Shaping the Future

Flagship initiatives of the James Hutton Institute

NESAAG 7 September 2022

Professor Lee-Ann Sutherland

Director of International Land Use Study Centre

The James Hutton Institute

James Hutton: innovator and polymath

Creator of “deep geological time”

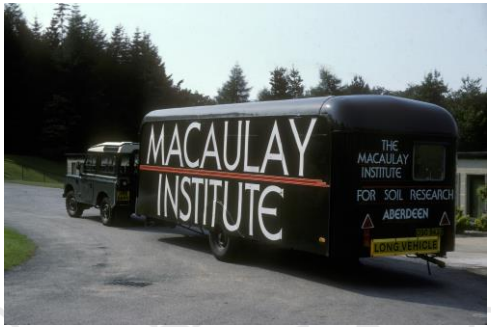
Author of

- Theory of the Earth
- Theory of Rain
- Principle of natural selection
- Principle of Uniformitarianism
- The Elements of Agriculture

1726-1797

Genesis

- Deep roots in the North East
  - **1930:** The Macaulay Institute for Soil Research, was established in Aberdeen through the benefaction of Dr T.B. Macaulay, with the aim of improving the productivity of Scottish agriculture.
  - **1987:** Merger with the Hill Farming Research Organisation to form the Macaulay Land Use Research Institute (MLURI).
  - **2011:** The James Hutton Institute was formed through a merger of the MLURI with SCRI (the Scottish Crop Research Institute).



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Key Facts about the Institute

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- Research environment of over 700 people
  - 500 employees: 350 science and technical; 150 professional services
  - 110 PhD students
  - 11 spin-in companies
- Main sites in Aberdeen and Dundee
- Three Research Farms covering full range of land uses
- One of Scottish Government's Major Research Providers
- Members of national and internationally important earth observation networks such as ECN, COSMOS, National Pollen records, Pest and Pathogen surveillance

COSMOS-UK
UK Soil Moisture Monitoring Network

UK Environmental Change Network

deecatchment partnership

We also host important scientific research facilities

- National Soils Archive and Database
- Commonwealth Potato Collection
- *Rubus* and *Ribes* germplasm collections
- Plant pest and pathogen collections
- Virtual Landscape Theatre

100 years of breeding – over 200 Plant varieties bred by the James Hutton Institute, its commercial subsidiaries and predecessors

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99 Potato

26 Barley

2 oats

26 Brassica, Turnip & Swede

1 Forage Rape

2 Kale

3 Common bean

1 Salad Rape

4 Lily

27 Blackcurrant

25 Raspberry

Plus the Tayberry and Tummelberry

3 Strawberry

3 Blackberry

1 Gooseberry

James Hutton Institute Atlas

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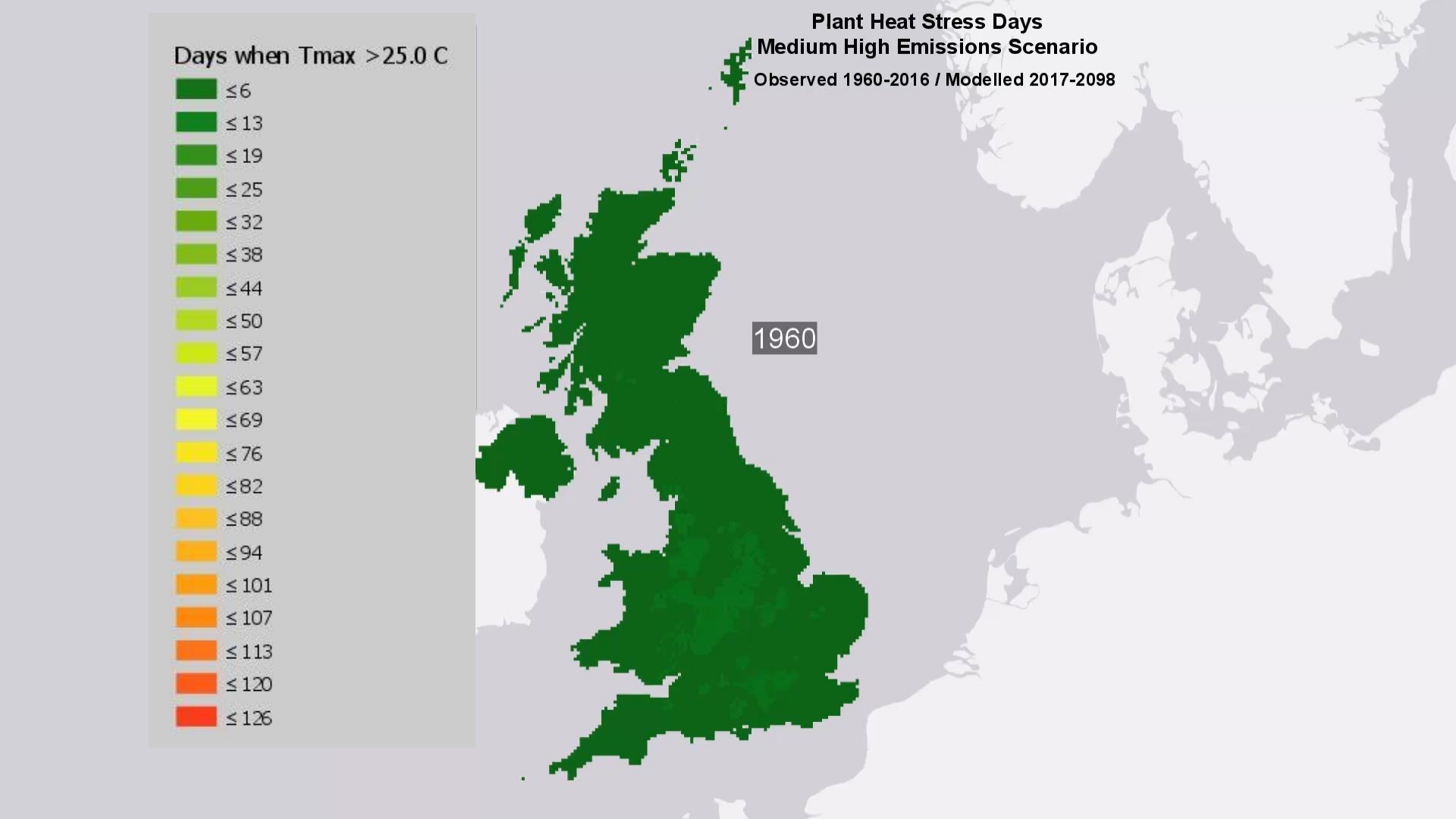
Plant Heat Stress Days
Medium High Emissions Scenario
Observed 1960-2016 / Modelled 2017-2098
Days when Tmax >25.0 C
≤6
≤13
≤19
≤25
≤32
≤38
≤44
≤50
≤57
≤63
≤69
≤76
≤82
≤88
≤94
≤101
≤107
≤113
≤120
≤126
1960

Largest group of rural social and economic scientists in the UK

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Farmer Intentions Survey

- 2500 farmers across Scotland
- 2013, 2018, 2023
- Analysis of:
  - response to Brexit
  - succession and new entrants
  - diversification – renewable energy, agritourism
  - environmental measures
  - women in agriculture
  - crofting
- In collaboration with SRUC


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SRUC

How often does intended farm management behaviour match 'actual' behaviour? Insights for thirteen farm activities (2013-18).

Farmer Intentions Survey briefing note, January 2021

Jonathan Hopkins[1], Steven Thomson[2], Dave Miller[2], Lee-Ann Sutherland[1], Carla Barlagne[1], Douglas Wardell-Johnson[1], Andrew Barnes[1], Jenny McMillan[1], Michael Spencer[3]

[1] Social, Economic and Geographical Sciences Group, James Hutton Institute, Aberdeen, UK

[2] Department of Rural Economy, Environment and Society, Scotland's Rural College, Edinburgh, UK

[3] Information and Computational Sciences Group, James Hutton Institute, Aberdeen, UK

Scottish Government Riaghaltas na h-Alba gov.scot

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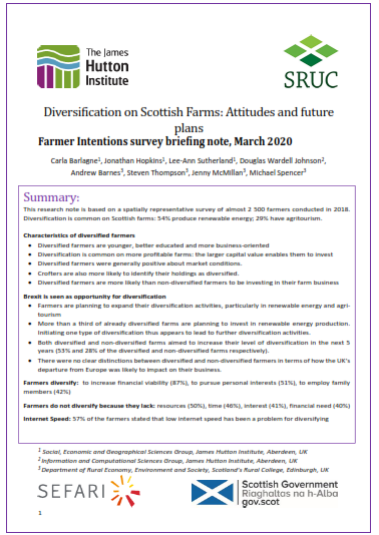
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SRUC

Diversification on Scottish Farms: Attitudes and future plans

Farmer Intentions survey briefing note, March 2020

Carla Barlagne[1], Jonathan Hopkins[1], Lee-Ann Sutherland[1], Douglas Wardell Johnson[1], Andrew Barnes[1], Steven Thompson[2], Jenny McMillan[1], Michael Spencer[3]

Summary:

This research note is based on a spatially representative survey of almost 2 500 farmers conducted in 2018. Diversification is common on Scottish farms: 54% produce renewable energy; 29% have agritourism.

Characteristics of diversified farmers

- Diversified farmers are younger, better educated and more business-oriented
- Diversification is common on more profitable farms: the larger capital value enables them to invest
- Diversified farmers were generally positive about market conditions.
- Crofters are also more likely to identify their holdings as diversified.
- Diversified farmers are more likely than non-diversified farmers to be investing in their farm business

Brexit is seen as opportunity for diversification

- Farmers are planning to expand their diversification activities, particularly in renewable energy and agri-tourism
- More than a third of already diversified farms are planning to invest in renewable energy production. Initiating one type of diversification thus appears to lead to further diversification activities.
- Both diversified and non-diversified farms aimed to increase their level of diversification in the next 5 years (51% and 28% of the diversified and non-diversified farms respectively).
- There were no clear distinctions between diversified and non-diversified farmers in terms of how the UK's departure from Europe was likely to impact on their business.

Farmers diversify: to increase financial viability (87%), to pursue personal interests (51%), to employ family members (42%)

Farmers do not diversify because they lack: resources (50%), time (46%), interest (41%), financial need (40%)

Internet Speed: 57% of the farmers stated that low internet speed has been a problem for diversifying

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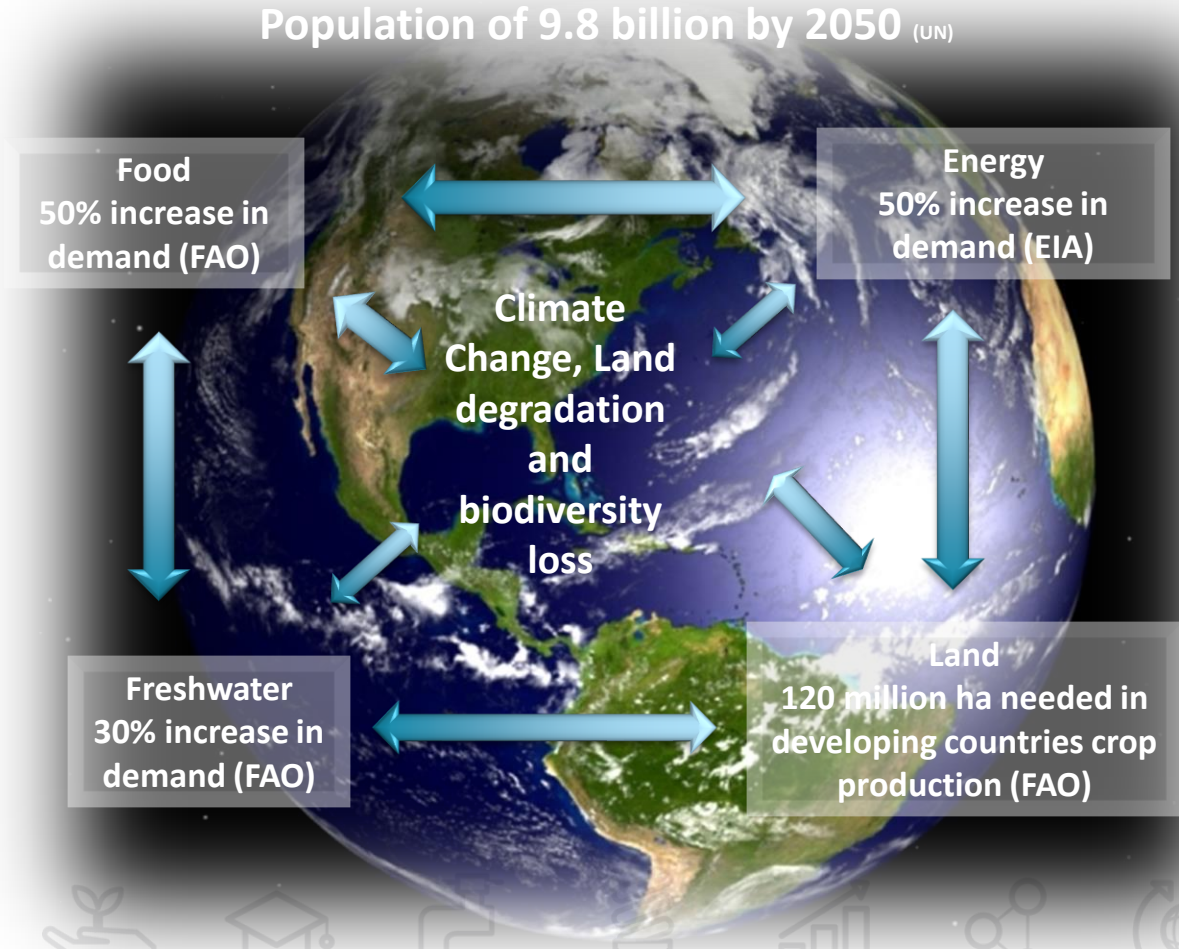
Global Challenges



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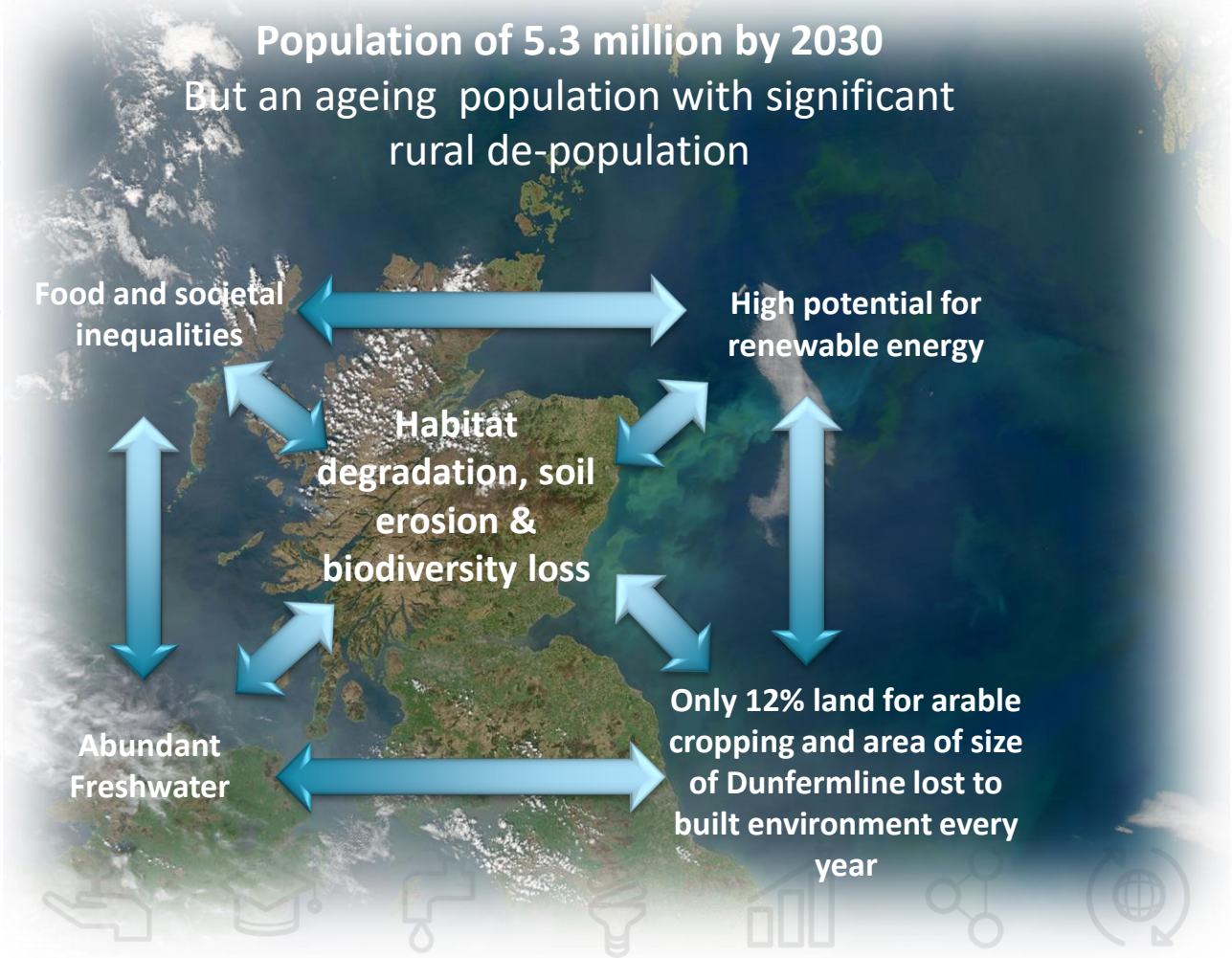
Challenges in Scotland



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Open Science Campus

- Innovation happens when people, problems, opportunities, ideas, technologies and empathy converge
- Co-location is not enough - we embed people so there is intimate co-location – no hard walls or exclusive offices / labs and all use common facilities
- The public and citizens are also needed to tackle the biggest challenges so we are open to them and our locations; our size and the way we work make this easier
- We are open with our data, information and knowledge and open to working with the public, private and third sector and can help facilitate international cooperation through our networks

Flagship initiatives

- Advanced Plant Growth Centre
- International Barley Hub
- Hydronation International Centre
- Glensaugh Climate-Positive Farming Initiative
- International Land Use Study Centre

Advanced Plant Growth Centre

Flagship Director: Professor Derek Stewart

- use **next generation controlled pre- and post-harvest environments** combined with **high throughput technologies to monitor plant physiology** to deliver the **underpinning science** that will lead to **new crop varieties.**

- **The varieties** can feed a growing population in the face of environmental change by **delivering on the promise of sustainable intensification** support technologies that **provide varieties and technologies to support the emerging industries of precision and controlled environment agriculture**.

APGC – Science

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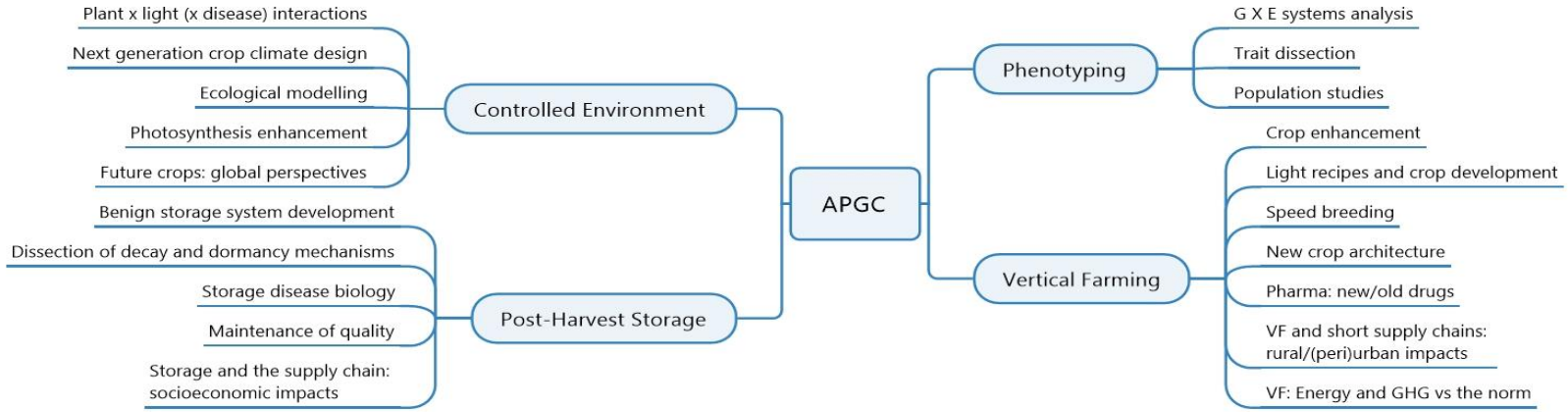

Occam Biosciences

Deep Science Ventures

ADVANCED PLANT GROWTH CENTRE

INTERNATIONAL BARLEY HUB

International Barley Hub

Flagship Director: Professor Robbie Waugh

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Mobilising untapped genetic diversity

a. Rapid evolution of a new domesticated barley gene pool.
b. Accessing and shuffling genetic diversity
c. A MAGIC population for genetics and breeding of Scottish barley

Safeguarding production

a Climate resilience
b Reduced inputs
c Underpinning Technology Development

Barley for future farming

a Adaptation to reduced Nitrogen (N) inputs
b. Phenotypic responses to soil pH and nutrient availability
c. How does Bere barley cope with Mn deficient soils?

Data management and Open Science

a. Automated computational pipelines for transparent and reproducible transcriptome analysis .
b Data management software

Underpinning Resources

Germplasm collections, databases, data, tools, technologies

Training – BARIToNE (BARley Industrial Training Network)

Germplasm collections, databases, data, tools, technologies

Hydronation International Centre

Flagship Director: Professor Rachel Helliwell

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- Aims to become the world leading centre to deliver solutions for sustainable water management to business, regulators, academia and policy.
- **HQ at Craigiebuckler**

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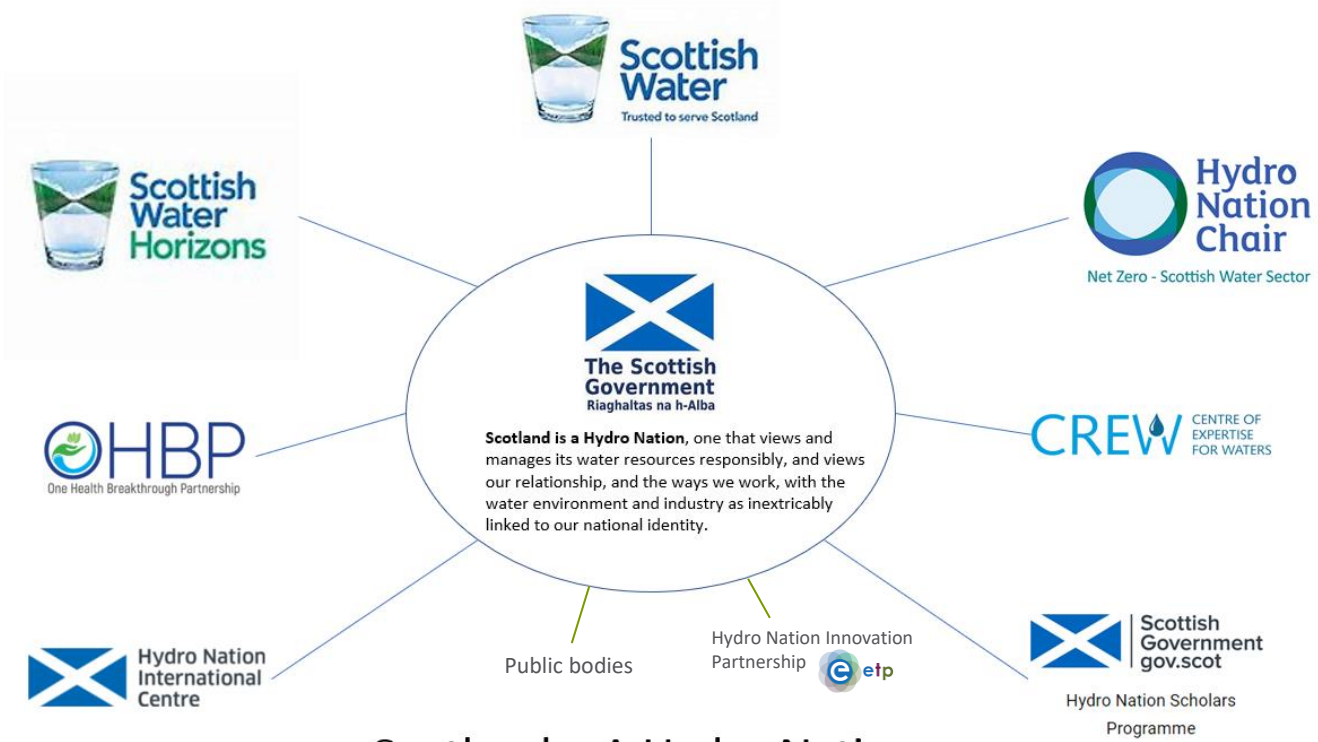

Scotland – A Hydro Nation

SEPA Scottish Environment Protection Agency · NatureScot · dwqr · water industry commission FOR SCOTLAND · ZERO WASTE SCOTLAND · Scottish Canals · Food Standards Scotland

Glensaugh Climate-Positive Farming Initiative

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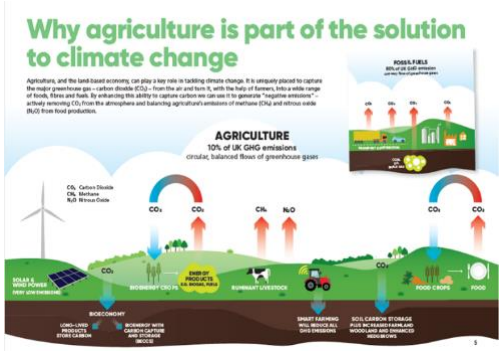
Flagship Director: Professor Alison Hester

- **Climate-positive farming** - a transformational approach to farming that achieves net-zero or negative carbon emissions, whilst also protecting and enhancing the natural assets of a farm and ensuring long-term financial sustainability of the farm business.
- **Requires innovations** in technology and in ways of working. At Glensaugh we can underpin this with robust research.
- **Testing and demonstrating** results on the ground - essential if farmers, policy makers, investors etc are to be persuaded to make climate-positive farming a priority.




Peatland restoration / moorland management
Regenerative catchment / water management
Red Deer Farm
New Woodland
Wind Energy
New Woodland
Agroforestry
Green Hydrogen / EV Hub
Solar PV
Climate Incubator Hub
Rotational/mob grazing
Species-rich pasture
Biomass heating
New Woodland
https://glensaugh.hutton.ac.uk/
2D

International Land Use Study Centre

Flagship Director: Professor Lee-Ann Sutherland

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Enabling land based science that makes a difference

Training Lab	Innovative Research	Nexus
Equipping for research excellence	New Research Generation	Opening land use science

Strategic Priorities

New grants | New funders | New approaches

- Enabling transformational change in land use
- Evaluating and supporting green finance initiatives with independent science
- Identifying the right scale and place for land-based intervention measures
- Supporting environmental and social justice in land relations
- Developing practical measures to support wetland and peatland restoration
- Bridging the science – policy - stakeholder interface with integrated data and translational research

Enabling science
Infrastructure

Just Transition Hub

- world-class, state-of-the-art, net zero innovation hub and capacity building centre of excellence
- the ‘go-to’ place for the engagement tools, methods and facilitation of net zero solutions and innovation
- New facilities to model, visualise, test and implement adaptation options and levers for change
- Co-location of spin-in and spin-out companies


Any questions?