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RE-NEW (OPINION) ARTICLE

Gender inclusion in ecological restoration

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Promoting diversity is core for ecological restoration. Restoration projects often quantify biological diversity as a measure of success, but generally overlook human diversity, including gender issues, which have not been sufficiently considered in restoration planning, implementation, and monitoring. Here, we justify the need to consider gender equality in ecological restoration and offer guidance on adopting gender-responsive approaches. Gender equality should be considered both a driver and a measure of success and will play a central role to leverage the contributions of restoration to the United Nations' Sustainable Development Goals and of women to its Decade on Ecosystem Restoration. We finally recommend that the International Principles and Standards for the Practice of Ecological Restoration are amended to include a gender-responsive perspective in its recommendations.

Key words: gender analysis, gender balance, gender equality, gender equity, restoration governance, Sustainable Development Goals, UN Decade on Ecosystem Restoration

Implications for Practice

- Restoration initiatives should incorporate a more holistic and transdisciplinary approach, going beyond ecology.
- Gender inclusion is an essential driver of restoration success and should be monitored as a restoration outcome.
- Restoration initiatives should embed a gender-positive approach with concrete strategies, actions, and appraisement to achieve these objectives.
- Gender inclusion maximizes restoration contributions to Sustainable Development Goals.
- SER should consider gender equality as part of its principles, standards, and the social benefits wheel.

Introduction

Promoting diversity is core for ecological restoration. Restoration projects often quantify the diversity of trees, bees, genes, habitats, and almost all sorts of variation of the living world for assessing restoration success (Gatica-Saavedra et al. 2017). Nevertheless, human dimensions such as social participation and engagement, socioeconomic outcomes, and well-being are scarcely assessed in academic studies as key elements of restoration success (Wortley et al. 2013; Adams et al. 2016), although are more commonly considered in restoration practice (Hallett et al. 2013; Broeckhoven & Cliquet 2015). Ultimately, as a human activity, ecological restoration reflects all the idiosyncrasies of our species and is largely impacted by culture, values, social norms, and all psychological and organizational factors driving our relationship with nature. It is unreasonable, therefore, that human diversity has been broadly neglected in ecological restoration. Gender, particularly, is an essential component of human diversity and has been recently regarded as a critical element to be considered for social justice and equitability (Sijapati-Basnett et al. 2017).

Gender refers to the economic, social, political, and cultural attributes and opportunities associated with being women and men. The social definitions of what it means to be a woman or a man vary among cultures and change over time. Gender is a sociocultural expression of characteristics and roles that are associated with certain groups of people with reference to their sex and sexuality, beyond the woman/man dualism (Jhpiego 2016). Gender roles are learned through socialization processes and are therefore subject to change. The concept of gender needs to be understood as a cross-cutting concept, which can be applied to other variables such as race, class, age, and ethnic group. By utilizing a gender approach, the focus is not on individual woman and man but on the system which determines gender roles/responsibilities, access to and control over resources, and decision-making potentials.

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The relevance of gender to environment and forest research dates back several decades. It started in the 1980s with the ecofeminist movement and theories (Gaard 2011), which have gradually expanded from the essentialist approach over women and their unique connection with the environment to a broader perspective of participation and decision-making (Manfre & Rubin 2012; Broeckhoven & Cliquet 2015). Despite this, the role that gender play in conservation and restoration activities is crucial (Lau 2020). Gender equality, and empowering all women and girls, are explicitly promoted by the United Nations' Sustainable Development Goal #5. Understanding the gender–environment nexus is not only key to understanding social and environmental inequities and barriers to sustainable development, but to unlocking options for transformative action (UNEP/IUCN 2018), which may play an utmost role for mainstreaming the UN Decade on Ecosystem Restoration (2021–2030).

Here, we justify why the gender dimension also matters on restoration programs and how it can be promoted.

Why Gender Matters for Restoration

Ecological restoration has advanced globally as a means to deliver benefits for nature and people (Chazdon & Brancalion 2019). However, environmental degradation and restoration benefits do not affect people equally. Institutions, governance structures, and anthropogenic assets regulate the impacts of ecosystem degradation and restoration on human well-being (Díaz et al. 2015). A critical issue for restoration is not only which positive outcomes result from a project but also who benefits from it (Boedhihartono & Sayer 2012). For example, women and children are usually the primary victims of the extreme adverse impact of climate change, and more likely to become climate change refugees (Al-Amin et al. 2019), so climate change mitigation through restoration could be more beneficial to women than to men (Schwerhoff & Konte 2020). Similarly, the vulnerability to water scarcity is also gendered and age-driven, given women's and children's sociocultural responsibility as carriers of water and collectors of firewood for household use in certain countries (Biran et al. 2004; Rao et al. 2019). Consequently, restoration projects focused on climate change mitigation and adaptation, and water and energy security considering the gender issue would be directly beneficial to women. Women and the vulnerable should not only be beneficiaries but also active participants of restoration projects, in the sense that effective social participation can promote a change of values in the relationship of particular social groups with nature (Leopold 2004; Gross 2006; Garzón et al. 2020; Ceccon et al. 2020*b*). Such an approach has been successfully employed by the Working for Water Program in South Africa, which have expressly addressed social benefits as a central motivation for restoration interventions (Bek et al. 2017).

There is progress in place, as women have increasingly performed leadership roles in restoration (Torre et al. 2019), expanding their traditional involvement in seedling production to other activities such as plant identification, tree planting, project management, and monitoring (Clewell & Aronson 2013; Gregorio & Herbohn 2018). One emblematic example of women's transformational potential in restoration is that of Wangari Maathai (1940–2011), the only restorationist in history who has won the Nobel Prize, for leading the Green Belt Movement as a response to rural women's needs in Kenya. The movement was motivated to reduce poverty and promote social justice based on restoration and conservation actions (Leigh 2005). In Cameroon, providing technical and material support to women's groups (and their linkages NGOs and knowledge centers) has been considered a "low-hanging fruit" for promoting restoration and would come at a time when urgent on-the-ground progress is needed in restoring degraded lands (Mbile et al. 2019).

In many of the world's most vulnerable and biologically diverse landscapes, women are reasonably well included in restoration projects (e.g. 62% of forest restoration projects in Mexico; Ceccon et al. 2020*a*). However, their participation is usually limited to performing restoration activities on the ground and underrepresented in management activities such as diagnosis, planning, and monitoring (Ceccon et al. 2020*a*), thus highlighting important differences from men regarding access to, control over, and use of local natural resources (Leisher et al. 2016). Regarding forest management, women's participation is more likely when institutions are less exclusionary and households more educated, and where economic inequality is diminished across society and genders (Coleman & Mwangi 2013).

In several rural communities, women are often head of households but, compared to men, have low-income generation opportunities, lower education level, little or no participation in land management decisions and are less likely to be landowners. Women own less than 20% of the rural properties in Brazil (IBGE 2017). Integrating gender into restoration requires asking more gender-related questions and making significant adjustments, particularly in project management and decision-making (Broeckhoven & Cliquet 2015). Despite recognizing synergies between restoration and gender equality (Coleman & Mwangi 2013; Leisher et al. 2016), strengthening women's capacities, leadership, and social organization is thus critical to engaging them in restoration programs (Sarmiento-Aguirre et al. 2020). Some recent local initiatives promote this strengthening, such as the "Madrinas del Bosque" in Bogota, Colombia, and the "Biocultural Restoration" in Southern Chile.Additionally, a growing body of research suggests that encouraging gender balance enhances forest management effectiveness and sustainability (Mwangi et al. 2011). Embedding gender into restoration activities offers considerable opportunities for integrating restoration initiatives, climate action, and sustainable development commitments (Metcalf et al. 2015; Sijapati-Basnett et al. 2017). The Restoration Opportunities Assessment Methodology, focused on forest and landscape restoration, has already understood this importance and developed gender-responsive restoration guidelines (IUCN 2017).

The inclusion of human dimension may further enhance social cohesion for restoration success (Ota et al. 2020), which can only be achieved if different genders have their needs attended and their unique contribution to restoration mainstreamed. The environmental knowledge and priorities of gender differ and need to be reconciled to achieve restoration

goals within territories or landscapes (Boedhihartono & Sayer 2012; Kristjanson et al. 2018). Gender equality should then be considered beforehand as a goal of restoration initiatives, and be subsequently assessed and promoted as a critical determinant of their success. Restoration initiatives that do not embrace the diversity of interests and stakeholders may fail on its core goals (Trigger et al. 2008; Brancalion & Holl 2020) and, more dramatically, may exacerbate the gender or power imbalances within the community. Patrilineality and traditional roles associated with gender can be critical influences in the institutional bricolage that prevents forest landscape restoration from achieving gender equality, mainly when decision-making is culturally attributed to men (Baynes et al. 2019). In Morocco, the scarce involvement of women in restoration relies on familiar constraints and local customs that limit women to be in contact with men (Derak et al. 2018). In South Asia, Agarwal (1997) argues for greater gender inclusion in forest policy and governance, being at the forefront of highlighting gender inequity based on land tenure and property rights and women's socioeconomic vulnerability. Women's participation in the decision-making process of environmental issues related to their territory needs to be addressed and promoted.

Despite all these known and documented advantages of gender inclusion, restoration projects still fail to inform who is benefiting from restoration interventions, and to what extent (Martin & Lyons 2018). This failure can negatively affect both restoration and gender equality. Examining the Global Restoration Network database, Broeckhoven and Cliquet (2015) analyzed the role and extent of the gender dimension in many initiatives and suggested the need for a more gender-inclusive focus.

Practical Issues on Gender Inclusion

Ecological restoration initiatives need to be designed based on a holistic, transdisciplinary, and inclusive approach (Aronson et al. 2020). To move toward gender inclusion in all aspects of ecosystem restoration, we recommend practical steps to be applied in restoration diagnosis, planning, implementation, and monitoring. One good start is to promote gender mainstreaming, a globally accepted strategy for promoting gender equality that includes legislation, policies, or programs in all areas and at all levels (UN 1997). In addition, the adoption of well-established tools currently applied in other fields of knowledge, such as gender analysis models, is particularly indicated, as it allows using existing tools, benchmarking successful cases, and put restoration in the context of other human activities. Gender analysis is the cornerstone of gender mainstreaming and should be the first step in a gender integration process (Jhpiego 2016). This analysis constitutes a strategic socioeconomic framework applied to understand gender roles and relations in different social life dimensions, such as access to assets, beliefs and perceptions, practices and participation, legal instruments and policies, and power and influence (USAID 2013).

In this sense, gender analysis models are worth considering appraising gender inequality, promote effective participation of women, and could be incorporated in the stakeholder engagement process/principle. This analysis also provides baseline information, a critical component for measuring success. There are a number of gender analysis frameworks that can guide the analysis of gender relevant information and each framework is based on a set of assumptions about how gender is constituted and how an understanding of gender can lead to better outcomes and greater equality (Manfre & Rubin 2012). A well-established gender analysis, the social relations approach, is adopted by the European Union and the Center

Box 1 How the Atlantic Forest Restoration Pact in Brazil addressed gender inclusion.

To illustrate the practical application of a gender inclusion framework in a restoration program, we present here the case study of the Atlantic Forest Restoration Pact (PACT) in Brazil, a multistakeholder coalition of more than 300 organizations working collaboratively to restore 15 million hectares by 2050 (Melo et al. 2013). This coalition created the Gender Inclusion Working Group, with the general aim of shifting the PACT's vision from gender-blind to gender-responsive. The transformation strategy of the group was based on critical theory, which focus on the reflective assessment of society, social structures, and systems of power to challenge current social inequalities, and social relations approach, through which it explored the root causes of gender inequality in member organizations and proposed solutions to address its systemic and structural causes. This working group was structured on three pillars: (1) capacity building, (2) communication, and (3) political incidence.

Capacity-building activities were focused on the dissemination and adoption of the theoretical framework used for promoting gender equity in the Pact, engaging key stakeholders in the process. A booklet on gender perspective—"Semeando Equidade" (Planting equity)—was produced to support capacity building activities (Pacto pela Restauração da Mata Atlântica & IUCN 2017). On the communication front, the working group created the blog "Mulheres de ImPACTO" (Women of ImPACT) to consolidate and disseminate the working group ideas by creating awareness about the gender-sensitive approach inside and outside the group. Finally, the working group participated in multiple policy fora and influenced adopting the first gender-responsive approach in a major Brazilian policy, the National Biodiversity Strategy and Action Plan.

These activities resulted in a progressive change in the importance of gender inclusion that can be demonstrated through the following achievements: (1) a chapter on gender and diversity inclusion in the restoration was included in the Brazilian Platform on Biodiversity and Ecosystem Services (the national branch of IPBES), (2) a playroom was pioneering included in the SER conference in Brazil 2017, creating a family-friend environment to support equal participation of men and women in the conference, and (3) a woman was elected as the national coordinator of the PACT.

for International Forestry Research and classifies the levels of engagement as gender blind, neutral, sensitive, and positive. These categories are valuable to assess gender consideration in restoration initiatives, being useful for progress tracking, financing, and reporting (Box 1). Gender analysis describes existing gender relations in a particular context, clarifies how gender roles and relations create opportunities or obstacles for achieving targeted objectives, and identifies ways to address disparities between men and women (Manfre & Rubin 2012).

Recommendations and the Way Forward

We recommend that the International Principles and Standards for the Practice of Ecological Restoration (Gann et al. 2019) are amended to include a gender-responsive perspective in its recommendations, aiming at intentionally driving changes toward a gender-inclusive restoration approach. This inclusion will ultimately lead to a change in on-the-ground projects, catalyzing social justice and equitability as a desired result of ecological restoration, maximizing restoration outcomes for biodiversity and ecosystem services. The United Nations' Sustainable Development Goals (SDGs) explicitly address ecological restoration, especially as part of SDGs 13 (Tracker 2020), 14 (life below water), and 15 (life on land), and also gender inclusion, with a specific goal on it (SDG 5, gender equality). Gender inclusion in ecological restoration could then be a win-win solution for promoting cross-cutting achievements of the SDGs and effectively demonstrate its broad positive benefits to promote diversity and equality. The United Nations Decade on Ecosystem Restoration offers the perfect momentum for the evolution of restoration to a gender-positive activity, an opportunity not to be missed.

Concluding, ecological restoration cannot be neutral. Gender equality should be considered both a driver and a measure of success and will play a central role to leverage the contributions of restoration to the United Nations' SDGs and of women to its Decade on Ecosystem Restoration.

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LITERATURE CITED

Adams C, Rodrigues ST, Calmon M, Kumar C (2016) Impacts of large-scale forest restoration on socioeconomic status and local livelihoods: what we know and do not know. Biotropica 48:731–744

Agarwal B (1997) "Bargaining" and gender relations: within and beyond the household. Feminist Economics 3:1–51

Al-Amin AKMA, Akhter T, Islam AHMS, Jahan H, Hossain MJ, Prodhan MMH, Mainuddin M, Kirby M (2019) An intra-household analysis of farmers' perceptions of and adaptation to climate change impacts: empirical evidence from drought prone zones of Bangladesh. Climatic Change 156: 545–565

Aronson J, Goodwin N, Orlando L, Eisenberg C, Cross AT (2020) A world of possibilities: six restoration strategies to support the United Nation's Decade on Ecosystem Restoration. Restoration Ecology 28:730–736

Baynes J, Herbohn J, Gregorio N, Unsworth W, Tremblay ÉH (2019) Equity for women and marginalized groups in patriarchal societies during forest landscape restoration: the controlling influence of tradition and culture. Environmental Conservation 46:241–246

Bek D, Nel E, Binns T (2017) Jobs, water or conservation? Deconstructing the green economy in South Africa's Working for Water Programme. Environmental Development 24:136–145

Biran A, Abbot J, Mace R (2004) Families and firewood: a comparative analysis of the costs and benefits of children in firewood collection and use in two rural communities in sub-Saharan Africa. Human Ecology 32:1–25

Boedhihartono AK, Sayer J (2012) Forest landscape restoration: restoring what and for whom? Pages 309–323. In: Stanturf J, Lamb D, Madsen P (eds) Forest landscape restoration. World Forests. Vol 15. Springer, Dordrecht, The Netherlands

Brancalion PHS, Holl KD (2020) Guidance for successful tree planting initiatives. Journal of Applied Ecology 57:2349–2361

Broeckhoven N, Cliquet A (2015) Gender and ecological restoration: time to connect the dots. Restoration Ecology 23:729–736

Ceccon E, Méndez-Toribio M, Martínez-Garza C (2020a) Social participation in forest restoration projects: insights from a national assessment in Mexico. Human Ecology 48:609–617

Ceccon E, Rodríguez León CH, Pérez DR (2020b) Could 2021–2030 be the decade to couple new human values with ecological restoration? Valuable insights and actions are emerging from the Colombian Amazon. Restoration Ecology 28:1036–1041

Chazdon R, Brancalion P (2019) Restoring forests as a means to many ends. Science 365:24–25

Clewell AF, Aronson J (2013) Ecological restoration: principles, values, and structure of an emerging profession. Island Press, Washington D.C.

Coleman EA, Mwangi E (2013) Women's participation in forest management: a cross-country analysis. Global Environmental Change 23:193–205

Derak M, Corina J, Taiqui L, Aledo A (2018) A proposed framework for participatory forest restoration in semiarid areas of North Africa. Restoration Ecology 26:18–25

Díaz S, Demissew S, Joly C, Lonsdale WM, Larigauderie A (2015) A Rosetta stone for nature's benefits to people. PLoS Biology 13:e1002040

Gaard G (2011) Ecofeminism revisited: rejecting essentialism and re-placing species in a material feminist environmentalism. Feminist Formations 23: 26–53

Gann GD, Mcdonald T, Walder B, Aronson J, Nelson CR, Jonson J, et al. (2019) International principles and standards for the practice of ecological restoration. Second edition. Restoration Ecology 27:S1–S46

Garzón NV, Rodríguez León CH, Ceccon E, Pérez DR (2020) Ecological restoration-based education in the Colombian Amazon: toward a new society–nature relationship. Restoration Ecology 28:1053–1060

Gatica-Saavedra P, Echeverría C, Nelson CR (2017) Ecological indicators for assessing ecological success of forest restoration: a world review. Restoration Ecology 25:850–857

Gregorio N, Herbohn J (2018) Implementing the national greening program in the Philippines: lessons learned. Current Conservation 12:25–28

Gross M (2006) Beyond expertise: ecological science and the making of socially robust restoration strategies. Journal for Nature Conservation 14:172–179

Hallett LM, Diver S, Eitzel MV, Olson JJ, Ramage BS, Sardinas H, Statman-Weil Z, Suding KN (2013) Do we practice what we preach? Goal setting for ecological restoration. Restoration Ecology 21:312–319

IBGE (2017) Censo Agropecuário 2017. IBGE, Brasilia, Brazil

IUCN (2017) Gender-responsive restoration guidelines: a closer look at gender in the restoration opportunities assessment methodology. IUCN, Gland, Switzerland

Jhpiego (2016) Gender analysis. https://gender.jhpiego.org/analysistoolkit/gender-analysis/

Kristjanson P, Siegmann K, Afif Z, Manchester K, Gurung J (2018) Enhancing effectiveness of forest landscape programs through gender-responsive actions. Center for International Forestry Research (CIFOR), Bogor, Indonesia

Lau JD (2020) Three lessons for gender equity in biodiversity conservation. Conservation Biology 34:1589–1591

Leigh P (2005) The ecological crisis, the human condition, and community-based restoration as an instrument for its cure. Ethics in Science and Environmental Politics 1:3–15

Leisher C, Temsah G, Booker F, Day M, Samberg L, Prosnitz D, et al. (2016) Does the gender composition of forest and fishery management groups affect resource governance and conservation outcomes? A systematic map. Environmental Evidence 5:6

Leopold AC (2004) Living with the land ethic. Bioscience 54:149–154

Manfre C, Rubin D (2012) Integrating gender into forestry research: a guide for CIFOR scientists and programme administrators. Center for International Forestry Research (CIFOR), Bogor, Indonesia

Martin DM, Lyons JE (2018) Monitoring the social benefits of ecological restoration. Restoration Ecology 26:1045–1050

Mbile PN, Atangana A, Mbenda R (2019) Women and landscape restoration: a preliminary assessment of women-led restoration activities in Cameroon. Environment, Development and Sustainability 21:2891–2911

Melo FPL, Pinto SRR, Brancalion PHS, Castro PS, Rodrigues RR, Aronson J, Tabarelli M (2013) Priority setting for scaling-up tropical forest restoration projects: early lessons from the Atlantic Forest Restoration Pact. Environmental Science & Policy 33:395–404

Metcalf EC, Mohr JJ, Yung L, Metcalf P, Craig D (2015) The role of trust in restoration success: public engagement and temporal and spatial scale in a complex social-ecological system. Restoration Ecology 23:315–324

Mwangi E, Meinzen-Dick R, Sun Y (2011) Gender and sustainable forest management in East Africa and Latin America. Ecology and Society 16:17

Ota L, Chazdon RL, Herbohn J, Gregorio N, Mukul SA, Wilson SJ (2020) Achieving quality forest and landscape restoration in the tropics. Forests 11:820

Pacto pela Restauração da Mata Atlântica & IUCN (2017) Semeando Equidade. https://www.pactomataatlantica.org.br (accessed 6 May 2020)

Rao N, Lawson ET, Raditloaneng WN, Solomon D, Angula MN (2019) Gendered vulnerabilities to climate change: insights from the semi-arid regions of Africa and Asia. Climate and Development 11:14–26

Sarmiento-Aguirre MJ, Gutierrez I, March R, Ramirez F, Saldivar S (2020) Género y Manejo Integrado de Paisajes, Informe de grupo de trabajo temático. Dialogo sobre Paisajes Sostenibles en Mesoamerica. EcoAgriculture Partners for Landscapes for People, Food and Nature, Washington D.C.

Schwerhoff G, Konte M (2020) Gender and climate change: towards comprehensive policy options. Pages 51–67. In: Konte M, Tirivayi N (eds) Women and sustainable human development. London: Palgrave Macmillan

Sijapati-Basnett B, Elias M, Ihalainen M, Paez Valencia AM (2017) Gender matters in forest landscape restoration: a framework for design and evaluation. Center for International Forestry Research (CIFOR), Bogor, Indonesia

Torre J, Hernandez-Velasco A, Rivera-Melo FF, Lopez J, Espinosa-Romero MJ (2019) Women's empowerment, collective actions, and sustainable fisheries: lessons from Mexico. Maritime Studies 18:373–384

Tracker CA. (2020) A government roadmap for addressing the climate and post COVID-19 economic crises

Trigger D, Mulcock J, Gaynor A, Toussaint Y (2008) Ecological restoration, cultural preferences and the negotiation of "nativeness" in Australia. Geoforum 39:1273–1283

UN (1997) United Nations economic and social council resolution 1997/2. https://www.unwomen.org/en/csw/csw64-2020/official-documents (accessed 11 June 2021)

UNEP/IUCN (2018) Gender and environment statistics: Unlocking information for action and measuring the SDGs. UN Environment, Nairobi, Kenya

USAID (United States Agency for International Development) (2013) ADS Chapter 205: integrating gender equality and female empowerment in USAID's program cycle. USAID, Washington D.C.. https://www-origin.usaid.gov/sites/default/files/documents/205.pdf (accessed 6 May 2020)

Wortley L, Hero JM, Howes M (2013) Evaluating ecological restoration success: a review of the literature. Restoration Ecology 21:537–543

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