TEAGASC RESEARCH INSIGHTS
LEADING RESEARCH FOR TOMORROW'S AGRI-FOOD SYSTEMS

Land Use Change and Forestry: Economic and Environmental Interactions

Mary Ryan

Ag Economics & Farm Surveys Department
Rural Economy Development Programme
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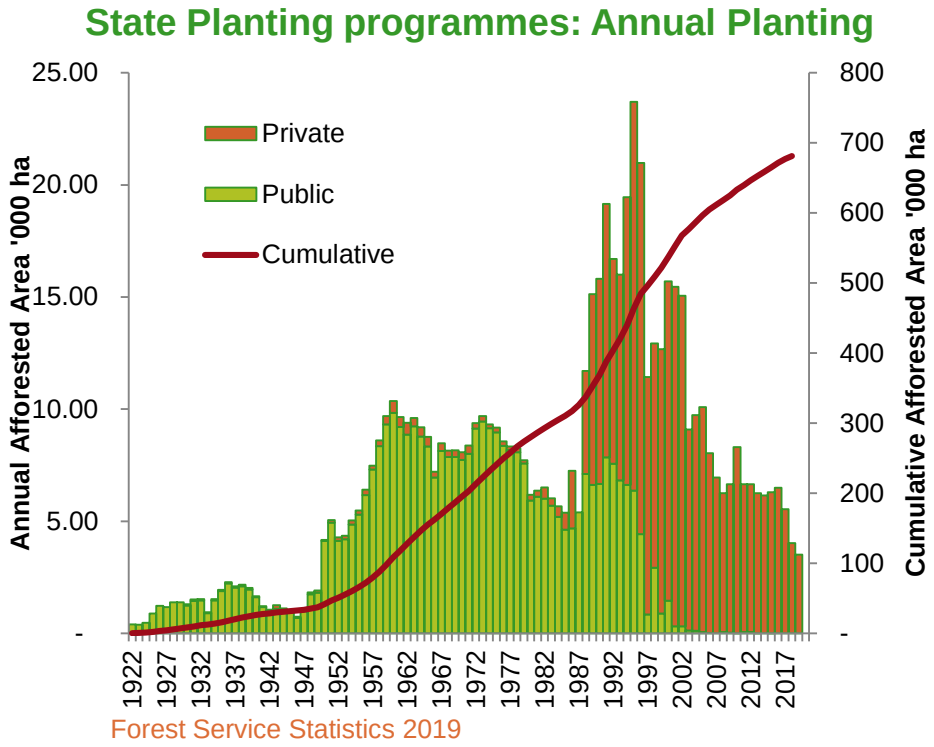
Teagasc
Agriculture and Food Development Authority

Context

- Largest land use change since the foundation of the State – major achievement
  - 1.5% (1920) → 11% (2020) of land area
- Challenges:
  - planting target: 18%
  - multiple small-holders: >20,000
- Research:
  - how / where benefits of forests can be realised



High-level summary
(details of projects, references and team on last slide)

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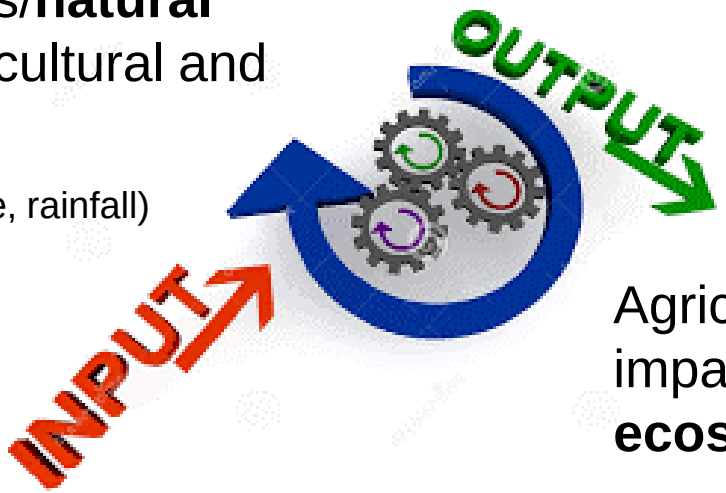
Environmental drivers

Environmental inputs/**natural capital** impacts agricultural and forest productivity

(soils, geology, altitude, slope, rainfall)

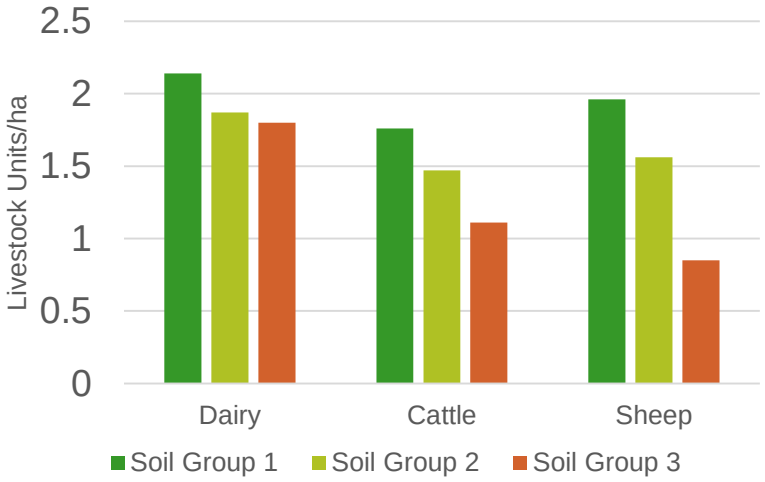


Agriculture and forestry also impact on the environment and **ecosystem services**

(water quality, gaseous emissions, carbon sequestration, biodiversity, recreation)

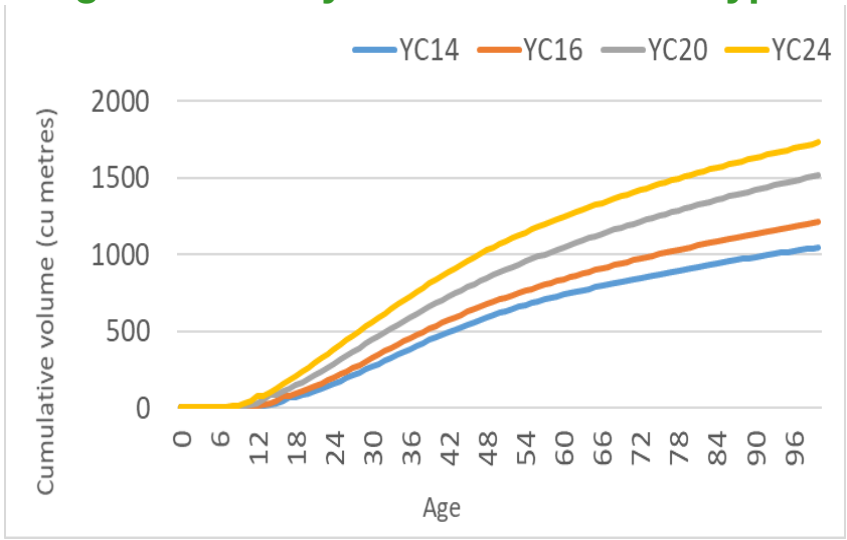
Environment: impact of soil/site type

Higher livestock density on better soils



Teagasc National Farm Survey (NFS) 2015

Higher timber yield on better site type



Sitka spruce Yield Classes (YC)

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Economic driver: opportunity cost of planting

Weigh up profitability of ag v. forestry

- Farm characteristics
- Market income
- Subsidies
- Costs
- Tax

- Forest characteristics
- Market Income
- Subsidies
- Costs
- Tax-free

Annual income v Forest rotation
Life-cycle approach

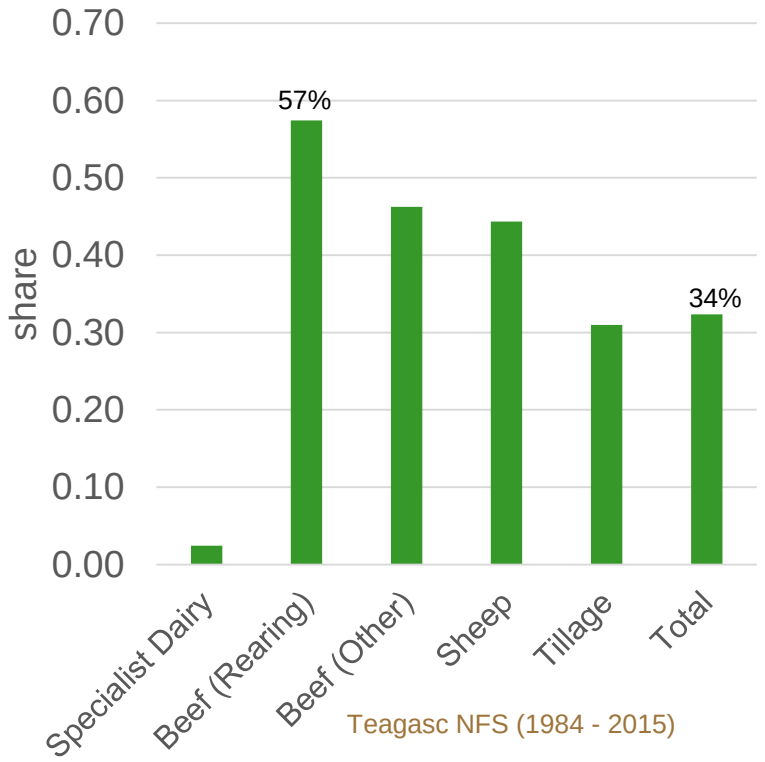
Relative profitability - agriculture and forestry

Agriculture is more profitable than forestry on majority of farms (66%)

Forestry is more profitable on

- 57% of cattle rearing farms
- approx half cattle finishing and sheep farms
- very few dairy farms

Share of farms by system where forestry is more profitable than agriculture



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Behavioural drivers:

- **Positive**
  - Environmental gains
  - Good use for marginal land
  - Lower working hours
- **Negative**
  - Culture and attitude really important → 84% don't intend to plant
  - Prefer farming
  - Prefer money now
  - Permanent change → loss of land flexibility
  - Saturation of forestry in some areas

Changes on farms after planting

Different farmers have different objectives

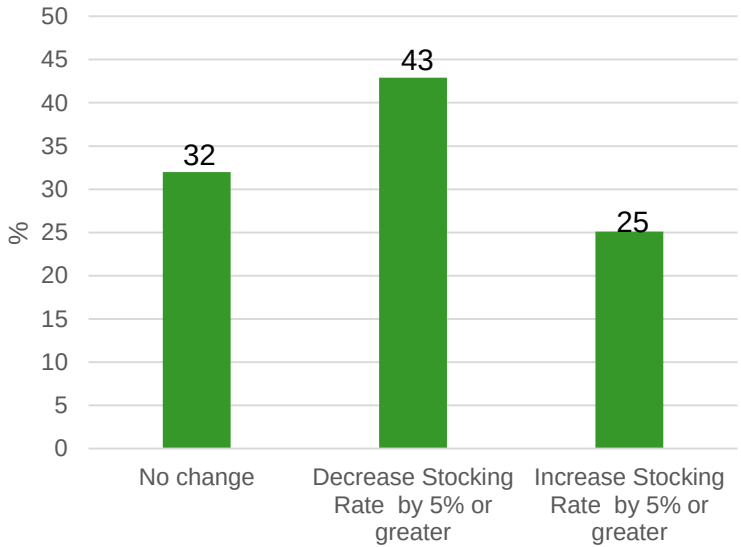
No change in SR: largest, most intensive - optimising land

Decrease SR: high stocking rate (pre-planting), older - optimising income/retire

Increase SR: younger, off-farm income - optimising time

Afforestation decision is not made in isolation
Part of other farming choices

Change in farm stocking rate (SR) in planting year



Teagasc NFS (1984-2015)

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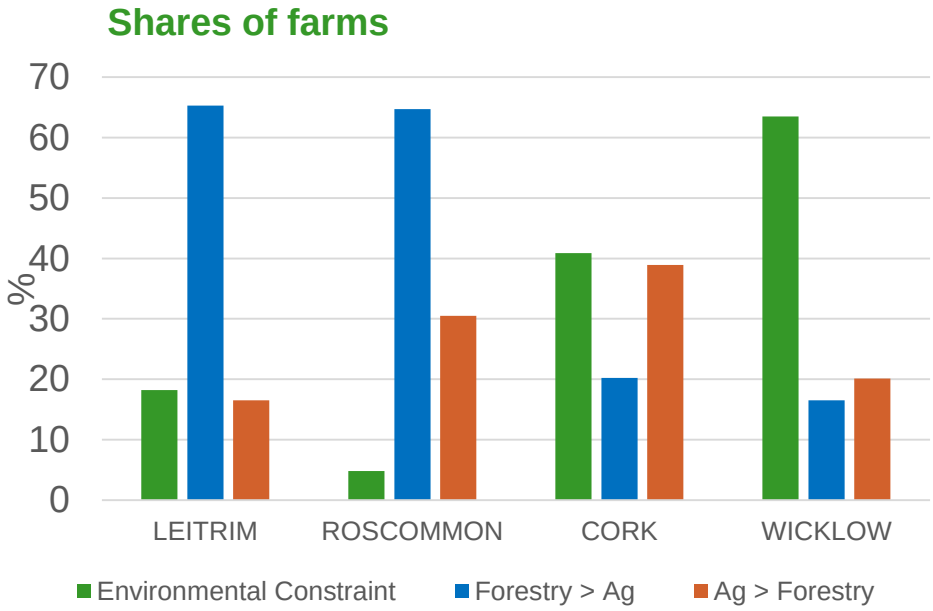
Spatial drivers: impact of location

- High environmental constraints
  - Wicklow and Cork
- Large share of farms - higher income from forestry
  - Leitrim and Roscommon
- Large share of farms - higher income from agriculture
  - Cork

Both environmental constraints and relative returns differ across the country

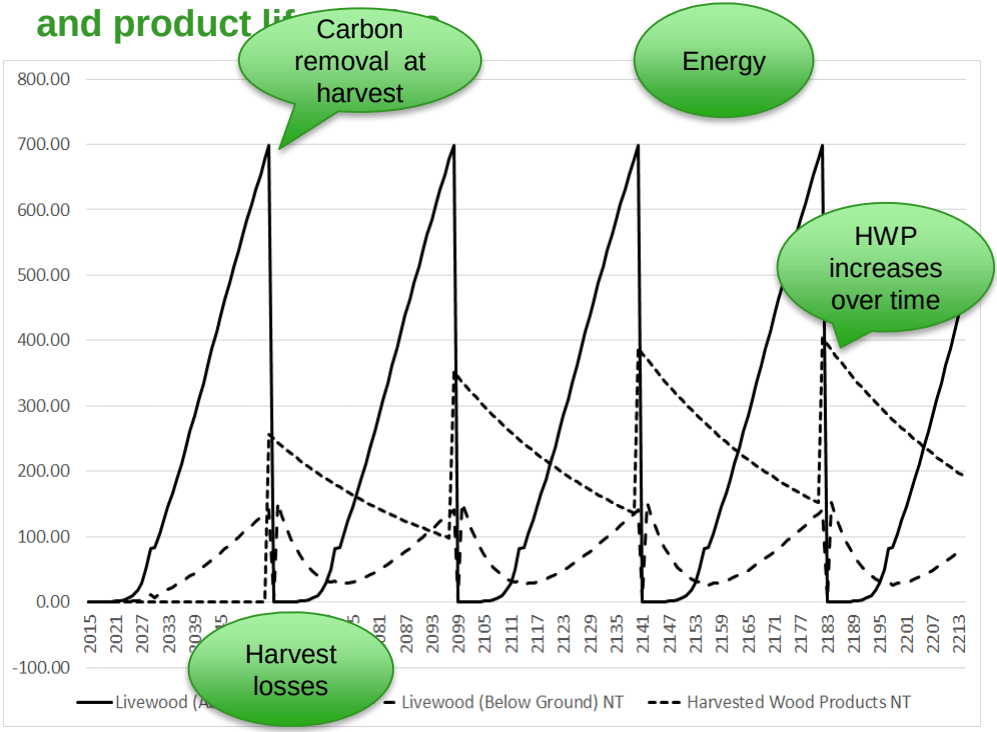


Environmental Impact: carbon sequestration

- **Main carbon pools**
  - Livewood
  - Harvested Wood Products (HWP)
  - Soil Carbon

- Greater losses for thin v no thin
- Wood and carbon objectives not necessarily complementary
  - may require different management regimes

Carbon sequestration and carbon loss over forest and product li



Sitka spruce YC 20 No Thin (NT)

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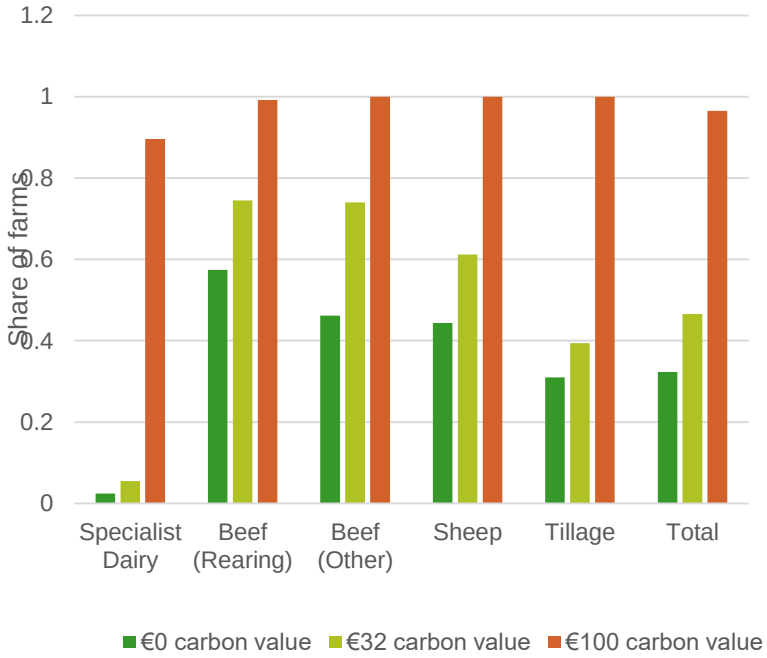
Environmental Impact: carbon value

- **Private return**: (**market + subsidy** only - €0 carbon value)

- Social return: (market + government carbon values)
  - €32 per tCO_2eq (2020)
  - €100 (2030)

Accounting for carbon value greatly increases share of farms with higher forest income

Share of farms with higher forest incomes at different carbon values

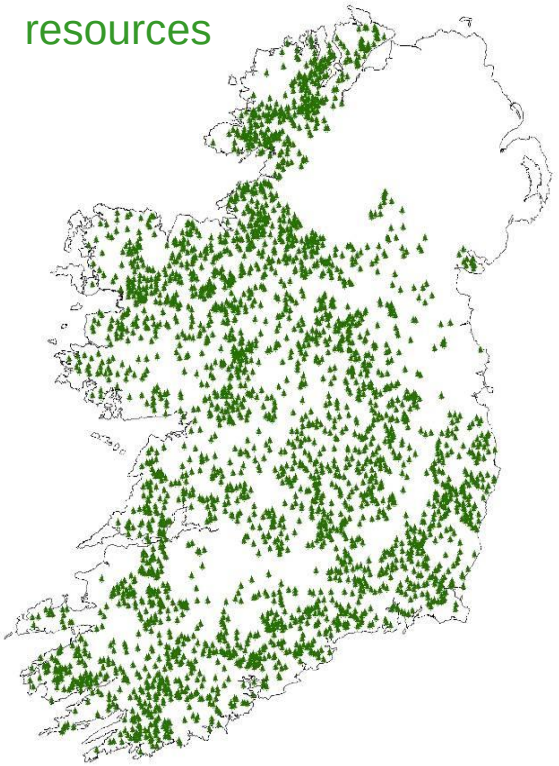


Public Spending Code 2019 Carbon values

Forest Ecosystem Services (ES)

- **Water quality**
  - forest planting/harvesting (disturbances) – negative impact
  - Increasing forest cover – neutral/small positive impact due to less disturbance & lower nutrient loads than agriculture
- **Biodiversity value**
  - high citizen willingness to pay (WTP) for mixed forests
- **Recreation/Landscape**
  - growing demand for forest recreation & landscape tourism
  - preference for broadleaf over conifer forest
- **Rural Development**
  - wood products - highest economic multiplier (industrial)

Potential forest recreation resources



Different forests deliver different Ecosystem Services

Planting Incentives

Benefits and Taxation

- Farm Assist improves farm income but eligibility for farming incentives is limited
- Strong tax incentives but not relevant for many farms

Knowledge Transfer/Extension

- “Extension service providers can have a positive impact on forest management outcomes and timber production goals.”
- Developing competency in evaluation of extension activities

Wood mobilisation challenges

System needs to adapt to multiple smallholders

Innovation Systems approach

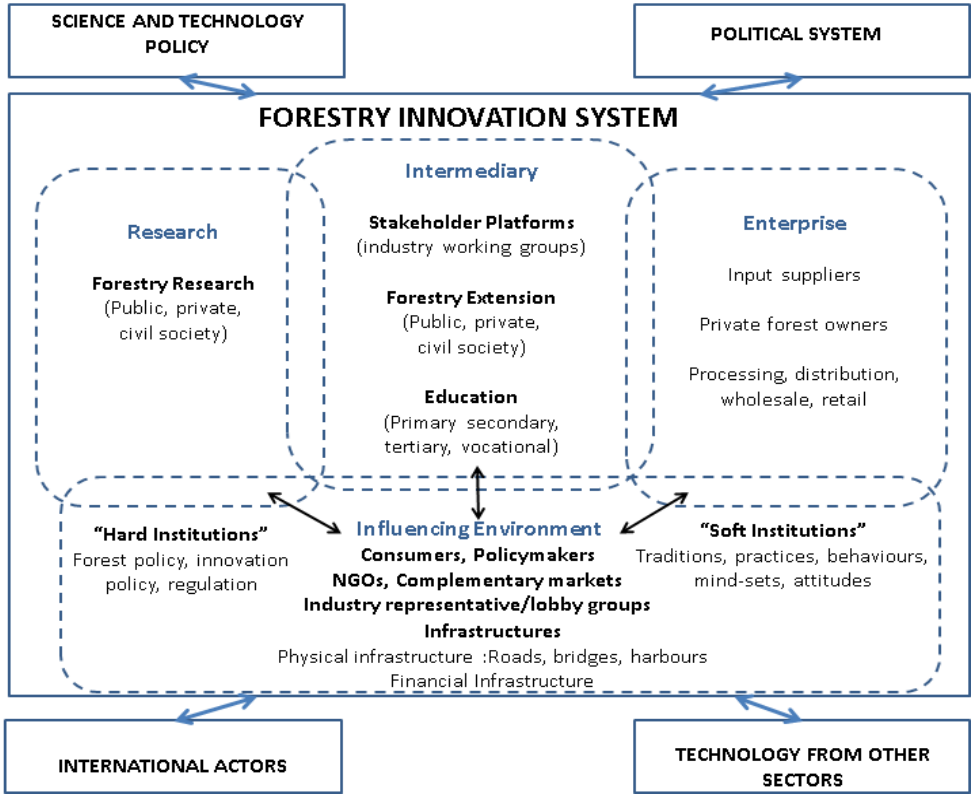
- involving all actors – examining interactions
- collaborative solutions

Changing behaviour of forest owners requires

- changes in behaviour of those who create incentives or policy

Importance of examining the entire system

Innovation system map



Take home messages

The research shows…

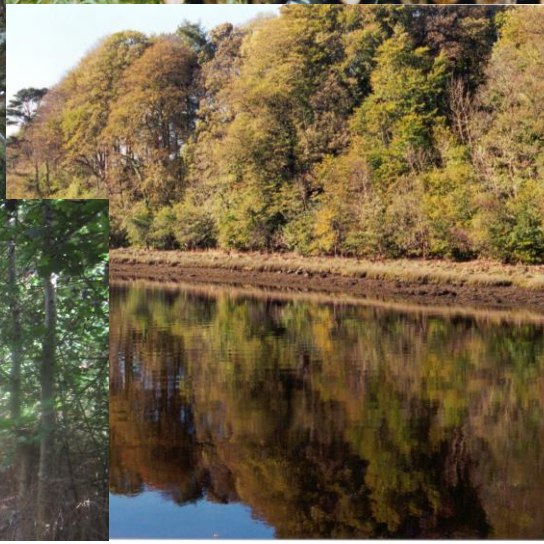
- favourable returns from forests for particular landowners in particular areas (+ carbon)
- environmental gains from forests are complementary with agricultural targets
- interactions between economic, environmental and behaviour

To realise the benefits…

- systems perspective
- focus on behaviour
- different forests for different purposes

Complex Problems…

- more research required



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Go raibh maith agaibh

Team effort

Cathal O'Donoghue, Stephen Hynes, Henry Phillips, Vincent Upton, Kevin Kilcline

Áine Ní Dhubháin, Kevin Heanue, Niall Farrelly, Nuala Ní Fhlatharta

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- BioSciences PhD – NUIG
- FOROWN – DAFM-COFORD
- Sequester – EPA
- Bio-Circle – SEAI
- Forest Recreation – DAFM-COFORD

mary.ryan@teagasc.ie

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