Re-Livestock
RESILIENT FARMING SYSTEMS

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PRACTICE ABSTRACT 16
Modelling future European food systems

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WP6: Re-Design of circular food systems

Modelling Climate-Resilient European Food Systems

How future European food systems should look like to be able to provide healthy and sustainable diet under climate change? **What and how many animals** should be kept and what they should be fed with? **What crops** should we grow? **Which are the most effective agro-ecological and technological strategies** within the livestock sector to mitigate and adapt to climate change? These are all relevant questions that we aim to tackle in WP6. We will do so by combining a suit of computer models. **The Lund-Potsdam-Jena managed land model (LPjmL)** will provide data on potential future crop yields in Europe under multiple climate change scenarios (Figure 1).

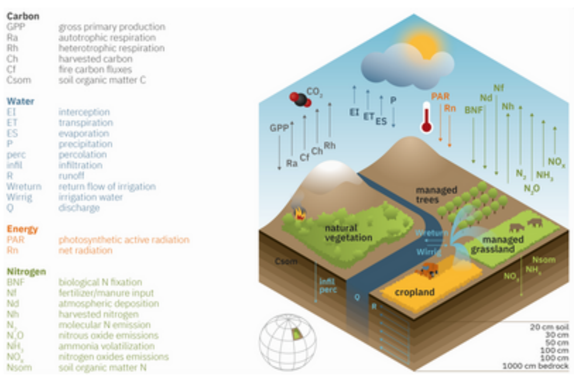

Figure 1. Graphical scheme of the LPJmL model. Each spatial unit can be covered by cropland, grassland, natural vegetation and biomass plantations. Cropland and grassland activities can be subject to different management (e.g. irrigation, fertilization, crop choice and settings of sowing dates). Each setting results in consistent stocks and flows of carbon (black), water (blue), energy (red) and nitrogen (green).

The **Circular Food Systems** model (CiFoS) (**Figure 2**) will use this crop data to model what **crops** we should grow and what **animals** we should keep for being able to produce a **healthy** and **sustainable** diet under the

different **climate change** scenarios, and **mitigation** and **adaptation** strategies.

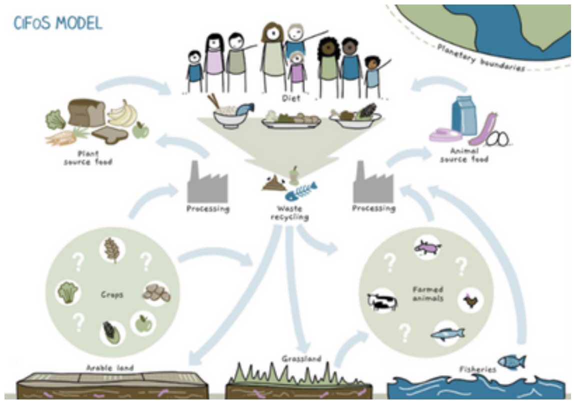

Figure 2. Graphical representation of the CiFoS model. The CiFoS model ingeniously ties multiple modules together (land, crops, fisheries, food and feed processing, waste recycling, livestock, human nutrition) to provide a healthy diet with the minimum environmental impact. CiFoS is unique because it embraces circularity principles due to its model structure: residual streams (by-products, manure, food waste) from one process become the input of another to estimate the environmental impact of healthy diets at a food systems level.

Local impacts and serious games

The **Livestock Spatial Allocation** model (LSAM) model will then use **CiFoS** outputs to assess the **impacts** environmental impacts at more local levels (e.g., **landscapes**). Finally, based on the modelling outcomes, we will develop a **serious game** that will be played with **European stakeholders**. The aim is to let them design **scenarios** for future **European food systems** based on their **visions** and **interests**, and explore via a **game setting** the **feasibilities** of such scenarios and the **compromises** that need to be made in order to make them possible.