

Building a WEF Nexus Community of Practice (NCoP)

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Abstract

Purpose of Review The purposes of this paper are to examine the literature for common threads and attributes inherent to scientific-based communities of practice, and to identify challenges and potential solutions for building a community of scientists to address the water-energy-food nexus.

Recent Findings The latest research suggests several guiding principles to build and maintain a successful scientific community of practice. These include the following: identifying a shared conceptual vision that is clear in purpose, but also provides for evolution and growth; providing for both internal and external perspectives as well as various levels of participation among members; and facilitating collaboration that satisfies personal and professional motivations.

Summary There are several challenges in building and maintaining a sustainable water-energy-food nexus community of practice. Perhaps, the most difficult to overcome is the lack of a clear definition, meaning, and identity of the “water-energy-food nexus.” While international collaboration among re-

searchers will provide critical perspective and insight for addressing similar challenges on a more localized basis, the variation in regional jurisdiction and political realities could restrict international collaborative research and implementation of potential solutions.

Keywords Community of practice · Scientific community · Water-energy-food nexus · Transdisciplinarity

Introduction

A “community of practice” (CoP) refers to a group of people engaged in a shared craft or profession. It signifies a way of knowing and learning with focus on people who exchange knowledge and practices to solve a specific set of problems. Wenger [1] defined a CoP as a group of people who share concern or passion for what they do and who learn how to

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do it better through regular interaction. Its members share a common domain of interest, and the CoP renews itself by generating new knowledge [2]. The CoP concept is not new. For decades, the CoP model has been employed by private and public organizations, social sciences, education, and among national and international government entities. Technological advances in social media and digital communications have only expanded the CoP concept as a platform to assuage geographic and funding limitations that have traditionally stifled sustainable collaboration and working relationships among national and international practitioners.

Scientists have long recognized the need for multi-stakeholder participation to address sustainability challenges and develop solutions palatable to civil society [3]. Representation from academia, research, business, sociological, and political sectors is imperative. Lang et al. [4] posit three arguments for interdisciplinary and transdisciplinary research. First, involvement by multiple communities of knowledge and multiple actors with diverse skillsets and expertise is necessary to address complex problems involving equitable access to food, water, and energy in the face of natural and anthropogenic change. Second, solution options require knowledge and action that moves beyond problem analysis, and are guided by shared visions and goals. Third, collaboration between researchers and non-academics should increase validity, accountability, and responsibility for the problem, including solution options.

Regarding transdisciplinary research, Scholtz [5] emphasizes the importance of focusing on societally relevant problems, enabling mutual learning processes among researchers from different disciplines. The goal is to create knowledge that is solution-oriented, socially robust, and transferable to both the scientific and societal practice. Kienle and Wessner [6] emphasize that because community members often belong to different organizations, exist in different cultures, and have different native languages, communication within a community is sometimes strained or findings are subject to a range of interpretations. Conversely, technical communication and cooperation infrastructures enable global involvement where exchange of ideas and solutions can transcend these boundaries.

Wenger [1] suggested three characteristics crucial to the existence of a CoP. (1) *A CoP includes a **shared domain** of interest that contains a common but distinctive focus, commitment, and competence among its members.* The WEF domain is one of inherent complexities and is likely to involve individuals of diverse subject matter expertise and geopolitical realities that stretch the boundaries of conventional CoP frameworks. (2) *As individual members negotiate this domain, a **community** enables engagement in joint activity, projects, and discussions that build professional relationships that are mutually beneficial to individuals and the CoP at large.* Li et al. [7] stress the importance of fostering a balance between facilitating personal growth among individual members while at the same time adhering to

the greater goals of the community. (3) *The community must involve **practice**—a shared repertoire of artifacts or resources such as new methodologies for solving technical challenges, tools, research, and synergies that transcend geographical and cultural boundaries and limitations, but also address CoP members' local realities, and that satisfy personal and professional expectations.*

Wegner et al. [8] developed seven principles for designing and cultivating a CoP:

- (1) *Design for evolution*—CoPs are dynamic and often founded on pre-existing networks. Though CoPs should have a guiding vision and purpose, they should also foster growth and provide flexibility as the needs of the community change.
- (2) *Open a dialogue between inside and outside perspectives*—While community insiders (often those who were instrumental in the formation of the community itself) ensure adherence to the foundational principles and vision of the community, those outside the community can act as agents of change by offering new perspectives or approaches.
- (3) *Invite different levels of participation*—There typically exists a small core of community members who are highly motivated and involved in steering community values and efforts. The CoP should also accommodate those less involved who also wish to contribute to the mission of the community.
- (4) *Develop both public and private spaces*—Communities should have sufficient activity and offer opportunities to cultivate professional relationships among its members.
- (5) *Focus on value*—As members engage in collaboration, networking, and problem-solving, the value of the community at large and individually will form and evolve.
- (6) *Combine familiarity and excitement*—Communities should be places where members feel comfortable to share ideas, free from personal ridicule or judgement. The community must provide for free exchange and novel approaches to encourage member engagement, interest, and excitement.
- (7) *Create rhythm for the community*—Communities should guard against complacency and lethargy by maintaining a consistent level of activity that involves both community insiders and those on the periphery. The community must strike a balance between moving too quickly and becoming stagnant.

In a review of Wenger [9], Amin and Roberts [10] summarized other elements essential for a successful community of practice. These include the following:

- Sustained mutual relationships;
- Shared ways of engaging in doing things together;

- The rapid flow of information and propagation of innovation;
- Absence of introductory preambles;
- Rapid setup of a problem to be discussed;
- Substantial overlap in participants' description of who belongs;
- Knowing what others know, what they can do, and how they can contribute to an enterprise;
- Mutually defining identities; and
- The ability to assess the appropriateness of actions, and products, specific tools, representations, and other artifacts.

Mohtar and Lawford [11••] argue for the establishment of an online water-energy-food nexus community of practice (WEF NCoP) as a platform to enable transdisciplinary and transnational collaboration of WEF research and solutions involving academia, government, private industry, scientists, policy makers, and stakeholders. Their vision is to “develop a global science-policy platform for sharing data, knowledge, and best practices. The WEF platform would define data gaps and develop a common accounting framework for the nexus, while the CoP could help monitor the effectiveness of the nexus governance by offering good governance models.” Furthermore, Mohtar and Lawford propose that the WEF NCoP takes the lead to identify and address the substantial knowledge gaps that currently exist in science, education, and governance of the WEF nexus. The NCoP would initiate and facilitate integrated research efforts, share experiences and perspectives for common WEF nexus challenges, and provide education and outreach to address local issues. Mohtar and Lawford [11••] believe that while WEF nexus solutions applied locally will most likely transcend regional and national borders, this approach will also encourage interdisciplinary cooperation and transparent methods among a multitude of stakeholder groups.

Key Challenges/Research Questions

Nexus challenges constitute an inherently “wicked problem” in that there are no easy solutions and knowledge of nexus interconnectedness is incomplete or contradictory. Affected are a large and diverse population with different cultural norms and value systems. Strong governance and institutional innovations are critical for navigating trade-offs and identifying appropriate policy interventions that achieve equitable nexus solutions [12•]. However, in the current context of nexus planning, technologic solutions predominate, and institutional fragmentation prevents the emergence of forward-looking and more integrated planning consistent with nexus approaches [13•, 14••, 15].

Fostering a community of practice that can actively mitigate these bottlenecks requires engagement from within and outside academia. Transdisciplinary research in which scientists work in close partnership with non-science actors (i.e., government, the private sector, and civil society) to co-frame problems and co-investigate solutions is becoming an increasingly important means for addressing difficult issues like those at the nexus. The emerging interest in applying transdisciplinary (TD) research approaches for addressing nexus challenges demonstrates both the high degree of complexity of nexus challenges. It also recognizes that nexus-related knowledge needs to have strong relevance and utility in order to support effective solutions. While TD approaches have significant potential to address nexus priorities, achieving sustained TD outcomes requires a long-term investment in community building supported by a foundation of trust and transparency [16•]. Though there is no single unifying definition of TD, common elements in defining TD include a reflexive and inclusive method of inquiry that jointly frames problems, integration of knowledge from diverse scientific and societal sources, and a solution orientation that is integrated with problem framing and where new knowledge is applied in both scientific and societal practice domains [4, 16•, 17].

Transdisciplinarity places high value on advancing mutual learning that creates ownership, legitimacy, and accountability for framing problems and finding solutions. In determining where TD fits into the WEF NCoP, it is important to consider that there is no one single approach to TD nor that TD should be applied to all problems. Rather, TD research should be strategically deployed where a solid foundation of trust and collaboration can be nurtured and sustained. The ability to step out of comfort zones, of both science and societal partners; experiment; and be willing to learn from failure underlie these conditions.

Kienle and Wessner [6] emphasize that TD community members often belong to different organizations, exist in different cultures, and have different languages; thus, communication within a community is sometimes strained or findings subject to a range of interpretations. Conversely, technical communication and cooperation infrastructures enable global involvement where exchange of ideas and solutions can transcend these boundaries. Steynor et al. [18] argue that forging a common vocabulary and understanding between researchers and policy/practice communities, around which to frame problems and investigate solutions, requires iterative engagement in the problem space through which layering and building up of information and trust can occur. Technical and epistemological language barriers can also be present in multi-disciplinary science engagement and is thus not confined to engagement that crosses science-society interfaces.

Key to sustaining an iterative and continuous TD effort is an understanding of what enables and incentivizes and what inhibits and prevents long-term participation from both

scientific and societal domains [16•]. These factors span institutional and cultural barriers and are not readily surfaced without strong understanding of underlying dynamics and historical patterns [19]. Furthermore, experience from past TD work [4, 17] points to the need for strong problem awareness that in turn promotes sound problem framing, as there can often be lack of agreement on the nature, extent, and direction of the problem. There is also a need for achieving balance in problem ownership—and sufficient number and diversity of partners that have a stake in the outcome—such that knowledge production can be tightly linked with implementation interests. Related to this issue is the need to reconcile local challenges, which become diminished at broader scales with regional challenges that are not prioritized locally, and consideration of boundaries that incorporate socio-ecological systems embedded within geographic boundaries, such as river basins [13•, 15].

Data/Knowledge Gaps

Modern internet technology and online communication applications afford communities of practice the ability to transcend geographical and disciplinary boundaries. However, existing technology and social network platforms have inherent challenges that can limit member interaction and group participation. In the context of a WEF NCoP where institutional and professional recognition is important, there are several critical issues that must be overcome to encourage a diversity of stakeholders, perspectives, and impactful outcomes.

1. *Branding*—Who will sponsor the NCoP platform?
2. *Hosting and maintenance*—Who will host the platform and resolve technical issues?
3. *Recruitment*—Who will be invited to participate and provide leadership for different efforts?
4. *Accessibility*—How to ensure that the NCoP platform and its features are compatible with existing internet access technology and applications for international users.
5. *Engagement*—How to meet the personal and professional needs of core members while, at the same time, attracting new expertise.
6. *Transdisciplinary interaction*—How to prevent silos forming among members?
7. *Measures of progress*—What metrics will be used to evaluate participation, interest, and impact?
8. *Relevance across spatial scales*—How to encourage cross-disciplinary applications, solutions, approaches, and transboundary?
9. *Governance*—Who will take the lead to moderate discussions, facilitate collaborative research, and maintain focus within the CoP activity?

Potential Transformative Solutions Needing More Research

Global engagement among scientists, researchers, practitioners, and policy makers provides an opportunity for building alliances that transcend geographic boundaries. However, cultural diversity and different governance structures complicate the level of access, involvement, and impact that scientific-based CoPs to address issues of global relevance including the water-energy-food nexus. Future research should explore existing technological, social, political, and cultural barriers that limit WEF NCoP development and engagement. Among these challenges include finding a suitable platform to enable transdisciplinary participation and involvement. Research should explore a variety of platforms already available through governmental and non-governmental organizations to determine an optimal framework for facilitating a WEF NCoP.

The question of WEF NCoP governance is critical to ensure long-term sustainability of a WEF NCoP. Mohtar and Lawford [11••] suggest that “during the early stages, a small executive that involves key stakeholders proves helpful in defining and motivating specific studies and initiatives. This executive is designed to be a facilitative and advisory mechanism rather than fulfilling a management role.” They also observe that due to the regional nature of WEF issues, there may be value in forming multiple communities at national and global scales.

Lastly, the question of how a WEF NCoP may sustain itself in long term (in terms of platform support, maintaining engagement among key members, and facilitating transdisciplinary and international cooperation) requires more study. Additionally, strategies to inhibit the formation of “silos” within the WEF NCoP should be investigated. Amin and Roberts [10] observe that “from an organizational perspective whether knowledge is held in silos or able to move easily around the organization will influence the level of innovation arising from the cross-fertilization of ideas.”

Impacts on Science and Society

The CoP has the potential to become a global science-policy platform for sharing data, knowledge, and best practices on WEF nexus science. However, the greatest impacts that would be experienced by forming an NCoP would be in the integration of diverse disciplines and scientists under the common goal of achieving a successful nexus community for WEF efforts. By coming together, and through intentional forming of the community, massive impacts could be seen. Under the WEF platform, data gaps and a common accounting framework for the nexus could be achieved. The CoP would help

monitor the effectiveness of nexus governance by offering good governance models [11••].

Conclusions

A review of current research suggests several attributes common to an effective and sustainable CoP; among these are a shared vision for the community, open dialogue to encourage inside and outside perspectives, and transdisciplinary involvement to ensure a systems approach to solving problems. Mohtar and Lawford [11••] call for a WEF NCoP as a means to foster collaboration among scientists, practitioners, and political players to address the growing spatial and temporal challenges of food security, energy production, and water supply. The transdisciplinary nature of the NCoP will have strong societal impact while at the same time address scarcity and management of these resources.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflicts of interest.

Human and Animal Rights and Informed Consent This article does not contain any studies with human or animal subjects performed by any of the authors.

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