IMPERIAL

Effects of Carbon Dioxide Removal on the water-carbon-food-biodiversity nexus

Supervised by Dr. Yiannis Moustakis

Meeting the Paris Agreement climate targets will require the large-scale deployment of Carbon Dioxide Removal (CDR) methods, including afforestation/reforestation, agroforestry, and bioenergy crops with carbon capture and storage. These interventions alter land-surface characteristics affecting climate and the water and carbon cycle, while competing with other land and water uses—potentially causing severe socioeconomic consequences. Yet, future mitigation pathways heavily rely on land-based CDR, especially over the Global South.

How can we ensure this transition is fair and sustainable?

Join us to explore this question using state-of-the-art climate and hyper-resolution terrestrial biosphere models. You will explore the biogeophysical effects of CDR and its impacts on the integrated water-carbon-food-biodiversity nexus at global and regional scales. You will improve CDR representation in models and quantify the effects of different methods under high and low emissions scenarios.

Your goal: identify diverse CDR portfolios that secure food and water, maximize carbon sequestration, and avoid negative climate and biodiversity outcomes.

This project is ideal for you if you are passionate about climate, ecosystems, and hydrology and excited to conduct policy-relevant interdisciplinary research that informs sustainable and fair mitigation strategies. Along the way, you will build advanced skills in modelling, programming, big-data analysis, and machine learning.

Funding: This is a fully funded PhD project for home students, covering tuition fees for 3 years and a tax-free stipend for 3.5 years (2025/2026 rate of £22,780/year/).

You are welcome to apply if you have:

- a background in Civil/Environmental Engineering, Environmental Sciences, Geography, or other quantitative fields
- strong programming and data analysis skills (in e.g., Python, Matlab)
- a willingness to contribute to an inclusive, respectful, and diverse culture

To apply: Contact Dr. Yiannis Moustakis (y.moustakis@imperial.ac.uk) for further details and informal discussion. Please include:

- your CV
- a personal statement (1 page max)

Review of applications will begin immediately and continue until the position is filled.