



WaterMARKE

Mitigating Agricultural Impacts through
Research and Knowledge Exchange



Improving Water Quality on Farms A Socio-Economic & Behavioural Perspective

EU-FarmBook Targeted Workshop
Farmers as guardians of water resources
April 14 2025

Professor Mary Ryan
Rural Economy Development Programme, Teagasc



OLLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY

Teagasc

Agriculture and Food Development Authority

- research
- knowledge transfer
- education

Chog-ask - Gaelic word: knowledge, learning, teaching



Rural Economy Development Programme Athenry, Co. Galway

National Farm Survey (FSDN), Sheep Research farm, BIA (food innovator hub)

Crops, Environment & Land Use Programme

Johnstown Castle, Co. Wexford



■ ■ ■ Failing to meet WFD targets

Ag = significant pressure....

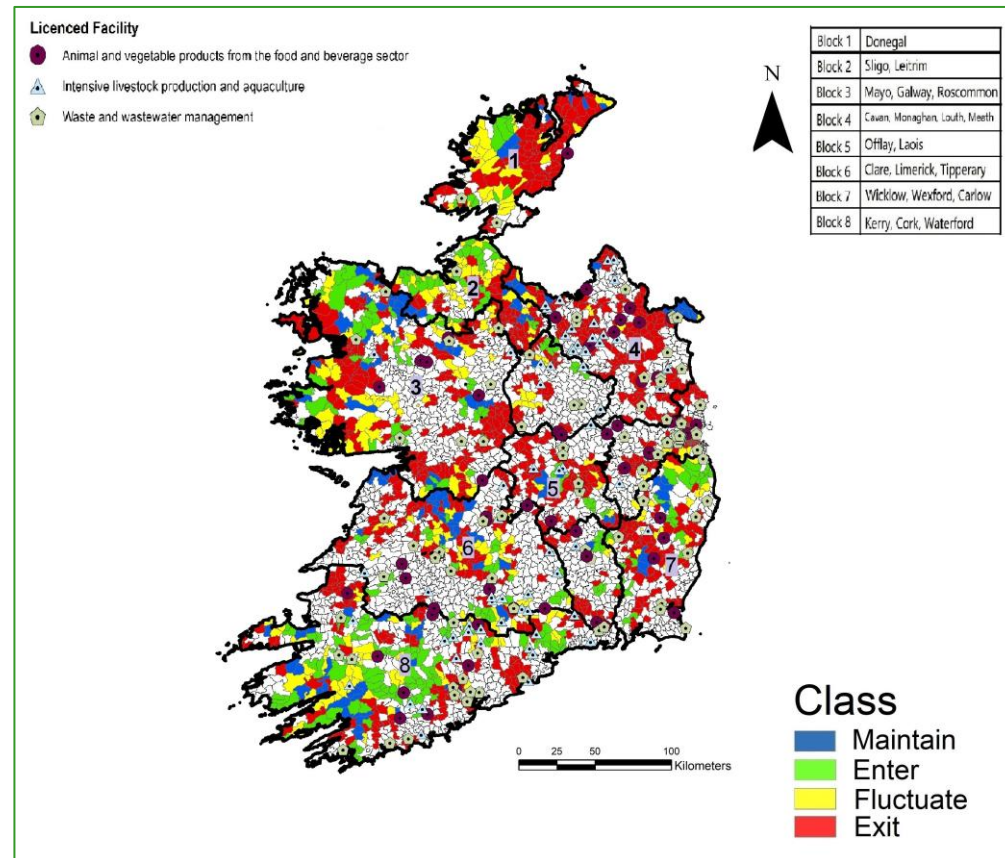
Variations in location of waterbodies exiting and entering High Status

Drivers of these fluctuations also **vary by region**

Also **variation across regions**

Local situation very important

Farmers also very important!



WaterMARKE

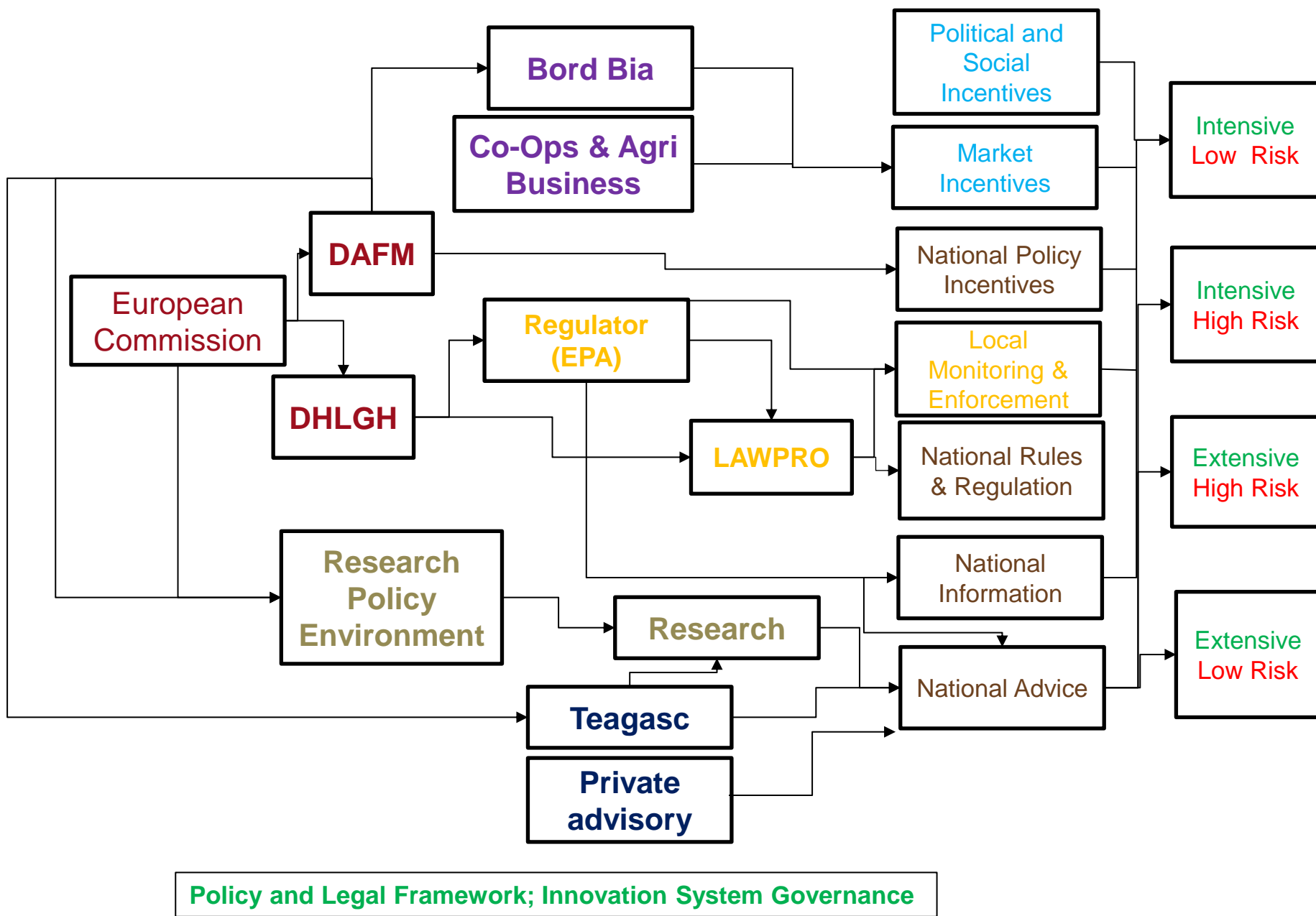
Mitigating Agricultural Impacts through
Research and Knowledge Exchange



OLLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY



Actors (influencers) in the wider Innovation System



Irish institutional approach

- Environment (DHLGH) + Agriculture (DAFM)
- River Basin Management Plans
 - Catchment Science (Environment Protection Agency - EPA)
 - + community engagement
 - -> 190 Priority Areas for Action
- catchment scientists locate issues (LAWPRO)
- specialised water quality advisers (ASSAP) (carrot)
- local agricultural inspectors (NAIP) (stick)



WaterMARKE

Mitigating Agricultural Impacts through
Research and Knowledge Exchange



OLLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY



ASSAP: Agricultural Sustainability Support Advisory Programme

- Referrals from LAWPRO
- Specialist water quality advisers
 - » Teagasc and Dairy Co-Ops
- Localised advice (EPA Critical Source Analysis maps)
- One-to-one farm assessment + mitigation plans
- High level of voluntary engagement
- Rich data source



Nitrate Leaching Risks

1. Weather conditions greatly impact nitrate losses to water. Chemical N should not be applied where heavy rainfall is forecast. Also, in drought conditions where grass growth is impacted, N application should be adjusted downwards in accordance with Soil Moisture Deficit (SMD). Contact your adviser for assistance.
2. Early N application should be delayed until grass is actively growing. Nitrate loss can occur when available nitrate in the soil is greater than grass growth demand and is potentially at greater risk of leaching to groundwater.
3. If using organic manures, apply in the spring to coincide with increasing grass growth rates. Adjust subsequent chemical nitrogen application downwards to take account of nutrients applied in these organic manures.
4. CAN based products are at greater risk of leaching. It is recommended to use protected urea as part of your farm fertiliser programme.
5. Apply fertiliser N in accordance with the regulations and observe closed periods for chemical fertiliser application. Adhere to the relevant 2m buffer margin along all surface water drains and water courses.



For more information please visit www.teagasc.ie/environment



Protected Urea

1. Protected urea allows a farmer to spread urea based nitrogen throughout the growing season without needing to worry that substantial levels of N will be lost.
2. CAN is 50% ammonium and 50% nitrate. After spreading CAN, nitrate is available to grass in the soil. However, this negatively charged nitrate is open to being leached to water if heavy rainfall occurs.
3. Protected urea initially converts to the positively charged ammonium.



Early Nitrogen for Spring Grassland

On grassland farms, having enough grass available for livestock to graze is crucial to ensuring a profitable enterprise. In springtime, applying nitrogen (N) fertiliser will help to provide enough grass as livestock are turned out from winter housing. The timing and rate of fertiliser N application are key decisions to ensure sufficient supply of grass. The challenge is to achieve maximum returns from applied fertiliser N without having negative impact on water quality. Nitrate in the soil is both soluble and mobile. In free draining soils, nitrate loss can occur when available nitrate in the soil that is not recovered during grass growth in spring or autumn is removed by percolating water. If soils become saturated or are subjected to heavy rainfall, this nitrate is more likely to leach down through the soil profile. Once nitrate travels below the root zone, it will be lost to groundwater where it can have a negative impact on water quality.

Benefits of Improved Spring Nitrogen Use

- N applied in suitable conditions will help improve Nitrogen Use Efficiency
- Better grass growth response to nutrient applied
- Reduction in the level of nitrate leached to groundwater
- Reduced negative impact on water quality
- Improved financial return from fertiliser investment
- Potential to reduce fertiliser N rate required and reduce fertiliser costs on farms

TIPS WHEN APPLYING EARLY SPRING NITROGEN

- » Only spread if fields are suitable for tractor work, when water is drained sufficiently and where heavy rainfall is not forecast. Apply fertiliser N when soil temperature is greater than 6°C and rising. Typically this occurs around the end of February however, this will vary across the country and from year to year.
- » Target fields for early N that are most likely to respond to an early N application: fields at optimum soil fertility (pH, P and K), perennial ryegrass swards, recently reseeded or with a grass cover of greater than 400 kg DM/ha or 5 cm grass.
- » Match chemical N applied to grass growth rates as this varies across the country. Apply up to 30kg N/ha (24 units N/ha) maximum in 1st split and avoid fields that have received an application of cattle slurry
- » Applying slurry in spring - 25 m³/ha (2,500 gals/ac) by low spreading application will supply ~25 kg/ha (~20 units N/ac) of available N. It is important to reduce your chemical N application rates accordingly.
- » To ensure efficient and accurate application of fertiliser, calibrate fertiliser spreaders and use GPS equipment where available
- » Use protected urea for early N applications as this will help reduce the risk of nitrate leaching

Factsheet No 2



WaterMARKE

Mitigating Agricultural Impacts through
Research and Knowledge Exchange



OLLSCOIL NA
GAILLIMH
UNIVERSITY
OF GALWAY

ASSAP technical measure characterisation

- ASSAP advisors recommend measures to address 44 different issues
- 90 different actions resulting in approx. 300 measure/issue combinations
- Issues classified by type:
 - Farmyard
 - Land Management
 - Nutrient Management



WaterMARKE

Mitigating Agricultural Impacts through
Research and Knowledge Exchange



OLLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY



ASSAP Data Analysis: Measure Uptake + Risk

Highest levels of engagement on dairy farms

High/medium risk farms less likely to have started than low risk

Farmers in catchments with **diffuse** P, N and sediment **losses** less likely to have engaged

Farmers in catchments with **point source losses** more likely to have **agreed, started and completed measures**



WaterMARKE

Mitigating Agricultural Impacts through
Research and Knowledge Exchange



OLLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY



AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

ASSAP behavioural measure characterisation

- **Knowledge**

- Know-how, capacity, skill

- **Costs**

- Upfront, ongoing, labour, lost area, lost productivity, farmer transaction costs (hassle, time), system transaction costs

- **Social (farmer & advisor) norms**

- Other farmers' perceptions of measures

- **Impact**

- Scale of impact, adviser classification



WaterMARKE

Mitigating Agricultural Impacts through
Research and Knowledge Exchange



OILLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY



AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

ASSAP Analysis: Behaviour + Uptake of measures

COM-B attributes	Agreed to undertake measure	Has started measure	Completed
N	8606	7797	7435
Pseudo R ²	0.1062	0.1271	0.1685
Understand impact			
Have the Skills	-***		
Have Experience	+***	+***	+***
Want to improve water quality	+***		-**
Think that Most Farmers Support measures	-*	-***	-**
Have the Time, Money and Resources	+***		+***

Farmers more likely to agree if they have

- Skills
- Experience of measures
- Have resources to adopt

+ve attitude/motivation => more likely to have agreed but less likely to have finished

Norms: If farmers don't think that other farmers support a measure they are less likely to have engaged (at any level)

ASSAP measure characterisation allows for...

Goal

- Identify measures that fit norms and have relatively low costs (or savings) compared to environmental impact
- Clustering of measures

Benefits:

- Measure priority, simplification, impact estimation

Opportunity to mainstream

- Prioritise advisor training and farmer education



WaterMARKE

Mitigating Agricultural Impacts through
Research and Knowledge Exchange



OLLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY



Teagasc - Better Farming for Water



8



WaterMARKE

Mitigating Agricultural Impacts through
Research and Knowledge Exchange



OLLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY



Teagasc


Better Farming for Water National Campaign

8 Actions for Change

Nutrient Management


01

Reduce purchased nitrogen (N) & phosphorus (P) surplus per hectare




02

Ensure soil fertility is optimal for lime, phosphorus and potassium



03


Ensure application of fertiliser and organic manure at appropriate times and conditions



Farmyard Management


04

Have sufficient slurry and soiled water storage capacity



05


Manage and minimise nutrient loss from farmyards and roadways



Land Management


06

Fence off watercourses to prevent bovine access



07

Promote targeted use of mitigation actions such as riparian margins, buffer strips & sediment traps to mitigate nutrient and sediment loss to water



08

Maintain over-winter green cover to reduce nutrient leaching from tillage soils





WaterMARKE

Mitigating Agricultural Impacts through
Research and Knowledge Exchange

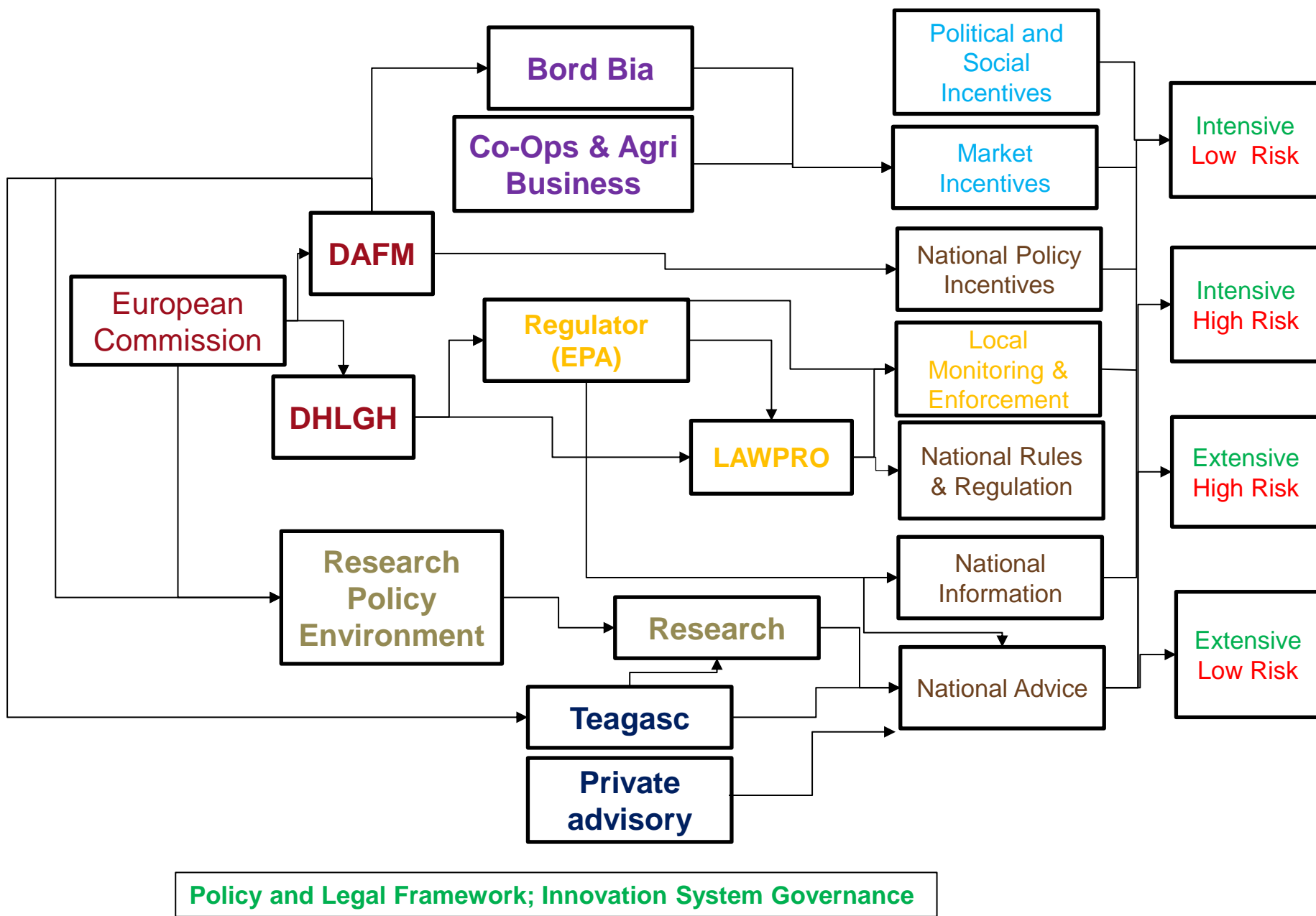
13



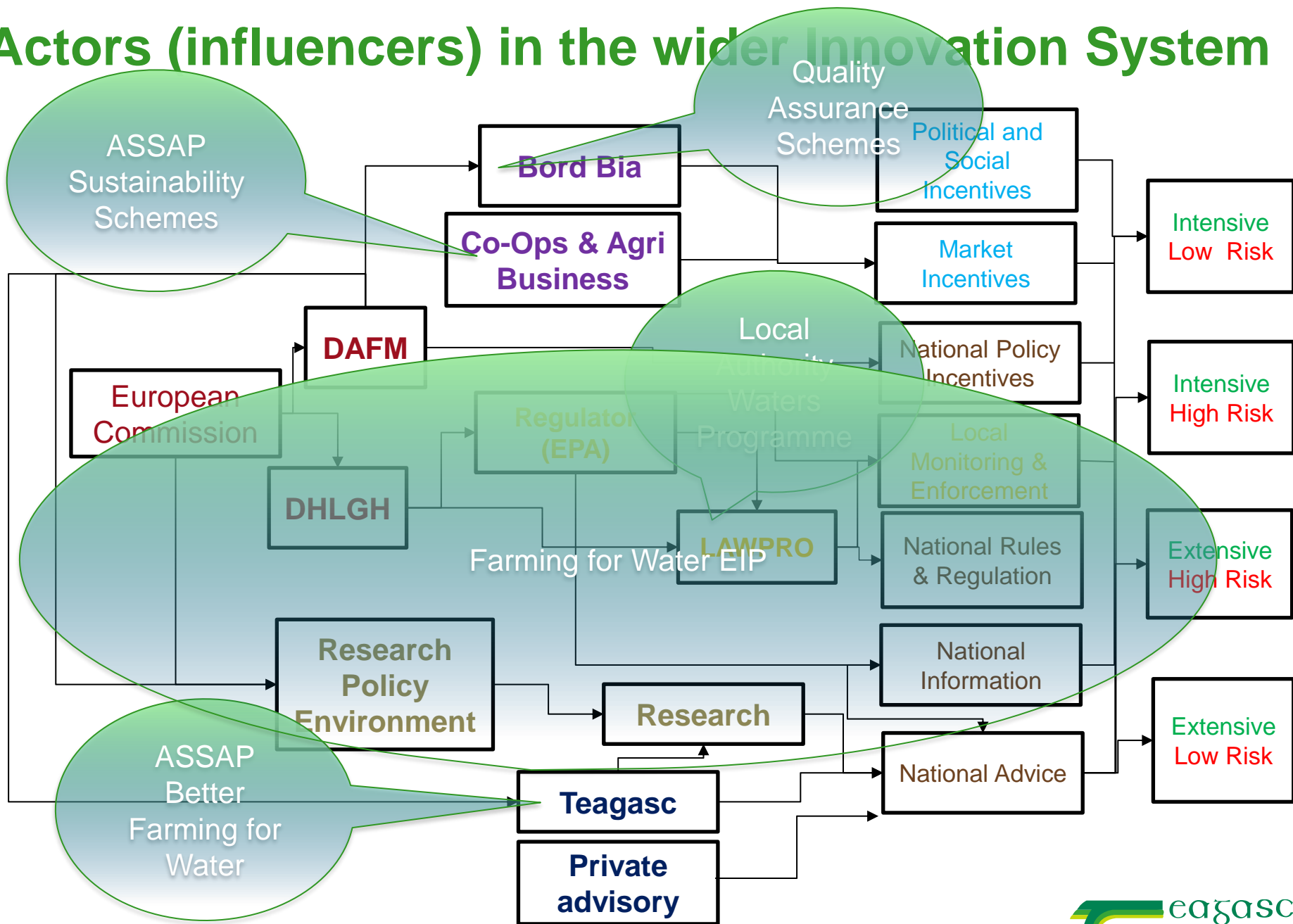
OLLSCOIL NA
GAILLIMHE
UNIVERSITY
OF GALWAY



Actors (influencers) in the wider Innovation System



Actors (influencers) in the wider Innovation System



Farming for WaterEIP: PROJECT STRUCTURE AT A GLANCE

TARGETING €50M LOCALLY-LED RESULTS BASED PAYMENTS TO UP TO 15,000 FARMERS ACROSS THE AGRI-ENTERPRISE SECTORS FROM RDP & CAP

A targeted innovative tracked measures approach, taking a multiple benefit focus with water at the centre, building on Ireland's River Basin Management Plans learnings and structures at a scale never done before in Ireland

PROJECT COORDINATION

Integrating science, targeting and evaluating measures and administration of payments to farmers



PROJECT TEAM

STRATEGIC OVERSIGHT COMMITTEE

DAFM, DHLGH, LAWPRO, Teagasc, DII, Bord Bia

OPERATIONAL GROUP

LAWPRO, Teagasc, DII, Bord Bia

SUBGROUPS

Ag Industry Working Group
Farm Org Consultative Group
Nature-based solutions Working Group
Catchment Partnership Network
Multiple Benefits Working Group
Research Hub

ALSO SUPPORTED BY:

LA, IFI and approved agency referrals

10 Catchment Science Farm Advisors & Admin & Comms

COMMUNITY CATCHMENT PARTNERSHIPS

GIS, Tracking, mapping measures, payments, policy feedback

Measure alignment with multiple benefits objectives, AA screening, optimization for Natura 2000 objectives, learnings dissemination

Evaluation of "Rainwater Management Plans" and efficacy of measures and their placement.

Research Hub - facilitation of research and collaboration with research community (UCD, UCC, ATU, TCD & others)

Community multiple benefit focus bottom up pilot catchment projects

Leverage community sector initiatives, networks and winning hearts and minds local and national public communications

6 Community Embedded Catchment Focused Farm Advisors

Integrating and Leveraging National Priorities

OPW: FLOOD RISK AWARENESS FUNDING CLIMATE

Sectoral Climate Plans Water and Biodiversity: WFD Governance and Biodiversity Plans

BEEF INDUSTRY

Meat Industry Ireland including ABP Food Group

TEAGASC

Targeting Beef, Dairy, Tillage farmers

20 Teagasc ASSAP Farm Advisors

Agricultural Catchments Programme Support

SMART Buffers Z, Watermark Projects

Sustainability Support

Provide Trees

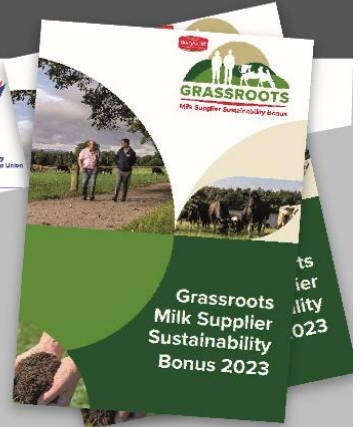
23 Dairy ASSAP Farm Advisors

DAIRY INDUSTRY

Targeting Dairy farmers

Integrate with Coop Water Sustainability Plans and WQ incentivized payments for milk & link in with sustainability approach

Provide trees to plant for certain measures



WaterMARKE

Mitigating Agricultural Impacts through Research and Knowledge Exchange

OPW Research, SRUC, Teagasc, and other partners.



OLLSCOIL NA GAILLIMHE
UNIVERSITY OF GALWAY

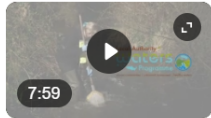


AGRICULTURE AND FOOD DEVELOPMENT AUTHORITY

Early indications of water quality improvement

- Water quality is a localised issue...
 - Localised Solutions
 - » Localised knowledge/advice
- Changing behaviour
 - Use farmers' behavioural drivers
 - Cost is a barrier....
 - Changes required across the Innovation System
- Engagement across Innovation System
 - Collaborative Solutions - carrots and sticks
 - Space for Innovation

Videos :



[The Power of Collaboration for Water Quality Improvement ...](https://youtu.be/37WRGRokzhc)

YouTube · CAP Network Ireland

14 Jun 2024

<https://youtu.be/37WRGRokzhc>

<https://capnetworkireland.eu/watermarke-the-power-of-collaboration-for-water-quality-improvement/>

[Research 482: Mitigating Agricultural Impacts on Water Quality through Research and Knowledge Exchange | Environmental Protection Agency \(epa.ie\)](https://www.epa.ie/research/482/Mitigating_Agricultural_Impacts_on_Water_Quality_through_Research_and_Knowledge_Exchange)

Go raibh maith agaibh

Thank you

