

Rewilding Mathematics

An ICMS Mathematics for Humanity programme

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An adventure in bringing ecology and the mathematical sciences together to strengthen the scientific basis for rewilding.



What is rewilding?

A radical approach to ecosystem conservation with a focus on ecosystem services and a flexibility about what species should be introduced to deliver those services.



There is a long history of application of mathematical techniques in biological systems. e.g. simple models can

predict important ecosystem behaviours: biologically controlled systems (e.g. agricultural pests controlled by natural predator, spraying with DDT leads to increase in pest numbers, exactly the opposite of what you want). This predicted by simple mathematical model. You can also find practical applications in fisheries, showing what fishing practices provide a good yield while keeping fish populations at sustainable levels.

The 'Re' is as in 'remodelling' rather than 'returning' or 'restoring' to a previous state. Rewilding aims for resilient ecosystems which work for humans and nature with a



minimal need for human management and intervention. In the context of climate change and other human

impacts on habitats and wildlife populations it is impossible to 'get habitats back to the way they were'...and here there is also the hidden question of the historic baseline: 'the way they were'...10 years ago? 100? 1000? Rewilding is pragmatic in acknowledging the scale of habitat change and seeks to transform depleted landscapes into resilient, vibrant ecosystems and accepts that such ecosystems may feature combinations of species that have never coexisted before.

How can the mathematical sciences help?

Rewilding is increasingly recognised as an exciting approach to ecosystem regeneration. Charities such as *Rewilding Britain*, *Rewilding Europe* support rewilding initiatives and the high-profile example of Knepp (Charlie Burrell and Isabella Tree) has caught the public imagination.

For more information about Mathematics for Humanity programmes and how to apply

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<https://www.icms.org.uk/funding-opportunities/mathematics-humanity>



If rewilding is to be used more widely it needs a solid scientific foundation, underpinned by relevant ideas and methodology from the mathematical sciences. Mathematical tools such as niche theory, food web analysis, network theory and population dynamics all seem relevant but have yet to be applied in the context of rewilding. Successful application of these tools will lead to a robust framework for setting up and maximising the chances of success of new rewilding initiatives.

Statistical methodology will be required to process ecological data and to set up robust monitoring schemes for rewilding projects. Such techniques are important for providing measures of success and evidence-based interventions in the early stages of rewilding projects.

The seminar series runs from January through to May 2024, with four hybrid seminars taking place in various venues around the UK. The objectives of the seminar series are to promote new collaborations between mathematical scientists and ecologists interested in rewilding and to identify areas in which the mathematical sciences might successfully be used to support rewilding.

The workshop, to take place in Edinburgh 17- 21 June 2024, will be an opportunity to bring together and discuss in detail the ideas and collaborative opportunities that have appeared during the course of the seminar series.

<https://www.icms.org.uk/RewildingMathematics>

