



AFBI Science - Providing the Evidence to Support Sustainable Nutrient Management

Dr Donnacha Doody

Overview

- Context
- Past Research Delivering Solutions
- New Research Evidence Base
- New Challenges





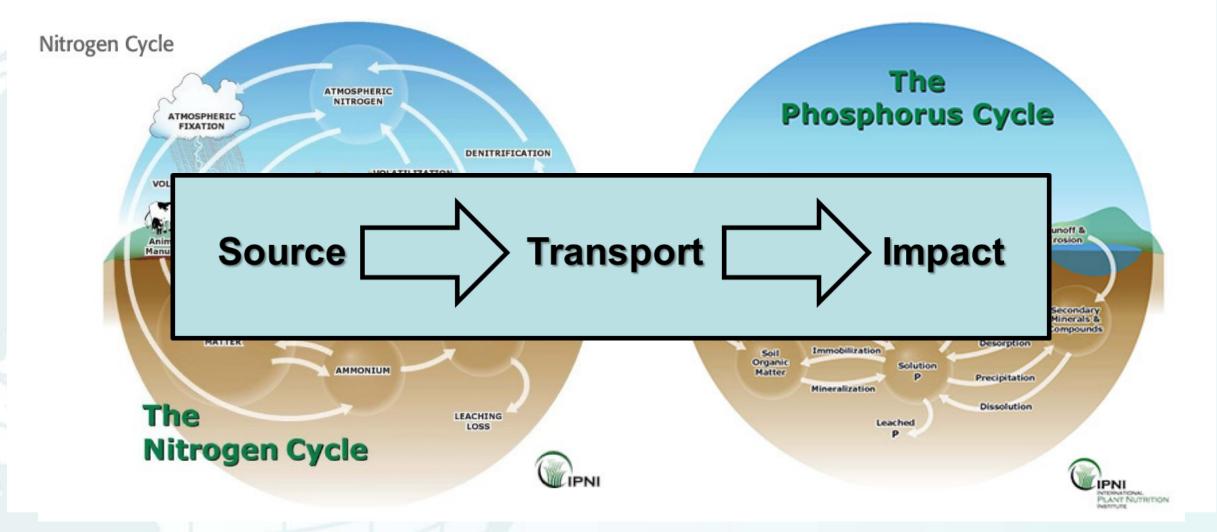












Sustainable Intensification means simultaneously improving the productivity and environmental management of agricultural land.



Temporal and Spatial Scale





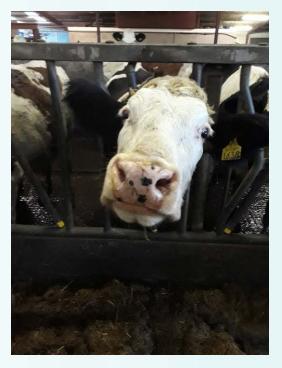




Managing Nutrient Sources

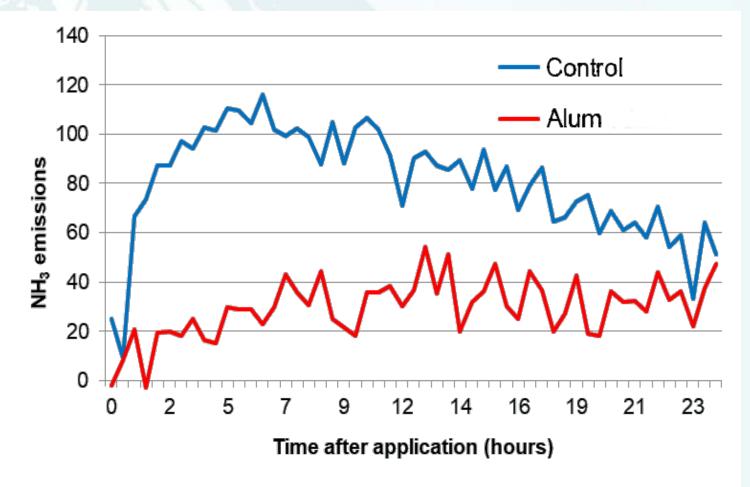






Ammonia Emissions from Housing

John McIlroy & Rachel Carolan





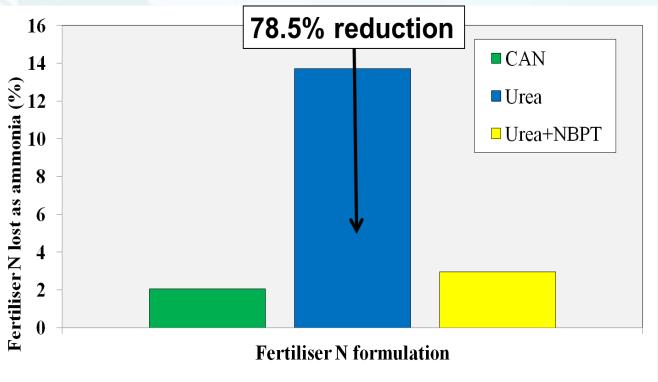


Alum reduced ammonia > 70% in the first 12 hrs

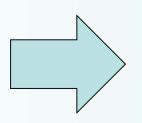


Ammonia Emissions from Fields

Peter Frost, Catherine Watson, Ronnie Laughlin







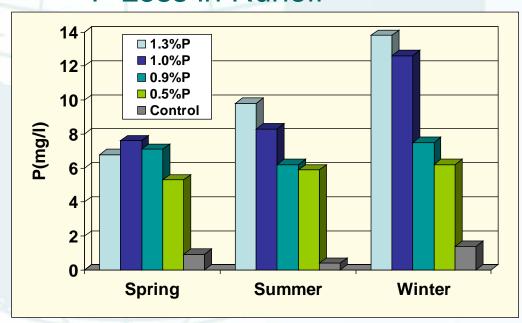
60% reduction in ammonia volatilisation



Dietary Phosphorus Conrad Ferris



P Loss in Runoff



Milk Yield

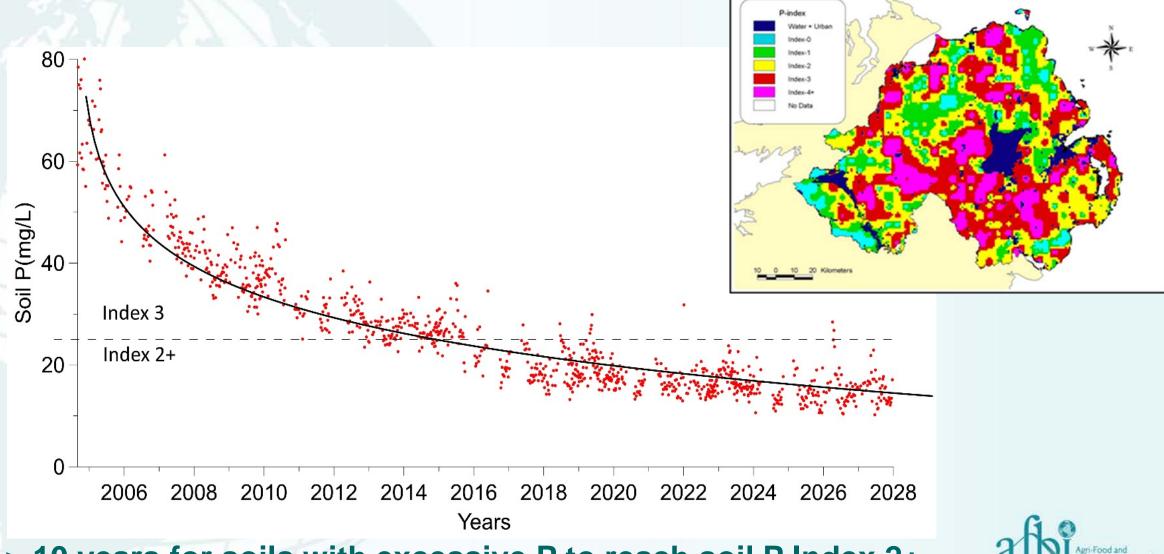
| | Normal P 4.5 g/kg DM | Reduced P 3.6 g/kg DM | SEM | Sig. |
|-------------|-------------------------|--------------------------|-------|------|
| Lactation 1 | 7521 | 7474 | 138.5 | NS |
| Lactation 2 | 8241 | 8419 | 166.5 | NS |
| Lactation 3 | 9177 | 9219 | 217.5 | NS |
| Lactation 4 | 9002 | 8976 | 394.0 | NS |

Reduced P in diets results in reduced P loss to water



Soil P Management

Rachel Cassidy & John Bailey



> 10 years for soils with excessive P to reach soil P Index 2+









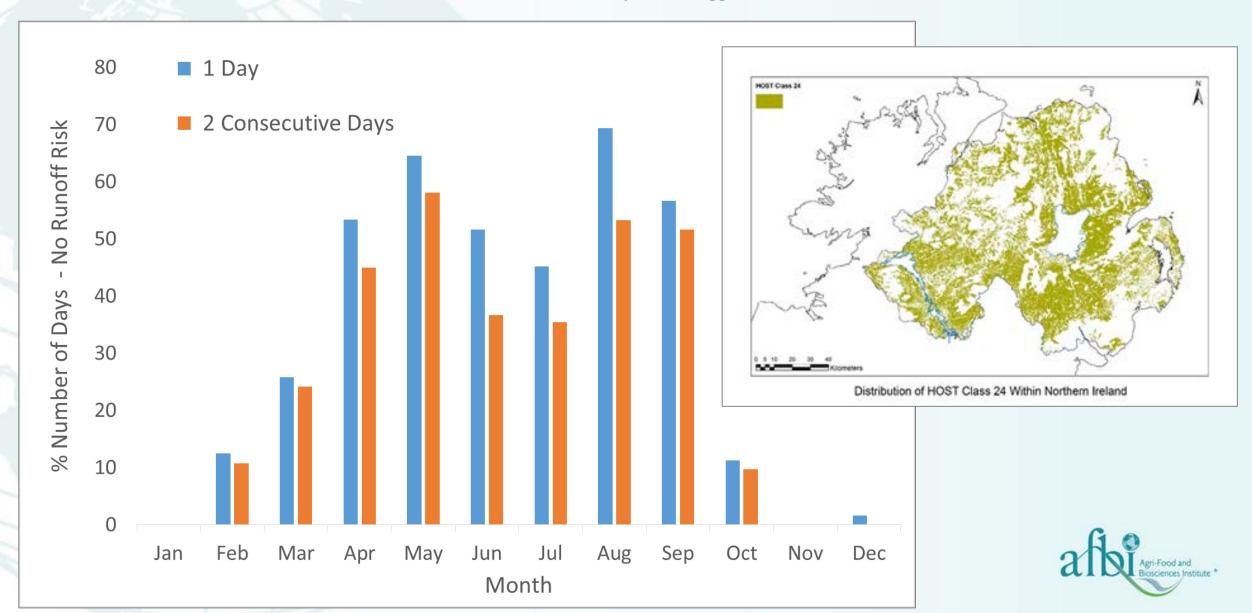
Managing Transport Pathways





Runoff Risk in Northern Ireland

Donnacha Doody & Alex Higgins



Identifying Flow Pathways-LiDar

Rachel Cassidy

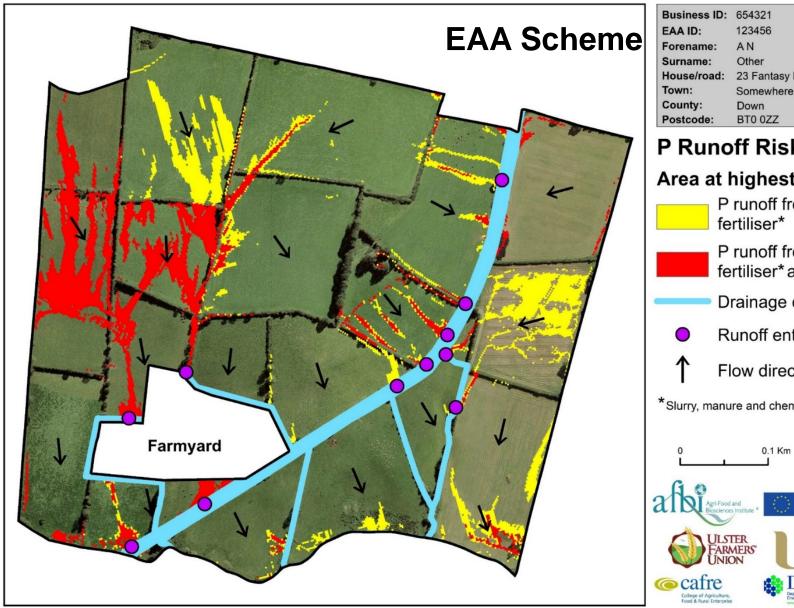


Identifying pathways enables us to manage them



Managing Pathways

Ian Thomas, Rachel Cassidy, Alex Higgins

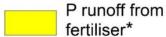


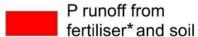
123456 Other

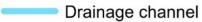
House/road: 23 Fantasy Road Somewhere Down BT0 0ZZ

P Runoff Risk

Area at highest risk of:







Runoff enters drain



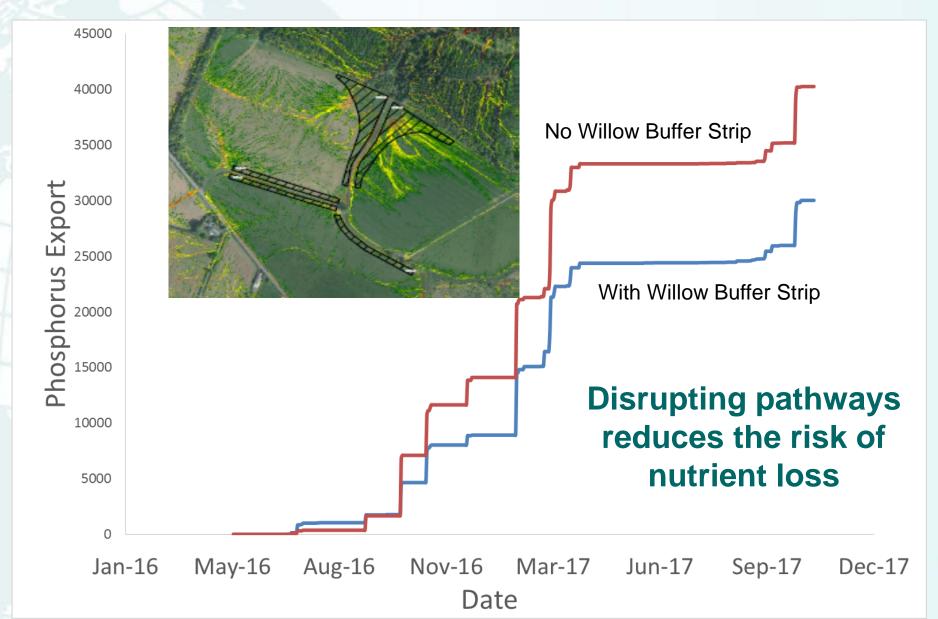
*Slurry, manure and chemical fertiliser.







Disrupting Pathways Donnacha Doody & Chris Johnston

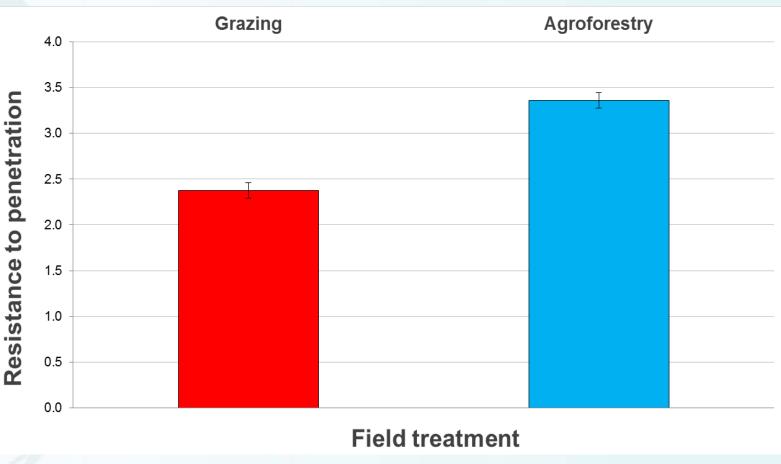




Agro-forestry-Improving Trafficability

Jim McAdam





Increased the grazing season by 17 weeks



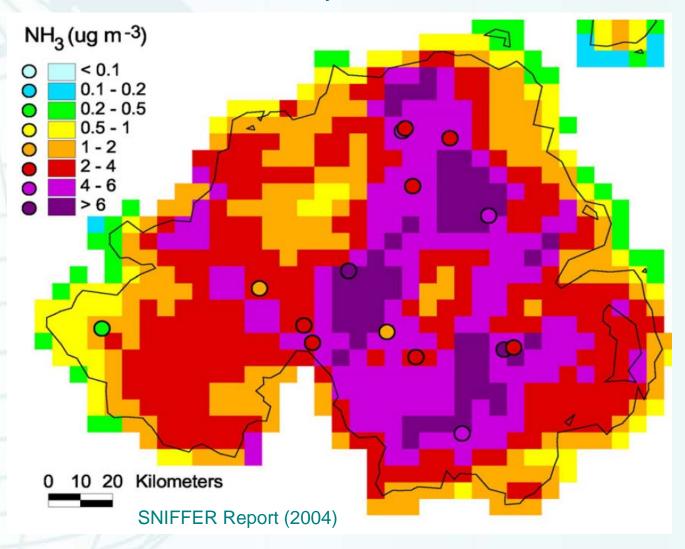


Understanding the Impacts



Measuring Ammonia Deposition

John McIlroy & Rachel Carolan

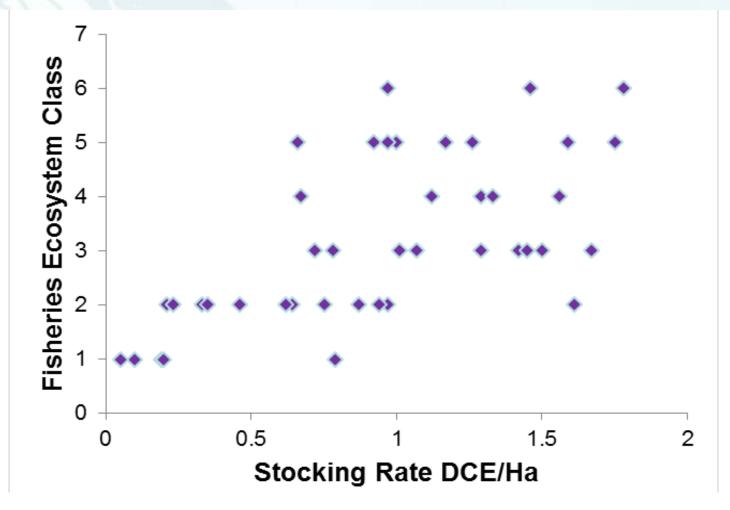


New AFBI research - 25 monitoring sites across NI



Catchment Scale Studies - AFBI

Donnacha Doody, Rachel Cassidy, Yvonne McElarney



Catchments vary in their ability to cope with agriculture pressures



Upper Bann Catchment UB22 Banbridge UB15a **UB25** UB4 Monitoring Points UB6 Monitoring Catchments Derogated UB8 **UB11 Derogation** Study & **UB10** UB9 **EAA Scheme**

High Resolution Monitoring

Rachel Cassidy & John Bailey



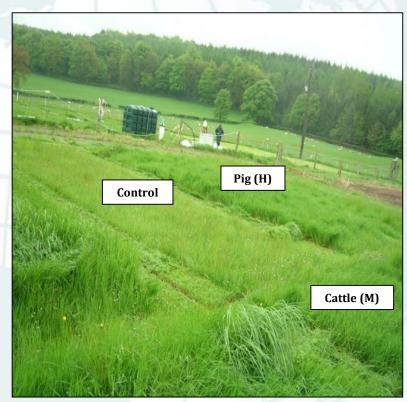


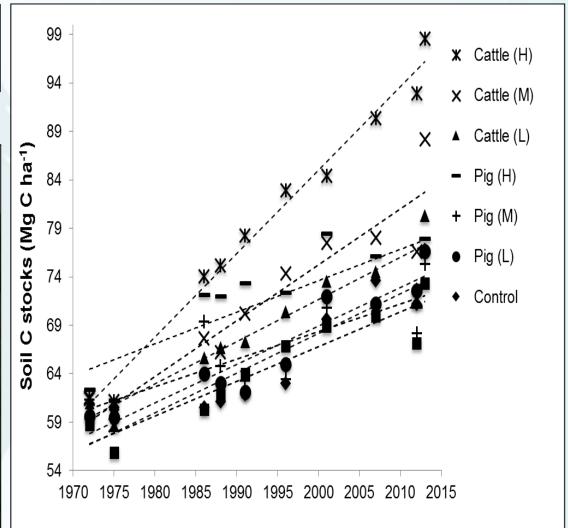


Improving Soil Health

Dario Fornara

LTS (Long-Term Slurry)
grassland experiment established at
Hillsborough in 1970





Carbon accumulation in grass continues > 20 years



Liming - Ecosystem Services

Dario Fornara Soil C stocks Soil C sequestration (+) Small aggregate C pools **AMF** Soil NO₃ Soil PO₄3 Soil nutrient cycling (+) Root mass decomposition **Bacteria** Plant NUE Biomass production (+) Plant yields Plant diversity Biodiversity (+) Legumes Fungi Soil nutrient retention (?)

Root Biomass

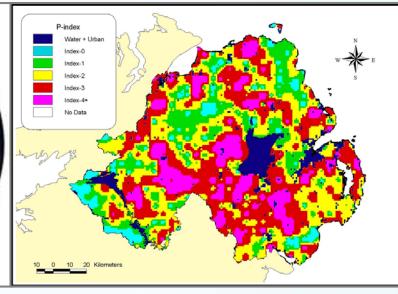




New Challenges









Adapting to Change

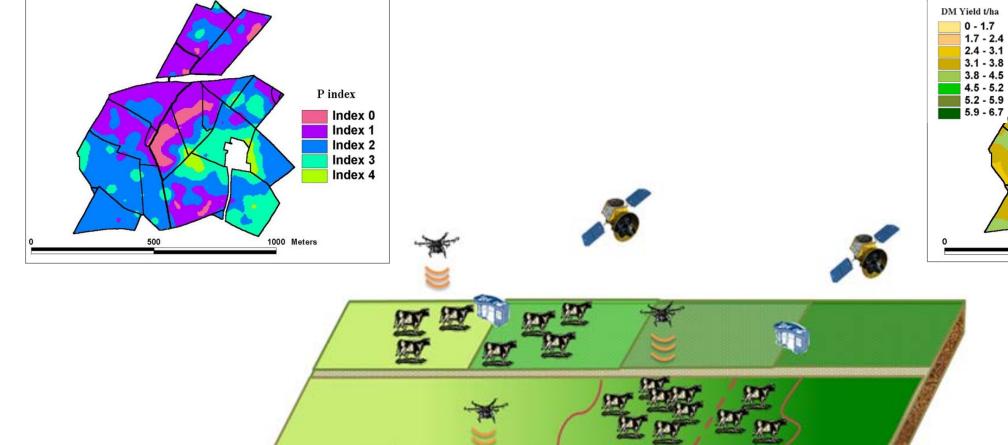
Production Environment Human Social Farmers Skills **Networks** Education Cooperation **Natural Physical** Infrastructure Soil Type **Financial** Hydrology Equipment Income Loans



Big Data – Precision Agriculture

Suzanne Higgins & Debbie McConnell

1000 Meters



Manure Processing

Gary Lyons







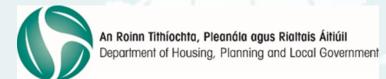


New Research





WATERPRO



































Thank You

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