LIFE on Machair
SAOL ar an Mhacaire

INCASE
Irish Natural Capital Accounting for Sustainable Environments

Trinity College Dublin
The University of Dublin

NATURAL CAPITAL IRELAND

# Natural Capital Accounting in Ireland: an introduction to NCI & INCASE

## Waters of LIFE

**Building Capacity to Drive Investment in our Environment**

March 29th / 30th

Catherine Farrell LIFE on Machair, INCASE, NCI, CWF

# Natural Capital Ireland

In a nutshell

— Established in 2014

— Not for profit company leading the conversation on natural capital in Ireland

— 1200+ website membership

— Cross-sector Steering Committee

— A policy working group

— A research team engaged across a number of projects at different scales

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INCASE

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lved

Business for Biodiversity Ireland

## VISION

Our vision is for an Ireland in which natural capital and ecosystem goods and services are valued, protected and restored.

## MISSION

Our mission is to value, protect and restore Ireland's natural capital and ecosystem services. We will do this by supporting the adoption of natural capital concepts in public policy and corporate strategy, promoting informed public and private sector decision-making, and assisting in the establishment of a national natural capital accounting standard.

# INCASE

Irish Natural Capital Accounting for Sustainable Environments

epa Research


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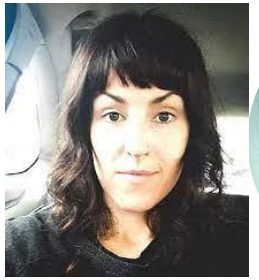


Iseult Sheehy  Fiona Smith

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Carl Obst  Mark Eigenraam

IDEEA Group
Institute for Development of Environmental-Economic Accounting

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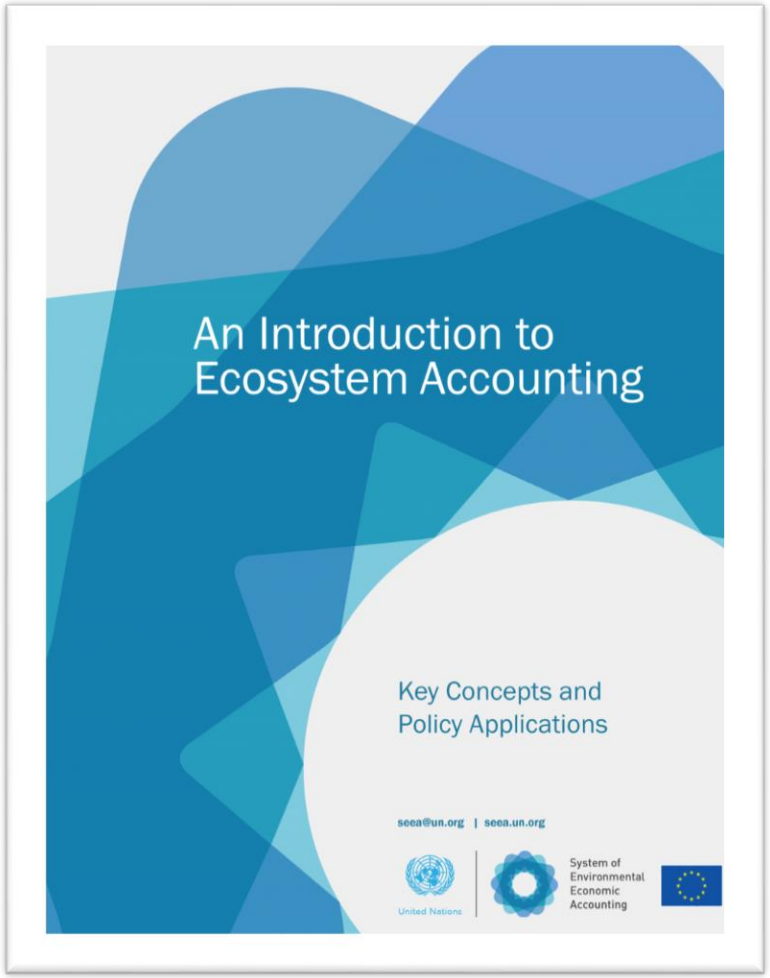
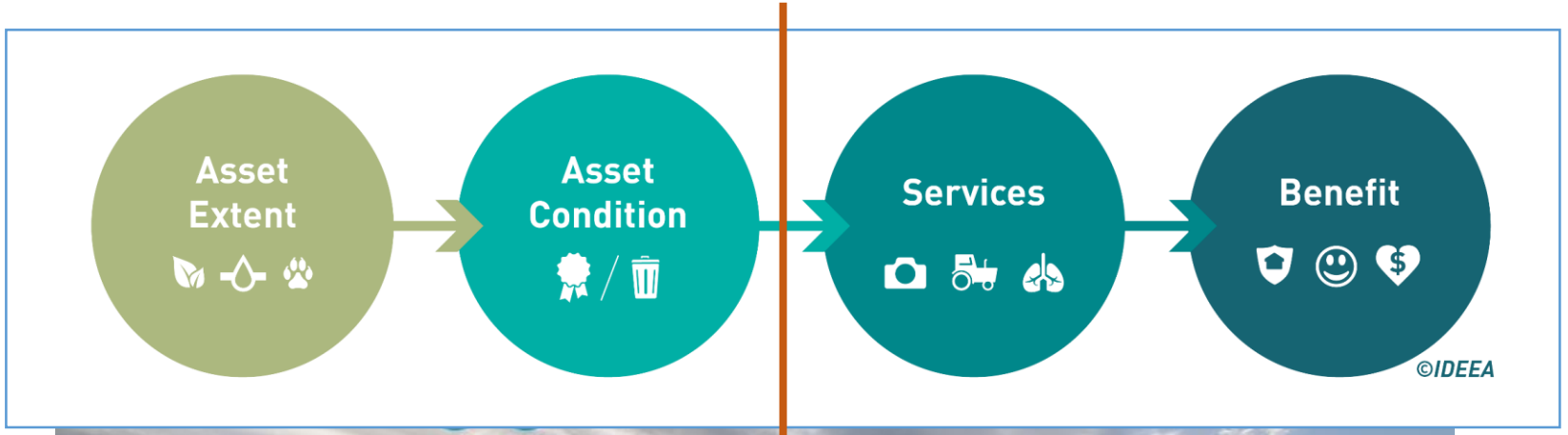
System of Environmental Economic Accounting





## Stocks:

forests, wetlands, rivers, seagrass beds, reefs, **subsoils, groundwater**

## Flows:

timber, fish, carbon, water, habitat, recreation, amenity, **aggregates, geo-forms**

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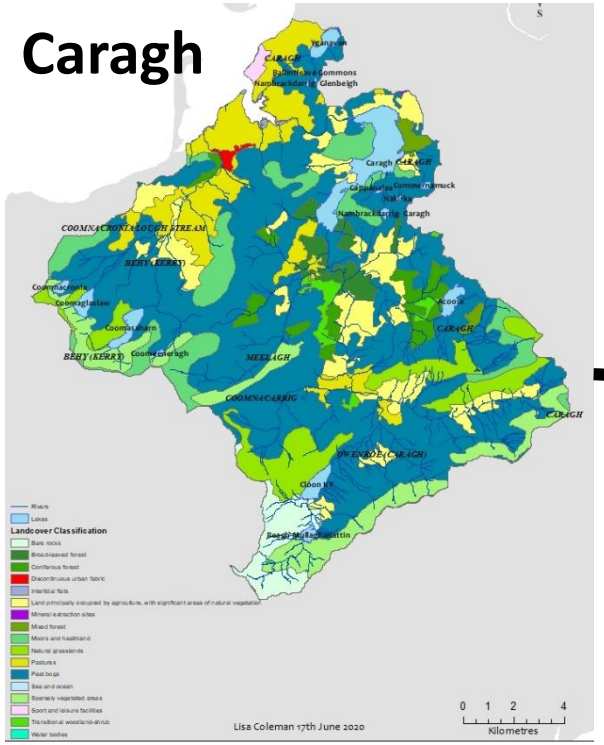
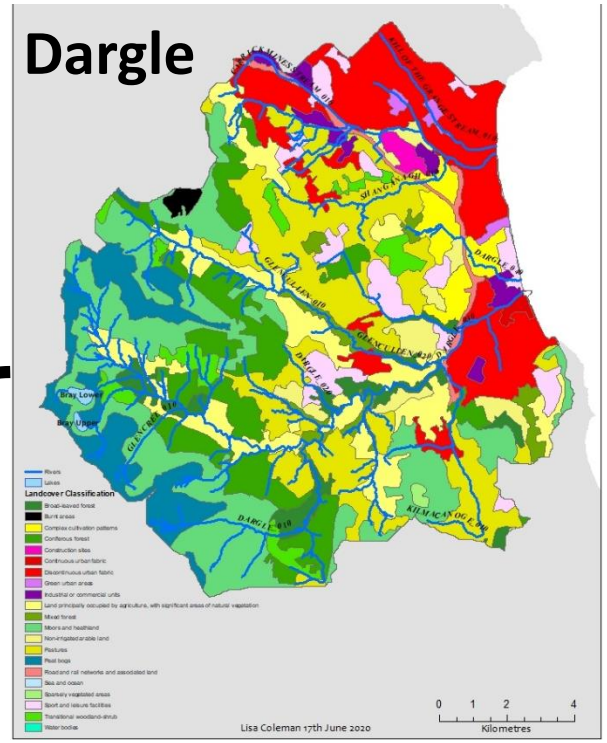
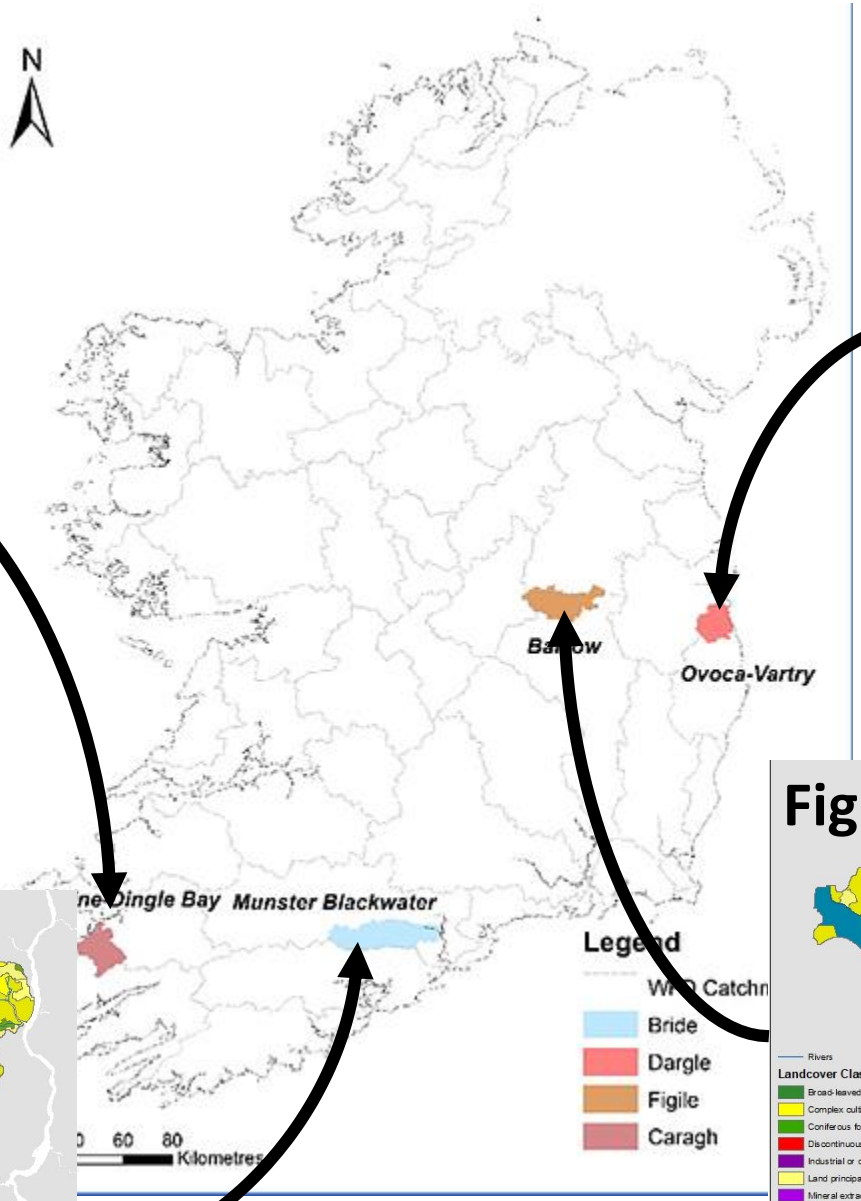
## Caragh

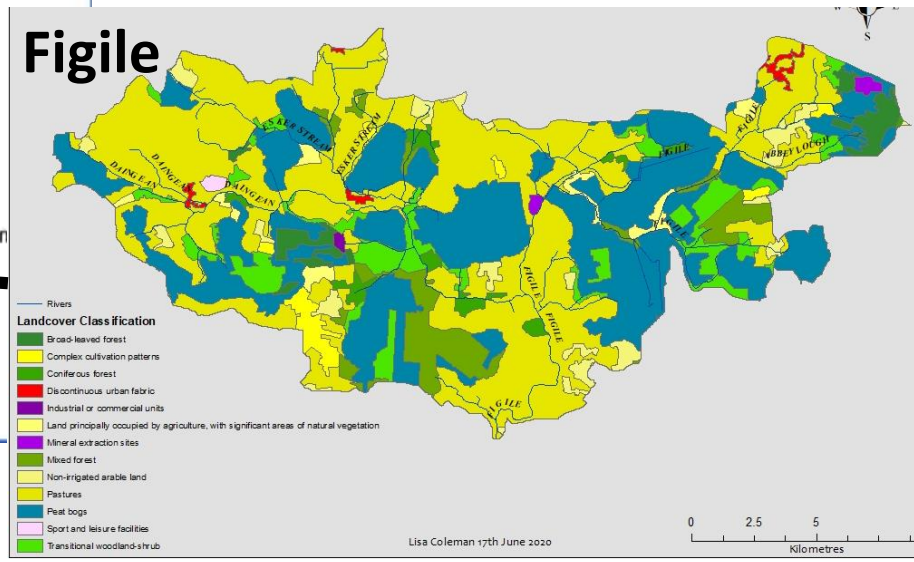



## Dargle

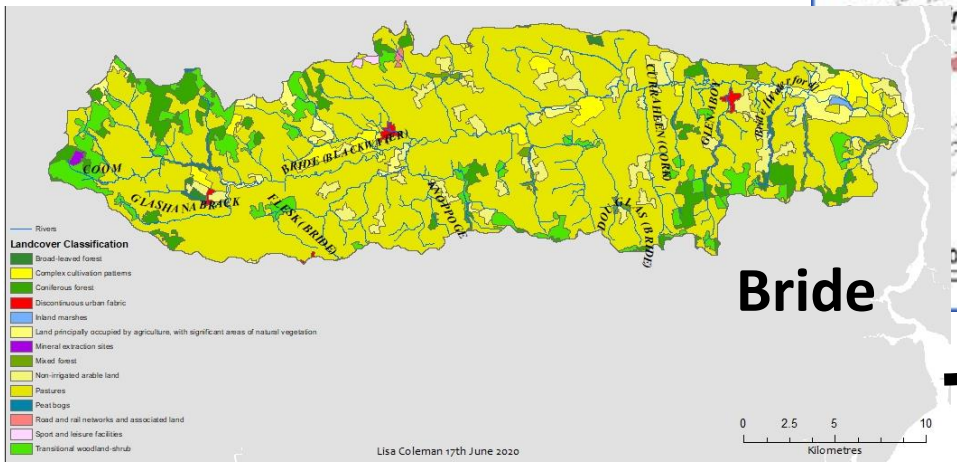



## Figile

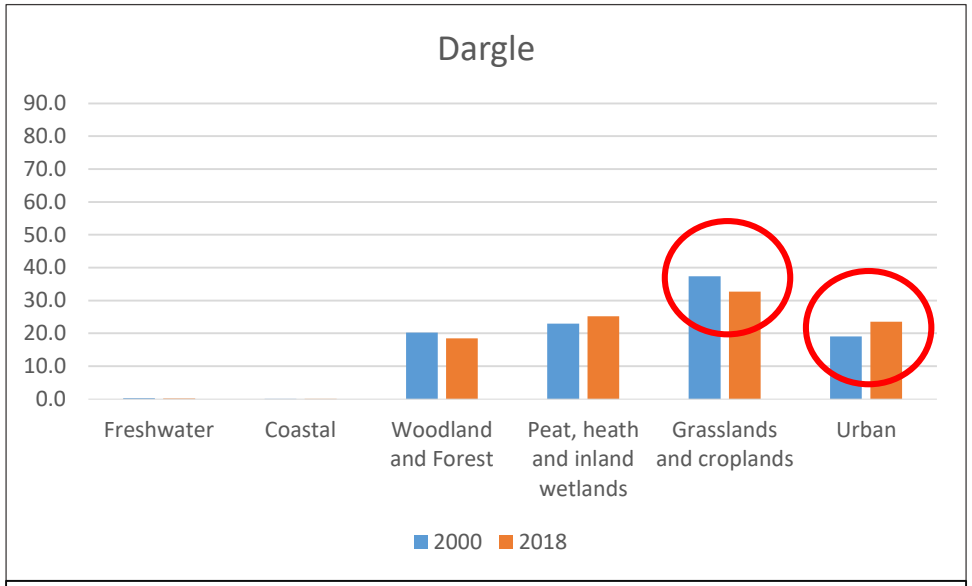


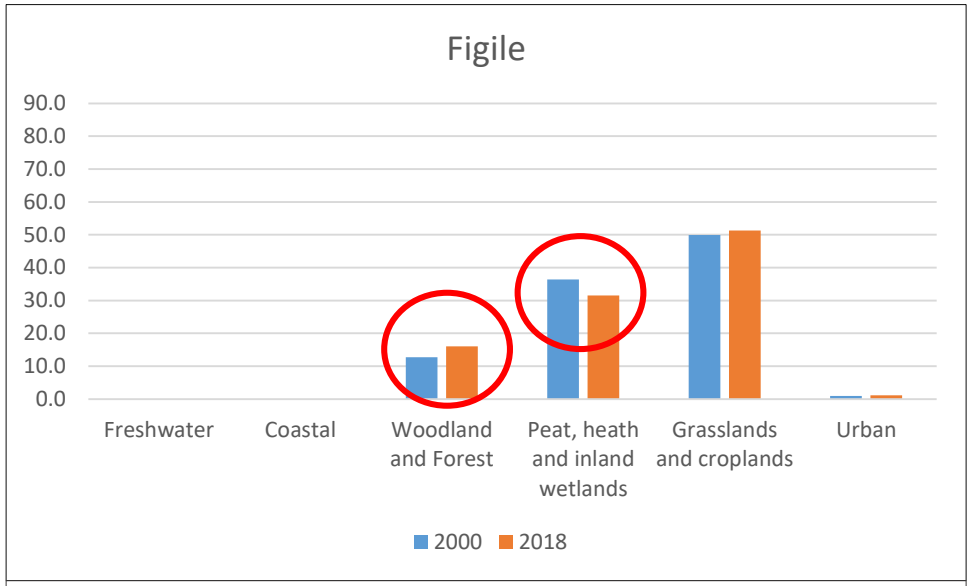

## Bride

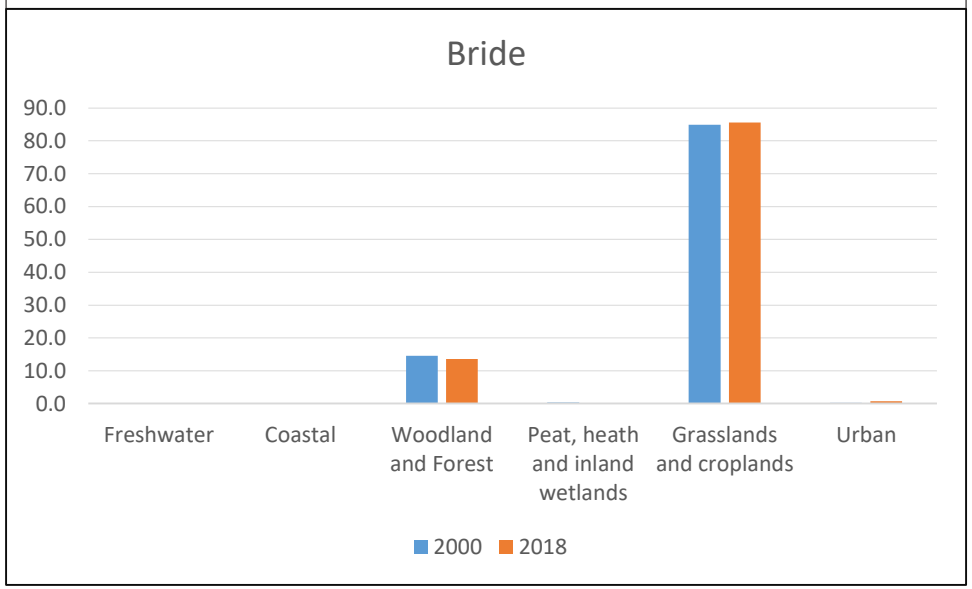


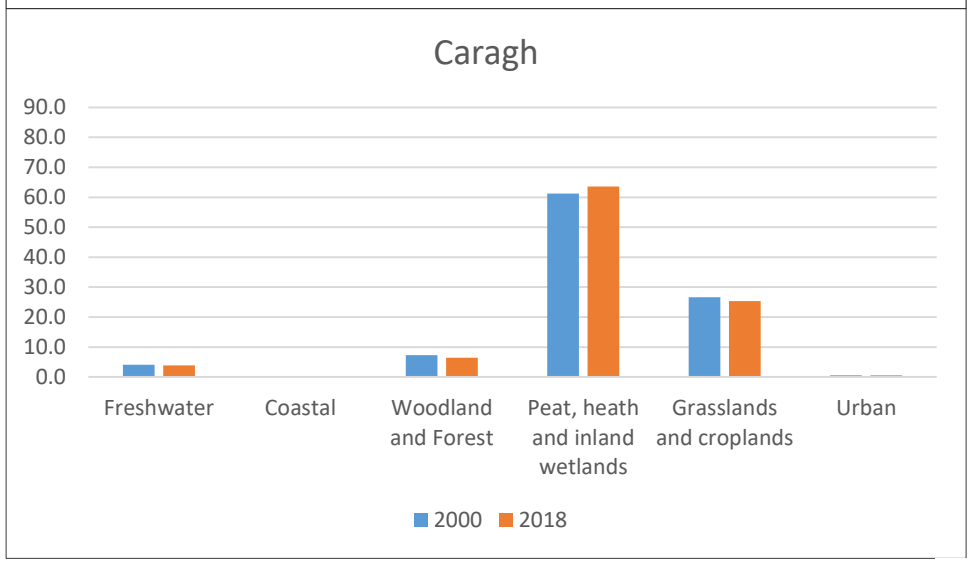

CORINE 2018

# Extent (% cover): changes over time (2000 to 2018)

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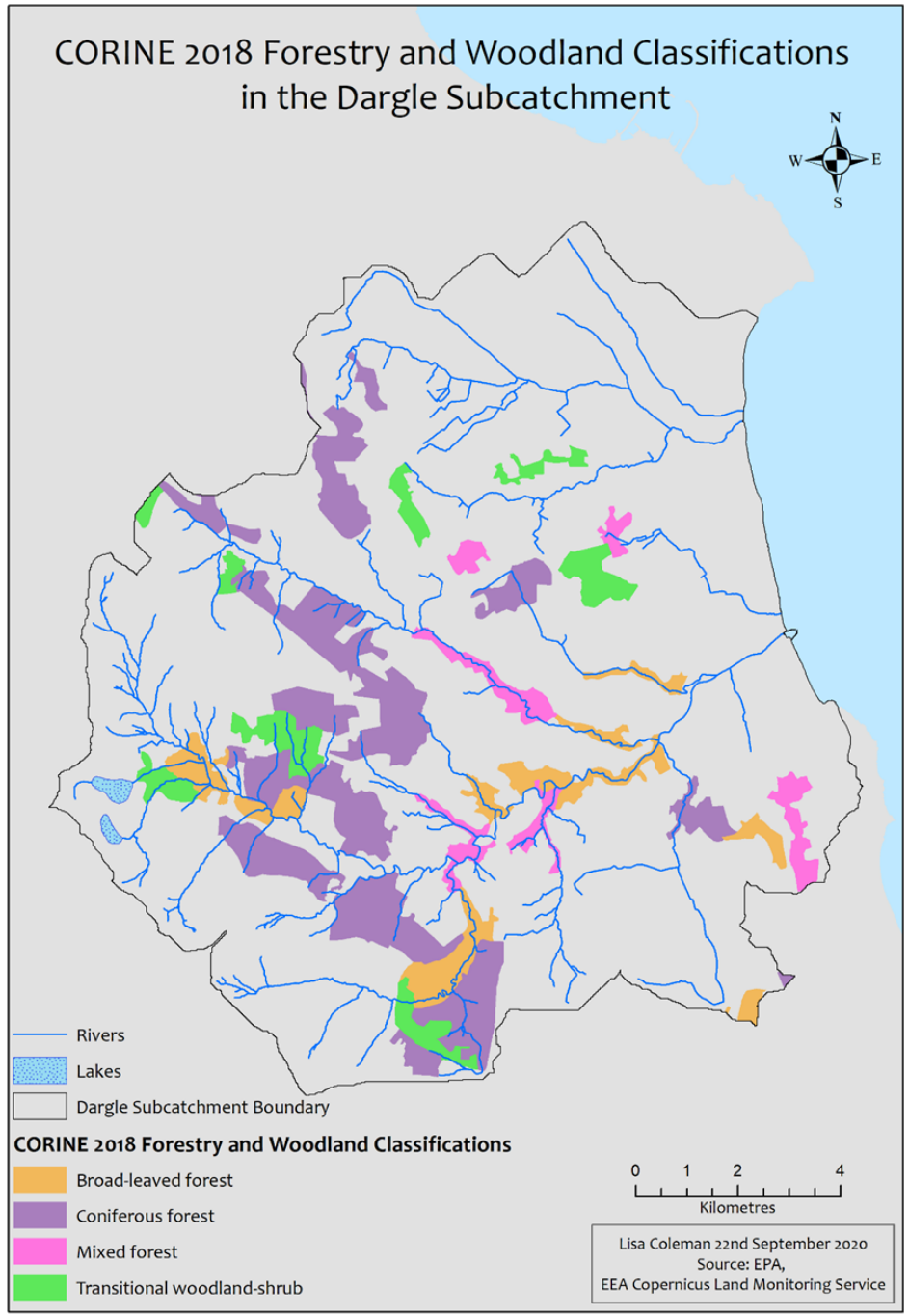


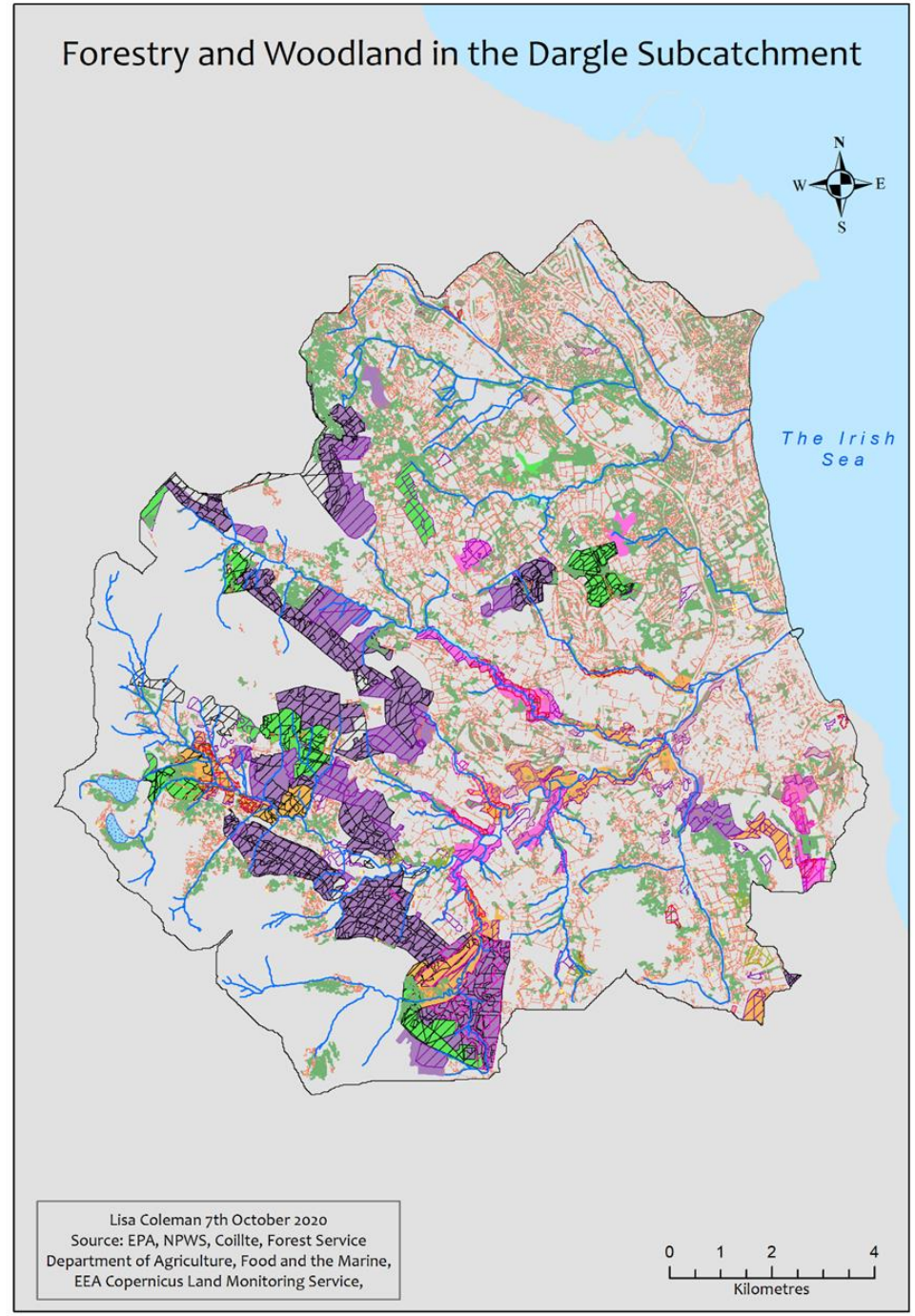


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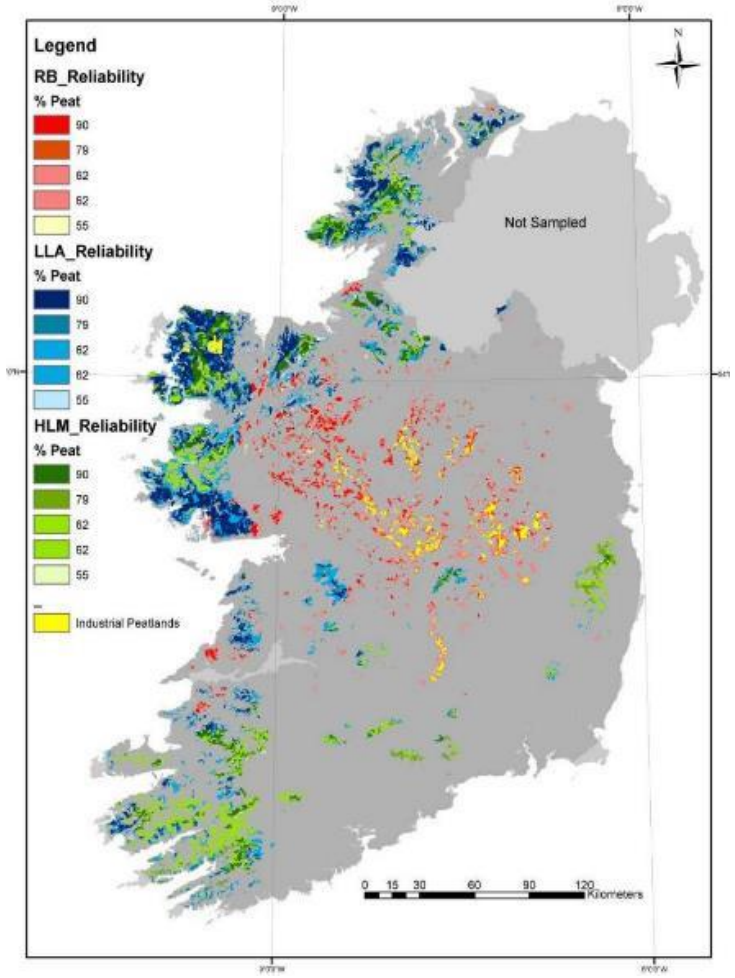
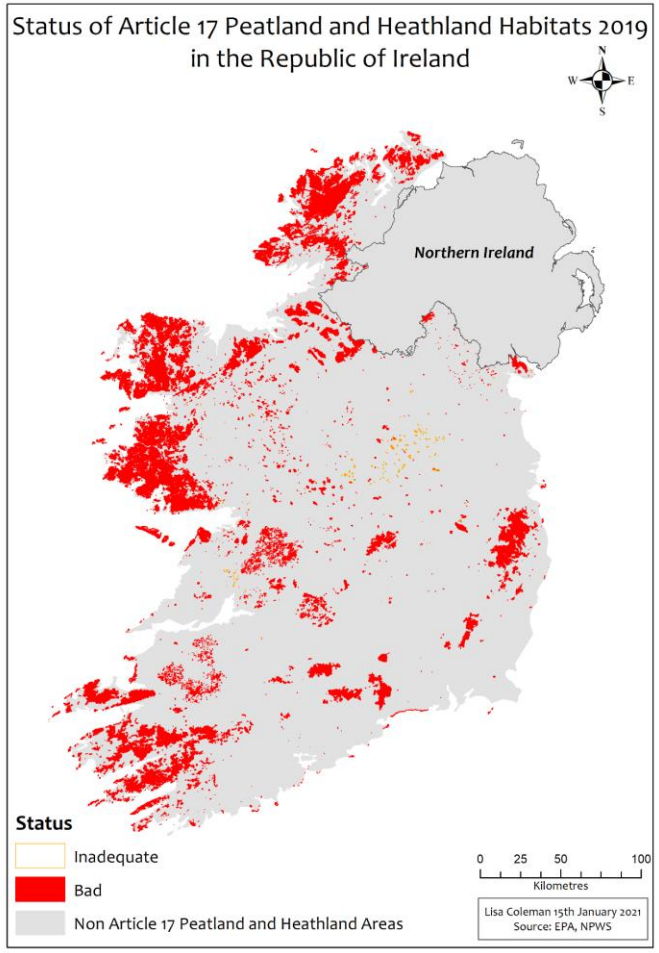
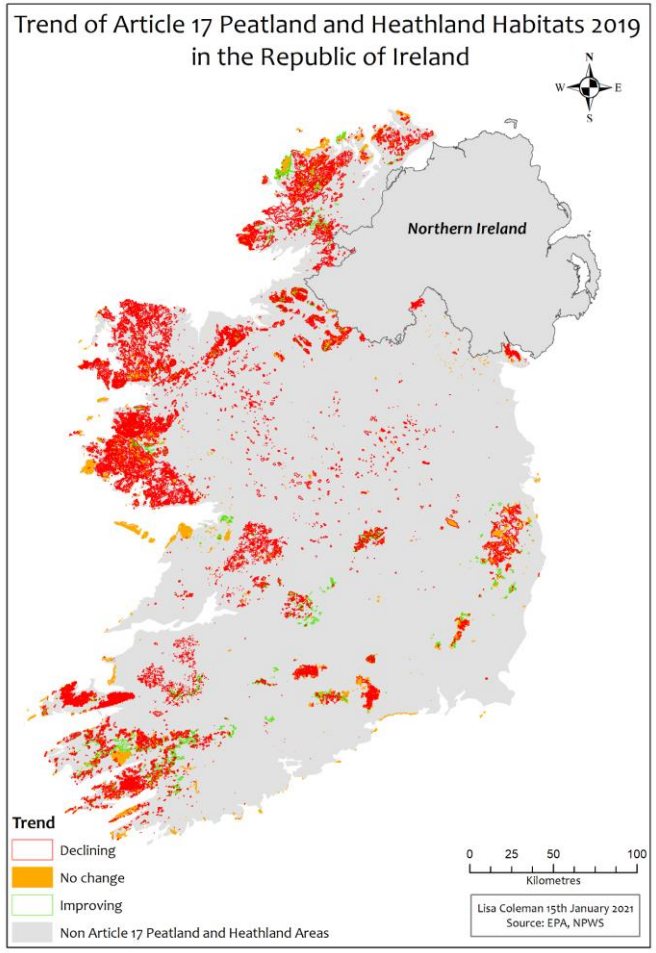
**Condition challenges:**
What reference condition (when)?
For ALL ecosystem types?
What condition characteristics?

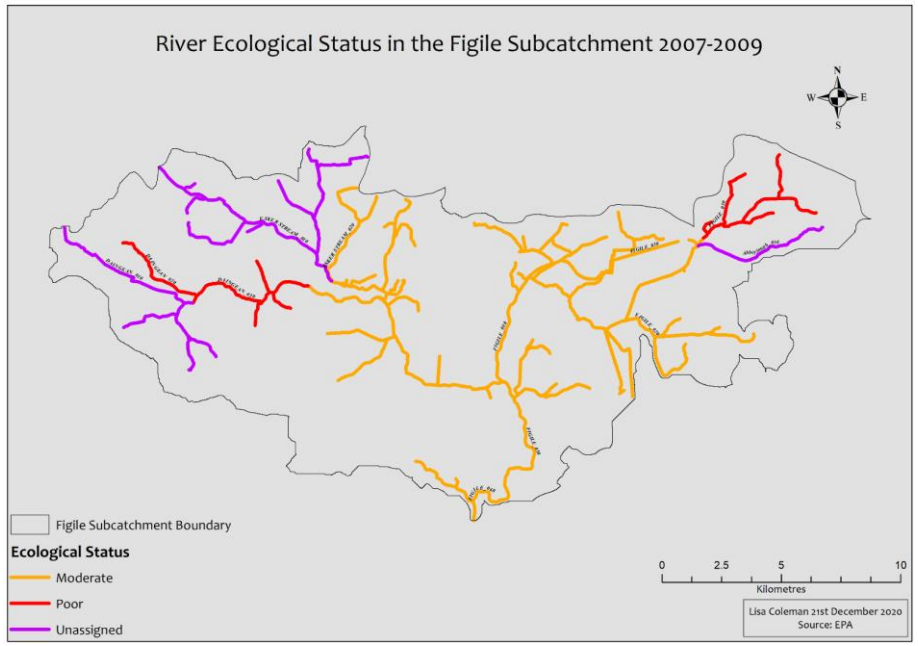
# What about condition? consider peatlands…

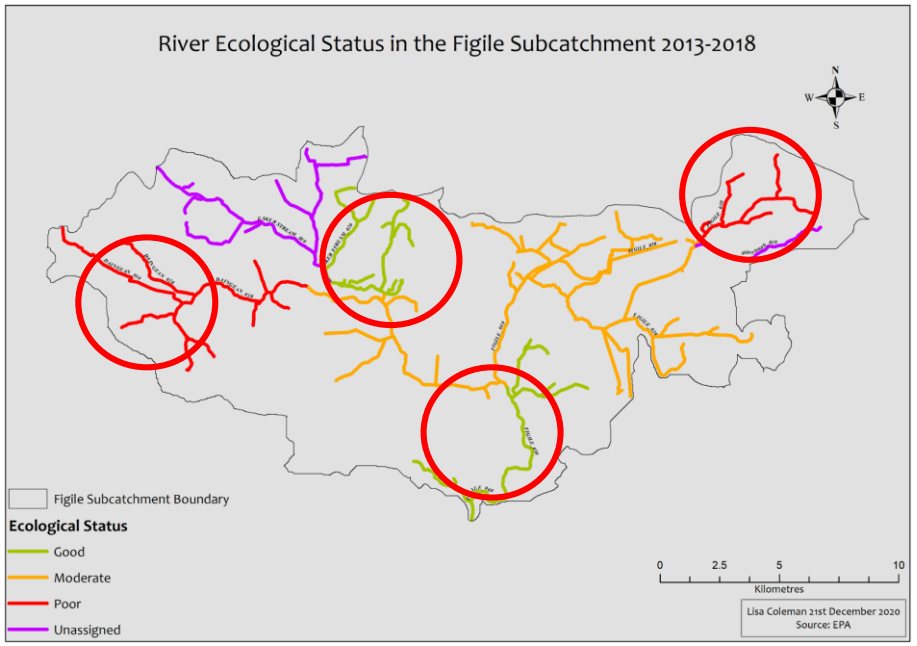


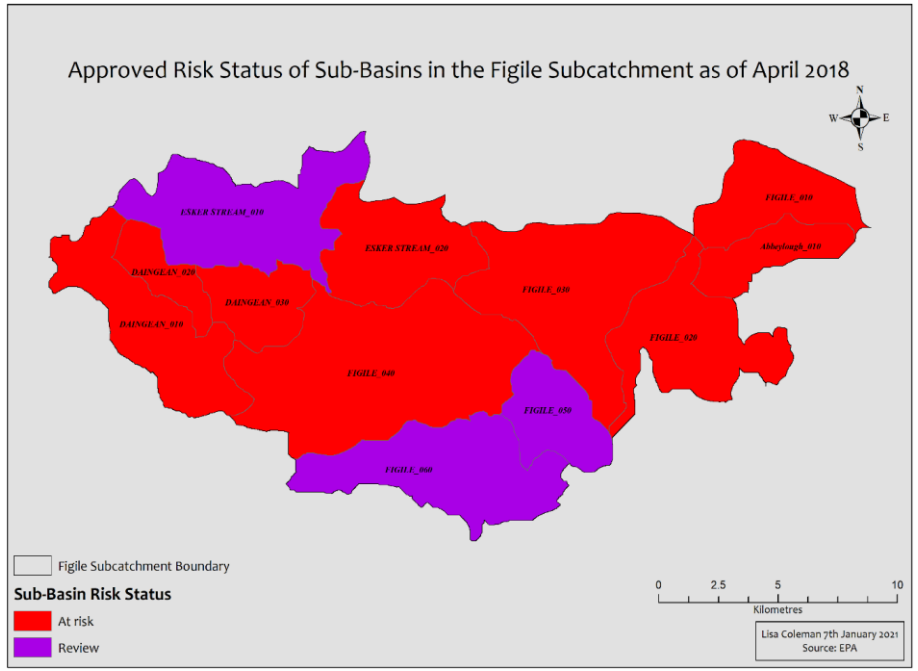



# Condition: changes in ecological status of rivers over time (2010 to 2018)




**Extent and Condition: reliable, time series data**
**Extent: landcover (is that good enough?)**
**Condition: WFD (to sub basin) and Habitats Directive (national level)**

**'Condition: The missing link to sustainable use'**

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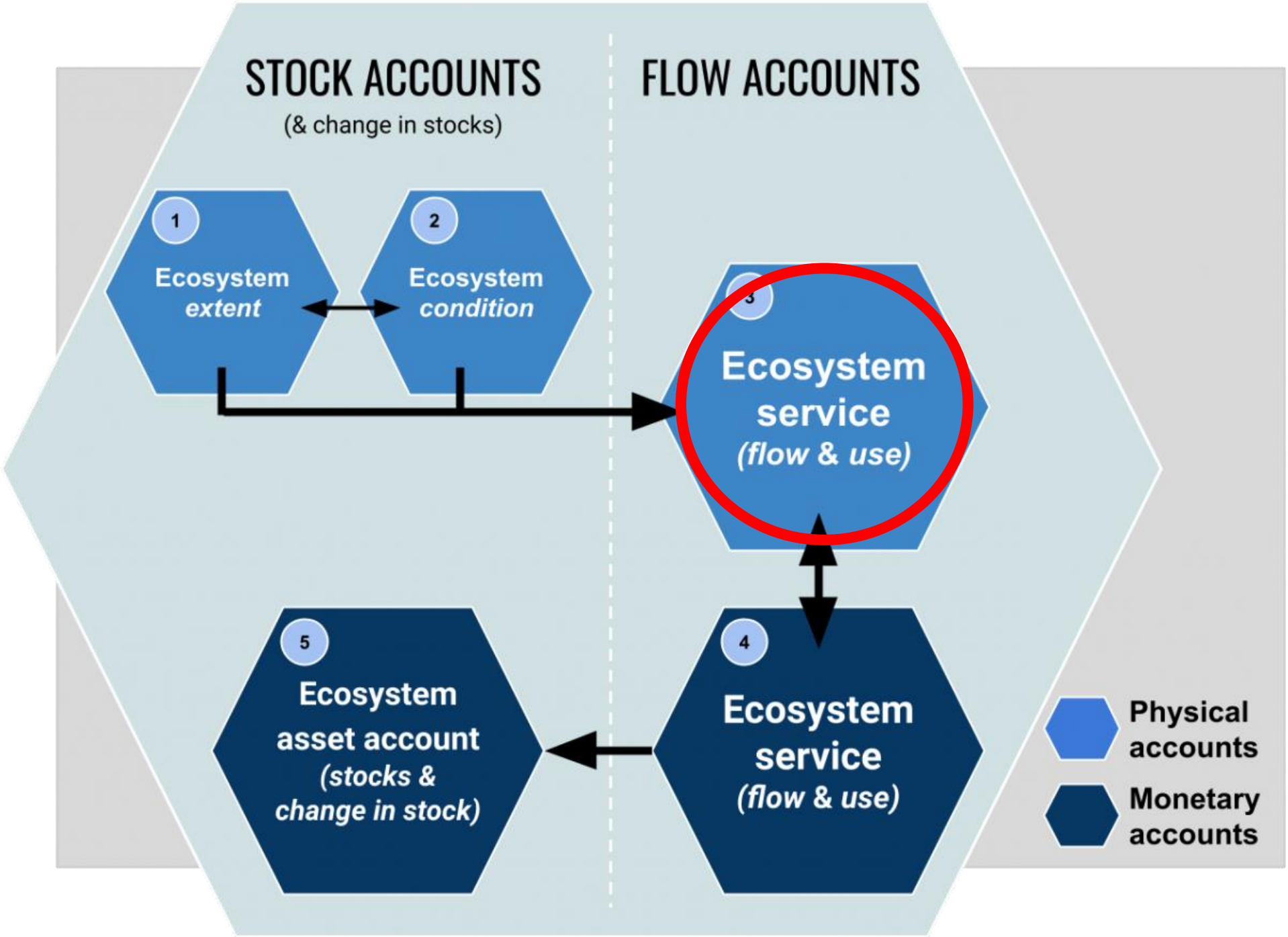
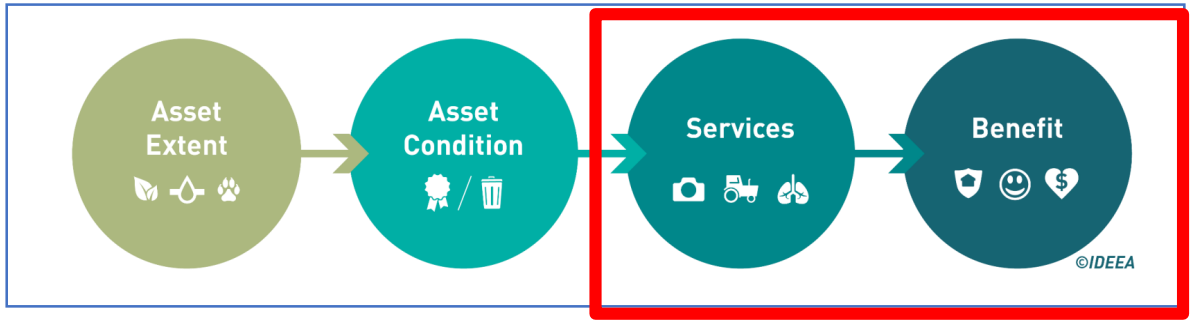

STOCK ACCOUNTS
(& change in stocks)
FLOW ACCOUNTS
1
Ecosystem extent
2
Ecosystem condition
3
Ecosystem service (flow & use)
4
Ecosystem service (flow & use)
5
Ecosystem asset account (stocks & change in stock)
Physical accounts
Monetary accounts

# SERVICES AND BENEFITS




**Figile**

Relevant services (first attempts!)

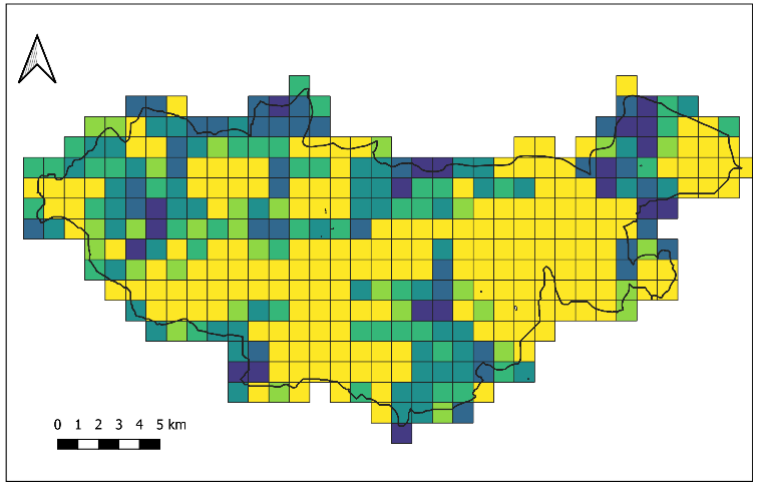
- *Provisioning*:
  - Biotic: biomass (food, timber),
  - Abiotic: water (drinking), peat (turf / milled / sodmoss)
- *Regulating*
  - Water purification (*flood regulation – no data*)
  - Climate
  - *Habitat (nursery)?*
- *Cultural*: recreation; ecosystem/ biodiversity appreciation

**Three Questions**

Where are people?

What are they doing?

Who could lose out?




Population Density (sq km)

- 0 - 5
- 5 - 10
- 10 - 20
- 20 - 50
- 50 - 100
- 100 - 1000
- 1000 - 6000

**Policy linkages / Policy relevance**

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# Logic chains: grazed biomass

Policy linkages: CAP Policy and national level rules

| Ecosystem type/s | Factors determining supply | | Factors determining use | Ecosystem Service | | Benefit | Main users and beneficiaries |
|---|---|---|---|---|---|---|---|
| | Ecological | Societal | | Description | Potential physical metric/s for ES | | |
| **Grasslands** | Type and condition of vegetation; soil type; elevation; weather | Ecosystem management (fertiliser application; stocking density) | Landowners occupation and preferences; market price; subsidies | **Biomass** for Reared animals and their Outputs | Gross tonnes of grazed biomass | Livestock and livestock products (e.g., meat, milk, eggs, wool) (SNA benefits) | Agricultural producers, including household and subsistence production |




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# SUPPLY ACCOUNT: WHAT ECOSYSTEM SUPPLIES WHAT SERVICE?

| Supply | | Units of Measure (e.g) | Selected economic units: Selected industries: Agriculture, forestry and fishing | Building and construction | Manufacturing industries | Commerce and trade | Transport and communications | Public administration | Professional services | Households | Total Industry | Imports - products | Total Supply products | INCASE working classification (CORINE / other data merged): Terrestrial: Woodlands and Forest: Woodlands | Forests | Linear woodlands and scattered trees | Peatlands: Raised bogs | Mountain blanket bogs | Lowland blanket bogs | Degraded bogs | Heathlands: Wet heathlands | Dry heathands | Bracken | Grass-land: Improved grassland | Semi-natural grassland | Crop-land: Cropland | Urban and Built: Built lands | Urban green space | Amenity and sports facilities | Saline: Coastal: Sand dune complexs | Saltmarsh complexes | Beaches (sand, shingle, tidal mudflats) | Sea cliffs | Freshwater: Water-bodies: FW Rivers | FW Lakes | Wet-lands: FW Wetlands and swamps | Geosystem: Groundwater aquifers | Geo landscape forms | Subsoils | Mineral aggregates | Total Supply resident ecosystem assets | Supply from non-resident ecosystem assets - Imports | Total Supply ecosystem services | TOTAL SUPPLY |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Selected ecosystem services (reference list)** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Provisioning services | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Biomass provisioning | Crops | Tonnes dry matter (tdm) | | | | | | | | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | |
| | Grazed biomass | tdm | | | | | | | | | | | | | | | X | X | X | X | X | (X) | X | X | | | | | | | | | | | | | | | | | | | |
| | Timber | tdm | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Peat | tdm | | | | | | | | | | | | | | | | | | X | | | | | | | | | | | | | | | | | | | | | | | |
| Water supply | | m3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | X | X | | X | | | | | |
| Other provisioning services | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Regulating and maintenance services** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Global climate regulation services | | Tonnes CO2 | | | | | | | | | | | | X | (X) | X | X | X | X | X | (X) | X | X | | | X | | | | | X | | | | | X | | | | | | | |
| Water purification services | | N/P loads | | | | | | | | | | | | X | (X) | X | X | X | X | X | (X) | X | X | | (X) | X | (X) | (X) | X | X | | X | | | | X | X | X | | | X | | | |
| Water flow regulation services | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Nursery population & habitat maintenance services | | Species types/no. | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | | | |
| Other regulating and maintenance services | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Cultural services** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Recreation-related services | | No. visits | | | | | | | | | | | | X | X | X | | X | | X | X | X | | | | | | | X | X | X | X | X | X | | | | X | | | | |
| Eco/Geosystem and species appreciation services | | Area conserved; species a/c | | | | | | | | | | | | X | X | X | X | X | X | X | X | X | X | X | X | X | X | | | | X | X | X | X | X | X | X | | | X | | | |
| Other cultural services | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

# FIGILE USE ACCOUNT: work in progress!

Need consistent approach to accounting for services – only as good as the inputs!

| | | Beneficiaries / Economic Sectors | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | 01 Crop and animal production, hunting and related service activities | 02 Forestry and logging | 03 Fishing and aquaculture | A - Agriculture, Forestry and Fishing | B,C - Mining and manufacturing | D - Electricity | E - Water supply | F-H - Construction, wholesale and transportation | I,R - Accommodation and food service, culture, sports and recreation | Other Sectors | Households | Government | Exports |
| Provisioning | Crop provisioning services (tonnes DM) | XXXX | | | | | | | | | | | | |
| | Fodder (tonnes DM) | XXXX | | | | | | | | | | | | |
| | Timber (m3) | | XXXX | | | | | | | | | | | |
| | Water (Quantity) (m3) | XXXX | | | | | XXXX | XXXX | | XXXX | X | XXXX | | |
| Provisioning (abiotic) | Peat Turf (tonnes DM) | | | | | | | | | | | XXXX | | |
| | Peat Milled (tonnes DM) | | | | | XXXX | | | | | | | | |
| Regulation & Maintenance | Carbon sequestration (tonnes CO2 equiv) | | | | | | | | | | | | XXXX | |
| | *Flood regulation* | | | | | | | | | | | | X | |
| | *Water (purification)* | | | XXXX | | | | X | | X | | X | | |
| Cultural | Recreation (Trips) | | | | | | | | | X | | X | | |
| | Ecosystem appreciation (ha conserved) | | | | | | | | | | | | XXXX | |

# Catchment level accounts: insights from applications

Language matters – learning collectively



- **Extent**: need higher resolution data
- **Condition**: limited, needs a bottom up and top down approach for local and national accounting
- **Services**: data gathered at electoral division or national level; a data jigsaw with lots of missing pieces
- **Benefits**: line up with policy; what benefits do we want to / need to favour?
- **Stakeholder engagement**: the gel that holds NCA together and brings it to its full potential

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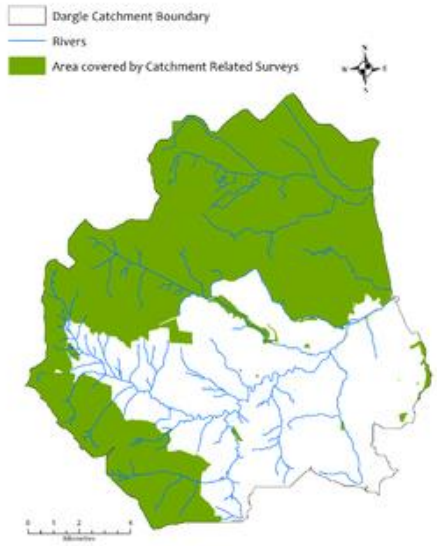
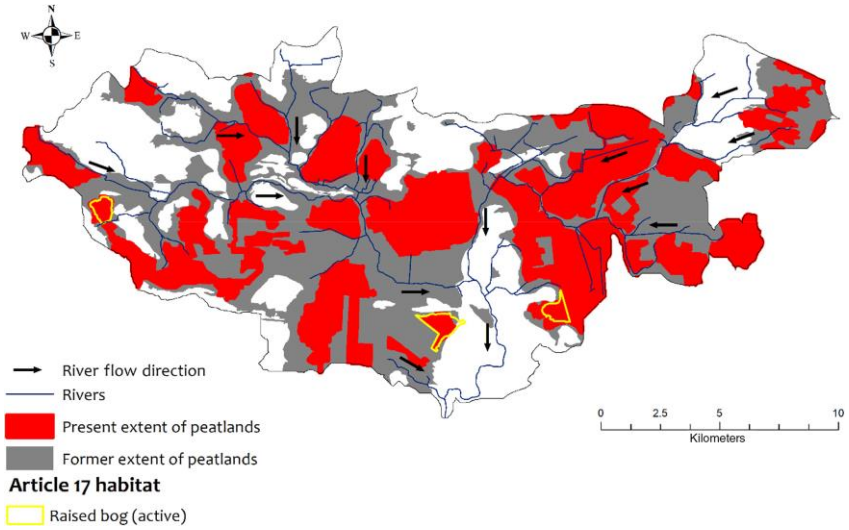



Coverage of habitat surveys (58%) available for the Dargle accounting area.


Characterisation of At Risk sub-basins in the Dargle.




**Likelihood of impact**

| **Level of impact** | *Low* | *Medium* | *High* |
|---|---|---|---|
| Low | No discernible change | Reduced flow | Reduced flow |
| Medium | Reduced flow | Reduced flow | Significant decline/loss of flow |
| High | Significant decline/loss of flow | Significant decline/loss of flow | Significant decline/loss of flow |

Risk register scoring matrix following from Mace et al. (2015). The colour coding is outlined as follows: green: no/minimal discernible change in flows; amber: reduced flows; red: significant decline in flows.

https://onlinelibrary.wiley.com/doi/full/10.1111/rec.13632

https://oneecosystem.pensoft.net/article/65582/

1. How to develop extent and condition accounts?

2. Applications: a risk register for loss of services / flows based on condition / trends and future use

# Policy linkages: Climate, Water and Biodiversity

- **Climate regulation and Land use (future proofing)**
- **National policy issue:** Acceleration of the National Response to Reducing Greenhouse Gas Emissions, Climate Mitigation and Adaptation; Changes in Land Use and Land Cover; Common Agricultural Policy (75% Ireland agri)

- **Integrated Catchment Management and WFD reporting;**
- **National (EU) policy issue:** Restore and Protect Water Quality

- **Biodiversity – building healthy, resilient ecosystems**
- **National policy issue:** Nature and Wild Places
- **EU:** Restoration targets under EU Biodiversity Strategy for 2030

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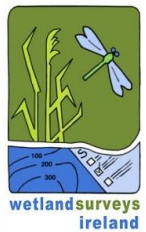
# Data challenges - Agencies





































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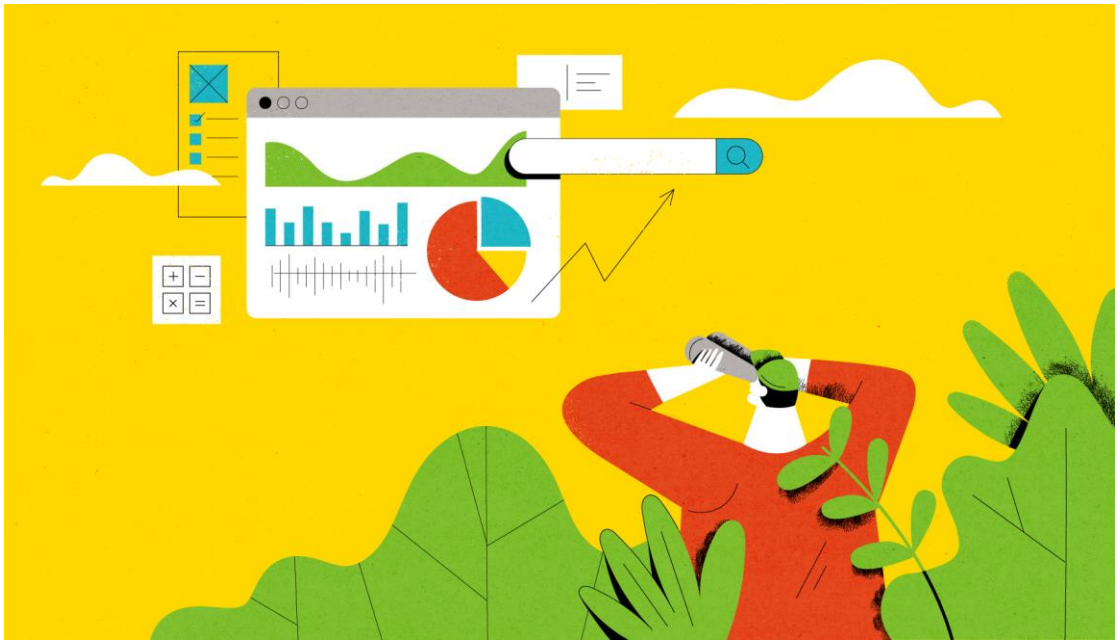
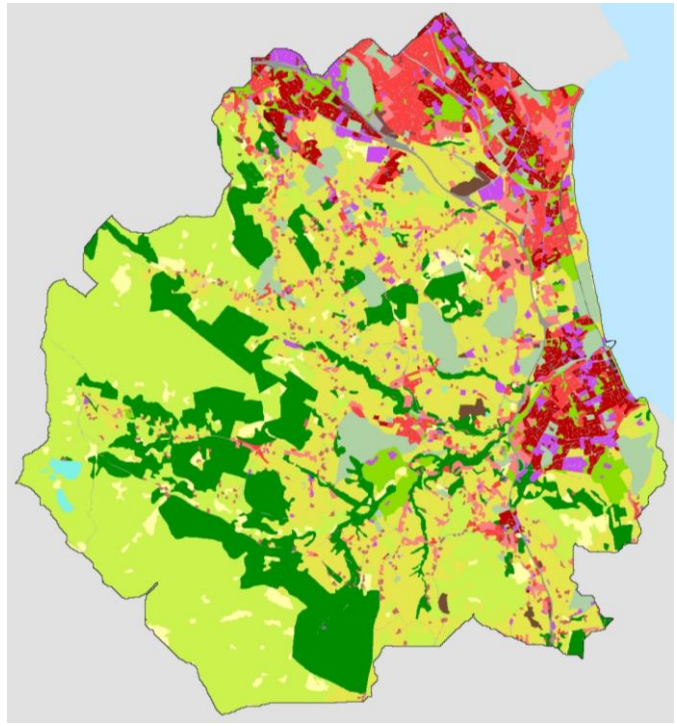
# Process steps

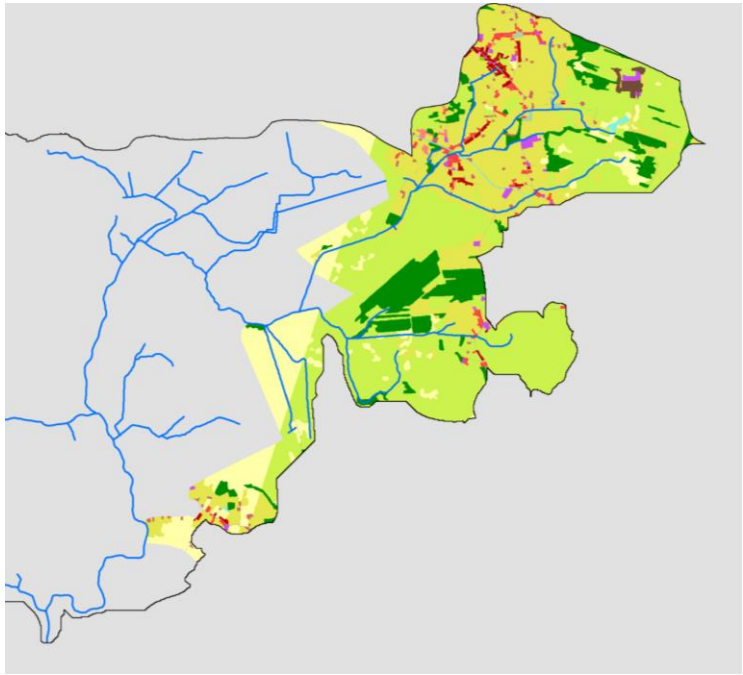
1. Finding the Data



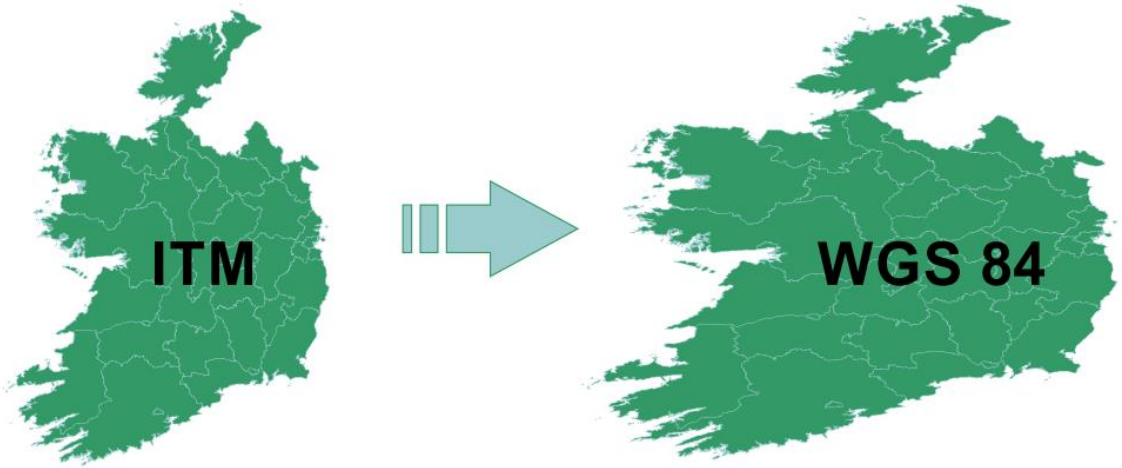
# Challenges

1. Finding the Data
2. Coverage

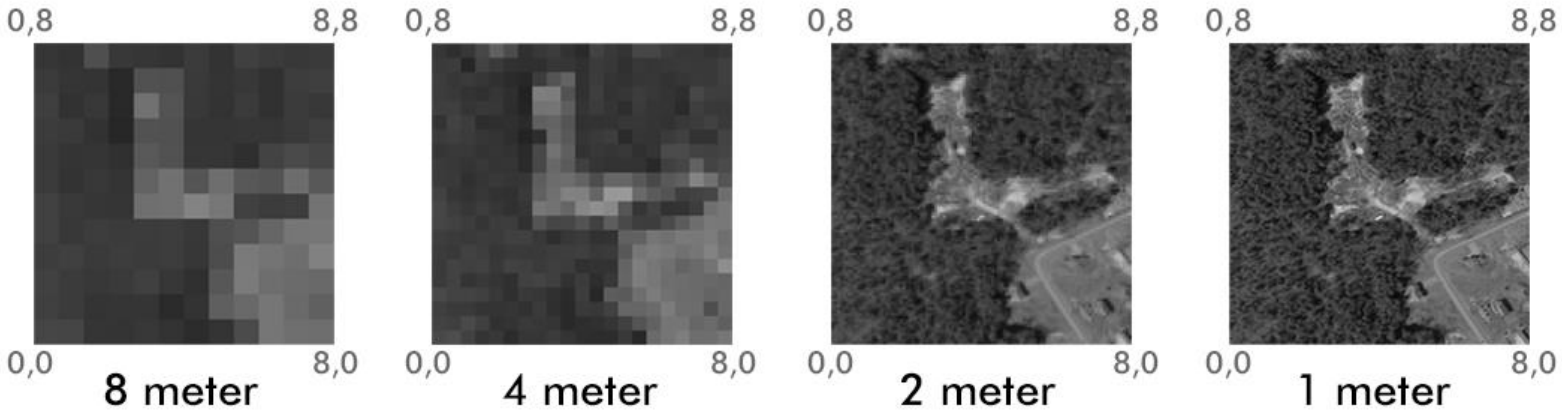




# Aligning data




1. Finding the Data
2. Coverage
3. Resolution and Coordinates

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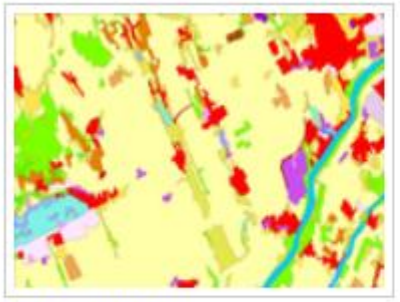
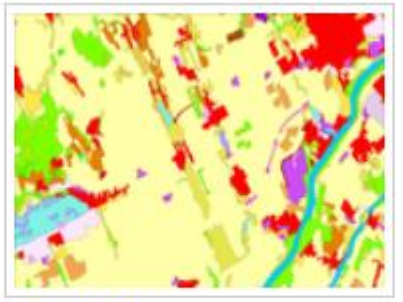
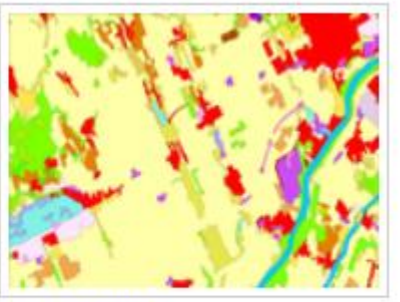
# Challenges



CLC 2000



CLC 2006



CLC 2012

1. Finding the Data
2. Coverage
3. Resolution and Coordinates
4. Time Series

STATUS 2007-2009

- WFD Status Geodatabase (All Waterbodies) 2007-2009 - January 2017
- WFD Status (GIS) (All Waterbodies) 2007-2009 - January 2017

STATUS 2010-2012

- WFD Status Geodatabase (All Waterbodies) 2010-2012 - January 2017
- WFD Status (GIS) (All Waterbodies) 2010-2012 - January 2017

STATUS 2010-2015

- WFD Status Geodatabase (All Waterbodies) 2010-2015 - May 2017
- WFD Status (GIS) (All Waterbodies) 2010-2015 - May 2017

STATUS 2013-2018

- WFD Status Geodatabase (All Waterbodies) 2013-2018 - November 2019

## Article 17 GIS and Metadata Downloads

The spatial data for the second and third 6-yearly Article 17 reports, in 2012 and 2019 are available here.

- Spatial data for 2019
- Spatial data for 2012

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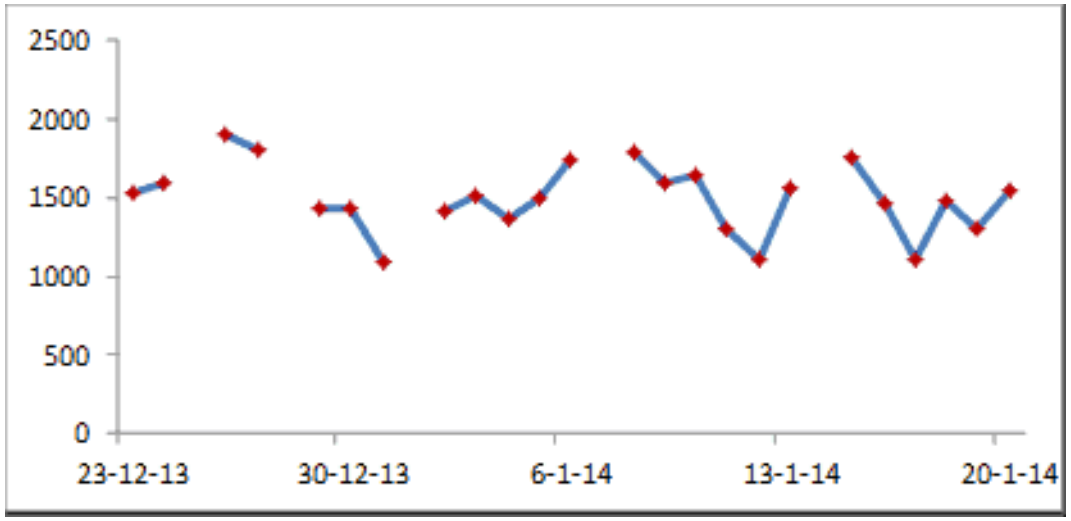
# Challenges




1. Finding the Data
2. Coverage
3. Resolution and Coordinates
4. Time Series
5. Data Gaps



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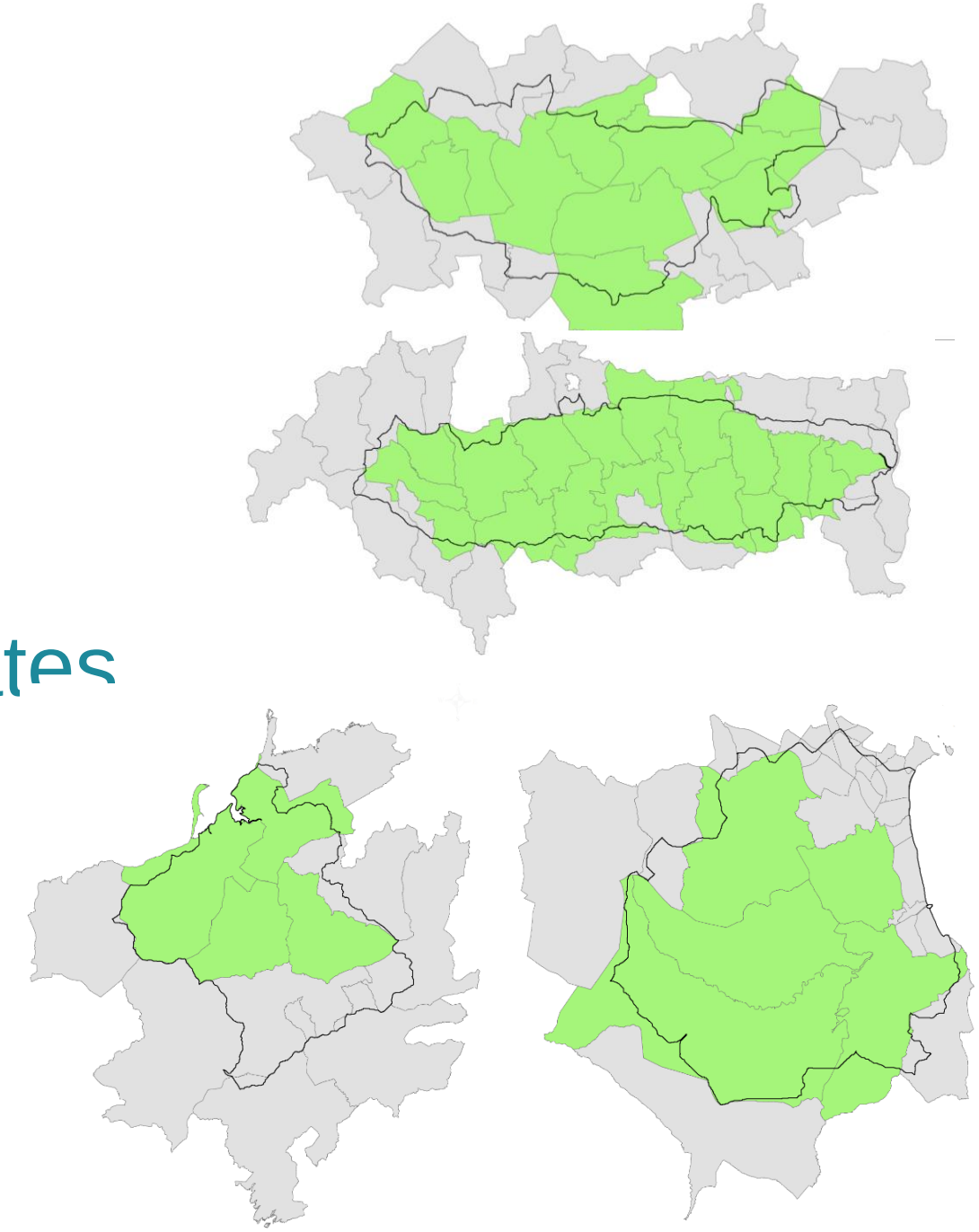
# Challenges

1. Finding the Data
2. Coverage
3. Resolution and Coordinates
4. Time Series
5. Data Gaps
6. Catchments



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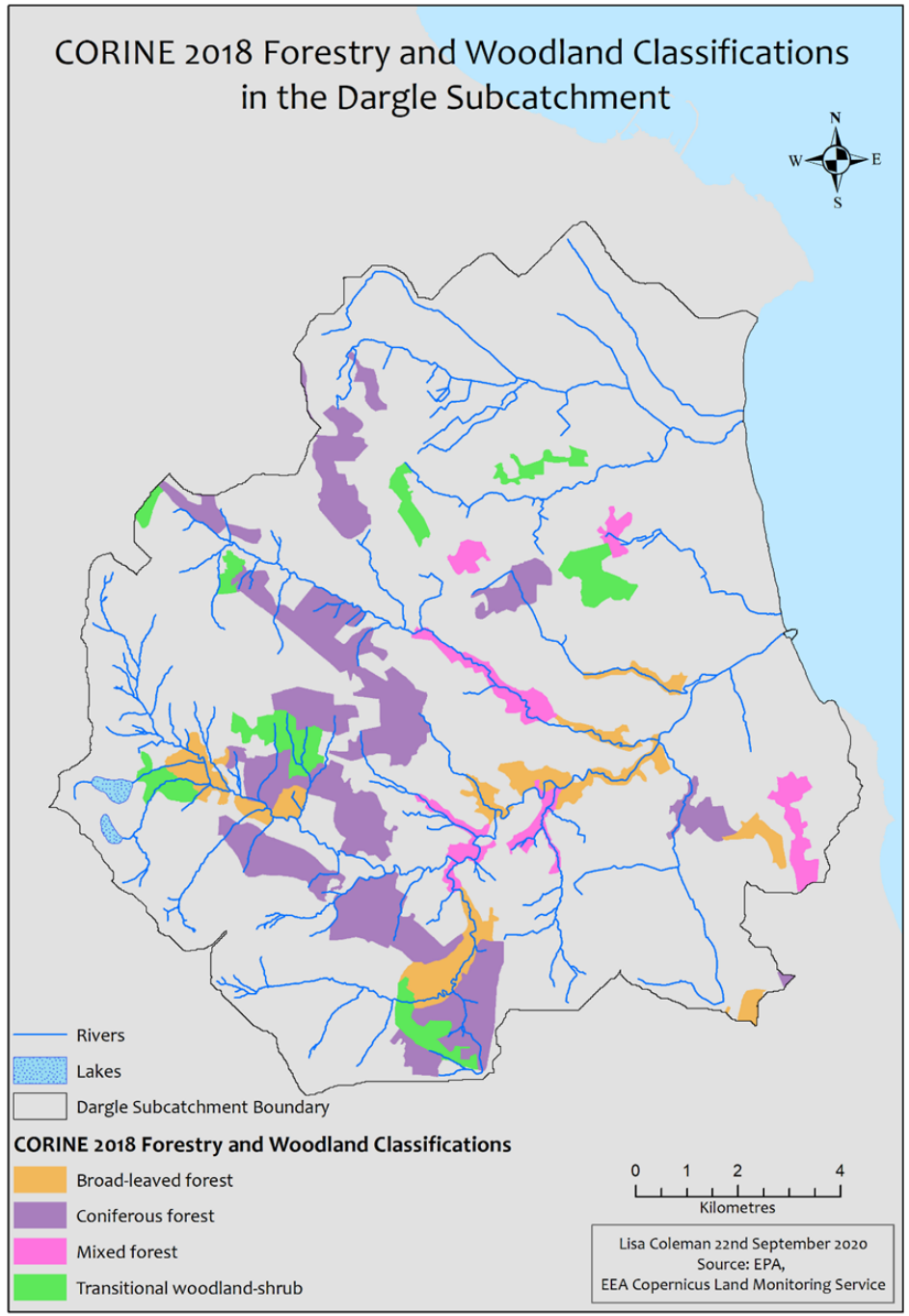


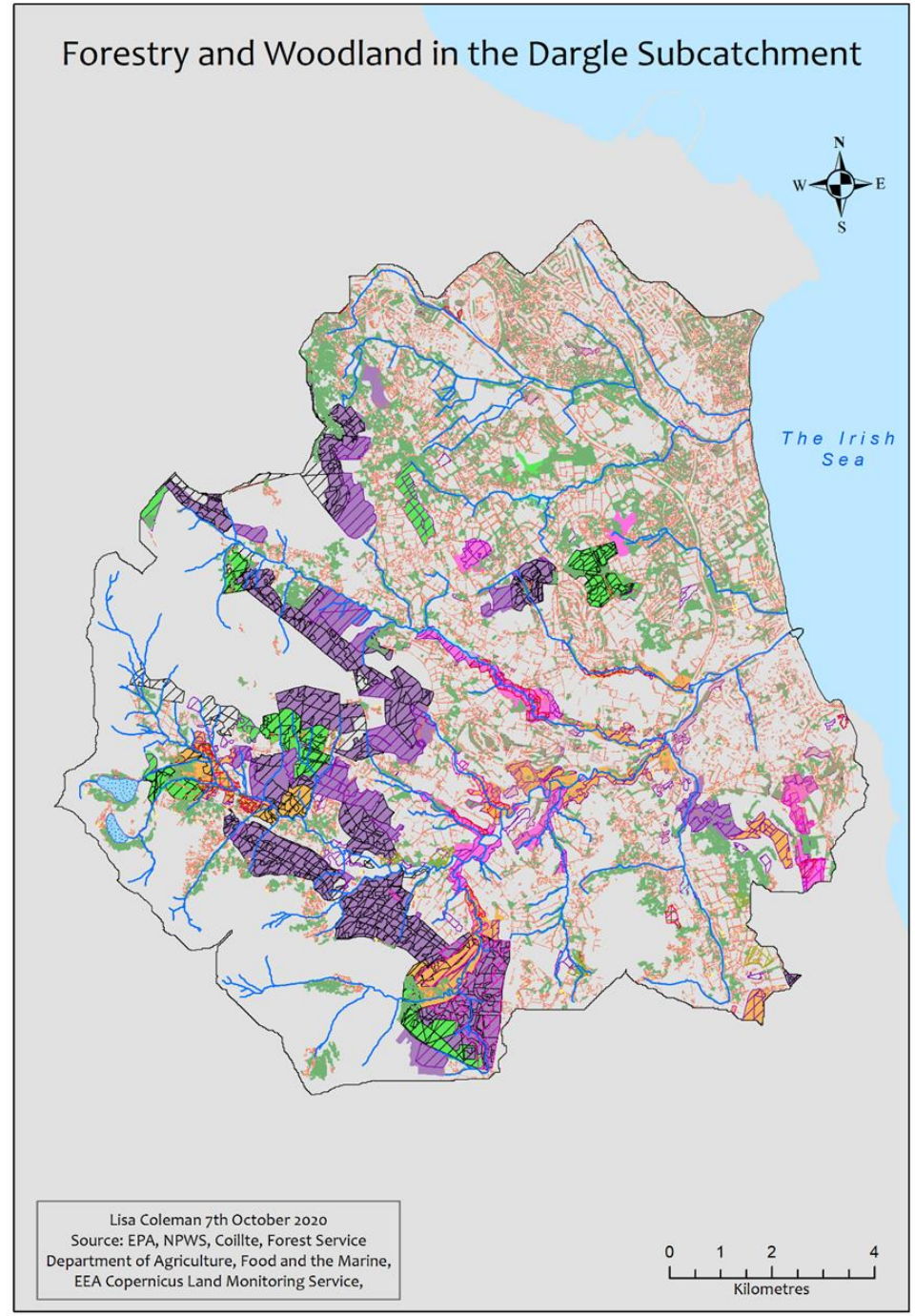


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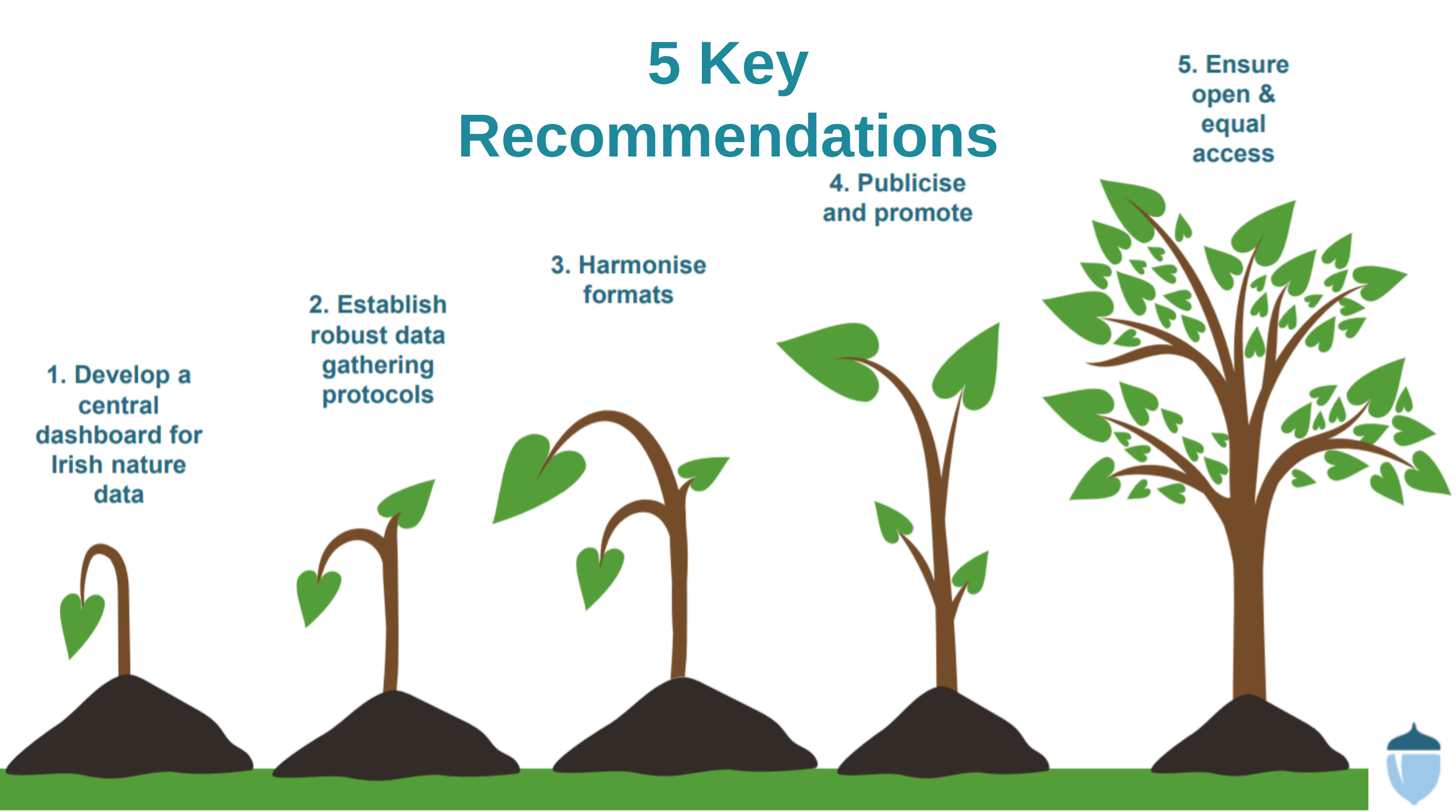
# Data4Nature Workshop and Report

- Held 11th May 2021, with over 100 attendees and 13 expert presentations
- This event was funded under the Open Data Engagement Fund of the Department of Public Expenditure and Ref... with additional funding from the Office of Public Works.

## Themes

| | | |
|---|---|---|
| Availability | Accessibility | Usability |
| Accuracy | Reproducibility | Discoverability |

# 5 Key Recommendations



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Data4Nature Report and Workshop Recordings: https://www.naturalcapitalireland.com/data4nature

- Read more about our work on INCASE in our papers: https://oneecosystem.pensoft.net/article/65582/
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