



Editorial: Managing Land for Risk: Climate Decision-Making in the Context of Forests, Farms, and Rangelands

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Editorial on the Research Topic

Managing Land for Risk: Climate Decision-Making in the Context of Forests, Farms, and Rangelands

INTRODUCTION AND RATIONALE

Forests, grasslands, and agro-ecosystems are facing unprecedented stress as climate change drives increasingly frequent and severe storms, droughts, wildfires, and pest and disease outbreaks. People whose livelihoods directly depend on farming, forestry, and ranching, therefore, have a great stake in managing land to reduce risk from climate change. In some cases, they have substantial capacity to reduce risk because of their years of management experience; in other cases, they have to learn new ways of adapting their livelihoods. Nevertheless, climate risk management is challenging for individuals as the complex set of stressors that interact within and across scales often have uncertain impacts at the local scale (Reser and Swim, 2011; Hawes et al., 2022). For example, some climate-driven changes, such as incremental increases in temperature at the global level or local sea rise in the far future, are particularly difficult for individuals to perceive (Grothmann and Patt, 2005; Adger et al., 2009; Gifford et al., 2011), making it difficult to make informed resource management decisions (Grunblatt and Alessa, 2017; Findlater et al., 2019; Fischer et al., 2022). Further, adaptation at the individual scale is almost always influenced by adaptation at other scales. Therefore, it can be difficult or even impossible sometimes for a farmer or forest owner to adapt in contexts where their adaptation will be influenced by others in their proximity who do not adapt (e.g., maintaining defensible space to reduce the risk of wildfire loss; Prior and Eriksen, 2013), or where institutional rules, structures, resources and cultures are not supportive of adaptation (Kates et al., 2012). Given this context, it may not be surprising that of the large number of empirical studies on adaptation at the individual level in the past two decades, a minority provide evidence of reduced risk as a key indicator of adaptation (Fischer, 2019; Berrang-Ford et al., 2021).

The goal of this Research Topic on climate decision-making by forest, farm, and range landowners was to contribute to scholarly understanding of whether and how adaptation occurs at the level of individuals, particularly how individuals develop adaptation on their farms or forestland. We called for papers that presented empirical research findings to illuminate features and factors of individual adaptation and test assumptions about individual adaptation in the climate change literature. We sought papers that discussed implications for policies and programs that aim to

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enable and encourage climate change adaptation among individuals. We welcomed empirical research, review, and perspectives articles, with a focus on climate-related decision making and management behavior by individual (as opposed to institutional) owners and managers of lands that produce food, fiber, and other ecosystem services of importance to society.

CHARACTERIZATION OF ARTICLES

The articles in this Research Topic focus primarily on North America and in particular the USA (Smith et al.; Upadhaya and Arbuckle; Upton and Nielsen-Pincus; Valliant et al.; vonHedemann and Schultz) and Mexico (vonHedemann and Schultz), with one cross-case comparison between the USA and Australia (Upton and Nielsen-Pincus).

All six articles sought to explain how individual landowners perceived and responded to climate change, specifically farmers (Haro et al.; Smith et al.; Upadhaya and Arbuckle; Upton and Nielsen-Pincus; Valliant et al.), ranchers (Smith et al.), and forest owners (vonHedemann and Schultz). The articles documented landowners' responses to different types of climate-exacerbated stressors, including drought and water scarcity (Smith et al.; Upton and Nielsen-Pincus); changes in temperature, precipitation, and growing seasons; and extreme weather events (Haro et al.; Upadhaya and Arbuckle; Valliant et al.; vonHedemann and Schultz).

The authors employed a variety of theoretical frameworks and methodological approaches, including Institutional-Social-Ecological Dynamics and social-ecological systems theories (Haro et al.; Upton and Nielsen-Pincus), general behavioral theories (Upadhaya and Arbuckle; Valliant et al.; vonHedemann and Schultz), as well as a lens of scale mismatches (Smith et al.). Three of the articles used qualitative methods (Smith et al.; Upton and Nielsen-Pincus; vonHedemann and Schultz), and three conducted quantitative analysis of survey and secondary data (Haro et al.; Upadhaya and Arbuckle; Valliant et al.).

EVIDENCE OF INDIVIDUAL ADAPTATION AND ASSOCIATED FACTORS

Three of the articles documented evidence of adaptation by individual landowners. That is, the landowners changed their behavior with the goal of reducing risk or increasing their well-being in the face of climate change. For example, vineyard owners attempted to reduce their water dependency through changes to viticulture options, farming techniques, and/or cellar operations (Upton and Nielsen-Pincus). Similarly, farmers from Iowa, USA, increased their use of conservation practices such as no-till, planting cover crops, and installing buffer strips to reduce risk from more frequent and heavier rainfall events (Upadhaya and Arbuckle). In another article focusing on farmers in the Midwestern USA, however, Valliant et al. found that although farmers have noted the changing weather patterns and regional climate effects, only half anticipated adapting by diversifying their agricultural products to manage risk. The other three articles either did not provide clear evidence of behavioral

change, or the documented changes in behavior were not always consistent with adaptation. For example, maize farmers in Southern Mexico did not shift away from rain-fed native varieties, while farmers in Northern Mexico adopted irrigation management to grow commercial feed crops, increasing their dependence on a climate-sensitive resource (Haro et al.).

It is worth noting that, overall, the articles in this Research Topic provided limited evidence of how or the extent to which the adaptive responses by landowners reduced climate and other forms of risk, as is common in the wider adaptation literature (Berrang-Ford et al., 2021). This may be due to the complex interconnections between individual and institutional adaptations. As such, our Research Topic highlights the importance of longitudinal studies to not only examine adaptation-oriented behaviors over time, but to track the adaptive outcomes in terms of reducing various forms of risk at the individual, household, community, and other scales.

When describing factors that enabled and/or constrained adaptation, most articles in this Research Topic emphasized institutional factors. For example, an institutional factor that constrained adaptation for vineyard owners was top-down water governance, which prevented local landowners from participating in water decision-making and resulted in a focus on engineered efforts to produce more water rather than conserving water (Upton and Nielsen-Pincus). Farm subsidies was another institutional factor that constrained adaptation among maize farmers in Mexico (Haro et al.). Among forest owners, lack of markets, lack of capacity of workforces, and limited management outreach and assistance constrained efforts to reduce wildfire risk and mitigate adverse impacts of drought (vonHedemann and Schultz). In some cases, adaptation was also constrained by the broad economic and market conditions, resulting in some crop farmers in the Midwestern USA prioritizing short-term actions that were potentially maladaptive (Upadhaya and Arbuckle). In addition to these institutional barriers, two articles also reported on psycho-social factors that motivate adaptation at the individual and household scales: stewardship motivations and wildlife values (Upadhaya and Arbuckle), as well as family relationships and legacy values (Valliant et al.). Finally, Smith et al. identified the availability of climate information at the appropriate scale as a limitation to landowners being able to adapt. These articles suggest that landowners are influenced by a wide range of factors, ranging from intra- and inter-personal factors, to local, regional, national, and international influences (Keskitalo et al., 2016; Fischer et al., 2022).

CONCLUSION

Overall, this Research Topic contributes to the behavioral adaptation literature by documenting individual adaptation efforts among forest, farm, and range landowners. The articles included in this Research Topic increase our understanding of the factors that influence adaptation at the individual level, and the way in which the institutional contexts influence individual adaptation. In this regard, the articles illustrate, amongst other factors, the role of various institutional resources such as funding,

personnel, technical assistance, knowledge, scaling information, and short-term incentives in promoting individual actions (Smith et al.; Upadhaya and Ar Buckley). The broader institutional contexts such as water rights or the negotiation of issues through boundary organizations (Upton and Nielsen-Pincus), as well as policies that limit parcelization (vonHedemann and Schultz), were also crucial for enabling stronger individual adaptation.

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AUTHOR CONTRIBUTIONS

APF conceived of the Research Topic. ZM, RSW, and CK contributed to the conceptualization, solicitation of article submissions, review of articles, and writing of editorial. All authors contributed to the article and approved the submitted version.

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