

Research Article

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The Role of Hybrid Methodologies in Understanding Complex Environmental Issues and Promoting Social Justice

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Abstract: Climate adaptation research often ignores the broader socio-cultural human sphere within which climate change takes place. Dominant viewpoints on climate adaptation derive from the biophysical world that often excludes social, economic, and political contexts that also connect to biophysical changes. Hybrid methodological mixed methods approaches to climate adaptation provide paradigmatically different questions. This perspective is useful for identifying socio-cultural aspects of climatic adaptation. To demonstrate the power of a hybrid approach for interconnecting human and non-human factors implicated in climate adaptation, we deploy an in-depth case study of N. Benin, West African farmers who increasingly must configure their farming methods to tackle erratic changes in weather. The case study examines the role gender dynamics play in climate adaptation that found few gender differences in the ways male and female farmers perceive the biophysical aspects of climate adaptation on their subsistence farming lifestyle from their initial village climate survey. However, the qualitative components of their study uncovered significant gender differences in socio-cultural adaptation challenges, vulnerabilities, and future lifestyle opportunities. We discuss the transformative policy implications about ignoring gender difference and the importance of taking an intersectional approach to variation in climate adaptation policy making.

Keywords: Situated knowledge; Mixed methods; Gender roles and the environment; Social justice

1 Introduction

Hybrid methodologies conceptualize an environmental problem by addressing the interactions of human and non-human aspects as causal factors in the understanding of climate adaptation. A hybrid methodology asks transformative research questions centered on issues of power and social control and also prioritize the human impacts of climate change by taking an intersectional approach to social policy initiatives that guards against essentializing gendered experiences (Crenshaw, 1991; Carr 2008; Arora-Jonsson 2011; Tschakert and Machado 2012; Nightengale, 2016). A transformative paradigm provides a good starting point for environmental researchers to consider how to adopt a wide range of different perspectives whose goal is to promote human rights and social justice (Mertens & Stewart 2014:334; Mertens, 2009, 2014).

The goal of a hybrid methodological approach is not to form better predictions but rather to provide multiple methodologies and methods that can uncover new knowledge options and research questions as well as analytical and interpretative strategies in the service of understanding complex problems such as adaptation to climate change. The environment itself is a hybrid entity that includes a complex set of inter-relationships between nature and culture (See: Mather et al., 1980; Hulme, 2010; Murphy, 2011; Cupples, 2012). It is critical to study “the synergistic relationships among climate processes, surface features, and human actions” (Mather et al., 1980, p. 285). Geographer Jeff Popke (2016) and his colleagues edited a special issue that originated out of a mixed methods session presented at the Association of American Geographers Annual Meetings held in 2013 and 2014. These conference session papers argued for examining climate change not as a single entity, but rather as a “mixed or hybrid entity” and advocated for a more multi-dimensional or pluralist perspective that includes a range of qualitatively and quantitatively driven approaches toward understanding climate change that takes into account

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interactions between the human and non-human (Popke, 2016; Nightingale, et al., 2017).

Hybrid mixed methodologies deploy both a quantitative and qualitative component, and this research design is particularly useful for understanding climate change adaptation. Each design component contains a different paradigmatic approach with its methodology and set of research questions that often deploy different methods, techniques, and analytical and interpretative styles (Hesse-Biber, 2012). There is no one right way of knowing. When deploying a mixed methods hybrid methodological approach, researchers using a quantitative perspective derive their methodology from a positivistic approach. A positivistic approach aims to find “the truth” through the practice of the scientific method whose procedures ensure a value-free, scientific inquiry, and a logical outcome. A quantitative approach often asks “why” questions and makes a priori assumptions concerning the nature of the social world (ontology), who can create knowledge (epistemology), and the types of questions that are critical to address (methodology). That, in turn, justifies the kind of research design – that given set of methods, analytical and interpretative strategies. “Why” questions derive from a worldview that assumes the social reality is “out there” awaiting discovery. Positivistic quantitative environmental research leans toward questions stated in the form of a hypothesis that is testable. This type of research design favors observation and measurement. Positivists often use evidence-based methods such as experimental designs or surveys to precisely measure empirical outcomes (Hesse-Biber, 2010; 2017).

Qualitatively-driven paradigmatic perspectives can analyze those specific human social processes that connect to climate adaptation. A qualitative approach views knowledge as inter-subjective and calls for an emphasis that aims for partial truths to provide an understanding of environmental issues that focus on the role of socio-cultural forces. Questions emanating from this paradigmatic perspective center on “What” questions such as, “What is the lived experience of individuals undergoing climate change?” This perspective aims to understand local, socially constructed lived realities, often seeking out those voices left out of environmental concerns such as women and other marginalized groups. This paradigm uses research techniques such as in-depth interviewing and fieldwork to understand lived experience.

Feminist philosopher, Donna Haraway’s (1988) theory of “situated knowledge,” is useful in thinking about the value of a hybrid approach to knowledge building. She argues that all knowledge is socially situated, meaning it has its own set of values and offers new alternative

views that are partial. The praxis of situated knowledge is to envision hybrid perspectives onto a research issue by asking epistemologically different questions. It is in studying the gaps created by these two epistemologically different perspectives and their data findings that are critical for new knowledge building. Therefore, the goal may not lie in first integrating research results or seeking to triangulate/converge them. Hybridity implies honoring each perspective’s lens onto the social world, without the goal of finding “a truth” (See also: Nightingale, 2003; 2016).

A hybrid methodological approach seeks out the contradictions and different layers of meanings to understand the complexity of the social world. It values the contributions of qualitative and quantitative approaches that address a complex research problem like climate adaptation that can also serve as a counter explanation to more predominant perspectives regarding the interface between nature and culture concerning critical environmental issues.

The following case study is an example of the powerful and transformative contribution of a hybrid mixed methods methodological approach toward understanding climate adaptation. Yin (2009) defined a case study as “an empirical inquiry that investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident” (p. 18). In other words, a case study approach provides a richer contextual understanding of intersectional issues. In this instance, it allows us to investigate a given problem from a range of perspectives and provides a more complex and nuanced understanding of climate adaptation. This case study especially illustrates the potential explanatory as well as exploratory power of mixed methods research designs that incorporate hybrid methodologies, which serve to unearth a richer understanding of the complexity of the human-environmental connection, especially concerning gender dynamics (Nightingale, et al., 2017).

2 Case Study: Understanding Gender-specific Dynamics in Responding to Climate Change in Agrarian North Benin, West Africa. (Dahgbeto & Villamor, 2016).

North Benin, West Africa’s rainfall patterns are highly variable, and there is little understanding regarding how

gender roles affect the adaptation responses of North Benin farmers to climatic variability. We know little regarding any perceived “linkages between gender and agro-ecological sustainability, decision making, and the development of multi-functional landscapes” (Dahgbeto & Villamor, 2016). Some research suggests that in semi-arid agrarian settings women are especially vulnerable to the impacts of climate change as their traditional gender role identity primarily wives and mothers serve to limit their access to resources and decision-making roles outside their households regarding issues involving climate change (Omari, 2010; Djoudi & Brockhaus, 2011).

The research study design employs a transformative hybrid sequential mixed methods methodological approach. The research design started with quantitative component that consists of a household survey of a stratified random sample consisting of 260 participants, all of whom were landowners (of which 197 were male, and 63 were female households). Participants were administered a semi-structured questionnaire in February and March of 2014. The survey questions contain demographic characteristics, land usage patterns, perceptions of what factors participants felt facilitated or impeded their decision-making concerning adaptation to climate change at the farm, and household levels.

Two qualitative components followed the survey. The first qualitative component consisted of thirty-seven participants from the investigation that agreed to participate in a climate simulation exercise. Participants were assigned into three men-only and three women-only groups corresponding to each of the three villages. The primary objective of this gaming exercise was to observe any specific gender differences regarding land use strategies (what crops were chosen to plant; use and sale of livestock), and the level of coping skills under erratic rainfall climate scenarios. Same-sex groups were encouraged to talk about how they were going to collectively respond to the variety of game unpredictable weather simulated scenarios. By creating this interactive and dynamic group setting, the researchers were able to observe how each same-sex group went about making climate-related farming decisions as each simulation game unfolded.

A second qualitative component consisted of a short reflection session after the simulation exercises, allowing researchers to validate and ask questions regarding the strategies/decisions made by each same-sex gender group. The researchers gave multiple-choice and open-ended questions to each of the simulation groups (Villamor & Badmos, 2016).

Observational data from both qualitative components were interpreted using score sheets, visual data, as well

as an on-site recording of field notes consisting of conversations. Utilizing a hybrid mixed methods methodology design allows the researchers to examine the range of gender dynamic processes taking place that are not visible in the quantitative component that the research literature and climate social policy often leaves out. Dahgbeto & Villamor (2016) note that “Gender-specific responses to climate change impacts have largely been ignored in the context of international debates and policy frameworks” (p. S297). Focusing on gender differences that combines quantitative survey data with qualitative data – game simulations, interviews and observational – provides the researchers with critical information on the role of gender dynamics in climate adaptability that may serve to “improve adaptability and resilience” among rural subsistence households.

The hybrid mixed methods methodology design had three research objectives. The quantitative component (survey) is designed to answer questions one and two, while the qualitative part (gaming exercise and observational data) was designed to answer question three.

“(1) How do male and female farmers perceive and react to climate variability and extreme weather conditions?

(2) Do male and female perspectives differ in terms of land-use preferences and adaptation to climate variability?

(3) What determines gender-specific decisions under conditions of climate uncertainty?” (p. 297).

The survey findings revealed few gender differences concerning perceptions of climate change in this region. Both genders were aware of the erratic and rising temperature patterns in their area that threatened their crops and ability to sustain their agricultural way of life. Both men and women responded in the survey that they would shift work toward a shorter growing cycle and would use a different set of crops that would tolerate a shorter growing period as a strategy to deal with lower crop outcomes. Thus, the survey data revealed *few differences in men and women’s awareness of climate changes* in their semi-arid region, and both genders stated that they respond with more or less with the same strategy to deal with climatic shifts. The survey, however, relied on self-reported data that did not provide a social context for assessing those socio-cultural processes involved in carrying out farming decisions as they unfold on the ground and the interactions of the biophysical with the socio-cultural aspects of climate adaptation.

To gain a contextualized understanding of any perceived gender differences in climate adaptation among farmers, researchers observed the farming strategies each same-sex group enacted in response to different varieties of simulated erratic climatic conditions (scenarios) as they unfolded in the gaming simulation. The observational data did find gender differences in the responses of climate adaptations. Within the simulated group exercises, women farmers tended to share information, to innovate regarding how crops were cultivated and were able to add new varieties of crops with a shorter growing season. They also diversified their revenue streams by adding livestock in addition to planting crops. The gaming simulation provided women the opportunity to make strategic farming decisions that would have remained hidden from their daily interactions with men, who were the primary decision makers within their households. Women were also observed to rely on their religious beliefs for support and solace during the game scenarios, often praying collectively for the rains to come.

All male groups behaved differently under the simulation exercises; namely, they concentrated on livestock production regardless of whether or not it resulted in land degradation. They selected crops that received a government subsidy when planted. Younger men, in particular, sought to invest in livestock as a strategy to obtain money quickly to emigrate from the area in search of wage labor opportunities under what they saw as dwindling economic opportunities in a subsistence agrarian way of life under increasingly erratic climate changes.

The observed gender dynamics taking place in all male and all female groups provided a different lens onto the lived experiences regarding how men and women farmers adapt to climatic changes. The observations found gender differences through detailed observations via the climate simulation games as well as during the reflexivity exercises. Women's farming adaptations focused on maintaining their subsistence economy. However, men's responses in the all-male groups showed a preference for out-migration from subsistence agriculture toward wage labor outside their farm community, leaving women to bear the burden of increased workloads to fill the gap in farm labor left by men. The differences in gender dynamics concerning climate adaption uncovered within the qualitative data are critical to consider to consider in understanding the impact of climate adaptation on family households. The qualitative component's intersectional approach revealed unique climate adaptation vulnerabilities and future economic concerns each gender will face as erratic changes in climate proceeds. Women may increasingly be left to tend their farms without the labor of their hus-

bands. This added labor burden may increase their need to expand their knowledge and farming skills, including the storing and processing of foods, and sending them to market. Men, as well, may face a new set of challenges in finding work opportunities outside their farming villages, and learn how to adapt to a new set of economic and lifestyle challenges.

3 Conclusion

The findings from the quantitative survey component revealed few gender differences about perceptions of climate change in this region. Both men and women knew about the erratic weather changes and patterns in their area and pursued atypical crops with a shorter growing cycle to compensate for unpredictable changes in rainfall. However, the survey method was unable to get at the day-to-day lived experiences of how each gender copes with such climatic changes on the ground. It was the deployment of a qualitatively driven component that provides information on how each gender adapts to changes in the weather, especially erratic rainfalls, by turning to reflexive accounts about how each gender group responds to climate shifts and the strategies they use to adapt to these changes. All female simulation groups showed increased resilience as they actively applied different approaches and innovations. Out-migration was an essential factor in adapting to erratic weather conditions among the all-male simulation groups.

A transformative hybrid mixed methods methodological approach uncovers subjugated knowledge, knowledge that was not seen before, especially from the perspective of marginalized groups (Haraway, 1988). Such knowledge is excluded in more dominant ways of knowing. Subjugated knowledge accepts that all views are always partial- and each provides new alternatives for thinking about causes as well as solutions to complex problems such as climate adaptation. It pursues different sets of questions and explores the gaps between research findings from varied (dominant non-dominant) approaches toward knowledge building. The addition of qualitative research components in the case study reveals new ways to conceptualize the nature-society interface. What appears hidden in the survey data, but unearthed in the simulation exercises and reflexivity interviews, were a set of intra- and inter-gendered relationships, as well as differences in cultural beliefs such as the dominant role of religion concerning enhancing the resilience of crops and concerning their responses to climate change. The quali-

tative components introduce methods that allow researchers to explore questions regarding the process of gender dynamics within which farmers make climate decisions. It enables the researchers to observe the decision-making process men and women farmers engage in to cope and adapt to erratic climate weather conditions, and also allows for the unfolding of those gender-related processes by observing and listening.

By using a transformative hybrid mixed methods methodology approach, the future challenges and vulnerabilities farm households face becomes evident in that it promotes observing men and women's responses to climatic simulation scenarios. The case study unearths how men sell off their livestock and use the revenue to seek employment elsewhere. Out-migration of males may, in turn, make women more vulnerable to severe weather conditions, as they try to cope with increased farming workloads to compensate for the absence of men as they struggle to sustain their farming way of life under challenging environmental conditions.

A transformative hybrid mixed methods methodology approach contributes to a fuller understanding of the role that gender dynamics play in environmental adaptation and opens up a fuller discussion and research agenda regarding how to study linkages between gender and the environment. For the most part, early on, women have been left out of environmental studies as a whole, and their contributions and concerns become marginalized within the more extensive field of environmental issues (Shiva, 1988; Agarwal, 1992; Raghuram, Rocheleau, Thomas-Slayter, & Wangari, 1998). The qualitative component of the hybrid mixed methods methodology is transformative in that it provides a new set of questions that examine the process of how gender dynamics interfaces with the physical environment that make visible the co-mingling of social and biophysical environments.

The application of a transformative hybrid methodological viewpoint onto a given complex issue, like environmental change, demands new forms of social inquiry in terms of alternative methodologies and methods. An important lesson we can take away from this study is how a researcher frames a research question, that resides in their epistemic viewpoint, ultimately shapes their entire research design from the questions they ask or don't ask, as well as how they combine methods in an overall mixed methods research design (Mertens, 2018). Epistemic viewpoints, in turn, serve to shape policy initiatives on climate adaptation (Howlett, 2009; Beland & Cox, 2013). A hybrid methodological approach asks many different questions that can address the policy needs of marginalized groups that are often left out of the environmental adaptation

policy. Thus, a hybrid approach has the potential to offer a more robust set of climate policies that may address the diverse range of human differences and diverse non-human environments (Vi, Biesbroek, Groot, & Termeer, 2018). It is important to note that while the study of N. Benin farmers in West Africa does examine gender differences in climate adaptation, it fails to address the range of diversity differences within and between the genders, including differences in age, ethnicity, socio-economic status, and so on. Taking an intersectional approach to social policy initiatives will guard against essentializing the experiences of men or women (Crenshaw, 1991; Carr 2008; Arora-Jonsson 2011; Tschakert and Machado 2012) in future climate adaptation research studies.

Additionally, this study of gender differences in climate adaptation also suggests the need for researchers to transform their social policy recommendations regarding the types of resources and their distribution that may need to vary depending on the intersectional standpoint of each gender. We noted in the case study; for example, women farmers might be especially vulnerable to broader environmental and structural forces of out-migration of males to wage labor.

What is missing from our understanding of the climate adaptation of women derives from findings from the simulation exercises that showed the pro-active and innovative qualities women display in coping effectively with erratic changes in farming weather conditions. The gaming exercises provided women-only interactive spaces that allowed women farmers to negotiate and engage with one another to solve problems around land-usage in creative ways. The all-female gaming scenarios allowed room for women farmers to reflect on their positionality/ identity and find ways to foster resilience through becoming change agents who make decisions and try out strategies for dealing with climate scenarios. The game simulation exercises offered women an opportunity to envision and revise farming practices by taking on the responsibility for making critical farming decisions, which traditionally was the responsibility of male farmers. Seeing women farmers as change agents provides transformative information for policymakers to identify and build on women's adaptive strengths in coping with challenging climatic conditions (Agarwal 1992; Mies and Shiva 1993; Resurrección 2013; Meinzen-Dick et al. 2014; Buechler and Hanson 2015).

Finally, implementing a transformative hybrid mixed methods methodological approach to climate change and adaptation requires research expertise in applying multiple methodologies and methods that ask different sets of questions regarding environmental issues. In other words, it calls for researchers to broaden their perspective

on climate adaptation by coming out of their methodological and methods comfort zone (See also: Ely, et al, 2014). This will require understanding that different points of view are equally situated, valid, and can potentially offer new insights into understanding climate adaptation that is in itself nuanced and variable. Ensor and his colleagues (Ensor, Wennstrom, & Bhattarai, et al., 2019) speak to this issue concerning the praxis of climate change adaptation. They stress the need to “ask the right questions that capture the on-going process of climate adaptation” that includes seeking to understand the biophysical as well as the lived experiences of those communities impacted by climate adaptation. They state:

Asking the right questions...means opening up adaptation by asking: ‘what are the most significant changes taking place in people’s lives? along with...’what are the impacts of climate change?’ Viewing adaptation as occurring between and within these two perspectives has the potential to reveal new vulnerabilities and opportunities for adaptation practice to act upon (Ensor,Wennstrom & Bhattarai, et al., 2019: 227).

Questions derived from quantitative and qualitative paradigmatic approaches are needed, and finding ways to connect and place these differently situated perspectives in dialogue with one another would be truly transformative: this is the next research challenge for those researchers seeking to understand complex environmental issues.

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