

Data to Motivate Synthesis

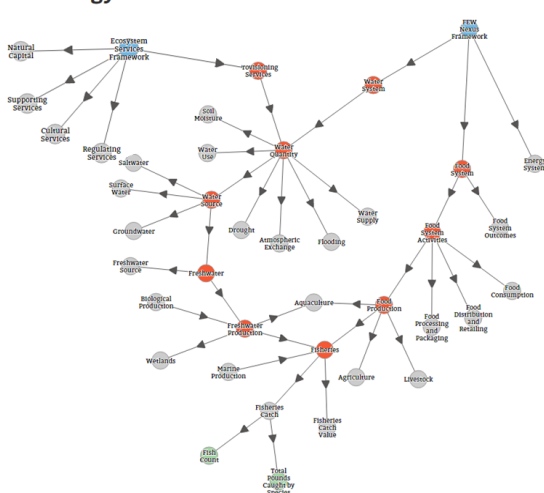
Understanding and addressing complex socio-environmental problems requires diverse forms and sources of data, as well as diverse disciplinary perspectives. Synthesis research often starts with the identification of a system or question of interest, followed by convening of a team with appropriate disciplinary diversity, and finally, looking for data that can help test hypotheses developed through discussion of theories, concepts and past research. While many important insights have been generated through this classical synthesis approach, questions often must be changed or go unanswered due to inadequate data availability or coverage.

The Data to Motivate Synthesis approach: Tools, topics and process

SESYNC has developed a platform and a facilitated process oriented around data discovery to motivate synthesis in the food-energy-water (FEW) nexus. The Data to Motivate Synthesis (DTMS) platform organizes and facilitates exploration of social and natural system data that characterize FEW systems in the United States context. The DTMS platform consists of empirical and conceptual metadata for each data set and the measurements within it, and a web interface that allows users to explore and discover data through several types of visualizations (search, ontology web, conceptual taxonomy). The DTMS facilitated process supports the formation of interdisciplinary teams through data exploration and discovery, with the goal of catalyzing data-driven FEW nexus research questions.

Tools

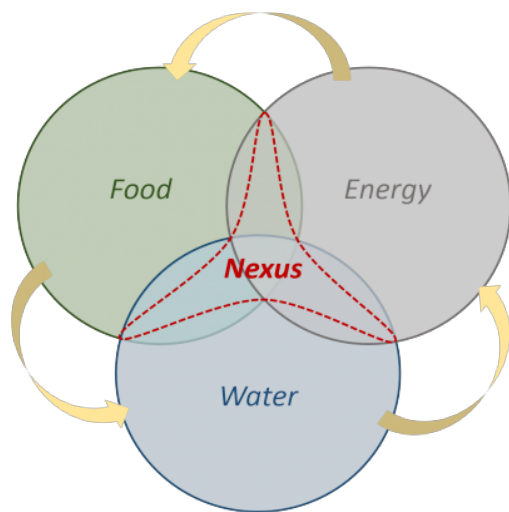
Ontology: "FEW Nexus Framework"



The core features of the DTMS platform are three distinct approaches to data discovery. Users can search by keyword for data that is of interest, and can refine the search results by further faceting on empirical metadata characteristics like temporal or spatial extent or resolution. Users can also discover data by exploring the domain ontology that has been developed to reflect common frameworks used to study socio-environmental systems. Three frameworks are currently represented

in the ontology: food-energy-water (FEW) nexus, coupled human and natural systems (CHANS), and ecosystem services. The ontology organizes the concepts within each framework in a hierarchical network, so that users can move from high-level concepts (like the food system) to more precise concepts that can be measured empirically (for example, production of grain crops). The conceptual frameworks depicted in the ontology are linked to the data sets and measurements within the data sets, so that as users move through a given framework, they discover data that measures specific concepts. The ontology structure is depicted in two ways in the DTMS interface, as a graphical network through which users can move to visualize linkages among data and concepts, and as a hierarchical list (much like a taxonomy) that presents the linear paths from high-level concepts to specific data. Once users identify data of interest, the interface also provides tools to compare metadata, to make notes associated with specific data sources, and to export full metadata records and metadata comparisons for later use.

Topics



Within the DTMS project, we consider FEW nexus topics, questions and data to include those that investigate and measure direct relationships and dynamics among at least two of the three systems. Because connections across the systems play out over different spatial and temporal scales, FEW nexus analysis might not always include a primary focus on all three systems. However, interpretation of results and implications should maintain the systems thinking that underlies nexus research by linking findings to FEW system dynamics as is possible and relevant.

Most of the data sets included in the DTMS platform were selected for inclusion based on entries from [data.gov](#) [1], the Federal Government initiative to promote open access to and use of data. SESYNC has [ongoing partnerships with the United States Department of Agriculture and the United States Geological Survey](#) [2] to identify and incorporate new data products and updated metadata from these and other agencies with domain expertise in some part of the FEW nexus. For the first version of the DTMS project, 300 datasets have been fully characterized and represented within the interface. The prioritization of datasets was guided by a goal to include data that characterizes both the social and environmental dimensions of food, energy and water systems, and their many points of overlap.

Process

The tools and content accessible through the DTMS interface are designed to be used in the context of a facilitated team science process meant to motivate innovative data-driven questions focused on FEW nexus issues. This process allows individual researchers to explore and discover data in domains with which they are familiar as well as those that are outside of their expertise. The conceptual and empirical linkages that are built into the interface then allow individuals to come together in small

groups to identify conceptual and empirical points of overlap in their areas of interest. Interdisciplinary teams then work to articulate specific research questions that are driven by available data, and to articulate a shared conceptual framework that draws on and refines the common frameworks within which data are organized in the DTMS interface. The ultimate goal of the DTMS project is to motivate and support new and innovative FEW nexus synthesis research.

Next steps

The DTMS platform is not yet publicly available, and can currently be accessed only through facilitated workshop held on-site at SESYNC. Two DTMS workshops were held in 2018, with a third scheduled for early 2019. For each workshop, researchers from academia, the public sector, non-governmental organizations and private enterprise whose work focuses on domestic FEW nexus research are invited to participate in a three-day facilitated workshop at SESYNC. Workshop participants are then invited to form synthesis teams and to [submit Pursuit and Workshop proposals](#) [3] for a special theme within the regular SESYNC request for proposals.

More information

For background on FEW nexus conceptual and analytical approaches, please see the SESYNC white paper [An Overview of Conceptual Frameworks, Analytical Approaches and Research Questions in the Food-Energy-Water Nexus](#) [4].

For a summary of the DTMS project process and content, please see a recent [poster presentation](#) [5].

Please contact [Dr. Kristal Jones](#) [6] (kjones@sesync.org [7]) for more information.

[Link to the SESYNC project page](#) [8]

Source URL: <https://www.sesync.org/for-you/cyberinfrastructure/research-and-tools/data-to-motivate-synthesis>

Links

[1] <https://www.data.gov/>

[2] <https://www.sesync.org/news/sesync-partners-with-usgs-usda>

[3] <https://www.sesync.org/about/funding-support>

[4] <https://www.sesync.org/white-paper-an-overview-of-conceptual-frameworks-analytical-approaches-and-research-questions-in-the>

[5] <https://www.sesync.org/data-to-motivate-synthesis-building-capacity-for-socio-environmental-research-in-the-few-nexus>

[6] <https://www.sesync.org/users/kjones>

[7] <mailto:kjones@sesync.org>

[8] <https://www.sesync.org/project/ventures/data-to-motivate-synthesis>