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Facilitating Interdisciplinary Learning About Interdependent Resource Systems Using Online Integrated Models

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Abstract: Enabling a holistic view of a region's resource (e.g. water, energy, food, environment, i.e., WEFE) systems requires representing individual system drivers, processes and interdependencies. Integrated system models incorporate multiple sectors where each sector is represented by a distinct stakeholder group with knowledge of their sub system, but not necessarily the others. This presents the challenge of 1: Enabling multiple users with different backgrounds and knowledge bases to communicate effectively and work together. 2: Integrating domain-specific sub-models into a single integrated system model. We present a web technology which 1: enables the integration of sub-models using the Pynsim simulation framework and 2: Allows users to collaborate by accessing and sharing data in a user-friendly online environment. This tool allows modellers, stakeholders, and decision makers to access a shared integrated model facilitating participatory planning and co-decision making. This talk presents a multi-resource system model of Ghana, including water and energy resources. Each sub-model is developed and verified independently, and then 'plugged in' to the integrated model using Pynsim, an open-source simulation framework for multi-resource networks. Hydra Platform, an open-source tool for networked resource systems, is used for data management and sharing. Through a web interface users run models (both their individual sub-model, and the integrated model) and visualise their outputs in a single collaborative environment. This has enabled users from different backgrounds to gain an understanding into how their system interacts in the wider context. While this presentation focusses on Ghana, the technology is used by researchers and practitioners collaborating on large multi-sector projects in the UK, Kenya, Myanmar, the Nile basin and the Tigris-Euphrates system. This talk will feature a short demonstration of the tools described.

Keywords: Collaboration, Interdisciplinary Modelling, Participatory Modelling**,** Multi-Sector Collaboration, Hydra Platform, Pynsim