

## PhD Position in Spatially Explicit Global Supply Chain Modelling

The research group 'Global Resource Use' at the Institute for Ecological Economics, Vienna University of Economics and Business (WU), announces an open PhD Researcher position in the field of spatially explicit modelling of raw material flows along global supply chains. This position is part of the project '**Resilience and Malleability of Social Metabolism**' (REMASS), a 5-year collaboration among six leading Austrian research institutions, funded by the Austrian Science Fund. REMASS aims to investigate the impacts of **global supply chain disruptions** – caused by factors such as wars, pandemics, and climate extremes – on resource use, inequality, and social well-being.

As a member of an interdisciplinary team at WU and within the REMASS consortium, the PhD candidate will **develop spatially explicit models to trace raw material flows** from extraction sites (e.g., mining of metal ores or harvesting of crops or timber) along sub-national and international trade routes to manufacturing sectors and final consumption. The candidate will build upon existing **physical multi-regional input-output (MRIO) models** (e.g., the FABIO model for global agriculture and food products) and enhance them with detailed information on the geographical distribution of resource extraction and sub-national trade patterns. The focus will be on **key materials that support provisioning services** in housing, mobility, and nutrition, such as timber for construction or metals (copper and lithium) for e-mobility technologies.

Using these models, the candidate will assess the **upstream material requirements** for providing e.g. housing or mobility services and the related material stocks (e.g., infrastructure), and investigate potential impacts of supply chain disruptions. Detailed supply chain data for selected materials will also be integrated into a novel **agent-based, environmental macro-economic model** run by another REMASS partner and capable of simulating non-linear socio-economic transition dynamics. Collaboration skills will be key, as the PhD candidate will work closely with another PhD candidate at the Institute of Social Ecology / BOKU University focusing on material stock modelling, as well as other PhD candidates in the wider REMASS consortium.

### Responsibilities:

- Develop and refine physical multi-regional input-output models for selected materials such as copper or timber.
- Develop methodologies for modelling sub-national trade and supply chains and implement these to refine the MRIO models for selected countries and commodities.
- Apply the spatially explicit MRIO models to trace raw material flows and related environmental impacts along global supply chains and investigate potential impacts of supply chain disruptions.
- Co-develop linkages between the spatially explicit MRIO models and agent-based models developed by the REMASS consortium.
- Collaborate with colleagues working on provisioning systems from a political ecology perspective on case studies on key services, e.g. nutrition, shelter and mobility.
- Set up and maintain databases and code structures, ensuring accessibility through public repositories such as Zenodo or GitHub.
- Lead the drafting of manuscripts for submission to international, peer-reviewed journals.

**Qualifications:**

- Excellent MSc degree in a relevant field (e.g., environmental science, industrial ecology, economics, geoinformatics, data science).
- Proficiency in programming, particularly in R.
- Enthusiasm for analytical thinking, data analysis and high-quality research.
- Experience in geospatial modelling and input-output analysis.
- Keen interest in the environmental impacts of global supply chains.
- Demonstrated experience in academic writing and publishing.

**We offer:**

- Being part of a cutting-edge research project that will develop innovative solutions for global sustainability challenges.
- Working within a dynamic and interdisciplinary team of leading experts.
- **A 3-year PhD position starting October 1<sup>st</sup>, 2024, with an option to extend the contract by one additional year.** Employment contract of 30 hours/week. Compensation is in accordance with the Austrian collective agreement for university employees, with a gross salary of 2,700-3,200 Euro per month, 14 annual pays.
- Excellent working conditions, modern facilities, and a friendly and supportive working environment.

If you are passionate about advancing research in global supply chain assessments and sustainability, we invite you to apply. Please send your application, including your CV, a cover letter explaining your motivation for this position, university grades and certificates, examples of your work (e.g., R scripts, your GitHub account, a scientific manuscript), and contact information for two references to Prof. Stefan Giljum ([stefan.giljum@wu.ac.at](mailto:stefan.giljum@wu.ac.at)) **until August 15<sup>th</sup>, 2024** at the latest.