



RESOURCE

The Water-Energy-Food Nexus: A systematic review of methods for nexus assessment

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Description / Abstract

The water-energy-food (WEF) nexus is rapidly expanding in scholarly literature and policy settings as a novel way to address complex resource and development challenges. The nexus approach aims to identify tradeoffs and synergies of water, energy, and food systems, internalize social and environmental impacts, and guide development of cross-sectoral policies. However, while the WEF nexus offers a promising conceptual approach, the use of WEF nexus methods to systematically evaluate water, energy, and food interlinkages or support development of socially and politically-relevant resource policies has been limited.

This paper reviews WEF nexus methods to provide a knowledge base of existing approaches and promote further development of analytical methods that align with nexus thinking. The systematic review of 245 journal articles and book chapters reveals that (a) use of specific and reproducible methods for nexus assessment is uncommon (less than one-third); (b) nexus methods frequently fall short of capturing interactions among water, energy, and food—the very linkages they conceptually purport to address; (c) assessments strongly favor quantitative approaches (nearly three-quarters); (d) use of social science methods is limited (approximately one-quarter); and (e) many nexus methods are confined to disciplinary silos—only about one-quarter combine methods from diverse disciplines and less than one-fifth utilize both quantitative and qualitative approaches.

To help overcome these limitations, we derive four key features of nexus analytical tools and methods—innovation, context, collaboration, and implementation—from the literature that reflect WEF nexus thinking. By evaluating existing nexus analytical approaches based on these features, we highlight 18 studies that demonstrate promising advances to guide future research. This paper finds that to address complex resource and development challenges, mixed-methods and transdisciplinary approaches are needed that incorporate social and political dimensions of water, energy, and food; utilize multiple and interdisciplinary approaches; and engage stakeholders and decision-makers.

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