# ESGI195 Challenge: Development of a Donkey Risk Index (DRI)

**This ESGI195 challenge is sponsored by**

The Donkey Sanctuary
University of Exeter Translational Funding
International Centre for Mathematical Sciences

**Overview**

The Donkey Risk Index (DRI) is a composite index designed to assess the level of risk to donkey welfare by systematically combining multiple data sources into a single, interpretable measure. It integrates indicators of exposure (such as donkey population size and density) with measures of vulnerability, which include susceptibility, coping capacity, and adaptive capacity, to reflect the socio-economic, environmental, and infrastructural conditions influencing welfare outcomes. By aggregating, scaling, and modelling these components - often using proxy indicators due to limited direct welfare data - the DRI provides a structured framework for identifying where donkeys are most at risk, enabling comparisons of the charities impact across regions and supporting decision-making for targeted interventions.

To improve robustness and applicability, this ESGI challenge focuses on the underlying methodology and assumptions of the Donkey Risk Index (DRI). This framework integrates multiple proxy indicators to represent the factors contributing to donkey welfare risk, including socio-economic, environmental, and population-based factors. The working hypothesis is that refining existing proxies, incorporating additional indicators, and developing predictive spatio-temporal models will enhance the charity's ability to detect

trends, identify risk drivers, and support more effective reporting, management and planning.

**Challenge Focus**

The study group will investigate the theoretical and methodological properties underlying the Donkey Risk Index (DRI) and relate these to practical performance and applicability in its current implementation. The aim is to better understand how different proxy indicators and model structures contribute to the accuracy and interpretability of risk estimates, and how limitations or inconsistencies may affect decision-making.

Participants will work with existing DRI datasets alongside newly identified proxy indicators and modelling approaches. The group will:

- Identify key structural components and assumptions within the DRI framework, including limitations and biases
- Explore and test additional proxies
- Develop predictive spatio-temporal modelling approaches for trend detection and attribution of risk drivers

**Outcome**

The expected outcome is a set of insights and methodological improvements that strengthen the Donkey Risk Index (DRI). This may include identifying limitations or inconsistencies in current risk indicators, proposing refined or additional proxies for further inclusion, and developing spatio-temporal modelling approaches to better capture trends and key risk drivers, to support more accurate, actionable, and policy-relevant reporting, risk management and planning.