International Journal of Gender, Science and Technology
http://genderandset.open.ac.uk

# Feminist ecology: Doing, undoing, and redoing gender in science

***Amy S. Teller, Apollonya M. Porcelli***

***Brown University, USA***

**ABSTRACT**
Women continue to be underrepresented in STEM fields and also are more likely to leave academic careers than men. While much existing sociological research on gender in science focuses on structures, institutions, and policies, we take a cultural and phenomenological approach to the question. We focus on the interaction between structural and micro-sociological forces that uphold existing gender inequalities and drive new forms of inequality within the discipline of ecology by tracing the experience of female graduate students. Ecology in the United States and elsewhere is currently undergoing three shifts, well documented by previous studies—more female scientists, interdisciplinary work, and research in human-altered landscapes—that comprise a transition to what we call "feminist ecology." We ask whether these disciplinary-level shifts in ecology are accompanied by renegotiations in the way ecologists "do gender" as they work.

In this paper we argue that despite structural changes toward a feminist ecology, gender inequalities are not eliminated. Our data collected using ethnographic and autoethnographic methods during ecological fieldwork in the Northeastern United States, show that gender inequality persists through daily interactions, shaping the way that fieldwork is conducted and bodies are policed. We provide additional evidence of the way that ecologists and non-ecologists interact during fieldwork, highlighting the embeddedness of scientific disciplines within larger societal forces. Thus, the question of women in science cannot be understood strictly from within the bounds of science but extends to gender relations in society at large. We hope that this study can serve as a teaching tool for university efforts to increase the success, not just the prevalence, of women in science, and facilitate productive interdisciplinary research across disciplines.

**KEYWORDS**
women in science; ecology; doing gender; autoethnography

# Feminist ecology: Doing, undoing, and redoing gender in science

## INTRODUCTION

Women continue to be underrepresented in science-based careers and are more likely to leave academia than men (Robinson, 2011; O'Brien & Hapgood, 2012; Shaw & Stanton, 2012; McGuire, Primack & Losos, 2012). Scholars have been carrying out crucial research on the issue of women in science by identifying mechanisms and structures that constrain women's careers based in the traditions of organizations (Fox, 2001; Smith-Doerr, 2004; Williams, Muller & Kilanski,. 2012), family-work balance (Herman & Webster, 2010; Robinson, 2011), social psychology (Correll, 2004; Cech et al., 2011), and stratification (Long, Allison & McGinnis, 1993; Shauman & Xie, 1998; Xie & Shauman, 2005; Goldberger & Crowe, 2010). In this paper, we extend this work by focusing on the cultural and micro-sociological forces that uphold existing gender inequalities in science and drive new forms of inequality, which has been noted by several researchers as a gap in the literature (Roy, 2004; West & Zimmerman, 2009; Cech & Blair-Loy, 2010; Giordano, 2014; Cain & Leahey, 2014).

Recent findings have pointed to the organizational and social context within which female academics train (Fox, 2001) and the informal and formal relationships created among colleagues (Cain & Leahey, 2014) as indicative of the cultural inclusion or exclusion women experience within scientific disciplines. Auto-biographies and first-hand reports have offered some of the most compelling evidence to investigate the entrenched cultural challenges to female participation in science (Roy, 2004; Cain & Leahey, 2014; Giordano, 2014). This paper relies similarly on first-hand accounts by employing autoethnographic and ethnographic methods as a means to explore more subtle aspects of gender inequality in science like interactions, dress, and sense of self.

We focus on the discipline of ecology, a "border science" in which data is developed from work in both the field and the laboratory (Kohler, 2002). Ecology can be considered a more feminist science because of its holism, elements of qualitative thought, and value-based interest in conservation (Merchant, 1980). Ecology relies on an egalitarian comprehensiveness, as ecologists are expected to be conscious of complex interactions among flora, fauna, microbes, and materials that comprise their field sites (Kohler, 2002). In addition to these aspects of content and methodology, the life sciences, including ecology, have a lower incidence of women's underrepresentation compared with physical sciences and engineering (Cain & Leahey, 2014). That said, ecology is a value-laden, problem-solving discipline that provides the knowledge and power to influence relationships among the planet's humans and non-humans (Worster, 1994). Thus, gender inequality within the discipline is a critical concern for society, as well as within science. Despite improvements, internal reports from the Ecological Society of America (ESA) in 2006 and 2013 cite "gender issues" as barriers to reaching top positions within the discipline (ESA Profile of Ecologists Report 2006; Lockwood, Reiners & Reiners, 2013).

Currently, ecology is undergoing three notable shifts—more female scientists, increasing support for interdisciplinary work, and a greater acceptance of research in "human-altered" landscapes—that constitute a transition to a more feminist discipline. These shifts are well documented by previous studies that we synthesize in this paper. Our research examines the extent to which these structural shifts toward a more feminist ecology are accompanied by renegotiations in the ways that ecologists "do gender" as they work. We draw upon our unique position as interdisciplinarians—Sociology doctoral students working on Master's theses in Ecology and Evolutionary Biology (EEB)—to employ ethnographic and autoethnographic methods spanning 18 months of data collection in ecological research settings in the Northeastern United States. We provide a comprehensive first-hand account of being a woman in science, the experience and cultural challenges, as well as the social interactions taking place during ecology's disciplinary-level transition. By being active participants in ecology, we illustrate otherwise undocumented connections between the culture of the discipline and structural shifts.

We argue that in spite of these three feminist shifts in the discipline, gender inequalities in ecology are not eliminated. Rather, our data show that gender inequality persists through daily interactions, shaping the way that fieldwork is conducted and bodies are policed. We provide additional evidence of the way that ecologists and non-ecologists interact in the field, highlighting the embeddedness of scientific disciplines within larger societal forces. In short, science is not an island unto itself. We hope that this reflexive study can serve as a teaching tool to improve gender equality within the sciences, and spur more research that examines the connections between structure and culture in academia.

## THEORETICAL FRAMEWORK: FIELD THEORY AND SOCIOLOGY OF GENDER

Sociologist of gender Paula England writes, "because of the omnipresent nature of gender in the culture, gender often becomes the most available material from which to construct aspirations and may be used even more when a job choice is seen as a deep statement about self" (2010, p.159). In an academic discipline like ecology, the choice to pursue an academic career is a fundamental part of one's self and a reflection of the inner self. Empirically investigating the way gender interacts with self and the culture of the field is an indispensible angle for understanding the difficulties female ecologists face. To do this, we draw upon Bourdieu's field theory (Bourdieu, 1990) and the sociology of gender's concept of *gender hegemony* (Connell, 1995; Connell & Messerschmidt, 2005; Schippers, 2007), applying them directly to the discipline of ecology. We also rely on the prominent conceptual framework *doing gender* (West & Zimmerman, 1987). Together, these social theories of gender and culture—aligned more with gender's persistence and structure (gender hegemony), its dynamism and interactions (doing gender), or traversing both (field theory)—inform our analysis of gender in ecology.

Given that this research is set in an academic field with its own culture and boundaries to protect, we merge Bourdieusian field theory with interactional gender theories. The relationship between culture and conduct is a central tenet of

Bourdieu's logic of practice (Bourdieu, 1990), and cultural norms—where doing gender and gender hegemony are located—define the field of ecology and its boundaries. The way in which gender intersects with disciplinary culture production is an important area of sociological interest applicable to women's success in science. As Bourdieu suggests, "participants in a field constantly work to differentiate themselves from their closest rivals in order to reduce competition" (Bourdieu & Wacquant, 1992). Field theory sets our focus on the appearances, tastes, values, and dispositions of ecologists that separate ecology from other academic fields, and ecologists by gender. However, Savage and Silva (2013) argue "a major route forward is to draw out the tension in Bourdieu's concept of field between forces of competition and integration." In addition to the more prominent account of competition and domination, participants also share passions, like an interest in producing new knowledge about how nature works or environmental conservation, and a stake in the academic ecology game (Savage & Silva 2013). Our empirical data on gender in ecology demonstrate both these competitive and integrative dimensions of field theory.

Fundamental to Bourdieu's theory is the concept of *habitus*, the set of dispositions or characteristics based on individual's past experiences that are taken for granted yet continue to organize and structure their practices (Bourdieu, 1990). This notably brings individuals' histories and past experiences into the narrative, while micro-sociological gender theories focus more on present social interactions. For example, women enter ecology with histories of experiences in their science and math classes as teenagers and in undergraduate introductions to the laboratory and fieldwork, which likely differ from men's experiences. Gender in ecology is not only about current interactions, but also about how individuals' pasts structure expectations for themselves and their places in the field. Thus, drawing upon Bourdieusian theory of reproduction adds considerations of what an ecologist's habitus looks like and how the ideal type ecologist is reproduced. At the same time, habitus can be an indication of social change. As conditions change (i.e., the transition to feminist ecology), new types of habitus arise along with the emergent reality of the individual, thereby subtly altering interactions (King, 2000). Given this understanding of habitus, we can also ask whether female ecologists bring a different habitus to ecology, and if this is one potential mechanism for cultural change in the field as the numbers of women increase.

Feminist critiques of habitus contend that the overemphasis on the possible refashioning of identity reduces gender to a symbolic identification rather than a deeply entrenched form of embodied existences. Therefore, habitus fails to address the barriers for women related to dispositions as they move between and within fields (McNay, 1999). Also, recent theoretical work uses the concept of "fragmented habitus" as it relates to gender and the labor required to integrate incongruous fields and associated dispositions (Silva, 2016). Silva (2016) suggests that we can better understand processes of change by paying attention to the multiple and transitional spaces that individuals, in our case female ecologists and interdisciplinarians, are standing in and what that experience of liminality is like. Our research integrates field theory with gender theory to show empirically that women do find ambiguity and difficulty in navigating fields. Both theories address

the slow and slight changes in human interactions to both objective and subjective conditions. Science, technology, and gender relations are constantly renegotiated rather than fixed (Adam et al. 2006), and they are structured by interactions and conditions within a context like the discipline of ecology.

*Doing gender,* introduced to sociology a few decades ago by West and Zimmerman, continues to be a leading way of thinking about gender (Risman, 2009; West & Zimmerman, 1987; 2009). In stark contrast to theory on gender roles and socialization, West and Zimmerman portrayed gender as a practice we do, rather than something we are. Being a recognizable member of a gender category takes some doing, and individuals are held accountable to current, contextual, and culturally specific conceptions of "woman" or "man" through social relationships (West & Zimmerman, 1987). Notably, doing gender focuses on the level of social interaction and asks how interactions serve to perpetuate inequalities. This framework can be applied to gender in the discipline of ecology by documenting social interactions in internal ecology spaces and external fieldwork spaces, observing how ecologists feel accountable for doing gender and in what ways they are held accountable by others.

Doing gender has sparked debate over whether or not gender can be *undone*. Judith Butler introduced the idea of *undoing gender* (2004), while Deutsch (2007), and Risman (2009) further argue the position. From Deutsch's perspective, *doing* evokes generating difference but not erasing it, and *undoing* is needed to understand interactions that reduce gender binaries (2007). Again, the importance of the interactional level is highlighted. Interactions can undermine structural improvements for women, while at the same time positive change for women (and people of all genders) can begin through social interaction. We work to understand when interactions become more or less gendered in ecology, when gender is irrelevant in an interaction, and whether gendered interactions necessarily reinforce inequality.

As society (including the discipline of ecology) continues to attain more feminist goals, Risman (2009) calls for sociologists to document the ways in which we find people undoing gender. However, we must be cautious, as gender can change form without reducing male privilege, and individuals can be doing some aspects of gender while undoing others. Recognizing that some behaviors are not gendered and being careful about what *doing* and *undoing* behaviors look like are crucial, and according to Risman, the best marker is whether the behavior challenges or supports the gender hierarchy (Risman, 2009). West and Zimmerman (2009), on the other hand, suggest that gender can only be *redone* and never undone. Gendered accountability does not go away but simply shifts in form (West & Zimmerman, 2009). Despite disagreements about the nuances of change, all the aforementioned gender scholars support the notion that "changes in those circumstances [historical and structural] can facilitate inferential shifts in the terms of gender accountability and weaken its utility as a ground for men's hegemony" (West & Zimmerman, 2009, p.117). Thus we ask, during ecology's current disciplinary-level feminist transition, how is accountability for doing gender also

changing at the micro-level, and how does this affect female ecologists and their work?

We also draw upon the concept of *gender hegemony* (Connell, 1995) to better understand why gender inequality may continue even as ecology sees more women, interdisciplinarity, and human-altered landscapes. Connell's concept of *hegemonic masculinity* conceives of masculinity as simultaneously a place in gender relations, the practices through which men and women engage that place in gender, and the effects of these practices on bodily experience, personality and culture (Connell, 1995; Schippers, 2007). Thus, masculinity is a position that any individual can move into, a set of practices and characteristics taken up, and the effects that the collective embodiment of these practices has on a culture, including ecology's. Hegemonic masculinity operates by delegitimizing all other masculinities and femininities (Connell, 1995). This hegemony comes to organize social life through discourse, actions, and interactions, but also through structures such as family leave and spousal hiring (Schippers, 2007; Connell & Messerschmidt, 2005).

Like with doing gender, nuance is important here, as not all masculine characteristics and practices sustain male dominance. Only masculine characteristics that inextricably pair with complementary, inferior feminine characteristics—known as hegemonic femininity—support the unequal arrangement. This hierarchical relation between masculinity and femininity is the core of what sustains gender hegemony (Connell, 1995; Schippers, 2007). Feminine characteristics that do not serve the gender hegemony are tainted as deviant. Within ecology, we can define the discipline-specific characteristics of hegemonic masculinity and hegemonic femininity, while also asking how this serves to buttress the status quo.

## THE FEMINIST ECOLOGY SHIFT: WOMEN, INTERDISCIPLINARITY, AND DIVERSE LANDSCAPES

As outlined in the introduction, ecology is experiencing an influx of women, an increase in interdisciplinary work, and more research set in human-altered systems like farms and fisheries—what we consider to be three aspects of a shift toward *feminist ecology* (women, interdisciplinarity, and landscapes). In this section we outline each of these and defend them as feminist. We use the term *feminist ecology* in both a literal and theoretical sense—literal, in that there are more women in the discipline of ecology than before and, theoretical, in the sense that more interdisciplinarity and attention to human-altered landscapes corresponds with the inclusion of multiple situated perspectives, which lies at the core of feminist theory.

First, however, it is important to note that though today's feminist shifts are consequential for women and the discipline, they did not emerge out of a vacuum, but are instead embedded within a unique disciplinary history. Feminist and non-feminist currents of ecology have been present from the beginning of the discipline in the United States, which can be traced to the institutionalization of the Ecological Society of America (ESA) in 1915 (Kormondy, 2012). Institutionalization did not necessitate consensus however, and this can in part be traced to the contention

around the role of human-altered landscapes within the purview of ecology (Worster, 1994; Gaziano, 1996). Human-altered landscapes were seen as antithetical to the quest to establish the burgeoning discipline as a basic, quantitative based science within elite universities, and by World War II, places with explicit human influence were nearly obsolete as academic ecological field sites. In a similar vein, the effort to streamline the discipline in the mid-20th century meant its separation from related disciplines and area such as natural history, human ecology, and botany (Kormondy, 2012). In effect this meant that disciplinary boundary-making coincided with a loss of interdisciplinary scholarship and a concentration on systems perceived as unaltered by humans like intact forests and protected marine areas.

Throughout the emergence and solidification of ecology as a discipline, women were nearly absent from its history. However, Haraway (1989) recognizes the long history of women working in the less industrialized biologies such as natural history. Here openings for women in science existed from the 19th and early 20th century via hybrid amateur-professional arrangements, yet the barriers to high status, academic, and principal investigator positions were enormous. As such, women have not been entirely absent from mainstream ecology's history, but of the three shifts, the influx of women is the most unprecedented.

The American academic discipline of ecology has seen an influx of women in recent years. National Science Foundation (NSF) data demonstrate that 55% of ecology graduate students and 47% of postdocs were female in 2012, up from 48% and 30% in 1994, respectively. Data retrieved directly from ESA demonstrate the recent increase of women, who represented 41% of ESA members in 2014, compared with 32% ten years earlier. However, only 25% of current faculty at top-ranked ecology departments are women. Based upon the most recent ESA survey of its members, professional female ecologists are younger (Figure 1) and in less advanced positions (Figure 2) than male ecologists.

Interdisciplinarity, defined as formal collaboration on research projects that include two or more disciplines, has long been fundamental to ecology's dynamism and breadth (Odum & Barrett, 1971; Eigenbrode et al, 2007; Goring et al, 2014). However, in recent years ecology has seen a marked increase in the amount and diversity of interdisciplinary projects that include collaboration with the humanities and social sciences. Much of this change is attributed to the increasing complexity and severity of problems facing humanity and the environment (Dawson et al. 2011), including food security (Acevedo, 2011; Winoweicki et al, 2011); deforestation (Lele & Kurien, 2011); marine management (Sievanen, Campbell & Leslie, 2011); and climate change (Winoweicki et al, 2011). The institutionalization of this increasing interdisciplinarity is made evident, in part, by the rise of interdisciplinary research centers throughout American and European universities (Jacobs & Frickel, 2009).

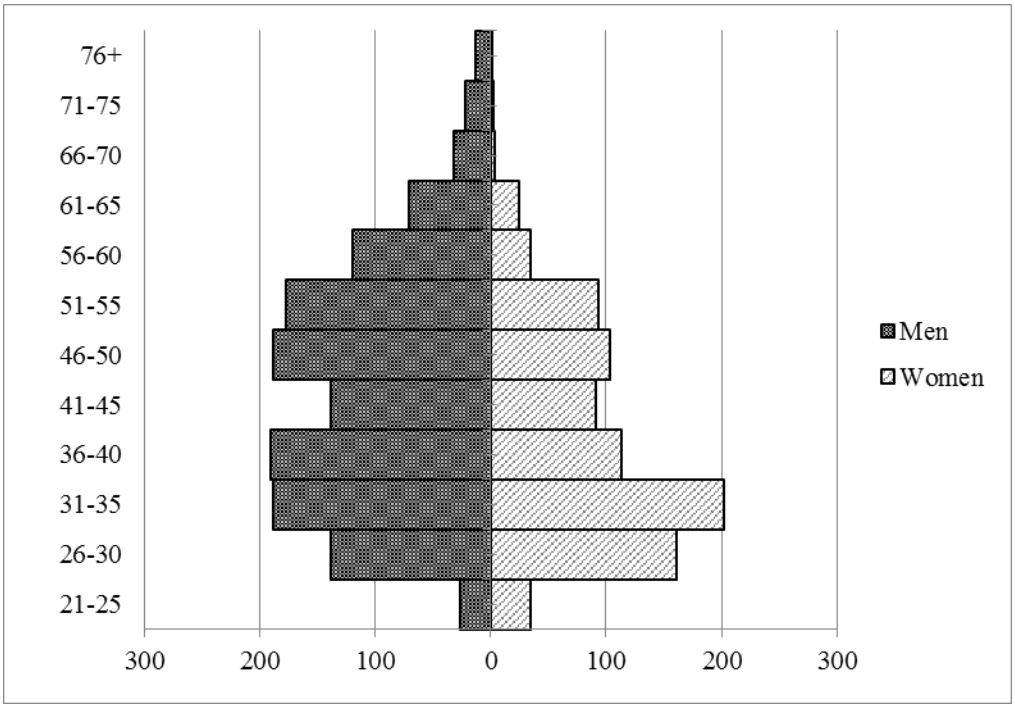


Figure 1. Ecological Society of America members by gender and age (2006 ESA Report)

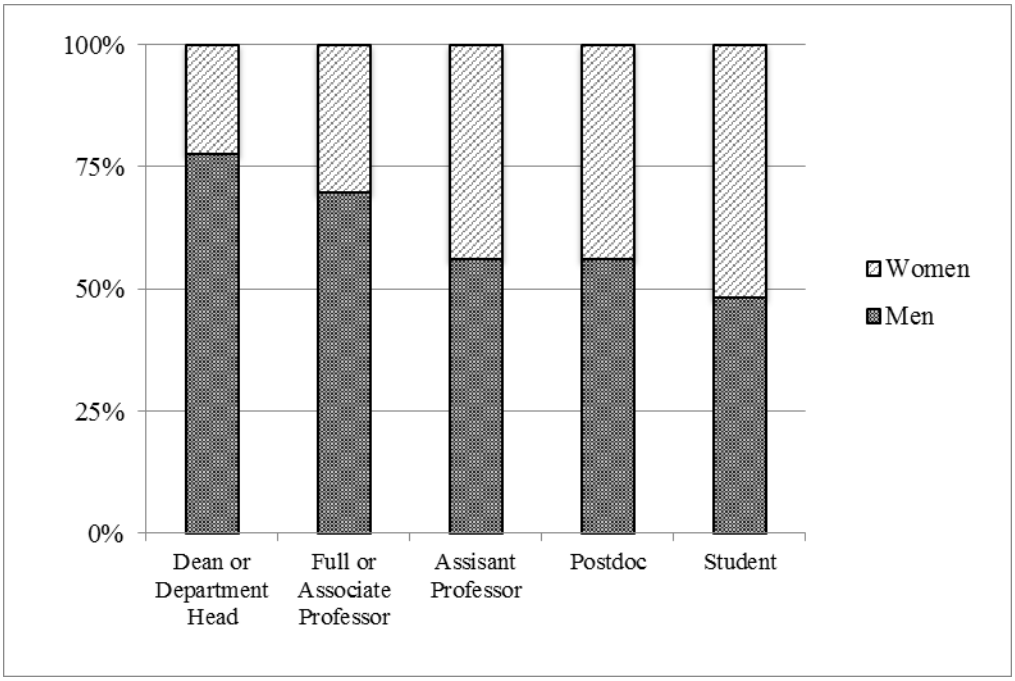


Figure 2. Ecological Society of America members by gender at each level within academic ecology (2006 ESA Report)

Leslie, 2011); and climate change (Winoweicki et al, 2011). The institutionalization of this increasing interdisciplinarity is made evident, in part, by the rise of interdisciplinary research centers throughout American and European universities (Jacobs & Frickel, 2009).

Since the solidification of the discipline in the mid-20th century, ecology has focused on "pristine" environments considered untouched by human interference, but recently the discipline is acknowledging the contentiousness of the term pristine. Peter Vitousek, a prominent ecologist, wrote, "any clear dichotomy between pristine ecosystems and human-altered areas that may have existed in the past has vanished, and ecological research should account for this reality" (1994, p.1862). This call signified a transition away from the essentialization of landscapes to a more nuanced perspective that incorporates the impacts of humans along with ecological functions and processes and pushes ecologists to see human-altered landscapes as important research sites. Specific structural changes in this vein include shifts in the National Science Foundation (NSF) funding to include thresholds and feedback loops as "potential focal points around which theory can be built for human–landscape systems" (Harden et al, 2014), and incorporating human impacts into work at high-status Long-Term Ecological Research (LTER) sites (Redman, Grove & Kuby, 2004).

We argue that these three shifts (women, interdisciplinarity, landscapes) are feminist because they all reflect a turn toward pluralized and situated knowledge in a way that challenges the singularity of science (Haraway, 1988). First, feminist scholars argue that an individual's gender can contribute to one's scientific viewpoint (Collins, 1990; Smith, 1990; Harding, 1991). As a result, more women in science means more perspectives. That is not to say that female scientists produce "feminine science", but rather that one's historical, social, and political position, of which gender is one important factor, contributes to the science produced (Haraway, 1988; Longino, 1989; Harding, 1991; Fausto-Sterling, 2000; Douglas, 2009; Subramaniam, 2009; Kourany, 2010). Second, through interdisciplinary cooperation, researchers draw on their partial knowledges to produce more complete science, recognizing their different but non-hierarchical positionalities as expert and non-expert (Fausto-Sterling, 2000). This in turn reveals new patterns and processes in the world that would otherwise have been excluded from study (Harding, 1991). Thus, interdisciplinary scholarship itself is a type of situated knowledge that collectively draws from multiple epistemologies and therefore creates more "objective" or complete scientific understanding (Haraway, 1988; Fausto-Sterling, 2000).

Third, research set in human-altered landscapes necessitates considering the ways human structures and behaviors, such as capitalism and fossil fuel consumption, factor into ecological processes like climate change and nutrient cycling. As the ecofeminist movement (Warren, 1990; Gaard, 1993; Salleh, 1995) and environmental sociologists (Banerjee & Bell, 2007; Mohai, Pellow & Roberts, 2009; Pellow, 2014) have argued, the world's hierarchies are not disconnected. Dissolving the gender hierarchy and the dichotomy between society and nature are steps in the same project. Ecology that considers humans as part of the landscape, and

impacting it, is a form of feminist ecology, because it is more comprehensive and reflexive about humans' positionalities vis-à-vis more-than-human nature. We draw upon autoethnographic and ethnographic methods to examine the micro-sociological implications of these structural feminist shifts in the discipline.

**METHODS**

We are both insiders and outsiders in ecology—doctoral candidates in Sociology and Master's of Science in Ecology & Evolutionary Biology (EEB). Our research on gender in science uniquely comes from the standpoint of individuals learning to be female scientists. We conducted sociological fieldwork over 18 months spanning 2014-2015 while we were involved with two separate ecology projects and field teams. Apollonya's ecology work focuses on the habitats, diets, and management of bluefish in New England fisheries, and Amy's research examines nutrient leaching from recycling chicken production waste as fertilizer on corn crops in the Chesapeake Bay area.

We corroborate these two cases to inform the paper's arguments about gender in ecology. Amy's field team consists entirely of women while Apollonya has a mixed-gender field team. Amy spent her time in a field van traveling to the Chesapeake Bay area from New England and at two institutional research farms in Delaware and Pennsylvania with her ecology research team. Apollonya worked out of a marine field station and recreational fishery in Massachusetts with ecology interns, students, and researchers in settings like a communal house, boats, and public docks. We conducted additional interviews with female ecologists from our field teams in Spring 2015 and coded our ethnographic and autoethnographic field notes in NVivo for themes of gender, culture, and self. We continue a nascent tradition of analytical autoethnographic scholarship on women in scientific fields like neuroscience (Giordano, 2014) and reproductive endocrinology (Roy, 2004), which can uniquely expose disciplinary cultures.

Our data collection relied upon ethnographic and autoethnographic methods in order to achieve deep insight into gender at the levels of individuals and interactions. According to Ellis and colleagues (2011), "autoethnography is an approach to research and writing that seeks to describe and systematically analyze (graphy) personal experience (auto) in order to understand cultural experience (ethno)." Notable scholarship employing autoethnographic methods has focused on, among other issues, gender (Blair, Brown & Baxter, 1994; Keller, 1985; Roy, 2004; Giordano, 2014), sexuality (Glave, 2005; Foster, 2008; Spieldenner, 2014), and race and ethnicity (Anzaldúa, 1987; Boylorn, 2006; Tsalach, 2013). More specificially, we adopt an approach called *analytical autoethnography* (Anderson, 2006). This refers to a methodology where the researcher is: (1) a full member in the research group or setting, (2) visible as such a member in published texts, and (3) committed to developing theoretical understandings of broader social phenomena (Anderson, 2006, p.375). Given our full involvement in ecological research, commitment to theoretical generalizability, and professional visibility, our methodological approach contains both analytical rigor and rich experiential insight.

## (AUTO)ETHNOGRAPHY

> "The field van has 'I <3 My Farmer' and 'No Farms No Food' stickers lining the bumper. Corn cobs and kernels were scattered on the floor of the shotgun seat, a bucket with field flags was in the trunk, soil from last season's fieldwork lines the dashboard along with a ninja turtle field hat."

Locating the ecologist in a room of academics or an ecologist's car in a parking lot is often an easy task. The characters in this ethnography wear khakis and Hawaiian shirts, or perhaps the variant of safari shirts and waterproof shorts. Heavily worn T-shirts, hiking boots, and remnants from the field like mud, dirt, sunglass tans, and rips often complete the look. This is the appearance of ecology's hegemonic masculinity. Female ecologists take on this look too, but when not outdoors in the field, hegemonic femininity can manifest as dress that is simple, casual, and earthy—a honed balance between put together and unconcerned about appearances. At ecology conferences, the appropriate dress code is "just wandered over from my field site."

Dress matters beyond practicality, and field clothes can determine who belongs and who does not. Presenting feminine, including makeup and a more urban rather than outdoorsy fashion sense, is deviant to hegemony. Appearing this way can lead to not being taken seriously in the field, or just as important, the perception of not being respected. This leads female ecologists to feel an even greater need to adopt the hegemonic look to whatever extent possible—changing hairstyles, buying new clothes, or removing jewelry—thereby propping up the dominant style that seems necessary for success. Women use dress to "neutralize" gender across science and technology disciplines (Adam et al., 2006), but this takes on a specific character in ecology where getting dirty outdoors is central to fieldwork and who ecologists are. The hegemonic style, despite actual diversity in ecologists' appearances, puts women in a particular kind of bind, as one female ecologist describes:

> "Men make comments about female appearances, but men and women never say anything about men's appearances. I've never heard that no matter what they look like. Once we had a visiting graduate student who dressed girly, while most ecologists dress like me [hegemonic ecology]. A male faculty member commented on her skirt. There's an image of ecologists: dirty, Carhartts[1], and boots. But it's really a spectrum. There are women that get dirty in the field and also like to look nice and paint their nails. You're judged if you dress too nice and not nice enough. Often comments happen in conference settings. Some of my female friends feel they have to dress down for them, but I have to dress up. Men don't need to worry. Women can't win. Why don't you have dirt under your nails? What's up with the dress? But if you're too casual, you're not a woman, and you're trying to fit that tough dirty boy roll. We can't really win."

[1] A brand of American clothing used for outdoor activities. The reference here is to Carhartt pants, which are made of denim.

Throughout fieldwork, female ecologists, including ourselves, struggle with fitting in. Our concerns extended beyond the completion of data collection to questions of dress and behavior. What follows is an analysis of our own experiences, and the shared experiences of fellow female ecologists, as we waded, both literally and figuratively, through our ecological fieldwork. We demonstrate that despite disciplinary-level feminist advances, inequality persists subtly at the interactional level, and some new struggles emerge given each of the feminist ecology shifts outlined above.

*More interdisciplinarity*

With more interdisciplinarity comes increased anxiety regarding failure and success, owing largely to the difficulty of crossing or living between disciplinary boundaries. We dealt with many internal battles about legitimacy and competency being interdisciplinarians and women. But equally as important, if not more so, is how other people reacted to us. This intersected with our ability to physically keep up with male counterparts, our knowledge about our field sites and methods, and how we chose to dress.

Our preoccupation with failure could be a partial product of our outsider status and uncertainty about belonging in Ecology as Sociology PhDs. However, we must also consider our position as women and how that relates to our own thoughts about failure and those of the ecologists around us. For example, Amy writes:

> "In a meeting today, I again had that feeling of incompetence. I couldn't understand how a vacuum would work. In time, he [advisor] will realize that I'm smart and good at what I do. Why do I deserve all this extra lab attention while anyone else in the ecology department has earned their places through prior lab work?"

Amy built some of her own materials for fieldwork, which prompted doubts from both herself and colleagues. In an early meeting, one of Amy's advisors expressed unease that her project was a recipe for something going wrong because no one in the lab group or department had experience with the methodology. Having the materials ready in time for the field season and collecting data that year might not be possible. Lysimeters—installed belowground to collect water from the soil below farm fields—are comprised of a two-foot PVC pipe with a porous cup on the bottom that allows water in, a rubber stopper on the other end to create a vacuum, and two tubes extending above ground to produce pressure and release the water. Throughout this early stage of the project Amy suffers from internal qualms rooted in her lack of experience with ecology and construction tools, putting off her first day in the lab to begin building the lysimeters for almost a week.

Meanwhile, Apollonya feels completely subject to opinions and advice from colleagues and local fishers. In her quest to find juvenile bluefish in the salt marshes of Massachusetts, Apollonya consults fellow ecologists and recreational fishers to find the best locations and gear to use. Initially she tries trot lines, fishing lines strung across a creek with six to eight baited hooks hanging off. After two months of catching nothing she learns to adapt, relying on a rod and reel with

flashy lures to tempt the fish. Throughout this process of learning new strategies, Apollonya is constantly under the impression that people thought of *her* as juvenile and incompetent as a fisher. "Everyone must think I am some kind of crazy. I get asked every day, 'did you catch any blues [bluefish]?' 'No,' I say, 'not yet.' I always feel that I have to sound positive and laid back." She has often deliberated about how to compose herself as a woman in the field in the face of apparent failure.

Gender operates quite subtly through failures in science, and in many circumstances we are left questioning whether and how being women might be playing a role alongside being seen as outsiders in ecology. A female colleague supports this notion by saying:

> "I think women are strong and brilliant, and men are strong and brilliant. I don't want to feel like who you are puts you at a handicap. I don't want to question that it's gender but sometimes it's hard not to. I like being my gender and I don't see it as a personal handicap. I don't want to succeed in spite of my gender, it's about your science."

Yet, she offers a list of personal anecdotes about how gender can hinder success in ecology, including mistaken assumptions that she is not the field team leader if a man is around, and a journal rejecting her publication with all female authors. Similar themes and experiences continue through the rest of our data.

*More women*

With more women inevitably comes more mixed-gender and all-female field teams. Success comes not from collecting good data alone but also in garnering respect from collaborators, especially for us as female interdisciplinarians. Our time in the field revealed that women feel more comfortable cooperating toward success in all-female teams than in mixed-gender teams. This is not meant to essentialize gender, but rather to expose the importance of sub-cultures within field teams as crucial to shaping the ways in which women find success in the field.

To collect data, gain respect, and thus succeed, female ecologists take on hegemonic masculine practices, especially in mixed-gender teams. Apollonya finds that she earns respect from male colleagues for being cocky and bragging about her boating skills at the same time as being tested on parallel parking with the fishing boat while two male ecologists were watching. We see how women are rewarded for practicing hegemonic behaviors, in this case being overtly confident and boastful about field skills. Similarly, previous research found that female geoscientists do not always feel secure touting and self-promoting. Their behavior does not align with the organizational logics where they work, revealing that behavioral norms can produce and reproduce gender inequality in today's science settings (Williams, Muller & Kilanski, 2012).

The gender dynamics of field teams can influence women's comfort levels and teamwork tendencies. One day mid-season Apollonya goes on the boat with two male ecologists and is asked to drive.

> "Despite my might, technique adjustments, and experience I cannot get the engine to start. I begin to think, 'I've made it this far and now my whole project will fail because I can't start a friggin boat.' After a male ecologist took over and got the boat to start, I took the driver's seat. I am able to maneuver us successfully over to the first end of the trot line. But with the wind picking up and the tide going out I have some trouble getting the boat over to the other side. I keep taking us in circles unable to hit the mark. Eventually I get it though. Embarrassed by having taken the boat in numerous circles and exhausted by wrestling with the heavy gear shift (but not showing it), we eventually pull up all the trot lines and to no one's surprise, we did not catch any fish. I swallow my pride, make a failed joke, cast my eyes ahead, and steer back toward the dock exhausted."

Here we see Apollonya's unwillingness to convey disappointment or physical defeat, thereby propping up the hegemonic masculinity associated with a successful fish ecologist—a confident boat driver, and physically and mentally strong—attributes both men and women find important for conducting field research. However, because Apollonya is unable to display her weakness when appropriate, she adapts her behavior in order to gain respect from male colleagues and perpetuates this practice.

On the contrary, Amy often asks one of the other members of her all-female team for help when she is too tired to continue physical work like using a hand pump or coring soil. After a long day in the field Amy writes:

> "I type this with calloused hands and sore forearms. I probably gave up with the hand pump at around eight minutes of pumping per lysimeter, getting very little water today. It was a dry day overall. The 20mL that I can usually get in one try was consistently taking two, and the usual problem lysimeters didn't give me any water at all. Thankfully Stephanie and Kat helped when my arms went numb and the sweat dripping into my eyes blurred my vision."

Examples like this characterize the dynamic on Amy's all-female field team. By asking for help and expressing physical distress, Amy does not lose the respect of her colleagues. They regularly shared tasks related to equipment and physical labor. However, she does feel some reservation about revealing weakness and pushes herself harder than she otherwise might because of the idealized practice of physicality put forth in the discipline at large. As a sociologist and a woman, she has an intersectional sense of needing to appear physically competent, as does Apollonya, but this manifests differently. These examples demonstrate how disciplinary-level culture shapes micro-level interactions in teams but the composition of the teams matter as well. A female colleague summarizes our findings about gender and field teams succinctly:

> "When men are around I feel the need to be as tough as I can be. I want to be the one working the hardest and the longest because I'm a

> woman and I don't want to be perceived as weak. But I like to think of the field group as a team. We work together and not in isolation. That is the best way."

Apollonya *does* gender in her mixed-gender team by suppressing fatigue because she feels accountable to masculine hegemonic behavior. Meanwhile, Amy is willing to reveal physical weakness in her all-female team and able to *undo* gender. These interactions could be different given another set of individuals and contexts, but nonetheless, we reveal that sub-cultures can be shaped by their gender composition and the disciplinary culture's expectations about interaction. Paying attention to which field team groups and sub-cultures allow for undoing gender and developing new practices and dispositions is useful.

*Human-altered landscapes*

Fieldwork brings ecologists into interaction with individuals who work and spend time around their field sites, especially in this era of research in human-altered landscapes like farms and fisheries. These individuals can also hold ecologists accountable to doing gender, making broader societal progress toward gender equality relevant for the same goal in a border science like ecology. Not everyone does fieldwork, but most graduate students do. Gendered interactions occur during fieldwork conducted in places where people live and work, which can be an especially formative experience for early-career ecologists.

One of Amy's agricultural field sites is ten feet away from a county highway, and we—women covered in dirt, silica slurry, chicken manure, and sweat—are regularly honked and yelled at as we core soil, grab field supplies out of the van, or simply stand in the field being female. "This is a constant reminder that I am a lady ecologist," Amy writes one field day. "Whether or not I realize it until these interactions, I am doing gender while doing ecology." This is most apparent when the highway is under construction and the cars slow to a stop directly adjacent to the farm. An escape comes when the corn is tall enough that the cars no longer see the three women, and despite the corn's prickling scrapes and stinging pollen, fieldwork is more comfortable with the corn at full height.

Yet, when interacting with collaborators at the research farm, Amy finds that sometimes gender is not necessarily redone, but *not* done, and irrelevant in certain interactions.

> "The men who work the experimental fields are used to scientists telling them when to plant, what to apply, and tricky ridiculous requests like ours to drive their tractors around our lysimeters. Their words suggest that they are extremely familiar with experimental designs and science, and one said that he used to work on field experiments before he started driving the tractor. It was a little strange to see them hanging out and driving their tractors around as we installed the lysimeters, almost as if they cultivate for us."

Sometimes, ecologists working in human-altered settings can choose their field sites for reasons like their relationships with the farmers and ranchers that maintain experimental fields. This is an example of when gender may not be done and a hierarchy not supported through interactions or practices, because female ecologists and non-scientists have histories of trust and respect.

Apollonya also interacts with non-ecologists while conducting her field research on fisheries, including people who fish recreationally in the area. Here, ecologists and non-ecologists confront each other in an environment heavily associated with masculinity—recreational fishing. "Everyone, let me rephrase, every man," she writes, "just loves to offer me advice, even if I don't ask for it." In this public field setting, she is regularly responded to in ways that suggest or expect that she is practicing gender, however taken-for-granted that is for her until the moment.

During one morning of fishing, Apollonya is bombarded with commentary from fishermen passing by. She writes:

> "I set up my station at the far corner of the dock as I have for the past week—making sure to stay out of the way of the folks who dock their boats here and avoiding any harm I might cause by casting too close to someone's inflatable boat, eye, or small child. Shortly after I arrived, the Harbor Master emerged from his air-conditioned trailer and strode toward me, inquiring about what I was fishing. 'Juvenile bluefish,' I responded. He took a look in my bucket holding the one lonely fish. He offered, 'That looks like a herring.' He was the second person today to assume that this fish was a herring, so I started etting nervous. He pulled out a magazine, 'Saltwater Massachusetts,' and showed me the images of commonly caught fish in the area. Based on what I had in my bucket and the pictures in the magazine, I would say I had juvenile blues, but the Harbor Master didn't seem to think so. After this came a parade of fishermen claiming the fish were herring, pogies, and 'god knows what.'"

She had never asked anyone to peek into the bucket and identify her fish that morning.

Individuals offer advice but also impose their opinions and ideologies on a person they assume is less competent and informed, which supports traditional notions of the gender hierarchy (Risman, 2009). These interactions have a destabilizing effect on the female researcher, leading her to question her knowledge and confidence. In an effort to appear knowledgeable and find respect, she is caught between cockiness and naïveté, aggression and passivity, crudeness and sweetness. Again, female scientists must balance between just two choices of practice—essentially hegemonic masculinity and femininity—the first not necessarily available, the second not necessarily supporting success, and neither feels entirely comfortable. This manifestation of fractured habitus (Silva, 2016) requires standing and acting between being a scientist and a woman on a fishing dock.

Across both field settings, women are held accountable for their gender when interacting with non-scientists, whether honking drivers on a bottlenecked highway or salty fishermen inviting themselves to judge a woman's daily catch. However, context does matter. Those who have experience taking directions from and collaborating with female ecologists participate in interactions where gender is *not* always done. Such experiences are refreshing, revealing how gender can sometimes be irrelevant when doing science. Marginalized standpoints contribute to new epistemologies in science, but gender does not need to shape daily interactions when conducting scientific field research. Ecology's feminist shifts—more women, interdisciplinarity, and attention to "human-altered" landscapes—can in fact lead to cultural and interactional changes in how science is practiced and improve the outlook for women in ecology. Non-scientists' growing experiences with more female ecologists in landscapes like experimental farms and fisheries provide templates for more equitable interactions in fieldwork and broader society.

## CONCLUSION

This paper investigates the connections between structural shifts towards feminist ecology and the experience of "doing gender" as a female ecologist. We contribute to literature on the underrepresentation of women in science by investigating the disciplinary culture of ecology. Since being a scientist is strongly connected with one's sense of self, micro-sociological and cultural approaches to understanding gender in science have much to add. Using (auto)ethnography, we reveal the current forms of gender inequality that persist in ecology, despite ecology's disciplinary-level feminist advances toward more women and changing norms of what counts as rigorous ecology research.

Specifically, we argue that more interdisciplinary work can expose power imbalances among disciplines thereby causing fears of illegitimacy and failure for those seen as inferior, a well-documented barrier to interdisciplinary research (Sievanen, Campbell & Leslie, 2011). Amy and Apollonya, sociologists conducting ecological research, experience self-doubt and find themselves subject to the opinions of their colleagues, especially men who hold higher status positions in the discipline. In this sense, we posit that our fear of failure is intertwined with our positions as sociologists and interdisciplinarians, but also our gender. This is notable as interdisciplinary graduate training programs like ours continue to grow, and train more potential scientists.

Second, we demonstrate that women fit in and succeed by adopting the dress, practices and tastes of ecology's hegemonic masculinity and bringing a hegemonic femininity to the discipline. Especially in a discipline where work is so intertwined with sense of self, interrogating dispositions is a crucial aspect of achieving gender equality. Moreover our analysis exposes that how female ecologists *do gender* is a product of their environments, including the gender composition of field teams. The culture of the discipline and the specific sub-cultures that emerge among teams during fieldwork are formative in constructing, reproducing, and undoing gender inequalities. Thus, as we see higher numbers of female ecologists but, continued underrepresentation at top tiers, understanding how and why women succeed and

fail requires further investigation into how gender is *done, redone,* or *undone* through interactions.

Last, the rise in human-altered landscapes as field sites brings ecologists in more frequent contact with non-scientists that hold women accountable for their gender. We expose the friction that can emerge between academics and non-academics within field research environments, particularly as ecologists do more work in places where people work, live, and recreate rather than at remote research stations. This shift accompanies the increase in interdisciplinary science and the growing acceptance of humans as part of ecological landscapes. Despite the tension that Apollonya experienced working in the male-dominated environment of recreational fishing, Amy found that gender can be *undone*, especially when working at field sites where non-ecologist collaborators have mutual respect with female ecologists.

We provide evidence that the three shifts toward more feminist ecology influence individuals. Despite the transition toward more female scientists, the shift toward more fieldwork in diverse human-nature landscapes like farms and fisheries places female ecologists in settings where undoing gender might be (though certainly is not always) more stalled than within the discipline. This highlights that science is not separate from society, particularly with field and border sciences like ecology. Therefore, women in science is not simply an internal concern but related to progress toward gender equality in society writ large. Furthermore, the feminist shift of interdisciplinarity comes with micro-level consequences. As natural and social scientists increasingly collaborate and overlap in training, this draws attention to and solidifies hierarchies among disciplines as much as it dissolves barriers. Thus, the intersection of gender and disciplinary hierarchies is relevant for understanding the successes and failures of women in science, as evidenced by our two corroborated experiences as female sociologists "doing ecology".

Within the sciences, women have achieved differential rates of equality regarding pay, prestige, and social inclusion—with the social and life sciences seeing significant improvements as compared to the physical sciences and engineering (Cain & Leahey, 2014). Understanding how gender inequality operates within disciplines is, in part, a cultural study that pervades throughout academia at this moment when structural changes have occurred to varying degrees (Cech & Blair-Loy, 2010; Cain & Leahey, 2014; Kulis & Sicotte, 2002; McGuire, Primack & Losos, 2012). As such, we encourage future research on the culture of gender and its relationship with disciplinarly cultures and with structural transformations in the natural sciences, social sciences, and humanities. A border science like ecology is distinct, but this approach that pays attention to structure and culture is transferrable. We hope that this study can serve as a teaching tool for institutional efforts to increase the success, not just the prevalence, of women and interdisciplinarity in science.

## ENDNOTES

[1] In this instance and all following, pseudonyms are used for our colleagues.

**ACKNOWLEDGEMENTS**

The authors would like to acknowledge all those who helped to make our ecology projects possible—this includes professors, post-docs, and research assistants at Brown University and in Plum Island, MA, State College, PA, and Georgetown, DE. We are also grateful for the Open Graduate Education program at Brown University which provided institutional and financial support for this unique interdisciplinary graduate school training. Our acknowledgements also go out to the sociology faculty and graduate students and the three anonymous reviewers who provided feedback that made this a better paper.

**REFERENCES**

Acevedo, M. (2011). "Interdisciplinary progress in food production, food security and environmental research." *Environmental Conservation* 38(2):151-171.

Adam, A.E., Griffiths, M., Keogh, C., Moore, K, Richardson, H. and Tattersall, A. (2006). "Being an 'it' in IT: gendered identities in IT work." *European Journal of Information Systems*, 15(4):368-378.

Anderson, L. 2006. "Analytic autoethnography." *Journal of Contemporary Ethnography* 35(4):373-395.

Anzaldúa, G. 1987. *Borderlands/La Frontera: The new mestiza*. San Francisco: Aunt Lute Books.

Banerjee, D., & Bell, M. M. (2007). "Ecogender: Locating gender in environmental social science." *Society and natural resources* 20(1):3-19.

Blair, C., Brown J. & Baxter L. 1994. "Disciplining the feminine". *Quarterly Journal of Speech* 80(4):383-409.

Bourdieu, P. (1990). *The Logic of Practice*. Stanford, CA: Stanford University Press.

Bourdieu, P. and L. Wacquant. (1992). *An Invitation to Reflexive Sociology*. Chicago: University of Chicago Press.

Boylorn, R. 2006. "E pluribus unum (out of many, one)." *Qualitative Inquiry* 12(4):651-680.

Butler, J. (2004). *Undoing gender.* New York: Routledge.

Cain, C. and Leahey ECECH. (2014). "Cultural correlates of gender integration in science." *Gender, Work and Organization* 21(6):516-530.

Cech, E. and Blair-Loy,M. (2010). "Perceiving glass ceilings? Meritocratic versus structural explanations of gender inequality among women in science and technology." *Social Problems* 57:371–97.

Cech, E, Rubineau B., Sibley S., and Seron C. (2011). "Professional Role Confidence and Gendered Persistence in Engineering." *American Sociological Review* 76(5):641-666.

Collins, P.H. (1990). *Black Feminist Thought: Knowledge, Consciousness, and the*

*Politics of Empowerment.* Boston, MA: Unwin Hyman.

Connell, R.W. (1995). *Masculinities*. Berkeley: University of California Press.

Connell, R.W. and Messerschmidt, J.W. (2005). "Hegemonic Masculinity: Rethinking the Concept." *Gender and Society* 19(6):829-859.

Correll, S. (2004). "Constraints into Preferences: Gender, Status, and Emerging Career Aspirations." *American Sociological Review* 69(1):93-113.

Dawson, T., Jackson S.., House J, Prentice I., and Mace, G. (2011). "Beyond predictions: biodiversity conservation in a changing climate." *Science* 332:53–58.

Deutsch, F.M. (2007). "Undoing Gender." *Gender and Society* 21(1):106-127.

Douglas, H. (2009). *Science, policy, and the value-free ideal*. Pittsburgh: University of Pittsburgh Press.

Eigenbrode, S., O'Rourke M., Wulfhorst J., lthof D., Goldberg C., Merrill K., Morse W., Nielsen-Pincus M., Stephens J., Winowiecki L., and Bosque-Pérez, N. (2007). "Employing philosophical dialogue in collaborative science." *BioScience* 57:55–64.

Ellis, C., Adams T. & Bochner T. 2011. "Autoethnography: an overview." *Historical Social Research/Historische Sozialforschung*, 273-290.

England, P. (2010). "The Gender Revolution: Uneven and Stalled." *Gender and Society* 24(2): 149-166.

ESA Profile of Ecologists Report (2006) Ecological Society of America http://www.esa.org/esa/wp-content/uploads/2012/12/profilesReport2006.pdf

Fausto-Sterling, A. (2000). *Sexing the Body: Gender Politics and the Construction of Sexuality*. New York: Basic Books.

Foster, E. 2008. "Commitment, communication, and contending with heteronormativity: An invitation to greater reflexivity in interpersonal research". *Southern Communication Journal* 73(1):84-101.

Fox, M. (2001). "Women, science, and academia." *Gender and Society*

15(5):654-666.

Gaard, G. (1993). Living interconnections with animals and nature. *Ecofeminism: Women, animals, nature*, 1-12.

Gaziano, E. (1996). "Ecological metaphors as scientific boundary work." *American Journal of Sociology* 101(4):874-907.

Giordano, S. (2014). "Scientific reforms, feminist interventions, and the politics of knowing." *Hypatia* 29(4) 755-773.

Glave, T. 2005. *Words to our now: Imagination and dissent.* Minneapolis: University of Minneapolis Press.

Goldberger, J. and Crowe, J. (2010). "Gender Inequality within the U.S. Land-Grant Agricultural Sciences Professoriate." *International Journal of Gender* 2: 334-360.

Goring, S, K Weathers, W Dodds, P Soranno, L Sweet, K Cheruvelil, J Kominski, J Ruegg, A Thorn, and R Utz. (2014). "Improving the culture of interdisciplinary collaboration in ecology by expanding measures of success." *Frontiers of Ecology and Environment* 12(1):39-47.

Haraway, D. (1988). "Situated Knowledges: The Science Question in Feminism and the Privilege of Partial Perspective." *Feminist Studies* 14(3):575-599.

Haraway, D. (1989). *Primate Visions: Gender, Race, and Nature in the World of Modern Science.* New York: Routledge.

Harden, C., Chin A., English M., Fu R., Galvin K., Gerlak A., McDowell P., McNamara D., Peterson J., Poff N., and Rosa, E. (2014). "Understanding human-landscape interactions in the 'Anthropocene'." *Environmental Management* 53:4-13.

Harding, S. (1991). *Whose Science? Whose Knowledge?* Ithaca: Cornell University Press.

Herman, C. and Webster, J. (2010). "Taking a lifecycle approach: redefining women returners to science, engineering and technology." *International Journal of Gender, Science and Technology* 2:1–27.

Jacobs, J. & Frickel S. 2009. "Interdisciplinarity: a critical assessment." *Annual Review of Sociology* 35:43-65.

Keller, E.F. (1985). *Reflections on Gender in Science.* New Haven: Yale University Press.

King, A. (2000). "Thinking with Bourdieu against Bourdieu: A Practical critique of the habitus." *Sociological Theory* 18(3):417-433.

Kohler, R. (2002). *Landscapes and Labscapes*. Chicago: University of Chicago Press.

Kormondy, E.J. (2012). "A Brief Introduction to the History of Ecology." *The American Biology Teacher*. 74 (7):441-443.

Kourany, J. (2010). Philosophy of science after feminism. New York: Oxford University Press.

Kulis, S., & Sicotte, D. (2002). "Women scientists in academia: Geographically constrained to big cities, college clusters, or the coasts?." *Research in Higher Education* 43(1):1-30.

Lele, S. & Kurien A. (2011). "Interdisciplinary analysis of the environment." *Environmental Conservation*. 38(2):211-233.

Lockwood, J., Reiners D., & Reiners W. (2013). "The future of ecology." *Frontiers of Ecology and Environment* 11(4):188-193.

Long, J.S., Allison, P., & McGinnis R, (1993). "Rank advancement in academic careers: Sex differences and the effects of productivity." *American Sociological Review* 58(5):703-722.

Longino, H. (1989). "Can there be a feminist science?" In *Feminism and science*, ed.N. Tuana (Ed.) Bloomington: Indiana University Press.

Merchant, C. (1980). *The Death of Nature: Women, Ecology and the Scientific Revolution*. New York: Harper & Row.

McGuire, K., Primack, R. & Losos.E. (2012). "Dramatic improvements and persistent challenges for women ecologists." *BioScience* 62(2):189-196.

McNay, L. (1999). "Gender, habitus and the field: Pierre Bourdieu and the limits of reflexivity" *Theory, Culture, and Society* 16(1): 95-117.

Mohai, P., Pellow, D., & Roberts, J. T. (2009). "Environmental justice." *Annual Review of Environment and Resources* 34:405-430.

O'Brien, K. & Hapgood, K. (2012). "The academic jungle." *Oikos* 121:999-1004.

Odum E. & Barrett G. (1971). *Fundamentals of ecology*. Philadelphia, PA: Saunders.

Pellow, D. (2014). *Total liberation*. Minneapolis: University of Minnesota Press.

Redman, C., Grove, J. & Kuby L. (2004). "Integrating social science into the Long-Term Ecological Research (LTER) network." *Ecosystems* 7:161-171.

Risman, B.J. (2009). "From Doing to Undoing: Gender as We Know It." *Gender and Society* 23(1):81-84.

Robinson, C. (2011). "Women in science: in pursuit of female chemists." *Nature* 476 273–275.

Roy, D. (2004). "Feminist theory in science." *Hypatia* 19(1):255-279.

Salleh, A. (1995). "Nature, Woman, Labor, Capital: Living the Deepest Contradiction." *Capitalism Nature Socialism* 6(1):21-39.

Savage, M. & Silva, E.B. (2013). "Field analysis in cultural sociology." *Cultural Sociology*, 7(2):111-126.

Schippers, M. (2007). "Recovering the Feminine Other: Masculinity, Femininity, and Gender Hegemony." *Theory and Society* 36(1):85-102.

Shauman, K. & Xie Y. (1998). "Sex Differences in Research Productivity: New Evidence about an Old Puzzle." *American Sociological Review* 63(6):847-870.

Shaw, A. & Stanton D. (2012). "Leaks in the pipeline." *Proceedings of the Royal Society* 279:3736-3741.

Sievanen, L, Campbell, L. & Leslie H. (2011). "Challenges to interdisciplinary research in ecosystem-based management." *Conservation Biology* 26(2):315-326.

Silva, E. B. (2016). "Unity and Fragmentation of the Habitus." *Sociological Review* 64(1):166-183.

Smith, D.E. (1990). *The Conceptual Practices of Power: A Feminist Sociology of Knowledge.* Boston: Northeastern University Press.

Smith-Doerr, L. (2004). *Women's Work: Gender Equality vs. Hierarchy in the Life Sciences*. Boulder, CO: Lynne Rienner Publishers.

Spieldenner, A. 2014. "Statement of ownership: an autoethnography of living with HIV." *The Journal of Men's Studies* 22(1):12-27.

Subramaniam, B. (2009). "Moored metamorphoses: A retrospective essay on

feminist science studies." *Signs* 34 (4):951–80.

Tsalach, C. 2013. "Between silence and speech: autoethnography as an otherness-resisting practice." *Qualitative Inquiry* 19(2):71-80.

Vitousek, P. (1994). "Beyond global warming: ecology and global change." *Ecology* 75(7):1861-1876.

Warren, K. J. (1990). The power and the promise of ecological feminism. *Environmental Ethics 12*(2):125-146.

West, C. & D. Zimmerman. (1987). "Doing Gender." *Gender and Society* 1(2):125-151.

West, C. & D. Zimmerman. (2009). "Accounting for Doing Gender." *Gender and Society* 23(1):112-122.

Williams, C., Muller, C. & Kilanski, K. (2012). "Gendered organizations in the new economy." *Gender and Society* 26(4):549-73.

Winowiecki, L., Smukler, S., Shirley, K., Remans, R., Peltier, G., Lothes, E., King, E., Comita, L., Baptista, S. & Alkema, L.. (2011). "Tools for enhancing interdisciplinary research." *Sustainability: Science, Practice, and Policy* 7(1):74-80.

Worster, D. (1994). *Nature's economy: a history of ecological ideas.* New York: Cambridge University Press.

Xie, Y. & K. Shauman. (2005). *Women in Science: Career Processes and Outcomes*. Cambridge, MA: Harvard University Press.