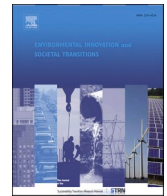




ELSEVIER

Contents lists available at [ScienceDirect](https://www.sciencedirect.com)

Environmental Innovation and Societal Transitions

journal homepage: www.elsevier.com/locate/eist

Engaging with climate adaptation in transition studies

Laura Kuhl

School of Public Policy and Urban Affairs and International Affairs Program, Northeastern University, 360 Huntington Ave, Boston, MA, United States

ARTICLE INFO

Keywords:

Climate adaptation
Transformational change
Developing countries
Just transitions

ABSTRACT

Transitions studies has much to offer to the study of climate adaptation. While there are several factors that explain why climate adaptation has not been the subject of sustainable transitions research historically, the process of adapting to climate impacts is well-suited to the analytical frameworks developed in transitions studies. Key areas where sustainable transitions research could contribute to adaptation include: the normative and directed nature of adaptation, cross-scalar politics associated with transformation, and the role of the private sector in adaptation. Similarly, adaptation research can inform the understanding of the role of disturbance and disasters in transitions, and increase attention to vulnerabilities, inequality and uneven impacts of transitions. Synergies between mitigation and adaptation, insights into the relationship between transitions and transformation, and just transitions are likely to be productive areas for collaborative engagement.

1. Introduction

Sustainable transitions research has influenced the discourse on climate policy, helping shape discussions on pathways to a low (or even net-zero) carbon future through insights into the enabling conditions and barriers for transitions in energy, transportation, industry, and more recently, food systems. This research has been particularly useful in moving the discourse from aspirational to actionable, with insights into how transitions occur, the actors involved, and the process through which transitions can be directed towards sustainability (Kohler et al., 2019). As environmental innovation and societal transitions research looks ahead to the next decade, it is time to broaden the research agenda to address the other side of the climate policy agenda: adaptation.

Transition studies has paid less attention to adaptation, despite adaptation being fundamentally a process of (sustainable) change (O'Brien, 2012), requiring radical shifts to new socio-technical systems, the hallmark of a sustainability transition (Grin et al., 2010). Several factors may explain why climate adaptation has not been the subject of sustainable transitions research historically, but these factors should not continue to limit the engagement of transitions studies with adaptation.

- (1) Adaptation was historically viewed as the “ugly stepchild” of climate policy, with adaptation efforts critiqued as admitting failure to transition to a low carbon system with sufficient speed (Khan and Roberts, 2013), which led to the marginalization of adaptation research. However, in recognition of the significant impacts already baked into the climate system and being experienced, particularly by frontline communities, there is now widespread agreement that adaptation must occur concurrently with mitigation. Urgent transitions in development, planning, and socio-technical systems are necessary to ensure climate resilience (Denton et al., 2014; Colloff et al., 2021; Schipper et al., 2021).

E-mail address: l.kuhl@northeastern.edu.

<https://doi.org/10.1016/j.eist.2021.10.024>

Received 28 July 2021; Received in revised form 15 October 2021; Accepted 26 October 2021
2210-4224/© 2021 Elsevier B.V. All rights reserved.

- (2) Transition studies has evolved as a primarily (although not exclusively) European community-of-practice, and as such, has understandably focused on urgent sustainability challenges for Europe. This geographic focus, however, is expanding, with recent advances focusing on the unique transition challenges in the Global South (Van Welie et al., 2018; Ghosh and Schot, 2019). Adaptation is one of the most critical sustainability challenges for developing countries, and thus well-suited for these new conceptual developments.
- (3) Sustainable transitions research has drawn extensively on sectoral and technologically-focused analysis such as the technological innovation systems framework (Markard and Truffer, 2008; Markard et al., 2015). While this emphasis has allowed for key insights into energy, transit, water and other socio-technical system configurations, the sectoral nature of adaptation is less clearly defined and the dominance of technologically-focused solutions for adaptation can be critiqued (Nightingale et al., 2020), necessitating an expansion of these frameworks for application to adaptation.

Despite these historical challenges, there are numerous opportunities for synergistic engagement. Table 1 summarizes key issues which could benefit from cross-fertilization. The potential new insights offered from engagement of sustainable transitions research with adaptation are discussed below.

1.1. Insights from sustainable transitions research

Given the urgency of adaptation and inadequacy of current responses, adaptation policy discourse often uncritically privileges transformation as a policy goal. Despite calls of scholars to attend to the power dynamics inherent in transformation (O'Brien, 2012; Carr 2019), transformational adaptation is still often viewed as a technical issue of scalability, rather than a social and political issue (Blythe et al., 2018; Ajibade and Adams 2019; Kasdan et al., 2021). While earlier scholarship on sustainable transitions was critiqued for a lack of attention to power dynamics, this has become a hallmark of recent sustainable transitions research with particularly relevant insights into the interplay between power and technical change (Avelino, 2017; Kohler et al., 2019). As an inherently political process, different actors have competing adaptation goals and visions for the future (Eriksen et al., 2015), and adaptation strategies reflect these values. Transitions management scholarship highlights the active role needed to manage transitions and provides insights into mechanisms and approaches for directing transitions (Loorbach, 2010) and shaping the directionality of sustainability transitions (Stirling, 2010).

Socio-ecological systems frameworks, commonly used in adaptation research, are not necessarily well-situated to address the cross-scalar politics and institutional arrangements that characterize adaptation (Jerneck and Olsson, 2008; Foxon et al., 2009). The multi-level perspective (MLP) provides a dynamic framework for analyzing socio-technical systems at multiple scales and situating potential levers of change within the system (Kemp et al., 1998; Geels, 2002). Jerneck and Olsson (2008) articulate this potential in a rare example using the MLP to analyze the multi-scalar responses to the United States' Dust Bowl. While these frameworks have not always explicitly considered the spatial dynamics of transitions, this has been growing area of focus in transition studies (Truffer et al., 2015; Binz et al., 2020).

There is significant interest in the role of the private sector in adaptation, but the theoretical literature on its role is limited (Pauw, 2017). Transitions studies has focused on the roles of multiple actors in socio-technical systems and the interactions among them, with particularly emphasis on the role of firms and their contributions (positive and negative) to sustainability transitions, which could enhance the understanding of the potential as well as the limitations of private sector contributions to adaptation.

1.2. Insights from adaptation research

Just transition movements, that seek to ensure that transition processes leave no one behind and account for historical injustices, have gained prominence (Newell and Mulvaney, 2013; McKauley and Heffron, 2018; Jasanoff, 2018). As transitions studies embraces a just transitions agenda, questions of vulnerability, inequality, and unequal impacts of growth and development, which have long been central to adaptation research will be critical to understanding just transitions (Vogel and Swillings, 2018).

With its emphasis of the role of rapid and slow onset disasters, and the disturbances climatic events can create for lives, livelihoods, and socioeconomic systems, research on adaptation can inform the understanding of the role that these events play in shaping sustainable transitions, either by facilitating more rapid transitions or creating backlash against transitions. This becomes an increasingly

Table 1
Potential synergies between sustainable transitions and adaptation research.

Issue	Research Gap
Normative and directed nature of transformational adaptation	How to incorporate competing visions and values into adaptation policy, "direct" adaptation policy towards those goals, and address the dangers or unintended consequences of transformation
Cross-scalar politics associated with transformational adaptation	Understanding the power and politics of actors, including incumbents, levers of change, and resistance to regime change
The role of the private sector in adaptation	Identifying aspects of adaptation the private sector is well-suited to support, and the limits of its contribution to system change
Ensuring just transitions	How vulnerability, inequality, and the unequal impacts of growth and development influence transitions
Disruptions and disturbance in transitions	Understanding the role of disruption and disturbance in enabling or constraining sustainable transitions
Synergies between mitigation and adaptation	Identifying potential for mitigation and adaptation synergies in the transition process
Transition vs transformation	Unpacking the relationship between transitions and transformation

important question in a world where climate disruptions are becoming more frequent and intense (Blackburn, 2018; Schipper et al., 2021).

1.3. Mutual insights

Identifying synergies (and trade-offs) between mitigation and adaptation is critical for future sustainable transitions, given the urgent need to both mitigate and adapt, insufficient resources dedicated to addressing transformations, and potential for co-benefits (Duguma et al., 2014; Suckall et al., 2015). Given their strengths in mitigation and adaptation respectively, collaboration in this area should be an immediate priority.

A second research area of potential mutual benefit is the relationship between transitions and transformation. While “transitions” is more commonly used in sustainable transitions research, there is growing work on transformation. Similarly, drawing on political ecology, adaptation research is increasingly interested in strategies that go beyond incremental change to address fundamental systems change, or transformation (Pelling 2010; Kates et al., 2012; Olsson et al., 2014; Fazey et al., 2018). Despite emerging from different academic traditions and emphasizing different components of system change (Feola 2015; Patterson et al., 2017; Hölscher et al., 2018; Colloff et al., 2021), collaboration could prove very fruitful for advancing scholarship in both fields.

If in the next decade, transition studies turns its attention to adaptation challenges with the same depth of insight that has characterized the analysis of mitigation challenges, understanding of the climate adaptation process will be greatly enhanced. Such engagement also offers significant potential to break down the siloes of sustainable transitions scholarship and lead to new advances in the field, particularly regarding just transitions that reduce vulnerability and increase equity globally.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

References

- Ajibade, I., Adams, E.A., 2019. Planning principles and assessment of transformation adaptation: towards a refined ethical approach. *Clim. Develop.* 11 (10), 850–862.
- Avelino, F., 2017. Power in sustainability transitions: analysing power and (dis) empowerment in transformative change towards sustainability. *Environmental Policy and Governance* 27 (6), 505–520.
- Binz, C., Coenen, L., Murphy, J.T., Truffer, B., 2020. Geographies of Transition — From Topical Concerns to Theoretical engagement: A comment On the Transitions Research Agenda, 34. *Environmental Innovation and Societal Transitions*, pp. 1–3.
- Blackburn, S., 2018. What does transformation look like? Post-disaster politics and the case for progressive rehabilitation. *Sustainability* 10 (7), 2317.
- Blythe, J., Silver, J., Evans, L., Armitage, D., Bennett, N.J., et al., 2018. The dark side of transformation: latent risks in contemporary sustainability discourse. *Antipode* 50 (5), 1206–1223.
- Carr, E., 2019. Properties and projects: reconciling resilience and transformation for adaptation and development. *World Dev.* 122, 70–84.
- Colloff, M.J., Gorddard, R., Abel, N., Locatelli, B., Wyborn, C., Butler, J.R., Dunlop, M., 2021. Adapting transformation and transforming adaptation to climate change using a pathways approach. *Environ. Sci. Policy* 124, 163–174.
- Denton, F., Wilbanks, T.J., Abeysinghe, A.C., Burton, I., Gao, Q., Lemos, M.C., Masui, T., O'Brien, K.L., Warner, K., et al., 2014. Climate-resilient pathways: adaptation, mitigation, and sustainable development. In: Field, C.B., Barros, V.R., Dokken, D.J., Mach, K.J., Mastrandrea, M.D., Bilir, T.E., et al. (Eds.), *Climate Change 2014: Impacts, adaptation, and vulnerability. Part A: Global and Sectoral aspects. Contribution of Working Group II to the Fifth Assessment Report of the Intergovernmental Panel On Climate Change*, Eds. Cambridge University Press, pp. 1101–1131.
- Duguma, L.A., Wambugu, S.W., Minang, P.A., Van Noordwijk, M., 2014. A systematic analysis of enabling conditions for synergy between climate change mitigation and adaptation measures in developing countries. *Environ. Sci. Policy* 42, 138–148.
- Eriksen, S.H., Nightingale, A.J., Eakin, H., 2015. Reframing Adaptation: the political nature of climate change adaptation. *Glob. Environ. Change* 35, 523–533.
- Fazey, I., Moug, P., Allen, S., Beckmann, K., Blackwood, D., et al., 2018. Transformation in a changing climate: a research agenda. *Clim. Develop.* 10 (3), 197–217.
- Feola, G., 2015. Societal transformation in response to global environmental change: a review of emerging concepts. *Ambio* 44, 376–390.
- Foxon, T.J., Reed, M.S., Stringer, L.C., 2009. Governing long-term social-ecological change: what can the adaptive management and transition management approaches learn from each other? *Environ. Policy Governance* 19 (1), 3–20.
- Geels, F.W. (2002). Technological transitions as evolutionary reconfiguration processes: a multi-level perspective and a case-study. *Research policy*, 31(8-9), 1257–1274.
- Ghosh, B., Schot, J., 2019. Towards a novel regime change framework: studying mobility transitions in public transport regimes in an Indian megacity. *Energy Res. Soc. Sci.* 51, 82–95.
- Grin, J., Rotmans, J., Schot, J., 2010. *Transitions to Sustainable Development: New Directions in The Study Of Long-Term Transformative Change*. Routledge.
- Hölscher, K., Wittmayer, J.M., Loorbach, D., 2018. Transition versus transformation: what's the difference? *Environ. Innov. Soc. Trans.* 27, 1–3.
- Janoff, S., 2018. Just transitions: a humble approach to global energy futures. *Energy Res. Soc. Sci.* 35, 11–14.
- Jerneck, A., Olsson, L., 2008. Adaptation and the poor: development, resilience and transition. *Clim. Policy* 8 (2), 170–182.
- Kasdan, M., Kuhl, L., Kurukulasuriya, P., 2021. The evolution of transformational change in multilateral funds dedicated to financing adaptation to climate change. *Clim. Develop.* 13 (5), 427–442.
- Kates, R.W., Travis, W.R., Wilbanks, T.J., 2012. Transformational adaptation when incremental adaptations to climate change are insufficient. *Proc. Natl. Acad. Sci. U. S. A.* 109 (19), 7156–7161.
- Kemp, R., Schot, J., Hoogma, R., 1998. Regime shifts to sustainability through processes of niche formation: the approach of strategic niche management. *Technol. Anal. Strategic Manag.* 10 (2), 175–198.
- Khan, M.R., Roberts, J.T., 2013. Adaptation and international climate policy. *Wiley Interdiscip. Rev. Clim. Change* 4 (3), 171–189.
- Köhler, J., Geels, F.W., Kern, F., Markard, J., Onsongo, E., et al., 2019. An agenda for sustainability transitions research: state of the art and future directions. *Environ. Innov. Soc. Trans.* 31, 1–32.
- Loorbach, D., 2010. Transition management for sustainable development: a prescriptive, complexity-based governance framework. *Governance* 23 (1), 161–183.
- Markard, J., Truffer, B., 2008. Technological innovation systems and the multi-level perspective: towards an integrated framework. *Res. Policy* 37 (4), 596–615.
- Markard, J., Hekkert, M., Jacobsson, S., 2015. The Technological innovation systems framework: response to six criticisms. *Environ. Innov. Soc. Trans.* 16, 76–86.
- McCauley, D., Heffron, R., 2018. Just transition: integrating climate, energy and environmental justice. *Energy Policy* 119, 1–7.
- Newell, P., Mulvaney, D., 2013. The political economy of the ‘just transition’. *Geogr. J.* 179 (2), 132–140.

- Nightingale, A.J., Eriksen, S., Taylor, M., Forsyth, T., Pelling, M., et al., 2020. Beyond technical fixes: climate solutions and the great derangement. *Clim. Develop.* 12 (4), 343–352.
- O'Brien, K., 2012. Global environmental change II: from adaptation to deliberate transformation. *Prog. Hum. Geogr.* 36 (5), 667–676.
- Olsson, P., Galaz, V., Boonstra, W.J., 2014. Sustainability transformations: a resilience perspective. *Ecol. Soc.* 19 (4), 1.
- Patterson, J., Schulz, K., Vervoort, J., Van Der Hel, S., Widerberg, O., et al., 2017. Exploring the governance and politics of transformations towards sustainability. *Environ. Innov. Soc. Trans.* 24, 1–16.
- Pauw, W.P., 2017. Mobilising private adaptation finance: developed country perspectives. *Int. Environ. Agr. Pol. Law Econ.* 17 (1), 55–71.
- Pelling, M., 2010. *Adaptation to Climate Change: From Resilience To Transformation*. Routledge.
- Schipper, E.L.F., Eriksen, S.E., Fernandez Carril, L.R., Glavovic, B.C., Shawoo, Z., 2021. Turbulent transformation: abrupt societal disruption and climate resilient development. *Clim. Develop.* 13 (6), 467–474.
- Smith, A., & Stirling, A. (2010). The politics of social-ecological resilience and sustainable socio-technical transitions. *Ecology and society*, 15(1).
- Suckall, N., Stringer, L.C., Tompkins, E.L., 2015. Presenting triple-wins? Assessing projects that deliver adaptation, mitigation and development co-benefits in rural Sub-Saharan Africa. *Ambio* 44 (1), 34–41.
- Truffer, B., Murphy, J.T., Raven, R., 2015. The geography of sustainability transitions: contours of an emerging theme. *Environ. Innov. Soc. Trans.* 17, 63–72.
- Van Welie, M.J., Cherunya, P.C., Truffer, B., Murphy, J.T., 2018. Analysing transition pathways in developing cities: the case of Nairobi's splintered sanitation regime. *Technol. Forecast. Soc. Change* 137, 259–271.
- Vogel, C., Swilling, M., 2018. Climate change and vulnerability in South Africa: sustainability transitions in a changing climate? *Sustainability Transitions in South Africa*. Routledge, pp. 40–57.