ONE Planet
ONE Planet
Doctoral Training Partnership

UKRI

Natural
Environment
Research Council

Project title: Natural Resources and Urban Climate Strategies

(Ref: OP2202)

Keywords: Earth deposits, critical raw materials. Infrastructures,

One Planet Research Theme:
Climate & Climate Change ☒ | Earth System Processes ☒ | Anthropocene ☒ | Environmental Informatics ☐

Lead Supervisor: David Manning

Key Research Gaps and Questions:

1. *What natural resources are needed to deliver climate change strategies?*

2. How do strategies and infrastructures help to reduce emissions and climate risks in UK cities?

3. Do Urban Local Climate Change Strategies and Plans result in higher use of natural resources?

4. What environmental and economic risks and opportunities are associated with CC strategies?

Cities around the world and in the UK develop local climate plans (Reckien at al 2019). Climate actions, i.e. pieces of infrastructures, require large amounts of natural resources (e.g. sand, aggregates, lithium and cobalt) that should be sourced sustainably. Whereas several studies have addressed the content of local climate plans, information on the impact on natural resources of these plans is largely missing. For effective local climate plans, assessment methodologies need to be developed (Salvia et al 2021) with detailed analysis of the impacts of these strategies using e.g. Life Cycle Assessment and Material Flow Analysis (Baars et al 2020). The student will develop an analytical framework to evaluate the impact of climate change strategies on infrastructures and natural resources, contrasting approaches in England and Scotland. The study will assess climate change scenarios and natural resources, employing methods like: strategy analysis and resource accounting (RQ1+2); infrastructure mapping and LCA (RQ3); calculating mitigation, e.g. GHG accounting linked to the Tyndall Carbon Calculator (Manchester University), and adaptation, e.g. flood defence efforts (RQ3+4), and develop/apply a risk matrix for RQ5.

In collaboration with cities like Newcastle, Manchester, North Tyneside the study will determine whether local climate plans represent an effective means to mitigate GHG emissions and adapt cities to climate change without compromising natural resources or geopolitical relationships. The study will consider the different sectors and scopes that are under the control of Local Authorities (direct influence) to impose the implementation of their plans. The student will acquire innovative natural and social science tools, such as GHG accounting methodologies, geospatial tools, LCA and MFA, as well as the network-based interview and analysis methods. The study will advance quantitative and qualitative measures and research methodologies of the perceived risk and value of climate change adaptation and mitigation infrastructures and natural resource provisions.

Ref: Salvia,…Heidrich, O. (2021). Will climate mitigation ambitions lead to carbon neutrality? Renew. Sust. En. Rev. doi:https://doi.org/10.1016/j.rser.2020.110253; Reckien, D., (2018). How are cities planning to respond to climate change? J. Cleaner Prod. doi:10.1016/j.jclepro.2018.03.220; Baars, J.,.Heidrich, O. (2020). Circular economy strategies for electric vehicle batteries reduce reliance on raw materials, Nature Sustainability. doi:10.1038/s41893-020-00607-0.

Prerequisites: Strong analytical, mathematical and statistics skills. Engineering, natural science background; strong academic writing skills.
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