

Women Scientists, Gendered Environmental Movements, and Climate Change Vulnerabilities: A
Call for Public and Private Empowerment

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Abstract

Rachel Carson, Jane Goodall, and Wangari Maathai are women scientists from three continents who publically challenged environmental degradation. All three experienced gendered criticism, including credentialism and accusations of impaired objectivity due to involvement in activism. Here, I narrate how women remain unacknowledged in environmental research and juxtapose this with women's disproportionate exposure to environmental problems. I use ecofeminist discourse to explore gendered environmental vulnerabilities, employing climate change as a model. Global temperature increases are associated with water and fuel scarcity, increased disease prevalence, crop and fisheries failures, and conflict and sexual violence. The root cause of women's susceptibility to these problems is social construction of gender within the domestic sphere. Despite increased vulnerability, women are less involved in environmental movements than men. In this broad review, I explore reasons for this using the gendered nature of environmental movements, policy, and science, and provide examples showing how to shift from *women as victims* toward *women as actors*.

Introduction: Women Environmentalist Scientists and the Public Sphere

Rachel Carson, a marine biologist from Pennsylvania, wrote about the oceans, pesticides, and environmental degradation in her books, including the landmark *Silent Spring*. Her work, though widely criticized, helped launch the American environmental movements of the 1960s and 1970s and contributed to global opposition to pesticides that led to the banning of DDT in many countries (Lear, 1997; Hynes, 1989). Jane Goodall, a British primatologist, active since the 1950s, completely altered paradigms of human uniqueness when she discovered that chimpanzees had personalities and used tools—and she did this without any university training (Masson, 1996, p. 9). Dr. Wangari Maathai, a biologist from Kenya, challenged power structures in her woman-centered tree-planting movement that empowered Kenyan women at a grassroots level to oppose environmental degradation. Maathai, who had been beaten by police officers and imprisoned on multiple occasions, went on to serve in the Kenyan parliament and won the Nobel Peace Prize in 2004 for her environmental and human rights efforts (Maathai, 2006).

These three women from three continents all challenged environmental degradation from a unique perspective, especially for their time and place: as scientists, they challenged via public spaces and suffered severe criticism for it. Goodall and Carson in particular were subject to credentialism from their male peers. Goodall was criticized for giving her chimpanzee subjects names, and Carson was criticized for integrating nonscientific, poetic writing into her books (Lear, 1997; Hynes, 1989). Maathai was charged with inciting women beyond the domestic sphere into environmental and political activism (Maathai 2006). I myself am a biologist working with environmental issues, and because I am interested in exploring dual social-ecological research questions, I have received similar treatment in terms of credentialism and claims that I lack objectivity, although on a much smaller scale than these world-changing female scientists.

My own experiences as a female scientist working on environmental problems inspired me to look into how gender informs multiple stages of environmental actions, from research to activism. I found that women involved in social movements are often discouraged from the roles that Carson, Maathai, and Goodall took, and are encouraged instead to be involved in the less public areas of movements (Buckingham and Kulcur, 2009). This broad review seeks to answer and integrate the following objectives related to the interaction of gender and environmental vulnerabilities, including, (1) exploring if and how women uniquely relate socially or ecologically to nature; (2) evaluating whether the impact environmental problems gendered; (3) determining if gendered environmental degradation impacts women's involvement in environmental actions; and (4) describing strategies for both private and public environmental empowerment in order to create resilience. Throughout, I will use climate change as a timely case study to explore how gender relates to environmental vulnerabilities. My overall argument is that hegemonic systems that oppress women are also involved in the degradation of nature, and these systems must be challenged in both the private and public spheres in order for structural and social change to occur.

The Ecological and Sociological Relationship of Women with Nature

Ecofeminism has focused for decades on the connection between the oppression of women through patriarchy and the oppression of nature through environmental degradation (Bloodhard and Swim 2010, p. 187). In the Global South both the oppression of women and the environment is rooted in the history of colonialism and the Western model of development (Agarwal 1992, p. 125). Humans throughout history and even some ecofeminists have viewed women as “closer” to the environment and thus ideally placed to oppose environmental degradation because of their innate natural knowledge stemming from childbirth and other care-oriented activities. However, most ecofeminists view this link not as a fact of nature, but as ideologically constructed as a part of the female identity (Agarwal 1992, pg. 120).

While avoiding the essentialization of women as innately “natural,” Buckingham and Kulcur (2009) do argue that women often are confronted with nature on a more regular basis than men. Generally, traditional female socialization includes emphasis on domestic activities, including providing food and water, child and sick care, and home maintenance. Behaviors and roles of women are structured based on socio-cultural expectations in regards to gender (Hunter, Hatch, and Johnson 2004, p. 679). These expectations in combination with differential power distributions between men and women create a gender divide in terms of environmental and social injustice.

It is important not only to recognize gender, but also the other predictors of environmental injustice (Agarwal 1992, p. 126). Low income, elderly, disabled, illiterate, sick, homeless, indigenous, immigrant, isolated, rural women and survivors of violence are more likely to be affected by environmental problems (UNEP 2009, p. 25; p. 33) For this reason, it is extremely important to look at environmental problems through a lens of intersectionality. Even though environmental injustice affects multiple and intersecting identities, I am going to focus on gender and the socialization of gender because how these topics relate to the construction of environmental policy, research, and activism is worth exploring.

Gender and Climate Change: Inequities in Environmental Vulnerability

Climate change is a useful global case study of the environmental inequities between men and women, especially in the Global South. A summary completed by the United Nations

Environmental Programme summarizes the effects of climate change on women, and much of the information described here is presented in their report (2009). Vulnerabilities of women in regards to climate change that I discuss include the increasing prevalence of natural disasters, resource scarcity, and increasing conflict.

Increasing incidence of natural disasters due to climate change will also increase disease prevalence, especially in poor communities. For example, hurricanes that are predicted to occur more frequently due to climate change initiate outbreaks of malaria, dengue fever, cholera, leptospirosis, and other diseases (Epstein, 2005). Women have decreased ability to respond to natural disasters, and therefore have higher rates of mortality than men after these climatic events. Women in general also have higher susceptibility to disease because of their role as caretakers. Healthcare disparities between men and women make these inequities even more pronounced (Chircop 2008, p. 137).

Resource scarcity in general will lead to lack of control, school dropouts, and early marriage. Climate change is also expected to lead to conflicts over resources, and wars often lead to sexual violence, trauma, and loss of life. Recently, a group of researchers argued that the conflict in Syria may be indirectly the result of climate change (Femia and Werrell, 2012). Leading up to the conflict, up to sixty percent of Syria was experiencing extreme long-term drought that is likely caused in part by climate change (NOAA, 2011), with systemic crop failures and loss of eighty-five percent of livestock herds in some regions. The researchers argue that these water shortages and agricultural failures led to mass displacement of people moving from rural to urban environments. This displacement created unrest among Syrians, especially due to the lack of help from the al-Assad government (Femia and Werrell, 2012). Importantly, the crisis in Syria has taken a toll on women specifically, with increasing levels of sexual violence, early marriage, and prostitution for survival, with most of the refugees arriving in Lebanon being women and girls living in overcrowded and unhealthy settlements (Anani, 2013; Grove and Zwi 2006). Women living in refugee settlements have higher maternal mortality and reduced or nonexistent access to maternal health services (McMichael et al, 2012). Climate change in the future will continue to lead to population displacement and instability, and this will continue to affect women disproportionately (Femia and Werrell, 2012).

Most research on gendered vulnerabilities in response to climate change focus on the impacts of natural disasters and disease, but little research exists on the economic realities women face in the domestic sphere that relate to climate change (Skinner, 2011). Women's multiple social realities, including gender, race, and culture often create situations where women are more directly reliant on natural resources and are therefore more susceptible to environmental problems such as climate change. Preexisting divisions of labor based on gender mean women are often solely responsible for family subsistence (Buechler, 2009). For example, seventy percent of the agricultural workforce in Africa are women (IAASTD, 2009). Climate change is likely to lead to increased crop failure due to less reliable rainfall, which will mean women will have to work longer and harder to provide food for their families (Skinner, 2011). Most women in the developing world use wood for fuel, and shortages could lead to more time spent gathering wood. Clean, safe water is likely to decrease in availability due to climate change, and women will have to work harder for water and may be exposed to contaminated water sources. In general, women will have to put more time into the acquisition of food, water, fuel, and other natural resources, and therefore have less time to be involved in decision-making activities (Terry, 2009).

Worldwide, seventy percent of people living in poverty are women, and these disadvantages reduce women's abilities to cope with environmental problems like climate change (Angula 2010, p. 13). Systemic gender differences in resource access and inequalities in women's access to technology also contribute to the gender divide in environmental injustice (Agarwal 2009, p. 136-137). Ultimately, women have less access to mitigation strategies, especially decision-making processes and technology, which in addition to the vulnerabilities described above reduces their capacity to respond to climate-change related problems (Demetriades and Esplen, 2008).

Gendered Motivations and Movements: Domestic and Public Responses to Environmental Problems

Studies indicate that women generally take less environmental action than men (Mohai 2008.). This is in spite of the fact that women generally care more about environmental

problems than men, even when controlling for age, education, labor force status, and other variables (Mohai 2008; Hunter, Hatch, and Johnson 2004, p. 677). Alley and Brent (2004) investigated the perception of environmental risk in Cancer Alley in the United States. Women perceived the most environmental risk, with black women perceiving the most risk of all and white men not perceiving much risk. This risk perception difference is attributed to cultural differences in risk assessment, and these factors must be considered when evaluating environmental motivations (p. 453).

Why does this difference in environmental action exist, especially when women are disproportionately affected by natural resource degradation and generally care more about the environment? While women do tend to take less action in the public sphere, they usually take more action overall in the domestic sphere. Hunter, Hatch, and Johnson (2004) considered women cross-nationally to determine if this was a worldwide trend. They found that women were substantially more likely to undertake private environmental actions than men, such as recycling or driving less (p. 690). This difference was especially apparent in developed countries such as Japan, Norway, and the United States. The difference still existed in the developing world, but due to a lack of education, resources, and time, these women were slightly less likely to take any environmental action (p. 690). Women who are more concerned about environmental issues are often constrained by societal expectations in the public sphere, but if they are acting within the domestic sphere these constraints are less likely to be emphasized (Tindall, Davis, and Mauboulés 2003, p. 909). In China, the country that currently has the highest level of national carbon dioxide emissions, women again take more domestic environmental actions than public ones (Xiao 2010, p. 87). However, Chinese women have less environmental concern than men, which contradicts previous studies done elsewhere in the world (p. 87).

The structure of the environmental movements themselves is gendered. The professional stage of environmental movements is often characterized by hypermasculinity (Buckingham and Kulcur 2009). Women are often involved in the early, grassroots stages of environmental movements, but are increasingly excluded as the movement becomes professionalized. For example, in Gambia, women gardeners advocated for the return of land

they previously had access to in order to respond to severe drought. However, the men took over when the land was returned to their community, and they used the land for development projects instead of gardening (Schroeder 1997, p. 487). In the developed world, feminist discourse has impacted environmental movements. Specifically, feminism has strongly influenced the Australian environmental movement (Connell 1990, p. 452). In this context, traditional masculinity has been challenged and many movement participants have been attempting to degender the movement. However, seeking androgyny as the ideal is often still patriarchal, and can lead participants to neglect important realities that both men and women experience, including the masking of gender inequalities inherent in the environmental movement (p. 476).

Environmental science and policy are elements of environmental movements that are solidly within the public sphere, and both reflect the gendered public-private divide found in environmental action. Women are often disregarded as an important consideration in these public spheres. The United States' Environmental Protection Agency defines environmental injustices as including race, culture, and income, but not gender. Often, academics attempt to explain environmental justice in terms of income and race, but gender is often neglected in mainstream environmental justice work (Buckingham and Kulcur 2009). The science involved in environmental degradation is often very gendered, especially the language used. Local women are in general not involved in development science and women's experiences with natural resources are often dismissed by scientists (Bryant 1998, p. 88). Female scientists often face discrimination from within the field, with one study finding that peer reviewers consistently "over-estimated male achievements and/or underestimated female performance" (Wenneras and Wold, 1997). Even ecofeminism often focuses on the domestic sphere, largely neglecting examination of public spaces (Buckingham and Kulcur 2009). Because climate change and response to climate change and other environmental problems are gendered, the approach to environmental policy, research, and movements requires encompassing gender in both the public and private spheres.

Integrating Private and Public Empowerment Strategies

It is undeniable that many women, especially in the Global South, have a reality that primarily consists of the domestic sphere. For this reason, women, especially poor women, are disproportionately affected by environmental problems such as climate change. Many organizations that work to engage disadvantaged women in environmental actions focus on combating the resource scarcity effects of climate change at the grassroots and domestic levels. As an example, in sub-Saharan Africa, where women are almost entirely responsible for water collection, organizations are working with women to supply pipelines and methods for recycling household water in order to reduce time spent on water collection (WEDO 2013, p. 3). In South America, women are being taught alternative inland fishing techniques in order to have employment mobility in the case of marine fishery collapse (WEDO 2013, p. 3).

These efforts alleviate problems associated with resource acquisition that disproportionately affect women due to their social placement within the domestic sphere are worthwhile. However, the most important strategy, and one that is often not engaged, is seeing beyond the *women as victims* paradigm, and shifting toward seeing *women as actors* who are fully engaged not only in the implementation, but also in the knowledge-generating and decision-making processes. This simultaneously improves access to resources and information and can lead to empowerment and improved situations (Angula 2010, p. 13). Too often, women are not involved in the decision-making processes of these mitigation strategies, or are only given coping mechanisms, not response strategies. Although rare, there are some examples of simultaneous public and private empowerment. In Liberia, organizations are teaching women to collect meteorological data in order to forecast the weather and develop early warning systems for mega-storms (WEDO 2013, p. 11). This effort exemplifies the potential of integrating public and private knowledge, with the integration of science alongside the need for women to know the weather that will influence growing food for their families.

When considering these issues, it is important to fully reject essentialism: women do not have an innate, biological bond with nature, but instead women's connection to natural resources is socially and politically constructed. It is also important to recognize women's

distinct social realities, which often involve increased exposure to environmental problems and decreased agency to respond to them. Building resilience in response to climate change requires an understanding that there are multiple ways of knowing (Burnham, Ma, and Zhang, 2015). Women may experience environmental change differently than scientists measure it, and so in order to achieve public and private empowerment and to combat the widespread implications of global climate change, it is necessary to acknowledge *both* the biophysical *and* the social realities of women. Adaptations that decrease vulnerabilities and increase resilience need to take every day social realities into account while simultaneously opposing patriarchal power structures (Burnham, Ma, and Zhu, 2014).

Conclusions

Wangari Maathai, Rachel Carson, and Jane Goodall all brought unique perspectives to their scientific work due to their social upbringing, and were able to synthesize their social realities with effective public discourses in academia, politics, and activism. Dr. Maathai called on mothers to take care of the planet by planting trees. Goodall used so-called “unscientific” emotional practices by giving her chimpanzees names, and discovered that chimpanzees had personalities and used tools. Carson was called a communist and criticized for being unmarried, but used poetic language to effectively communicate biological problems, and this was consumed by the general public and led to the banning of DDT in the United States and elsewhere. All three of these biologists challenged conventional views of science and of women.

The lessons learned from these women scientists and from my examination of gendered environmental vulnerabilities and movements include the understanding that empowerment in the domestic and public sphere are not mutually exclusive. What is empowering in the private sphere may lead to greater self-confidence in individual agency, and may increase the likelihood of someone engaging in the public sphere. Additionally, women who have greater access to clean water, land, food, fuel, and other natural resources may have more time to engage society beyond their domestic duties, including contributions to science and policy. The two types of empowerment should not be taken separately. Each is essential to the other.

All gender identities will have unique perspectives that can enrich and strengthen environmental movements. Looking beyond the gender binary, all social identities have something to contribute. Ecofeminism has argued that the liberation of women requires the liberation of nature and vice versa (Chircop 2008, p. 137). However, only an intersectional approach will be effective in identifying and changing inequities. We must recognize social realities and the unique perspectives that may result from them while simultaneously combating both day-to-day environmental struggles and structural disenfranchisement from environmental movements, policy, and research. While researching this topic, my appreciation for the necessity of contributions from many human identities to science significantly increased, and I better understand my own position as a female scientist working on environmental issues. Only with recognition of all intersectional social realities, gendered and otherwise, and a full integration of both public and private empowerment strategies, can environmental justice be achieved.

Acknowledgements

This paper benefited from insightful edits and suggestions from Dr. Brigette Bechtold (Central Michigan University), and from colleagues Amanda L. Erwin (Vanderbilt University), Amberly B. Dziesinski (AmeriCorps), and Adam Kranz (University of Illinois).

References

- Impact of Climate Change on Women and Gender Relations (2009). United Nations Environment Programme (UNEP) and United Nations Foundation (UNF).
- Agarwal, B. (1992). The gender and environmental debate: Lessons from India. *Feminist Studies*, 18, 119-158.
- Angula, M. (2010). Gender and Climate Change: Namibia Case Study. *Heinrich Böll Stiftung Foundation Southern Africa*.
- Bloodhard, B., and J. K. Swim. (2010). Equality, harmony, and the environment: An ecofeminist approach to understanding the role of cultural values on the treatment of women and nature. *Ecopsychology*, 2, 187-194.

- Brent, K. (2004). Gender, race, and perceived environmental risk: The “white male” effect in Cancer Alley, LA.
- Buckingham, S. and R. Kulcur. (2009). Gendered geographies of environmental injustice. *Antipode*, 41, 659-683.
- Buechler, S. (2009). Gender, water, and climate change in Sonora, Mexico: implications for policies and programmes on agricultural income-generation. *Gender & Development*, 17, 51-66.
- Burnham, M., Ma, Z., and B. Zhang. (2015). Making sense of climate change: hybrid epistemologies, socio-natural assemblages and smallholder knowledge. *Area*.
- Burnham, M., Ma, Z, and D. Zhu. The human dimensions of water saving irrigation: lessons learned from Chinese smallholder farms. *Agriculture and Human Values*, 32, 347-360.
- Chircop, A. (2008). An ecofeminist conceptual framework to explore gendered environmental health inequities in urban settings and to inform healthy public policy. *Nursing Inquiry*, 15, 135-147.
- Connell, R. W. (1990). A whole new world: Remaking masculinity in the context of the environmental movement. *Gender and Society*, 4, 452-478.
- Demetriades, J., and E. Esplen. (2008). The gender dimensions of poverty and climate change adaptation. *IDS Bulletin*, 39, 24-31.
- Epstein, P.R. (2005). Climate change and human health. *New England Journal of Medicine*, 353, 1433-1436.
- Femia, F., and C.E. Werrell. (2012). Syria: Climate change, drought and social unrest. *The Center for Climate and Security Briefer*, 11, 1-3.
- Grove, N.J., and A.B. Zwi. (2006). Our health and theirs: Forced migration, othering, and public health. *Social Science and Medicine*, 62, 1931-1942.
- Hynes, P. H. (1989). *The Recurring Silent Spring*. Pergamon Press, New York, NY, 1-240.
- IAASTD. (2009). A synthesis of the global and sub-global IAASTD reports. *The Center for Resource Economics*.
- Lear, L.J. (1997). *Rachel Carson: Witness of Nature*. Henry Holt & Company, New York, NY, 1-634.

- Jackson, C. (1993). Doing what comes naturally? Women and environment in development. *World Development*, 21, 1947-1963.
- Maathai, W. M. (2006). *Unbowed: A Memoir*. Anchor Books., New York, NY, 1-368.
- Masson, J. M., and S. McCarthy. (1996). *When Elephants Weep: Emotional Lives of Animals*. Delta, New York, NY, 9.
- McMichael, C., Barnett, J., and A.J. McMichael. (2012). An ill wind? Climate change, migration, and health. *Environmental Health Perspectives*, 120, 646-654.
- Michaelson, M. (1994). Wangari Maathai and Kenya's green belt movement: Exploring the evolution and potentialities of consensus movement mobilization. *Social Problems*, 41, 540-561.
- Mohai, P. (2008). Men, women, and the environment: An examination of the gender gap in environmental concern and activism. *Society and Natural Resources: An International Journal*, 5, 1-19.
- NOAA. (2011). NOAA study: Human-caused climate change a major factor in more frequent Mediterranean droughts. *Cooperative Institute for Research in Environmental Sciences*.
- Schroeder, R. A. (2004). "Re-claiming" land in The Gambia: Gendered property rights and environmental intervention. *Annals of the Association of American Geographers*, 87, 487-508.
- Skinner, E. (2011). Gender and climate change: Overview report. *Institute of Development Studies*.
- Terry, G. (Ed.). (2009). Climate change and gender justice. *Oxfam*.
- Tindall, D. B., S. Davis, and C. Mauboulés. (2011). Activism and conservation behavior in an environmental movement: The contradictory effects of gender. *Society and Natural Resources: An International Journal*, 16, 909-932.
- Wenneras, C., and A. Wold. (1997). Nepotism and sexism in peer-review. *Nature*, 387, 341-343.
- Xiao, C., and D. Hong. (2010). Gender differences in environmental behaviors in China. *Population and Environment*, 32, 88-104.