

## **How do we manage our local environment in the face of global uncertainty and complexity?**

Topic: Climate policy issues: analyses

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It is becoming clear that the environment can no longer be managed successfully as a portfolio on its own. Resilience science shows us that the environmental, social, economic aspects of our society are interlinked not only at many different spatial scales but also over time. Such complex adaptive systems have non-linear relationships and feedback loops which means that the behaviour of the system cannot be predicted by understanding the individual mechanics of its component parts or any isolated pair of interactions. How are decision makers to make sophisticated, justifiable decisions which protect the environment in the midst of such complexity and within the context of such future global uncertainty? We investigate this predicament using the Ecological Footprint (an environmental indicator of human consumption). We investigate the repercussions of a number of global scenarios upon sub-national jurisdictions by using input-output analysis to model Ecological Footprints 50 years into the future. A global MRIO forms the core of our model, where each country is represented by final demand, gross output, and a set of satellite accounts in terms of land use, emissions, energy use, etc. The causal relationships between the variables are formulated as a system of first-order differential equations. An iterative finite-differences algorithm progresses this system over time and space, connecting environmental state variables (land use, energy consumption, etc) with economic variables. The use of global MRIO allow us to demonstrate the global considerations environmental decision makers at smaller scales need to anticipate, such as the impact of globalised trade with its complex supply chains