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Future Research Trends on the Water-Energy-Food nexus approach: A review of definitions, methods and metrics

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Introduction

DEPLETION

SUSTAINABILITY

2011
Holger Hoff
The World Economic Forum

→

NEXUS

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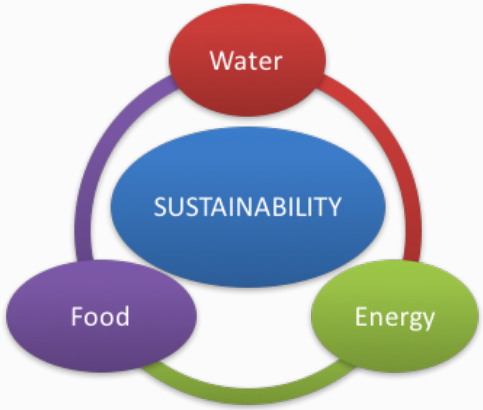


OBJECTIVES OF THE PAPER

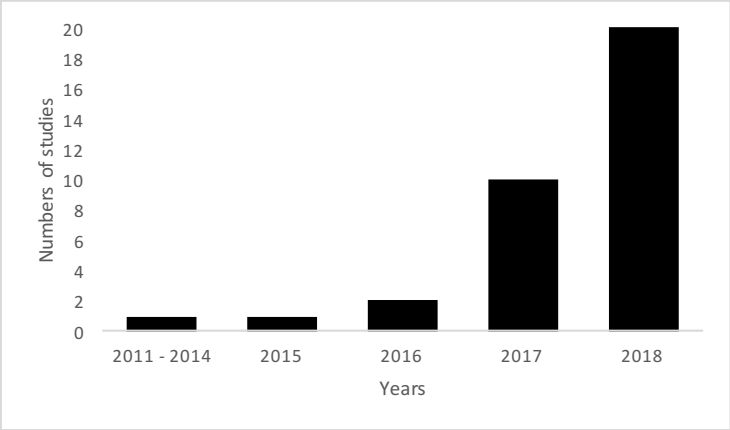
Present a critical review of definition, metrics, and methods applied to the Water-Energy-Food nexus models, resulting in future research trends

APPROACH USED

- A literature review was performed at the online platform Web of knowledge, additionally consulting also Springer Link, Wiley Online Library, and Science Direct.
- The used keywords included synonyms dealing with combinations of the terms “water-energy-food nexus” or “water energy food nexus” (“WEF nexus”; “FEW nexus”), and “WEF nexus analysis” (“WEF nexus”, “WEF nexus model”, “WEF nexus tools,” “WEF nexus approaches”)
- The database search resulted in 241 articles (with duplicates). The adopted time period covered from 2011 to 2018, since the concept of the Water-Energy-Food nexus was proposed in 2011 (Vieira & Amaral, 2016).
- Articles were selected by reading their title abstract and if interested the whole text.

KEY RESULTS

- 34 articles were selected.
- Applied Energy Journal was the most cited 6 times followed by Journal of Cleaner Production 6 times.
- WEF nexus researches is spread all over the world.



KEY RESULTS

- 23 articles presented a case study .
- About the place coverage the majority were city analysis, followed by international analysis, national, regional and Production phase analysis.
- Regarding the objectives all of them aimed to have an overview about the situation in order to propose actions and policies with a positive impact based on a new tool or indicator.

MAIN CONCLUSIONS

- WEF nexus tools:
- WEF Nexus Tool 2.0 and WEF framework provided a first building block that need to continue evolving in order to provide better analysis.
- Simples indicators.
- Input-output approaches.
- Optimization models.

FUTURE RESEARCH TRENDS:

Future research should integrate other concepts, namely those coming from social sciences and economics (Scanlon et al., 2017).

There is no universally recognized methodology for doing so in the nexus analysis

This review shows that most of the WEF nexus perspective papers published targets cities, cross-national or national analysis (Macro-level). Therefore, micro-level such as companies are required.

WEF nexus indicates the desire to achieve policy coherence, besides overcoming the unintended consequences of uncoordinated policies between different sectors and players (Weitz et al., 2017).

CONCLUSIONS:

- Different purposes guided these studies: the assessment of current and future scenarios; the possibility of using new indicators; the support of future actions toward sustainability and even environmental protection.
- However, the scientific literature lacks tools for applying this methodology in smaller scale scenarios, for instance, regarding households, parks, buildings, companies and industries.
- The overall results show that there is no universal tool that can address all of the assumed objectives.
- future research may include alternative uses for local scales of study, and the use of new scientific areas, concepts and tools

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Thank you!

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