

SIP



SUSTAINABLE INTENSIFICATION
RESEARCH PLATFORM



SCIENCE, POLICY AND PRACTICE NOTE 7 Dynamic Landscape Typology Tool for Sustainable Intensification





The Issue

Sustainable intensification is defined as changes in agricultural land management that maintain or increase agricultural production whilst enhancing or maintaining a wide range of ecosystem services that improve our quality of life, including the conservation of natural and historic landscapes, supplying of clean drinking water, health through recreation, and opportunities for rural employment.

Sustainable intensification means adopting new farm management practices that improve the efficiency of farming, mainly by careful management of inputs such as chemicals and fertilisers, but also benefiting the environment. Technical approaches such as the adoption of precision farming and conservation tillage offer reductions in fertiliser and fuel use whilst reducing soil erosion and pollutant runoff, whilst agro-ecological approaches such as enhancement of natural biocontrol and mixed swards of grasses, legumes and herbs offer reductions in chemical use and increase climate resilience.

Achieving management change will require targeted investment of time and resources, especially support of farmer-to-farmer knowledge exchange and technical networks, in the areas most in need and likely to benefit. The very wide range of needs means that no single assessment of priorities will meet the expectations of all interest groups, and there is a need to share the available evidence in a way that allows exploration of different views to develop a consensus on next steps. In particular, there is a need to understand the significance of local issues in the context of regional disparities.

Our objective in this work was to therefore develop a dynamic national 'Landscape Typology' for use by key organisations such as Defra and Natural England to better understand regional differences by interactive computer mapping of the needs and opportunities, and providing a free tool for identifying areas of similar status that could become the basis of advisory zones, and for exploring the consequences of prioritising different needs.

“Whatever you do must be sustainable to ensure production from your land in future years; environmental sustainability protects future productivity. There is a need for better directives from science and policy.”

Farmer – Conwy Valley, Wales

Outcomes		
Economic	Environmental	Social
Production	Biodiversity	Direct Employment
Loss	Air Quality	Indirect Employment
Waste	Water Quality	Recreation
Efficiency	Water Quantity	Public Health
Profitability	Greenhouse Gases	Ethical Standards
Costs	Carbon Sequestration	Landscape Character
Quality	Flooding	Cultural Value
Other	Pollination	Other
	Soil Quality	
	Other	

Economic, environmental and social outcomes affected by Sustainable Intensification practices.

SIP's Response

Web Mapping Tool

We developed a mapping tool, freely accessible via the web, which allows users to visualise the distribution of more than 100 'outcome' indicators of the status of rural England and Wales. The indicators measure the relative need for improvement or protection of rural areas and their inhabitants, and were developed by integration of a wide range of publicly funded surveys. The indicators are organised by theme:

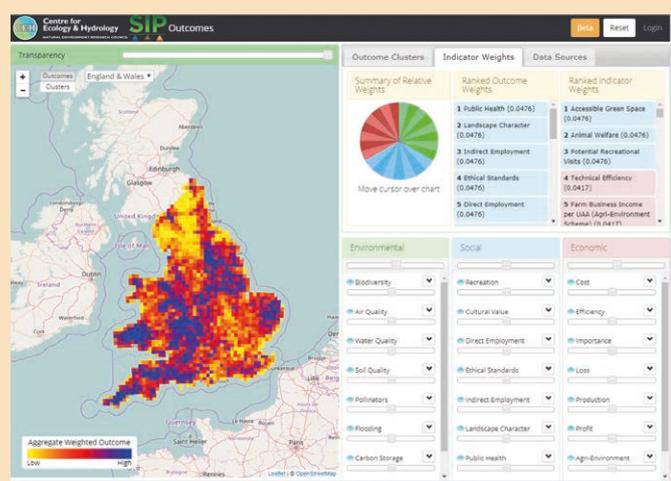
- Economic indicators map the productivity and efficiency of farming, including sales per farm worker or area of agricultural land, expenditure on crop protection chemicals and veterinary medicines, and payments received under agri-environment schemes.
- Environmental indicators map biodiversity hotspots for a wide range of plants and animals, and risks relating to atmospheric and river pollution, soil erosion and flooding. Selected ecosystem services to agriculture are also mapped, such as the abundance of insect pollinators.
- Social indicators map the cultural and recreational value of the countryside, such as the presence of historic farm buildings and publicly accessible greenspace, but also the sustainability of rural incomes and employment opportunities.

Guidance on the source and interpretation of each indicator is provided, along with a clustering or zonation tool that identifies similar areas in response to users changing the importance of the themes by moving sliders. The created maps can be shared

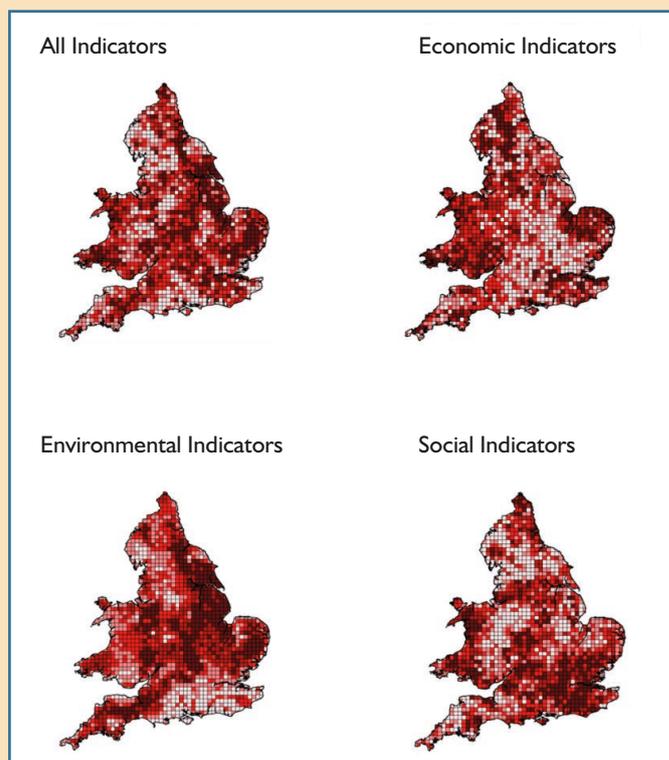


with colleagues and are intended to help understand where the needs for Sustainable Intensification practices are most similar.

The web mapping tool is designed as an open system, so that new spatial datasets can be easily uploaded and integrated with the existing indicators.



Identification of similar areas using the web mapping tool to weight the importance of outcomes.



Map of indicator 'hot spots' for improvement or protection of economic, social and environment outcomes.

“High importance is placed on jobs provided by farming, these keep people in their communities, support local economy and villages. Well-kept farmland and initiatives also support tourism, bringing further benefits to the local economy.”

Farmer – Conwy Valley, Wales





Targeting Tool

To further aid the targeting of resources, we developed a separate tool that maps the potential farm interest in 20 Sustainable Intensification practices, alongside a broad assessment of our confidence in them having detectable positive or negative impacts on the 'outcome' indicators. The latter was substantially based on earlier government funded work by the University of Hertfordshire.

The practices assessed are diverse, and include precision farming, business diversification, animal health and welfare improvement, and habitat creation. With the support of a small number of farm advisors, the individual practices have been scored for the potential benefits and demands they place on farm managers in terms of skill, labour and costs, and in terms of their compatibility with existing enterprises.

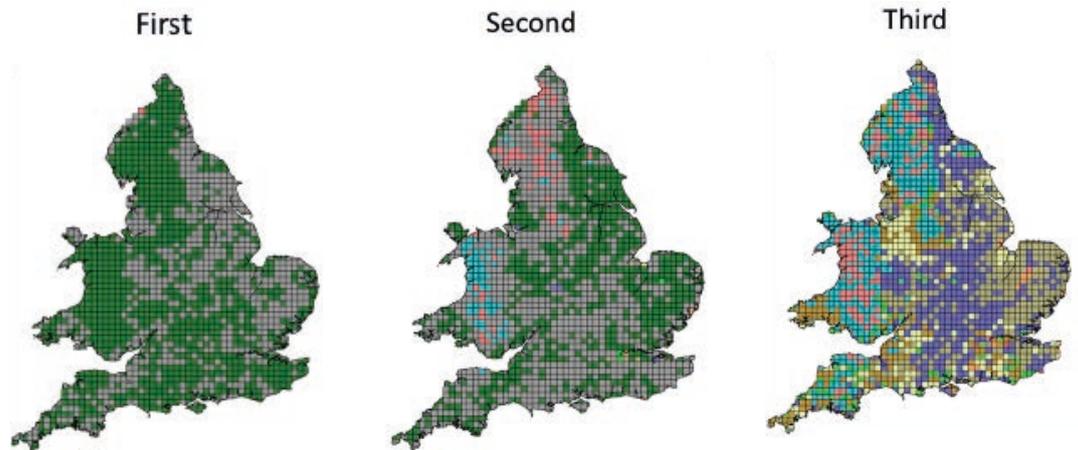
Simple rules are used to compare the demands with national agricultural survey data on 'structural' indicators known from the literature to affect the capacity for management change and rate

of adoption of new practices, such as farm size and tenure status, and farmer age and education. To reflect variability in individual preferences for economic, conservation or lifestyle changes we have also incorporated aspects of the existing Defra segmentation models of farmer attitudes and behaviours to adjust the rules. The approach is generic and can be easily applied to new practices.

The output is an additional set of 'relevance' indicators that map potential level of interest and timescale of uptake, and are being incorporated into the Web Mapping Tool to show where there are greater opportunities to engage with farmers to encourage adoption of practices that address the regional needs mapped by the 'outcome' indicators.

By combining the 'outcome' and 'relevance' indicators the Targeting Tool is further able to rank areas according to the estimated response to individual or multiple practices, and measure the benefits of targeting support. The approach to ranking is similar to that used in optimising habitat reserves.

- Animal Improvement and Acquisition
- Animal Nutrition and Growth
- Integrated Crop Protection
- Indirect Diversification
- Direct Diversification
- Resource Trading
- Soil Retention
- Grass Improvement
- Irrigation Efficiency
- Habitat Creation
- Soil Structure
- Precision Farming
- Nutrient Efficiency
- Conservation Tillage
- Animal Health and Welfare



Top three sustainable intensification strategies. Prioritised for delivering local improvements in outcome indicators.



Opportunities for Policy and Practice

- The typology can be used to identify concentrations of farms with the characteristics associated with uptake of specific practices. This is relevant where policy objectives are seeking to encourage the adoption of particular farm practices.
- The capability of the typology to provide increased access to information on farming systems and structural characteristics of farms in areas may generally result in the better design of interventions, and insights into the technical or land use changes that could best address policy objectives.
- More significantly, the typology is capable of identifying relatively coherent areas with particular characteristics in common. These need not be areas previously identified as needing to achieve particular policy targets, but simply areas where socially desirable practices have the potential to be relatively widely adopted either individually or in sets of practices.
- An ecosystem approach implies that greater attention should be directed to the interactions amongst different ecosystem services. The typology makes explicit the possible co-benefits associated with the adoption of particular practices, and the changes in the efficiency of a spatial targeting approach as the number of benefits included in the analysis is changed.
- The typology indicates opportunities and potentials at a relatively broad scale. It does not indicate the situation on individual farms, although the best available survey statistics are used to provide relevant indicators for small areas. It therefore represents a first stage in a process towards the promotion of Sustainable Intensification practices leaving the initiative to be taken by government, groups of farmers or their representatives, or by commercial organisations.
- The typology provides a means of identifying similar regions within which traditional agricultural extension activities might be organised. Advice might be oriented towards practices that offer 'win-win' opportunities, which can improve farm profitability but also generate environmental or social benefits. This might include farm demonstration projects, open days and discussion groups. In the longer term, this might promote the development of more locally specific diversified farming systems, perhaps incorporating particular livestock breeds or plant varieties.



“The Conwy Valley is too big to be a single collaboration – Smaller collaborations, with less diversity in terms of farming approach, work better.”

Farmer – Conwy Valley, Wales



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Based on findings from the SIP Landscape Typology prioritisation of sustainable practices workshops in the Conwy, Upper Welland and Taw catchments.

Further Resources

The Dynamic Landscape Typology Tool can be accessed via the SIP website www.siplatform.org.uk/decision-support-tools

The below reports can be accessed via the Defra website. Please visit <http://bit.ly/2tYtWnx>

Anthony, S., Boatman, N., Cosby, J., Crowe, A., Emmett, B., Henrys, P., Hodge, I., Lee, D., Midmer, A. and Thomas, A. (2016). *Landscape Typology – A Framework for Prioritisation of Sustainable Intensification Strategies*. Report for Defra project LM0302 Sustainable Intensification Research Platform Project 2: Opportunities and Risks for Farming and the Environment at Landscape Scales

Henrys, P., Anthony, S., Boatman, N., Brown, M., Cooper, J., Cosby, J., Crowe, A., Emmett, B., Johnson, C., Lee, D., Midmer, A., Thomas, A. and Watkins, J. (2016). *Dynamic Typology Tool – Initial Development and Future Roadmap*. Report for Defra project LM0302 Sustainable Intensification Research Platform Project 2: Opportunities and Risks for Farming and the Environment at Landscape Scales

Lee, D., Midmer, A., Henrys, P. and Hodge, I. (2016). *Report on Stakeholder Workshops to Introduce a Landscape Typology Modelling Framework*. Report for Defra project LM0302 Sustainable Intensification Research Platform Project 2: Opportunities and Risks for Farming and the Environment at Landscape Scales

Cosby, J., Anthony, S., Emmett, B., Henrys, P., Lee, D., Midmer, A. and Thomas, A. (2017). *Identifying land-use opportunities, risks and conflicts to develop Sustainable Intensification targeting approaches*. Report for Defra project LM0302 Sustainable Intensification Research Platform Project 2: Opportunities and Risks for Farming and the Environment at Landscape Scales

Acknowledgements

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The Sustainable Intensification Research Platform (SIP) is a multi-partner research programme comprising academia, farmers, industry experts, environmental organisations, and policymakers.

Funded by Defra and the Welsh Government, the platform explores the opportunities and risks of Sustainable Intensification (SI) from a range of perspectives and landscape scales across England and Wales.

The Platform, run from 2014-17, has investigated ways to increase farm productivity, reduce environmental impacts, and increase the benefits that agricultural land provides to society.



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More Information

Visit: www.siplatform.org.uk

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