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COMMUNICATION BRIEF

BUILDING NEXUS RESILIENCE: ADDRESSING MIGRATION AND CONFLICTS IN WATER-ENERGY-FOOD (WEF) SYSTEMS

WEBINAR 2

INTEGRATING MIGRATION MODELS AND WEF NEXUS ASSESSMENTS

SEPTEMBER 10, 2024

BUILDING NEXUS RESILIENCE: ADDRESSING MIGRATION AND CONFLICTS IN WATER-ENERGY-FOOD SYSTEMS

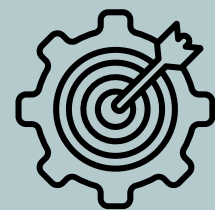
BACKGROUND

According to the International Organization for Migration, there were over 280 million international migrants in 2020, a number influenced by global crises such as conflicts, economic instability, and disasters, and positive factors like labor migration and free movement agreements. Migration drivers include water stress, extreme weather events, energy poverty, and food insecurity. This surge in migration trends also impacts host nations, particularly in regions already facing resource scarcity challenges. Anticipated climate change and population growth will exacerbate these challenges, causing nonlinear impacts across water, energy, and food systems. Migration can also contribute positively to all aspects of economic, environmental, and social development and is key to achieving the Sustainable Development Goals (SDGs). The 2030 Agenda for Sustainable Development recognizes the intricate interdependencies among these resource systems, but their complex relationships with migration (forced, economic, rural-urban, internal, and cross-border) remain insufficiently addressed. Understanding the connections between migration and key environmental resources (e.g., water, energy, and food) including how resource scarcity influences migration needs further study.

Existing Water-Energy-Food nexus models often fail to capture the nuanced interplay between conflicts and migration. Nexus communities from across the globe search for better tools to understand these trends and interconnections and guide anticipatory action toward improving the resilience of communities facing these pressures. Moreover, there is a need to understand the impact of the various underlying conditions and vulnerabilities on amplifying disaster risks related to water, energy, and food systems that contribute to migration. Also, connecting the vulnerability and resilience of resource systems (primarily water, energy, and food) with the nexus still needs to unravel solutions for long-term sustainable development. The webinar series aims to fill this gap.

OBJECTIVES

This webinar series aims to catalyze cross-disciplinary, cross-institutional, and international dialogues toward understanding the knowledge gaps and opportunities in taking a holistic, systems approach to addressing these tightly interconnected challenges. With a focus on water, energy, and food systems, the webinar series will also consider other key environmental resources like climate, land, and ecosystems.



OUTCOMES

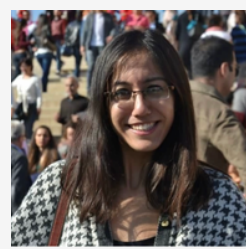
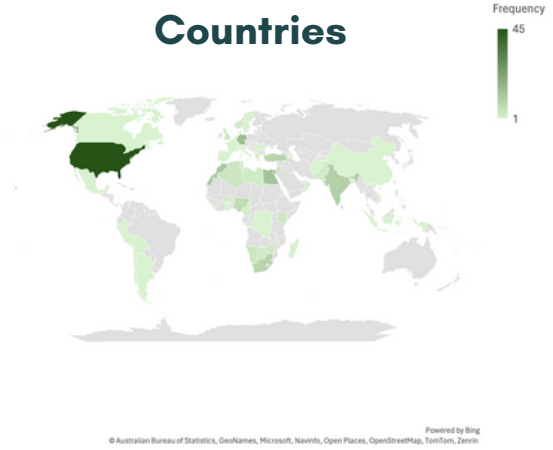
The webinar series is envisioned to facilitate the development of a common framework and road map for integrating migration in nexus assessment tools. This would contribute to exploring and developing anticipatory tools and strategies incorporating migration dynamics into nexus assessments, aiming to guide policymakers, researchers, and practitioners toward evidence-based, sustainable, and resilient solutions.



- **Introduction**
 - **Water-Energy-Food Nexus Tools and Opportunities for Integration with Migration Models**
Dr. Bassel Daher, Texas A&M University, SustainFood Network, IWRA
- **Panel and Moderated Discussion**
 - **The Importance of Water in Internal Climate Migration Modeling**
Dr. Alex de Sherbinin, Columbia Climate School, Columbia University
 - **Understanding the Nexus and Vulnerability to Improve Migration Models**
Dr. Robert Oakes, United Nations University Institute for Environment and Human Security
 - **Water-Migration-Gender Nexus: Towards Integrated Governance Strategies for (Non) Migrants**
Dilare Ecenur Irbik, PhD Candidate, École de Santé Publique, Université Libre de Bruxelles
- **Moderated Q&A**
Floor Brouwer, UNU-FLORES
- **Next Steps**
Dr. Bassel Daher, Texas A&M University, SustainFood Network, IWRA

100+ participants

from 64 Countries



in Bassel Daher
Texas A&M Energy Institute,
Texas A&M University

[LINK TO BIO](#)

in Alex de Sherbinin
Columbia Climate School,
Columbia University

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in Robert Oakes
Institute for Environment and
Human Security, United
Nations University

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in Dilare Ecenur Irbik
École de Santé
Publique, Université
Libre de Bruxelles

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Building Nexus Resilience W...
BUILDING NEXUS RESILIENCE
Webinar 2: Integrating Migration Models and WEF Nexus Assessments
Tuesday September 10, 2024
3:00-4:30 PM CET
8:00-9:30 AM CST

[Watch Webinar 2 Recording](#)

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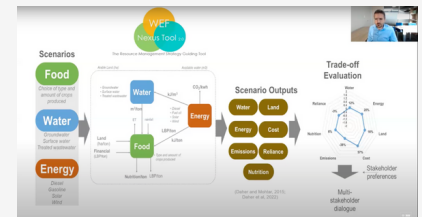
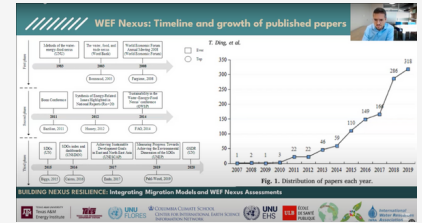
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Making
December 3, 2024

WEBINAR 2 KEY TAKEAWAYS

INTEGRATING WEF NEXUS TOOLS WITH MIGRATION MODELS

- Daher's presentation emphasized the complex interconnections between **water, energy, and food (WEF) systems** and the need for further studying the contributing role of insecurities within these systems to migration. He stressed the importance of a **systems approach** for addressing these interconnected challenges, as no single discipline, sector, or region can tackle these issues independently.
- Over the past decade, research on WEF Nexus issues has grown significantly, with various institutions globally contributing to the development of tools and methods for integrated resource management.
- **WEF Nexus tools**, including econometric models, input-output analysis, life cycle assessments, and system dynamic models, are being utilized to assess the **interdependencies** between water, energy, and food at different scales. These tools help evaluate **trade-offs** between resource management strategies and provide a framework for evidence-based decision-making in addressing sustainability challenges.
- **Migration models**, such as gravity models, radiation models, and agent-based models, have been developed to predict migration patterns. These models consider different determinants, including economic, non-economic, climate-driven, and behavioral factors.



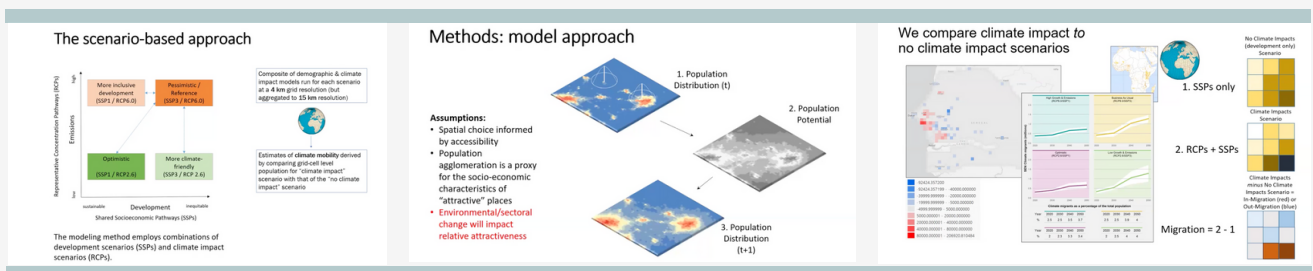
WEBINAR'S GUIDING QUESTIONS

The session was guided by key questions, including:

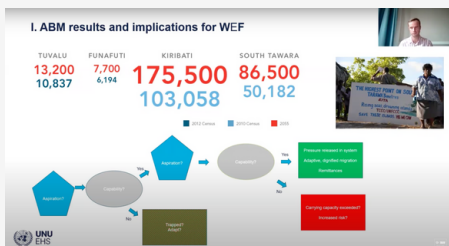
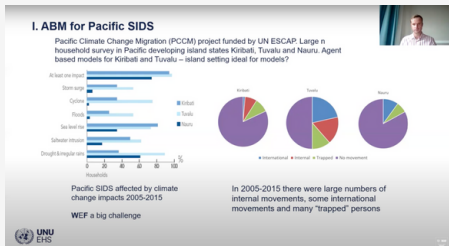
1. How can migration models be integrated into WEF assessments given their interconnectedness?
2. What challenges and opportunities exist in this integration?
3. What are the current research gaps at the intersection of WEF and migration?

IMPORTANCE OF WATER IN INTERNAL CLIMATE MIGRATION MODELING

- Alex de Sherbinin's presentation focused on using **scenario-based modeling** to predict **internal migration** driven by climate change, particularly emphasizing the role of water and food insecurity.
- The **Groundswell Report** uses a scenario-based approach, integrating different climate models and socio-economic development pathways to forecast migration patterns. The report projects that up to **260 million people** could become internal climate migrants by **2050** due to environmental changes.
- The **Africa Climate Mobility (ACMI) Initiative** focuses on **internal climate migration** in Africa, analyzing how water availability, crop production, and climate impacts contribute to migration. It integrates crop models and water availability models, to assess the impacts of climate change on migration patterns at the local level. The modeling approach utilized a **gravity modeling** method, combining **Shared Socioeconomic Pathways (SSPs)** and **Representative Concentration Pathways (RCPs)** to simulate future migration flows.
- Findings revealed that **water availability affects migration**: flooding can lead to migration as people decide to move away from flooded regions and droughts reduce agricultural productivity which promotes rural populations to migrate to urban areas, but can also lead to trapped populations.
- Migration is shaped by a complex mix of economic, social, climate, and governance factors, making it difficult to isolate single drivers in the models.



UNDERSTANDING THE NEXUS AND VULNERABILITY TO IMPROVE MIGRATION MODELS



- Robert Oakes emphasized the importance of understanding vulnerability and agency in migration decisions, with **agent-based modeling (ABM)** being a key tool for capturing the complexities of household-level migration dynamics.
- Oakes highlighted how ABMs offer a detailed approach to understanding how **aspirations, capabilities, and social networks** influence migration, incorporating various factors such as economic conditions, environmental pressures, and social dynamics.
- Migration in Pacific SIDS, such as Kiribati, Tuvalu, and Nauru, is partly driven by environmental factors, including both flooding and droughts. These environmental challenges create pressure for internal migration, often moving populations from vulnerable outer islands to more urbanized ones.
- This urbanization process raises concerns about intensifying existing vulnerabilities by putting additional pressure on **limited water, food, and energy resources**
- There are also **"trapped populations"**, people who are unable to migrate despite the environmental challenges. These populations may lack the resources or capacity to migrate, which increases their vulnerability to climate change impacts.
- The study highlights the need for policies that address both those who can migrate and those who are forced to remain in high-risk areas.
- Migration is often a strategy for adapting to changing livelihoods and resource insecurities, not just a response to environmental shocks, and ABMs can model how social networks influence migration decisions.

WATER-MIGRATION-GENDER NEXUS:TOWARDS INTEGRATED GOVERNANCE STRATEGIES FOR (NON) MIGRANTS

- Irbik focused on the **gender dimensions** of migration in the context of water and food insecurity, advocating for a **feminist political ecology framework** to better understand these dynamics.
- While climate change and migration have been widely studied, research often lacks a gender perspective. The different perceptions and responses of men and women to climate change require an analysis of **social relations** and **power structures** to develop case-specific strategies.
- Water scarcity significantly impacts women, particularly during vulnerable periods such as pregnancy or postpartum. Women face additional health risks due to a lack of access to clean water and adequate nutrition. This indicates the need for gender-sensitive policies.
- A **gender lens** is necessary to fully understand migration patterns, as existing research often overlooks women's experiences and contributions to resource management.
- Integrating **feminist political ecology** into **WEF and migration** studies is important for addressing gender inequalities and advocating for gender-sensitive governance strategies.

Solution: Combining the FPE and Water-Migration Nexus

What is the feminist political ecology?

- The central idea of the FPE is that men and women have different experiences, responsibilities, and interests concerning nature due to gender differences in human-nature interactions. These gender differences are constructed socially, not biologically, resulting in divergence in culture, class, race, and place, and variation with the changing conditions of individuals and societies (Rochelleau et al., 1996; Sanyal, 2006).
- Three concepts of the FPE which overlap and influence each other (Tilpa et al., 2019):
 - Policy and implementation
 - Knowledge (creation and value)
 - Rights and responsibilities (control, access, use of resources)
- **How it works?**
 - Feminist political ecology gives prominence to environmental justice and seeks to locate and explain the origins and causes of oppression and injustices, vulnerabilities, and the social relations causing them.
- **How it helps?**
 - Through its holistic perspective, it reveals the connections and interactions between the environment, the economy, and politics on a local to global scale and how they are gendered, intending to decrease such inequalities, poverty, and other vulnerabilities (Rochelleau et al., 1996).

Source: Author's illustration based on Yipaa et al. (2019).

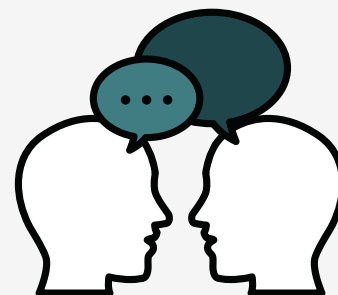
Results of the systematic literature review

- 67 peer-reviewed publications and collected the recommendations for the impact of climate change/water resources crisis on human (in)mobility and its intersection with gender.
- Most selected studies were conducted in Bangladesh (n = 13), India (n = 5), Kenya (n = 5), and Pacific Small Island States (n = 5). There were 79 study settings overall from 67 selected studies.
- The predominant water resource outcomes studied were livelihood, food and water security, water infrastructure, and infectious disease.
- Existing case studies mainly focus on four thematic areas:

Technological	Socio-economic	Political	Health
• Tools to increase resilience against climate and water-related problems	• Recommendations that sought to enable vulnerable people to adapt to socio-ecological change	• The implications of the political implications of climate change adaptation	• The implications of climate change on the health of vulnerable populations and the need for gender-sensitive health services

WEBINAR'S DISCUSSION HIGHLIGHTS

- **Migration** is influenced by a complex interplay of factors, including environmental conditions, economic opportunities, infrastructure, social dynamics, political contexts, and demographic trends. The interwoven nature of these factors makes it challenging to distinguish between voluntary and climate-induced migration, as economic, social, and environmental drivers are deeply interconnected.
- **Current migration models** often overemphasize **physical factors** such as water availability and crop productivity, while underestimating the importance of **social and economic drivers**. More attention is needed to incorporate elements like social networks, cultural practices, and governance systems, which play crucial roles in shaping migration decisions.
- **Integrating WEF Nexus assessments with migration models** presents significant opportunities for a better understanding of how resource insecurities may contribute to migration, particularly in vulnerable regions. However, achieving this integration requires addressing challenges related to theory, data compatibility and model resolution.
- **Data availability and quality** remain significant challenges, particularly at subnational levels. There is a need for more granular, disaggregated data that includes social and economic vulnerabilities, such as those affecting women, children, and other marginalized groups.
- A **systems approach** is important for addressing the **interconnectedness of WEF systems and migration**, as no single discipline or sector can fully address these complex challenges independently. Cross-sectoral and interdisciplinary collaboration is necessary to develop effective solutions.
- **Holistic policy** approaches are needed that go beyond individual solutions, emphasizing integrated strategies to address the complex intersections of water, migration, and gender.



OPEN RESEARCH QUESTIONS

- How can **migration models** better **incorporate society and networks, cultural practices, and governance systems** to reflect the complex realities of migration?
- How can **evidence-based governance frameworks** be developed to guide policy decisions at the intersection of migration and WEF Nexus challenges?
- How can **migration models** be effectively **integrated with Water-Energy-Food (WEF) Nexus assessments** to provide a more comprehensive understanding of the drivers and outcomes of migration?
- What **governance structures and policies** are necessary to support integrated responses to migration and WEF challenges, particularly in the context of climate change?
- How can **migration models be adapted** to better account for the experiences of vulnerable populations, including women, children, and ethnic minorities?

ADDITIONAL RESOURCES

- [A Bibliometric Analysis of Food–Energy–Water Nexus: Progress and Prospects](#)
- [Water–energy–food \(WEF\) Nexus Tool 2.0: guiding integrative resource planning and decision-making](#)
- [CLIMADA: Economics of Climate Adaptation](#)
- [Groundswell: Preparing for Internal Climate Migration](#)
- [Assessing human habitability and migration](#)
- [Migration and Household Adaptation in Climate-Sensitive Hotspots in South Asia](#)
- [Migrants on the Move and Food \(In\)security: A Call for Research](#)
- [A Systematic Literature Review of Water-Migration-Gender Nexus Toward Integrated Governance Strategies for \(Non\) Migrants](#)

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