



Sustainable Intensification & Ecosystem Services: Two Sides of the Same Coin?

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What is SIP?

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- £4.5M Defra investment over 3 years
- Three linked research projects:
- SIP1: Integrated Farm Management (IFM) for improved economic, environmental and social performance (Lead: NIAB).
- **SIP 2: Opportunities and risks for farming and the environment at landscape scale (Lead: Exeter).**
- SIP 3: The influence of external drivers and actors on the sustainability and productivity of farming (Lead: ADAS). Multidisciplinary (natural and social sciences, economics)



SIP's Ambition

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- Create a community of practice within case study areas, including farmers, land managers, supply chains, researchers, policymakers and other stakeholders.
- Develop new, integrated metrics for Sustainable Intensification (SI) and **use to determine the performance of English and Welsh farming, now and into the future.**
- Provide tools and demonstrate approaches to help promote individual or collective actions that benefit **farming productivity** and the environment.
- Establish a route to impact between research and innovation, policy development, application at farm and landscape scales and measurable changes in SI performance

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SIP 2



- Aims to develop an understanding of the actions required at landscape scales to deliver SI by:
 - Investigating the spatial variation in land capability and environmental risk
 - Identifying where coordinated action is required at these scales to achieve SI, and design and test methods of collaborative working in the study areas
 - Understanding the barriers to collaboration and investigate for mechanisms through which this can be encouraged

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4 main strands



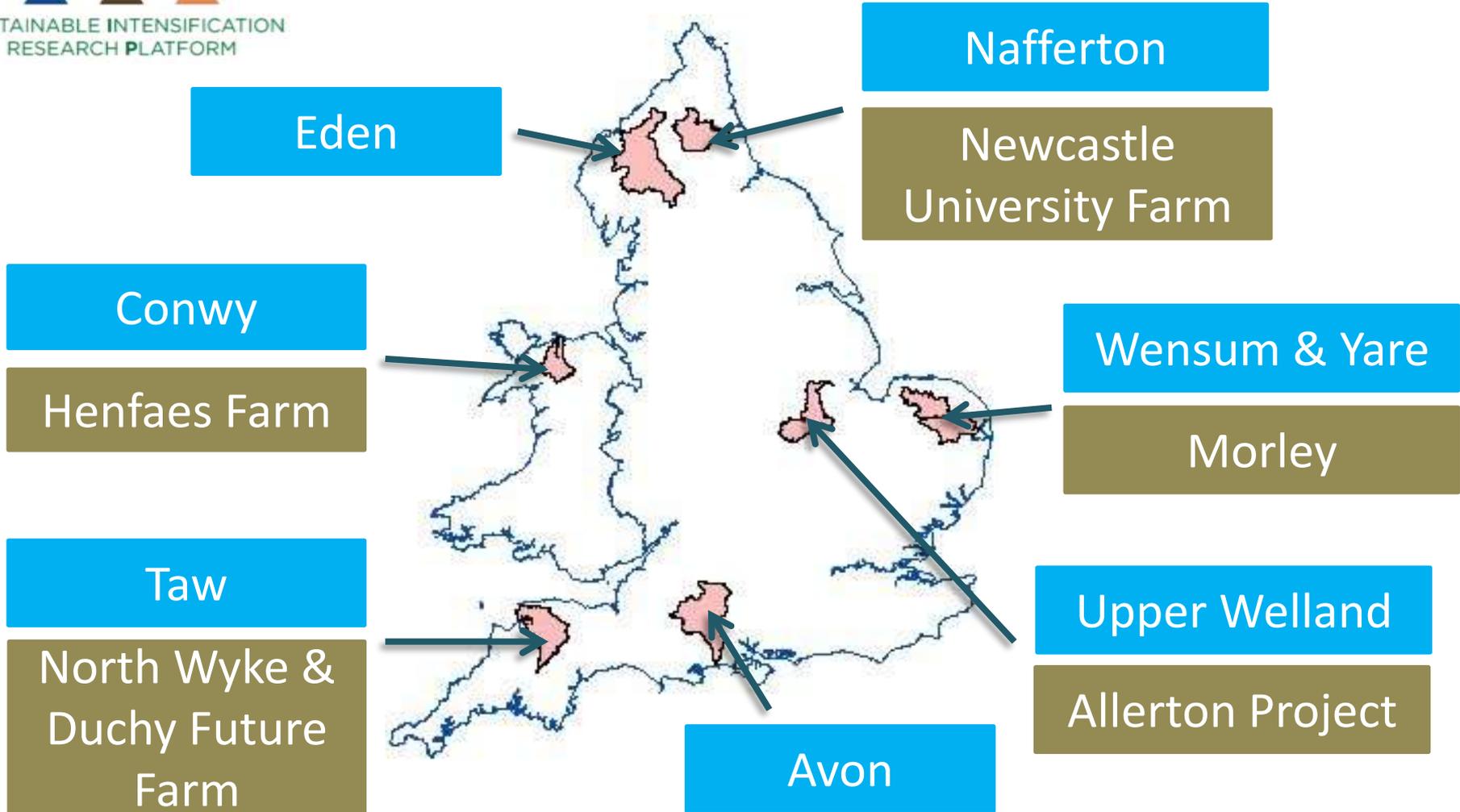
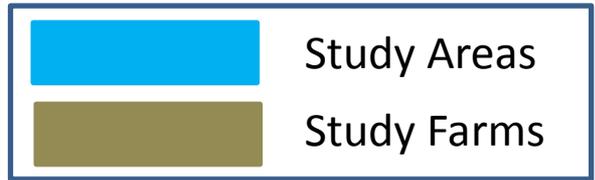
- **Understanding farmer collaboration** (literature review, baseline survey across study areas and follow up focus groups etc).
- Developing and applying **Dynamic Landscape Typology Tool**.
- Applying and **testing landscape interventions** in platform case study areas.
- Design and develop a **SI benchmarking system**.

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Where is SIP?





What about Ecosystem Services?



**With thanks to my collaborators
on the rest of the presentation:
Leslie Firbank, Richard Gunton,
and Alex Inman.**

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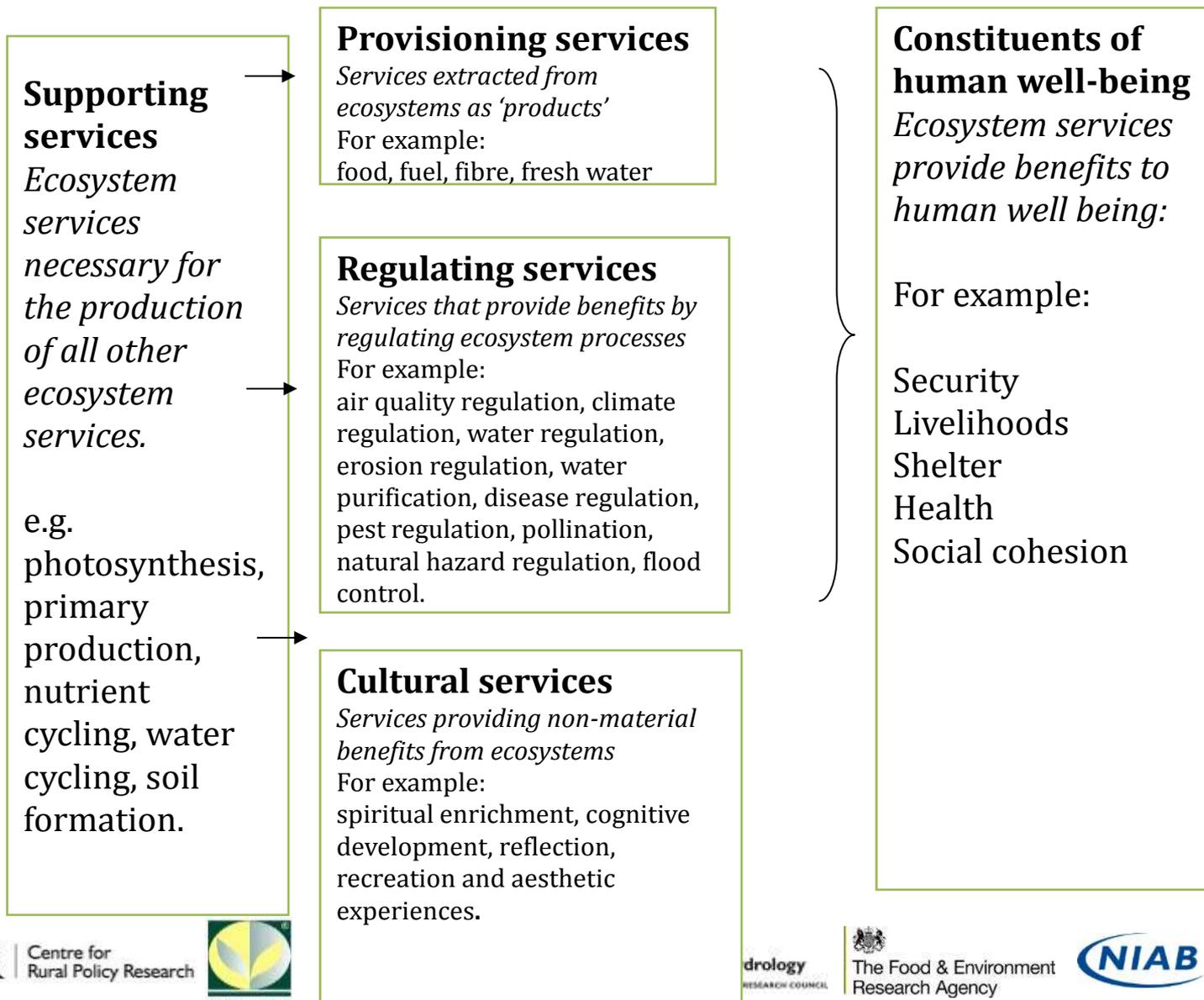


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- But there are some big questions around the inter-relationship of these 2 big ideas.
- Does an Ecosystem Services approach necessarily imply sustainability?
- And what is the role of non-provisioning ES in SI?

Figure - Ecosystem services: general framework (after MA, 2005)



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- SI at its most basic is about efficiency – most food output for least input.
- ‘More from less’ using Total Factor Productivity as an indicator of achieving SI.
- But this narrow focus has attracted increasing criticism.

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- Efficiency pays little attention to wider sustainability criteria (Loos et al, 2014).
- It is possible to be *efficient* without being sustainable.
- Total Factor Productivity for food does not take account the negative externalities experienced by non-provisioning services (Franks, 2014).
- What about the type, variety and nutritional content of food produced? (Garnet, 2014, BBSRC SI Working Group).

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Buckwell et al, 2014:



‘ sustainable intensification ... should include examples where there is a rise in the non-provisioning services, i.e. the environmental services, produced per hectare..... A correct interpretation of sustainable intensification should embrace examples where the output or production which is intensified per hectare are the conservation outputs, e.g. pollinators or fledged lapwings per hectare.....So pursuing intensification of environmental services per unit of land is critical, and sustainable intensification must put the task of producing non-provisioning eco-system services alongside the provisioning services of food and energy.’



3 visions of SI:



- **Agronomic efficiency (“*more from less*”)**

Focus on: *closing yield gaps through nutrient and water management, precision farming, selective breeding, etc.*

- **Local sustainability (“*without compromising the ability of future generations...*”)**

Focus on: wider aspects of land management and local ES.

- **Global sustainability (“*mindful of the social, economic and ethical context...*”)**

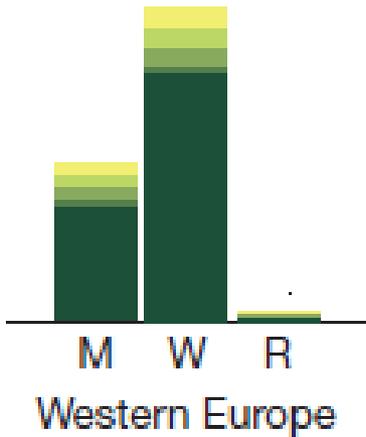
Focus on: nutrition and diet, global FS and global ES.



1. Agronomic efficiency:

Closing yield gaps economically

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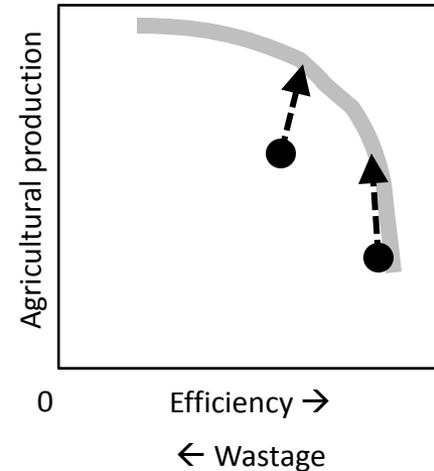


[Mueller et al. 2012](#)
*Closing yield gaps
though nutrient and
water management.*
Nature 490:254–257

Optimise:

- Yield vs.
- Inputs:
 - N
 - P
 - K
 - irrigation
 - pesticides
 - etc...

Solve in monetary
terms, with or
without penalties
for pollution





2. Local sustainability:

“the process of delivering more safe, nutritious food per unit of input resource, whilst allowing the current generation to meet its needs without compromising the ability of future generations to meet their own needs” (Smith 2013)

Maintain the **natural capital** on which food production depends:

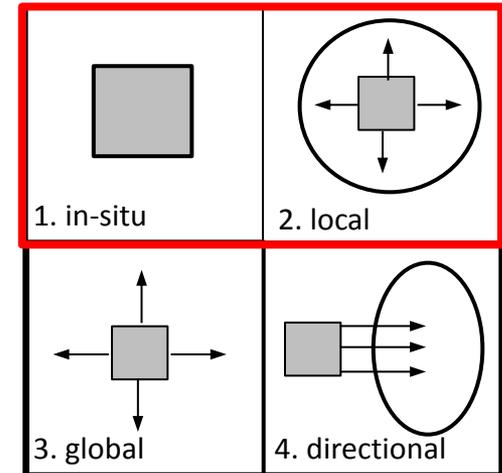
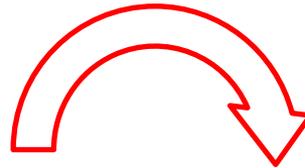
- **Soil** and nutrients
- Pollinators
- Biocontrol agents?
(=‘supporting services’?)

Other natural capital:

- Mycorrhizas
- Genetic resources
- Water supply; CO2...

Optimise:

- Agricultural production over time





3. Global sustainability:

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Balance intensification of provisioning ES:

- Yields of Crops, Livestock production...

... against 'intensification' of all kinds of ES:

- Soil maintenance
- Biocontrol
- Pollination
- Farmland bird diversity / abundance
- Recreation
- Aesthetic landscape quality
- Climate cooling
- Air and water quality (N, P)
- Animal welfare (livestock)

Optimise:

- a politically-negotiated balance of all ES...



3. Visions for SI

- Agronomic efficiency (*“more from less”*)
 - Measurable goals; Clear methods → tractable
- Local sustainability (*“without compromising the ability of future generations...”*)
 - Measurable goals; Multifarious methods → experimental
- Global sustainability (*“mindful of the social, economic and ethical context...”*)
 - Incommensurate goals; Multifarious methods →

political!



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A bigger vision for SI...

*Good farming and the need for
inter-disciplinarity:*

- Economical (agronomy; husbandry; economics)
- Sustainable (agro-ecology)
- Globally responsible (climate and earth sciences)
- Nutritious (dietetics)
- Aesthetically pleasing (cultural studies)
- Favourable to biodiversity (ecology)
- Kind to animals (psychology; ethics)
- Socially appropriate (sociology; ethics)
- Legal (policy science)

→ Ecosystem Services and beyond...



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- **Sustainable Intensification & Ecosystem Services: Two Sides of the Same Coin?**
- They should be but it is a battle that has to be won!