

**Project title:** The worsening impacts of Contaminated Lands/Soils due to Climate Change

**Ref:** OP2467

**Keywords:** Climate Change; Contaminated Lands/Soils; Environmental Health Risks; Climate Action (One of the 17 SDGs – Sustainable Development Goals by the United Nations, UN)

**One Planet Research Theme:**

Climate & Climate Change  | Earth System Processes  | Anthropocene  | Environmental Informatics

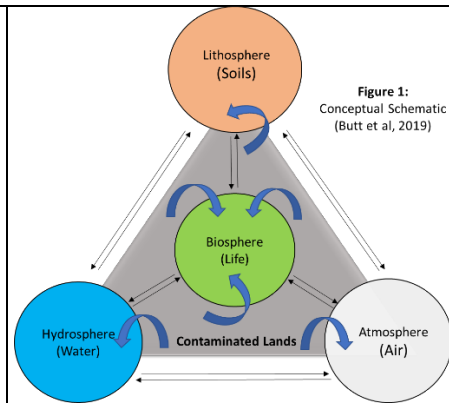
**Lead Supervisor:** [Dr. T. E. Butt](#), Northumbria University

**Key Research Gaps and Questions:**

The knowledge gap is two fold:

- 1). How far climate change impacts are escalating the hazards and risks posed by contaminated lands/soils?
- 2). How to inform mitigation and adaptation approaches against these 'increased' risks (due to climate change) in order to secure human and environmental health by protecting flora, fauna and water?

In summary, there is a lack of knowledge on how contaminated lands/soils, due to climate change, can additionally harm the four spheres of the environment (Fig. 1), directly and indirectly; and how to combat these '*climate change induced*' magnification in hazards.



**Project Description:**

Our hypothesis is that the hazards posed by contaminated lands/soils are worsening due to climate change. Extreme precipitation events (both, intensity and frequency) are causing moisture regime change in hydrological catchments, which is rendering pollutants in contaminated soils to become (physically, chemically and biologically) mobile with rising bioavailability in various land-types and -uses such as agricultural/farm lands. This increased mobility may even generate new contaminated sites e.g. via floods and rising water levels. This climate change induced escalating mobility can lead to additional problems for human health and the environment – comprising hydrosphere, lithosphere atmosphere and the biosphere. See Fig. 1.

Specifically, there is a substantial lack of knowledge on how moisture regime changes (i.e. varying saturation levels) in various soil types can influence mobility and bioavailability of pollutants (particularly metal(oid)s) in contaminated catchments. Based on Climate Change projections (e.g. from IPCC – Intergovernmental Panel for Climate Change), the proposed PhD will focus on this multi-faceted knowledge gap by imitating such conditions in laboratory- and field-based experiments. Metal contaminated farmlands in north-east region of England would be employed as real-world case-studies and empirical surveys (including both quantitative and qualitative, questionnaire and semi-structured interviews) with landowners, and experts in contaminated land/soil risk assessment and climate change. In addition, a key outcome of the research will be to frame a protocol/system of how such climate change induced additional risks can be and should be measured and mitigated, so that the environment as a whole can be rendered more resilient via adapting around the climate change impacts.

The proposed PhD, being multi- and inter-disciplinary by virtue of its nature, offers research training on a wide range of methodologies. The PhD links to a number of NERC programmes: UK Climate Resilience; Flooding from Intense Rainfall; Emerging Risks of Chemicals in the Environment; Earth System Modelling Strategy (ESM); and Building Resilience to Environmental Hazards (both Natural and Anthropogenic).

The PhD candidate will be involved in lively networks both within and beyond NERC, within and beyond UK, thereby inducing internationalisation to the research.

**Prerequisites:** The project suits a candidate with background in the environmental field with knowledge of climate change challenges and SDGs (Sustainable Development Goals). A bachelors degree is a must, though MSc and MPhil qualifications would be advantageous. For more information, please contact Dr. T. E. Butt ([t.e.butt@northumbria.ac.uk](mailto:t.e.butt@northumbria.ac.uk))

