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Modeling the Food-Energy-Water Nexus: A Data Analysis Toolbox

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Food, energy and water resources are intertwined in the most complex form. On one hand, more than 70% of water resources is used in agriculture globally. On the other hand, abstraction, purification, distribution and disposal of water is intensively energy consuming. California, for example, consumes about 19% of its electricity resources for its water supply system. Moreover, energy resources are highly water dependent. Hence, modeling the complex interactions in the nexus of water, food and energy is crucial for human well-being and sustainable development. The ever-increasing stress on these systems due to population growth, urbanization, economic development and climate change has only magnified the need to manage these systems jointly. We have developed a user-friendly analysis toolbox that mine the available global data in the nexus of food, energy and water, and model/analyze the interactions in this nexus. This toolbox, entitled FEWT, provides estimates of water footprint for several food types for different countries. FEWT also approximates, for each country, the energy required for certain amount of water, as well as potential food amounts associated with that. FEWT also estimates the emissions associated with different energy sources; provides a rough appraisal of water necessary to produce/extract/refine energy; and finally approximates the biofuel production of different crops. In short, FEWT conveniently analyses the dependencies of the food, energy, and water nexus at the country scale.