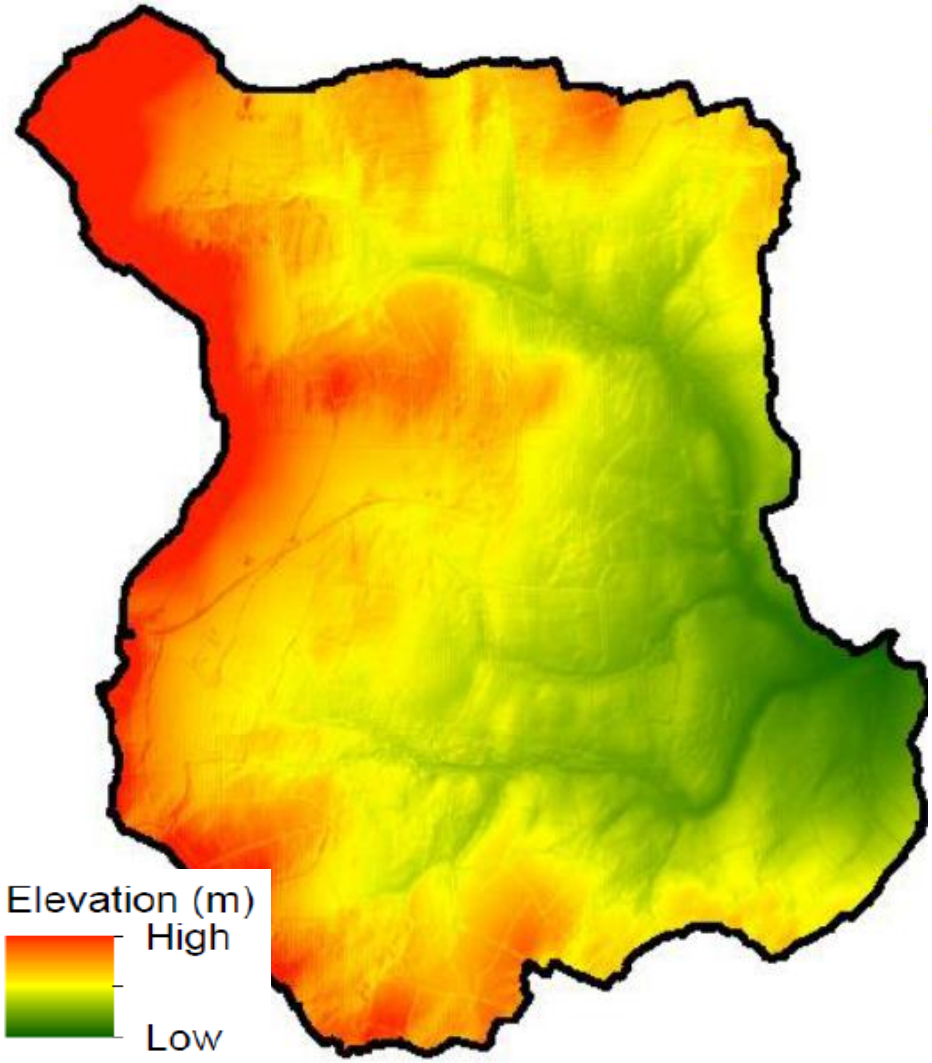
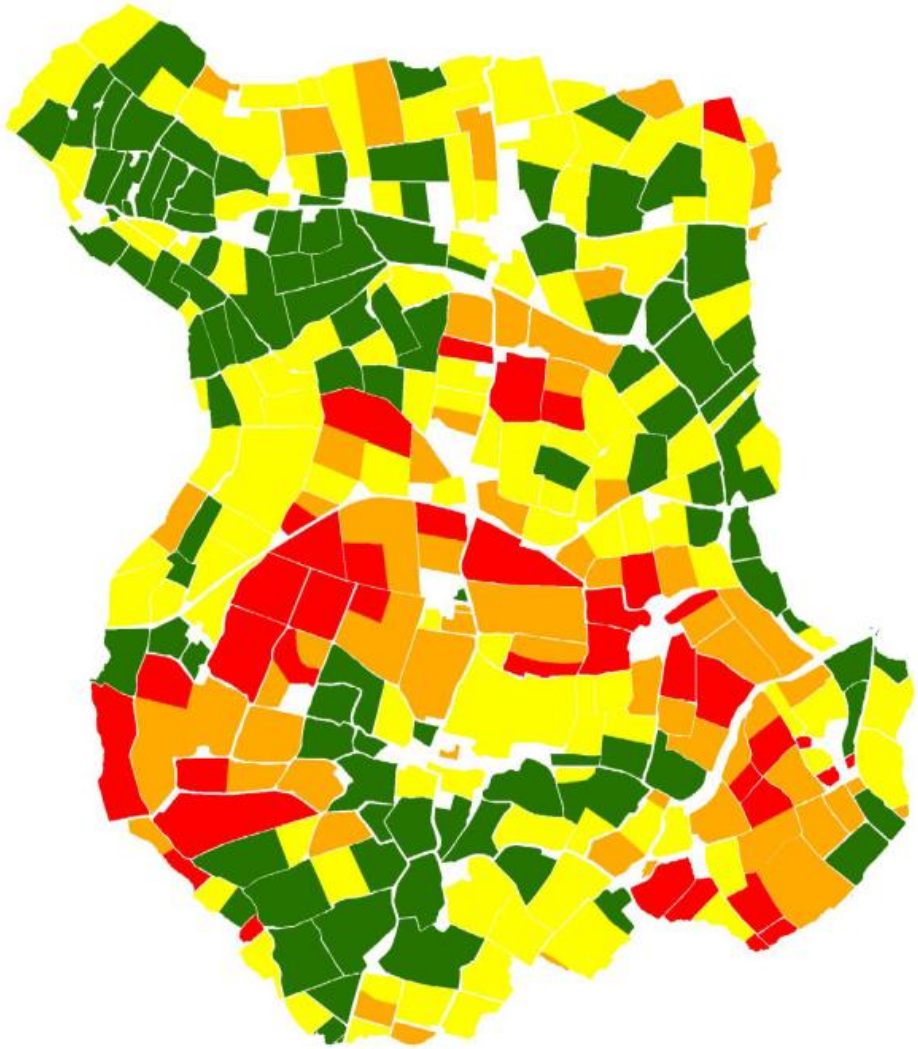
Right place





Flow

Delivery point/
HSA

Natural mitigation
features

Targeting of riparian margins to ‘Delivery points’ -
Reduction of 89-96% in costs
(compared to blanket implementation)

Diffuse Tools
Engaging • Modelling • Learning

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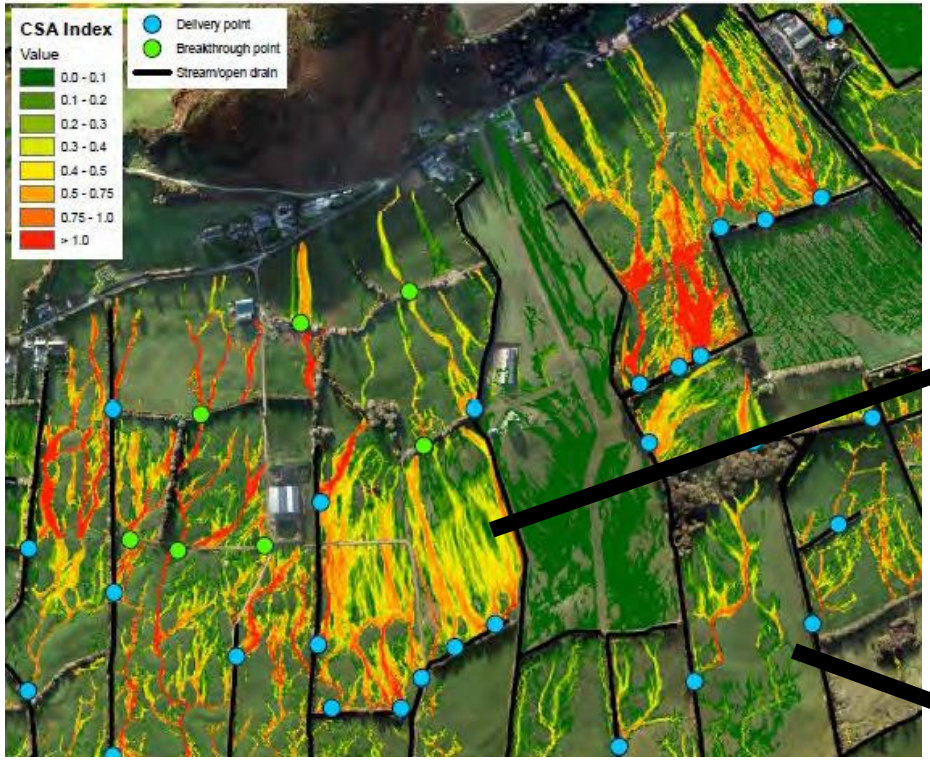
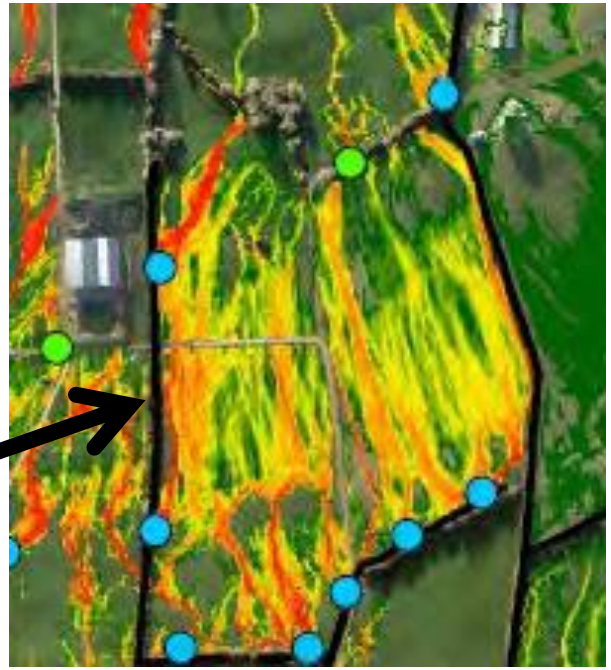
Characterise flowpaths

- Right place can inform right measure





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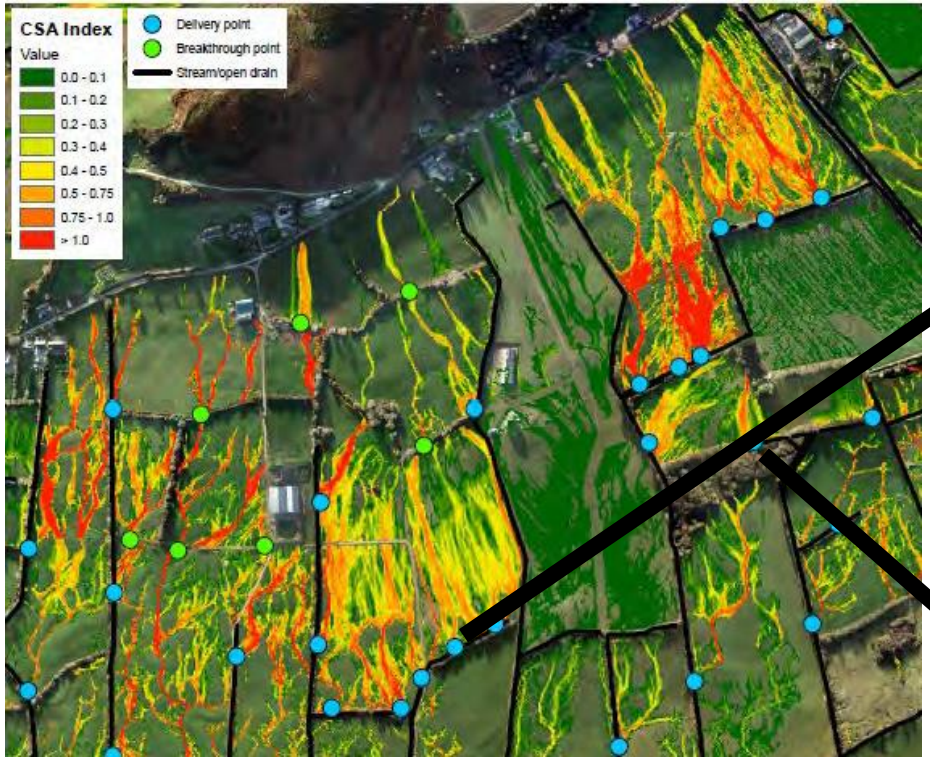
Characterise delivery points



Right measure

- Riparian measures are widely implemented
  - Compulsory and Optional
- GAEC - 2m, No fert/pest
- REPS, AEOS, GLAS –No fert/pest, no stock,

- Policy has been conservative with riparian design
  - Various widths (3m-30m)
    - » Wider margins not very popular, low uptake by participants
    - » Wide margins not necessarily more effective at buffering
  - Alternative management, planting, design?

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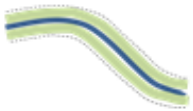
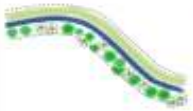
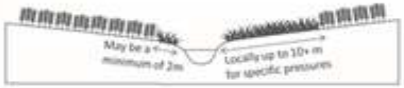
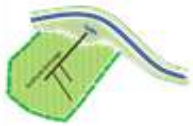
Mitigation action	Diagrammatic representation		Cost	Acceptance
	Cross section	Aerial view		
Do only the regulatory minimum				
Linear grass buffer strip over all field edges bordering a watercourse				
Linear buffer strip with managed vegetation				
Targeted denitrification buffer zone protecting areas of groundwater upwelling				
Targeted grass erosion buffer zone at surface runoff delivery points				
Targeted erosion buffer zone with erosion traps (sculpted ground)				
Targeted buffer zone with actions to intercept subsurface artificial soil drains				

Policy

Advisory

Agriculture

Research

Farmers

Local authorities

Water managers

NGOs

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THANK YOU

Daire.ohuallachain@teagasc.ie

@dohuallachain





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