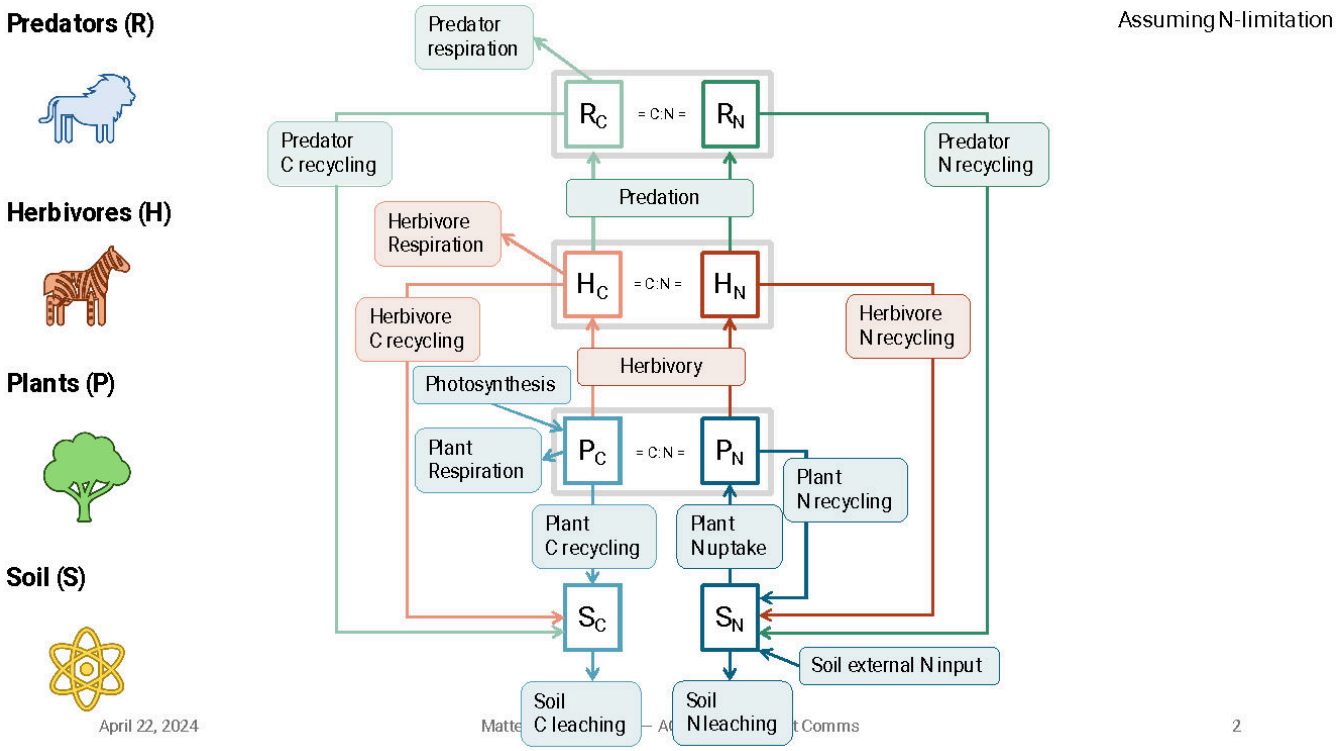
New unique tool available for nature-based climate solutions: the Yale/GRA ACC Model

The mathematical tools that scientists use to account for the amount of carbon captured and stored in ecosystems rarely consider the effects of animals. This stems from the assumption that because animals are much rarer than plants and microbes in ecosystems, their potential influence ought to be minimal. Yet, field studies have begun to show that this assumption may not be accurate, as was shown in the paper "Trophic rewilding can expand natural climate solutions" published by the journal *Nature Climate Change* in late March 2023. This is leading to a new field of enquiry known as Animating the Carbon Cycle (ACC).

On 31 March 2024, a paper "Rewiring the Carbon Cycle: A Theoretical Framework for Animal-Driven Ecosystem Carbon Sequestration" was published in the American Geophysical Union's *Journal of Geophysical Research: Biogeosciences* – a core publishing outlet for scientists working on carbon cycle dynamics worldwide. It was written by Matteo Rizzuto and Oswald J. Schmitz at the US-based School of the Environment, Yale University, and Shawn J. Leroux at the Memorial University of Newfoundland, Canada. Funding was provided by One Earth and Rewilding Europe through the Global Rewilding Alliance.



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In this paper, the authors present a model for characterising and even predicting the amount of additional carbon that an ecosystem or landscape could capture if wild animals were reintroduced. This is the ***Yale/GRA Animating the Carbon Cycle model***.

The modeling analyses incorporate insights from field research about the different ways that animals can affect carbon uptake and storage in ecosystems through their interactions with plants and microbes.

The analyses show that animal presence fundamentally changes the relationships between plants, microbes, and the environment. In turn, this leads to large changes in the amount of carbon captured and stored in ecosystems relative to conditions that exclude animals.

Overall, the authors found, on average, a twofold increase in ecosystem carbon sequestration when animals were included in their carbon cycle model. A scenario that includes herbivores but not predators showed the highest levels of carbon sequestration. Adding in predators decreased slightly the overall carbon sequestration, though it still remained much higher than a scenario with no animals.

This new model has now been applied for the European Bison in the Tarcu Mountains, Romania, indicating an almost 10-fold increase of carbon captured in grasslands and open-canopy forest gaps through the foraging of the bisons, stimulating plant growth and carbon capture through releasing nutrients, spreading seeds, and by trampling and compacting soils.

Other studies are also underway on (i) Forest Elephants in the Congo Basin, (ii) Pumas and, Guanaco in Chile, (iii) Pumas, Jaguars, and their shared prey White-tailed Deer and Collared Peccary in Mexico, and (iv) Tauros and wild horses in Croatia.

Hence, animals can be significant allies in fighting climate change as a key addition to the growing portfolio of nature-based climate change solutions.

Rewilding organisations are welcome to work with us to apply the model to their rewilding landscape or ecosystem. There is a modest cost to cover expenses. Please contact Magnus Sylvén magnus@globalrewilding.earth for information.

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