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GENDER AND LAND DEGRADATION NEUTRALITY: A CROSS-COUNTRY ANALYSIS TO SUPPORT MORE EQUITABLE PRACTICES

Short title: GENDER AND LAND DEGRADATION NEUTRALITY

Key words: Sustainable land management, gender equality, SDGs, female empowerment, land rights, women

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ABSTRACT
Women and men have unequal opportunities to address land degradation. While adoption of Sustainable Development Goal target 15.3 leads the world to 'strive towards land degradation neutrality (LDN)' by 2030, gender concerns are sparsely considered in LDN programming to date. To achieve LDN in regions with deeply entrenched socio-cultural norms requires gender-responsiveness, accounting for the varied gender components of land degradation. This paper identifies innovative entry points for, and benefits of, integrating gender issues into LDN, as well as the risks of gender inaction. Assessment of the literature on the links between gender and land reveals land degradation is gendered and closely tied to gender biases in land rights, access to resources and incentives, opportunities to participate in decision-making, and the distribution of costs/benefits of projects targeting land improvement. Analysis of selected LDN-related projects shows that interventions seem to target gender biases by engaging: women's groups that are locally-recognised as change agents in driving inclusiveness; and gender specialists to coordinate gender mainstreaming activities. Entry points for gender-responsive LDN are identified, including interventions that: merge LDN gender plans with existing gender schemes at local and global levels; enable gender-sensitive early warning systems; and narrow gender disparities and safeguard women's land rights through gender-sensitive LDN financing mechanisms. Gender-responsive LDN is one of several avenues to support growing international efforts to promote gender equality and female empowerment, alongside movement towards a future where more balanced relations ensure women and men can interact with and care for land in more equitable and non-hierarchical ways.

KEY WORDS: sustainable land management, gender equality, SDGs, female empowerment, land rights, women

INTRODUCTION
Links between gender equality, female empowerment and sustainable land management (SLM) are long recognised, but have attracted growing academic and policy interest more recently (Kondylis *et al*., 2016; Doss *et al*., 2018). This has been largely driven by the persistence of gender barriers in achieving development, and was boosted by the Sustainable Development Goals (SDGs) which spur action to preserve 'life on land' (Goal 15) and promote gender equality (Goal 5). Making progress towards these goals is fundamental for achieving other SDGs and their targets (see the IPBES Report, 2018). Action to preserve 'life on land' requires tackling land degradation since approximately 12 million hectares of land are degraded annually, undermining the wellbeing of 3.2 billion people in more than 169 countries worldwide (Stringer *et al*., 2017; UNCCD, 2017). Land degradation has a strong gender component, yet statistics on land degradation mask the gendered nature of degradation, in particular, the different roles women and men play in land degradation. Researchers and practitioners have argued that degradation threats can be reduced if gender gaps in land rights, access to finance and credit, and participation in actions to avoid, reduce and reverse degradation, and knowledge dissemination, were closed (UNCCD, 2017). As the world strives towards land degradation neutrality (LDN), gender-responsive actions that contribute to LDN, and that recognise women and men as equally important and legitimate stakeholders, are therefore vital.

LDN links SLM, land restoration and land rehabilitation practices. It is addressed in target 15.3 of the SDGs and provides a key political opportunity to stabilise or increase the amount and quality of land resources globally by 2030 (Sietz *et al*., 2017). The United Nations Convention to Combat Desertification (UNCCD) recognises gender equality, female empowerment and land rights as essential for successful LDN outcomes, with Orr *et al*. (2017) calling for LDN actions that: include gender analysis as a way to account for women's participation/contribution in LDN decision-making; and enable LDN assessment based on gender-sensitive indicators that capture sex-disaggregated data as a way to enable accurate

monitoring of progress. Integrating gender considerations into LDN is desirable from a human rights and social justice/equity perspective. This can help uncover and address underlying structural inequalities and power imbalances between women and men, facilitating LDN outcomes that deliver ecological and economic benefits more equitably to both women and men.

Although a strategic gender-responsive and socially-inclusive approach can foster a balanced representation of men and women in sustainable development initiatives, LDN's gender dimensions and priority to include and empower women and men equally (e.g. by giving them a voice in decisions that critically affect their wellbeing) remain unclear. Unlocking the potential of a gender-equitable[1] LDN rests critically on the aspirations and support of those who depend on land-based livelihoods — whose rights and access to land must be protected and promoted for LDN-facing initiatives to be sustainable. Similarly, movement towards LDN in any country would depend on the cooperation and commitment of numerous actors and user communities/stakeholders at all levels. LDN is, and will be, pursued and implemented in countries (and contexts) characterised by histories of land tenure conflicts, ineffective land governance systems, and where patriarchal norms discriminate against women and girls. Yet, limited strategic guidelines exist to support countries on the scope of gender-equitable LDN actions to ensure that initiatives do not perpetuate historical inequalities and injustices and/or marginalise indigenous and local communities. Patriarchal structures in places where LDN related projects are ongoing necessitate Parties to the UNCCD to ensure that such projects are informed by human rights guidelines and/or global gender norms to achieve both gender equality and land resilience. Advancing gender-equitable LDN actions at a time when there is renewed global commitment to empower women (and girls) offers a window of opportunity to tackle structural and procedural constraints that undermine women's effectiveness as agents of change in land management.

This article identifies some of the ways countries can more systematically and consistently integrate gender equality into LDN to better incentivise women's participation and leadership capacity, and as such, support more equitable practices. It assesses the literature on the links between gender and land (see Appendix S1) to understand how gender and women's rights are conceived and addressed in agricultural and land-based livelihood systems where land degradation is stark. It critically analyses ongoing and past projects that contribute to measures to avoid, reduce and reverse land degradation around the world to understand how gender and women's issues are considered. In doing so, it uncovers innovative entry points for, and identifies the benefits of, integrating gender issues into LDN, as well as identifying the risks of not doing so. The article stimulates both scholarly and policy-oriented thinking on pathways towards more equitable, gender-balanced LDN actions, and a future where women and men can interact with and care for land resources in more equal and non-hierarchical ways.

RESEARCH DESIGN AND METHODOLOGY

We undertook a desk-based document search and literature review supported by evaluation of evidence from LDN-related projects from around the world. Our literature review (synthesised in Appendix S1) indicates that perceptions of gender and land are deeply rooted in cultures, vary widely within and between societies, and are dynamic. Gender relates to socially constructed differences between women and men on the basis of their roles, responsibilities, behaviours, daily activities and attributes. Eco-feminists conceive the links between land use, ownership and management as substantially mediated through gender, focusing in particular on women as victims of land degradation (Doss *et al*., 2015; Hirao, 2016). Our review demonstrates that gender bias exists in: land rights; agricultural/domestic labour

[1] The terms gender-sensitive, gender-responsive and gender-equitable are used interchangeably to mean: 'recognition of gender issues in relation to socially constructed differences in the roles, responsibilities, opportunities and realities of women and men; and treatment of women and men as equal humans'.

divisions; access to resources and incentives; participation in decision-making opportunities; and sharing of costs/benefits of intervention projects. Such bias can fuel inequalities and social injustices; and can be tied to the ways women and men degrade the land (FAO, 2009; Meinzen-Dick *et al.*, 2017). The notion of inequality in the theory and practice of land management and restoration/rehabilitation does not suggest that women and men are unequal humans, but rather that their roles, responsibilities, opportunities and realities are dependent on whether they are born female or male (FAO, 2018).

While awareness of gender dimensions related to land has risen significantly, current LDN literature is scarce concerning: i) how LDN actions can help address/overcome gender disparities alongside its primary goals to avoid, reduce and reverse land degradation; ii) the advantage(s) of bringing gender into mainstream LDN processes; and iii) the risks we face by not doing so. Implementing, achieving and maintaining LDN, e.g. in places with deeply entrenched patriarchal norms, underscore the need for a better understanding of these issues.

We identified and evaluated a sample of projects that contribute to measures to avoid, reduce and/or reverse land degradation (i.e. LDN-related projects) (see Table 1 for the criteria used to include projects). We adopted the guidelines of Waddington *et al.* (2012) which specify a replicable protocol for searching defined project databases, selecting evidence against pre-defined criteria and reviewing/synthesising the selected evidence. Evaluation sought to elucidate evidence of concrete actions (planned or implemented) to: bring about gender equality in land rights and workloads; facilitate equality in knowledge sharing and transfer; and promote participatory decision-making processes in tackling land degradation, including sharing of costs/benefits from land-based initiatives. We account for the particular needs, priorities, realities and knowledge of women and men, focusing on how these are included in project planning[2] (Doss *et al.*, 2014).

Table 1. Project inclusion and exclusion criteria.

		Inclusion	Exclusion
Project	Project type	▪ LDN-related projects[3]	▪ None LDN related
	Focal area	▪ Land degradation (LD)	▪ None LD focal area
	Year	▪ 2012 – 2018	▪ 2011 and earlier
	Language	▪ English	▪ Language other than English
	Land use type	▪ Agroforestry, rangeland, wetland, mountain landscape, forest land, coastland, ecological corridors, protected land	▪ Housing, urban green infrastructure
	Geography	▪ Low and middle income countries[4]	▪ High income countries
Funding mechanism	Donor type	▪ GEF/UNCCD LD remit	▪ International/national research grants; private donor agencies

[2] We assessed 'planned' intervention projects (at the inception phase), rather than effectiveness/implementation outcomes of projects. This is because the majority of the LDN-related projects we included are currently ongoing.
[3] Owing to the scarcity of specific LDN projects aligned to the LDN Target-Setting Programme (LDN-TSP) currently implemented by the Global Mechanism of the UNCCD, we included projects that directly/indirectly contribute to measures to avoid/reduce/reverse land degradation, desertification and drought (LDDD).
[4] Projects included are based in Asia, Africa, South America and Eurasia – countries involved in the LDN-TSP.

Our sample focused on Global Environment Facility (GEF) funded projects[5] on SLM and land restoration, encompassing interventions that aim to tackle degradation, desertification and droughts (i.e. to stabilise or increase land quantity and quality), and which fall within the wider 'land degradation' focal area (n = 30). Selected projects (see Table S1 in supplementary material) are ongoing or completed, covering the period 2012-2018. This period encompasses the time the UNCCD first voiced the idea of zero net land degradation neutrality which later evolved into LDN and SDG 15 in 2015 (Chasek *et al.*, 2015; Stavi and Lal, 2015). Both GEF and UNCCD LDN country profile databases[6] were searched to collate project documents/proposals. We do not include all LDN-related projects, but we do cover a wide range of land use types (agroforestry, rangeland, wetlands, mountain landscapes) and land degradation issues (from sustainable agriculture to large-scale rehabilitation of degraded land) across low- and middle-income countries/regions, reflecting important dimensions of gender issues considered in land-based interventions.

Project documents were examined for references to 'gender' and 'women', identifying the meanings they communicate in relation to the gendered dimensions of land degradation, and covering how women and men contribute to and are impacted by land degradation/restoration (see Table S2 for questions that guided reading and assessment of projects). Specific gender issues related to land use/ownership, safeguarding of tenure security, participatory decision-making and benefit sharing were then identified. This allowed us to uncover how gender matters for land degradation/restoration, whether gender relations are changing, and how women's roles are captured, to better understand the core gender issues deserving the greatest attention in pursuing LDN.

PORTRAYALS OF GENDER IN LDN-RELATED PROJECTS

Table 2 presents the typology of project core themes and associated countries in our sample. Projects, covering 34 countries, differ in the scope of gender issues/concerns covered. To tease out the central gender issues considered, we focus on two broad aspects of the gender dimensions: gendered participation and engagement; and contextual/structural gender components.

Table 2. Typology of project core theme and associated country.

Core theme of project	Country[7]
Sustainable land management (practices, systems, technologies, investments)	▪ Albania, Armenia, Georgia, Dominica, Ghana, Jordan & Egypt, Botswana, Chile, Madagascar, Namibia, Macedonia
Sustainable forest and landscape management (forest landscape, mountain landscape, ecological corridors)	▪ Chad, Brazil, Indonesia, Liberia, Sierra Leone, Bosnia & Herzegovina, Lebanon, Benin, Thailand, Kyrgyzstan, Mali, Gambia
Coastal zone/water shed management and ecosystem rehabilitation	▪ Lesotho, Cambodia, Central African Republic, Mauritius
Land degradation offset, mitigation and agro-sylvo-pastoralism management	▪ Mongolia, Nigeria, Niger
Protected area management	▪ Swaziland, Zambia

[5] We focused on GEF funded projects because GEF serves as a financial mechanism for UNCCD; it works to extend LDN projects world-wide (see https://www.thegef.org/topics/land-degradation-neutrality).

[6] URLs: i) https://www.thegef.org/projects?f[]=field_p_focalareas:2210; and ii) https://www.unccd.int/ actions/ldn-target-setting-programme/ldn-country-profiles.

[7] Three of the projects we examined are being implemented in more than one country (see supplementary material – Table S1)

Gendered participation and engagement

References to 'gendered participation' were found to be limited to mentioning women as partners alongside men in decision-making, relating to: project design/planning; validation workshops; and livelihood enhancement (Table 3). Women and women's groups partner with men because of the active role women play in agriculture, SLM, harvesting and value-addition of forest products, and community-based environmental advocacy. Partnership is also influenced by the needs to strengthen women's resilience to land degradation. One important example (demonstrating partnership) is the project on *Land degradation neutrality of mountain landscapes in Lebanon* where women are expected to partner (equally) with men in any dialogue initiated by the project on the basis of their role in local innovations relating to land rehabilitation, restoration and sustainability. The project accounts for the priorities of men and women – acknowledging women's vulnerability as the reason gender should be considered in addressing land degradation.

Many projects identify institutional platforms that encourage/support gendered participation. For example, the *Sustainable Land Management Project in the Commonwealth of Dominica* was based on the involvement of the National Council of Women in providing technical support for gender mainstreaming in SLM; the project on *Promoting Sustainable Land Management (SLM) through Integrated Restoration of Ecosystems in Albania* incorporates the Kolonja Women's Association to lead the development of baseline gender analysis; while the *Community-based Sustainable Dryland Forest Management Project in Gambia* employs the expertise of the Agency for the Development of Women and Children to coordinate participatory gender-based activities in forest conservation. In these countries, project interventions seem to target gender bias by engaging women's groups that are locally recognised as change agents in driving inclusiveness.

Table 3. Central gender issues recognised based on 'gendered participation'.

Evidence of participatory aspects of the gender dimension identified
▪ Participation of women's groups in developing baseline gender analysis ▪ Stakeholder consultation integrating women and men equally – to identify needs and priorities ▪ Decision-making covering: training/capacity building, land use planning, awareness raising, outreaches, business planning ▪ Partnership for enabling gender equality promoted by: accounting for socioecological needs in project locations; engaging several agencies (NGOs, CBOs, extension services) to strengthen the voice of women; using women and men representatives in project planning

Several other projects (e.g. *Mainstreaming SLM in rangeland areas in Botswana*; *Sustainable forest and landscape management in Bosnia and Herzegovina*; *and Integrated community-based forest and catchment management through an ecosystem service approach in Thailand*) highlight the role of community-based groups (such as Women's Self-Help Groups) in setting up social mobilisation activities and coordination of rural women's representation in environmental advocacy. '*Mainstreaming biodiversity into the management of the coastal zone in the Republic of Mauritius*' provides a good example of a gender-sensitive participatory approach in project planning. By combining a gender lens and a Human Rights-Based Approach, the project aims to reduce the gender bias which assumes that men are the sole breadwinner and household head, and the chief recipients of household income. The project distinguishes women and men as household beneficiaries of project outcomes, ensuring that: i) women's participation is not hampered by unpaid care work; ii) alternative care arrangements are considered as part of development of sustainable and alternative livelihoods; iii) women's participation does not worsen their unpaid work load; and iv) the project does not take advantage of gender bias in income to offer women benefits that are

lower compared to men. Further, the project - *Promoting SLM through integrated restoration of ecosystems in Albania* (planned with the Kolonja Women's Association on gender matters), used quotas to enlist women's participation in training activities. Gender-focused training, skill acquisition and access to resources and information sharing are mentioned in a few projects as ways to foster women's participation. However, it is unclear how these are planned to increase women's engagement considering that increased women's engagement is often not realised in most middle- and low-income countries where participation generally is dominated by educated, better resourced and powerful land-owning men from elite socio-cultural groups (Nederlof and Dangbégnon, 2007).

No project explicitly highlights how structural issues (e.g. discriminatory attitudes and practices originating from cultural norms) may be tackled in male-controlled settings in which females and males are embedded. A number of projects suggests that increasing women's representation in project planning and implementation would result in better outcomes for women, yet no specific criteria exist within projects' texts to verify this.

Gender analysis is incorporated in some projects from the outset to identify: activities in which women have recognised know-how and from which they can benefit through participation; and factors that enhance/hamper participation. Examples include *Promoting SLM through strengthening legal and institutional framework, capacity building and restoration of most vulnerable mountain landscapes in Macedonia*; and *Restoring ecological corridors for multiple land and forests benefits in Western Chad*. Women's participation may not imply 'right holding'; it may also not suggest fairness in land rules and tenure security (Doss *et al*., 2014). However, it can include attending and speaking up at meetings, holding official positions and engaging in strategic decision-making activities at the community or state level (Table 3). Among the 30 projects examined, we found that 17 (i.e. 57%) explicitly indicate women's participation or representation in a way that portrays women as a homogenous group without considering the varied social categories of age, ethnicity and education that distinguish females.

Unpacking contextual/structural gender components

Moving beyond gendered participation and engagement, we focus on the wider contextual/structural gender dimensions of: land rights; household and farm workloads; benefit sharing; and access to resources/knowledge and incentives. Five projects clearly demonstrate these aspects (see Table 4).

These projects recognise the importance of moving beyond gendered participation to incorporate important contextual/structural gender issues, and as such offer some insights of how to enable gender inclusion in LDN projects, including the benefits of integrating gender issues and the risks of not doing so (see Table 5). Although the projects we examined target gender bias in a variety of ways following largely the GEF gender guidelines, the gender dimensions related to cost and benefit distribution, and mechanisms for safeguarding of women's rights and privileges have only been marginally considered. Despite these shortcomings, important general gender elements emerged from our analysis which deserve the greatest attention in LDN actions. These include: instituting (project) result frameworks that integrate gender-specific data to reveal women's land rights, access to and use of land, and participation in projects from inception to delivery; merging project gender plans with existing gender schemes at both local and global levels; and engaging gender experts/specialists in coordinating gender mainstreaming activities, such as the development of gender-sensitive early warning systems and budgetary provisions enabled by gender analysis.

Table 4. Unpacking contextual/structural gender components in LDN projects

Projects demonstrating contextual/structural gender components
Sustainable Land Management in the Commonwealth of Dominica ▪ Focuses on reducing violence against women emanating from inequality. Its broad gender focus is grounded in the country's successes in gender equity and equality as evident in the strides towards the socio-economic achievement of women. By drawing on Dominica's Gender Policy as the main framework for gender mainstreaming, it demonstrates the need for gender equity and equality strategies of land-based projects to align with national policies on gender. In this project, gender consideration encompasses three aspects: the understanding of ecosystem benefits for women (benefit sharing); the initiation of knowledge management activities that are gender-sensitive in terms of using sex-disaggregated data and language in publications and photos to avoid presenting stereotypes; and the relative positions of women, men and youth in terms of access to (and benefit from) the knowledge created.
Generating economic and environmental benefits from sustainable land management for vulnerable rural communities in Georgia ▪ Recognises women's limited access to credit (i.e. funds to purchase fertiliser, better seeds and other inputs) as driving low productivity and risks of poverty among women. It prioritises making contributions directly and indirectly to improve women's capacity to own land and engage in land use activities that have the potential to improve their economic situation, through skills development (education/training) and improved access to modern technologies and knowledge on land management - the project provides an interesting example of how to increase both women's incomes and social capital.
Sustainable Forest Management and Conservation Project in central and southern Benin ▪ Shows that women can be empowered by pursuing outcomes that: reduce women's time and labour on household chores, e.g. making harvested forest/land produce available near family settlements; increase capacity for women's education/training on processed forestry products and sustainable forest/land management/conservation (and to use this to generate alternative income); and enhance women's overall health by building accessible primary healthcare centres near villages.
Collaborative Management for Watershed and Ecosystem Service Protection and Rehabilitation in the Cardamom Mountains, Upper Prek Thnot River Basin in Cambodia ▪ Prioritises female headed households living in and depending on forests, covering: provision of land use rights to support acquisition of livelihood assets for women; narrowing gender disparities through access to economic and financial resources and opportunities (i.e. security of land tenure, infrastructure, off-farm employment opportunities); and enhancing women's voices and rights and reducing work burdens.
Enhancing Agro-ecological Systems in the Northern Prefectures of Central African Republic ▪ Prioritises women because of their heavier productive, reproductive and community-based workloads and existence of land-related gender disparities. The project targets c.8 million women by focusing on: women's access to land security; enhanced organisational capacity of women's producer groups; inclusive investment and growth opportunities for women; gender-sensitive early warning systems; pro-women services centred on creation of ecological value chains and technologies to reduce women's work time and increase their productivity; and recruitment of a gender and socio-economic development specialist to enhance gender mainstreaming.

Table 5. Associated gender-responsive LDN benefits and risks.

Focus/benefits of a gender-responsive LDN	Risks of ignoring gender issues in LDN
Identifying legitimate stakeholders and capturing relevant experiences/skills/knowledge of women and men.	Increased women's work burden; reinforcing their status as victims of degradation rather than champions of restoration.
Understanding and accounting for the different women's and men's roles, rights and responsibilities as land users and managers, including their particular land access and use patterns.	Imprecise identification of i) men and women stakeholders in land use practices; ii) socially-just options for neutrality interventions; and iii) benefit sharing leading to increased marginalisation of women in decision making.
Clear identification of drivers of degradation, guaranteed accuracy of information and potential synergies/coordination to address challenges.	Draw back in project sustainability and long-term effectiveness, e.g. due to maintenance of existing inequality in tenure security.
Joint planning, implementation and monitoring of LDN options and outcomes, ensuring sustainable land conservation/restoration and equitable sharing of benefits e.g. in line with a human rights-based approach to development.	Discriminatory planning systems and risk of unfair cost/benefit sharing reinforcing social divisions.

ADVANCING GENDER-RESPONSIVE LDN

Since the recent decade, awareness and recognition of gender biases, e.g. in the way land-based activities are planned and executed, have grown significantly. Several projects examined in this paper suggest that SLM and land restoration are either gender-sensitive or gender blind (Table 6). To achieve the goal of a land degradation neutral world that advances gender equality would require uncovering innovative entry points for integrating gender concerns into LDN actions (see Figure 1). Here, we highlight valuable entry points for integrating gender issues into LDN efforts, focusing on the importance of engaging key constituencies/voices and stakeholder groups, as well as global gender norms/principles and financial mechanisms, to support gender equality promoting efforts. We also identify opportunities that exist to maximise women's expertise/skills in pursuing gender-responsive LDN actions.

Narrowing gender disparities and empowering women as agents of change

At the core of the global action to achieve gender-responsive LDN are transformative SLM and restoration/rehabilitation projects and a LDN finance mechanism that promotes and safeguards women's and men's rights to resources and opportunities that enhance their quality of life (Figure 1). Gender-responsive LDN explicitly accounts for human rights and addresses gender equality concerns, empowering women to become agents of change in addressing land degradation. A key promising point of entry for integrating a gender perspective that empowers women would be through the LDN interlinked hierarchy of responses that seek to avoid, reduce and reverse land degradation (see Okpara *et al*., 2018), as well as through gender-based assessment/monitoring of LDN indicator components (land cover, productivity and carbon storage). Gender-sensitive actions along the LDN response hierarchy can enable gender equality and increase women's capacity to participate in LDN projects if socio-cultural norms are aligned with human rights principles.

Table 6. A summary table showing the 30 projects selected based on three attributes: (i) gender participation and engagement (**GD1**); (ii) contextual/structural gender components (**GD2**); and (iii) gender inaction, i.e. absence of specific gender content (**GD3**) [Note: (++) = explicitly indicated/captured; (+) slightly indicated/captured; (-) = not indicated/captured].

Project*	GD1	GD2	GD3
Land degradation neutrality of mountain landscapes in Lebanon	++	+	-
Sustainable Land Management Project in the Commonwealth of Dominica	++	++	-
Promoting SLM through Integrated Restoration of Ecosystems in Albania	++	-	-
Community-based Sustainable Dryland Forest Management in Gambia	++	-	-
Improving Sustainable Management of Natural Resources in Niger	++	+	-
Sustainable forest and landscape management in Bosnia and Herzegovina	++	+	-
Integrated community-based forest and catchment management through an ecosystem service approach in Thailand	++	-	-
Mainstreaming biodiversity into the management of the coastal zone in the Republic of Mauritius	++	++	-
Using SLM to improve the integrity of the Makgadikgadi ecosystem and to secure the livelihoods of rangeland dependent communities in Botswana	++	+	-
Promoting SLM through strengthening legal and institutional framework, capacity building and restoration of most vulnerable mountain landscapes in Macedonia	++	+	-
Restoring ecological corridors for multiple land and forests benefits in Western Chad	++	-	-
Sustainable rangeland management for biodiversity conservation and climate change mitigation in Jordan and Egypt	++	++	-
Generating economic and environmental benefits from sustainable land management for vulnerable rural communities in Georgia	+	++	-
Sustainable Forest Management and Conservation Project in central and southern Benin	+	++	-
Collaborative Management for Watershed and Ecosystem Service Protection and Rehabilitation in the Cardamom Mountains, Upper Prek Thnot River Basin in Cambodia	+	++	-
Enhancing Agro-ecological Systems in the Northern Prefectures of Central African Republic	+	++	-
Piloting Innovative Investments for Sustainable Landscapes in Brazil, Indonesia and Liberia	+	++	-
Sustainable Land and Water Management in Ghana	+	-	-
Scaling up a multiple benefits approach to enhance resilience in agro- and forest landscapes of Mali's Sahel regions	+	++	-
Integrated Watershed Management for improved agro-pastoral livelihoods in the Sepabala sub-catchment in Lesotho	++	+	-
Sustainable and Integrated landscape Management of the Western Area Peninsula in Sierra Leone	++	+	-
Sustainable Land Management for Increased Productivity in Armenia	++	-	-
Sustainable Land Management in Chile	-	-	++
Participatory Sustainable Land Management in the Grassland Plateaus of Western Madagascar in Madagascar	++	+	-
Land Degradation Offset and Mitigation in Western Mongolia	+	+	-
Sustainable management of Namibia's forested land in Namibia	++	+	-
Sustainable Forest and Land Management Project in Kyrgyzstan	-	-	++
Strengthening the National Protected Areas System of Swaziland	+	+	-
Strengthening Management Effectiveness and Generating Multiple Environmental Benefits within and around Protected Areas in Zambia	+	-	-
Comprehensive and integrated management of natural resources in Nigeria	-	-	++

*Note: Refer to Table S1 in the supplementary material for a detailed description of each project.

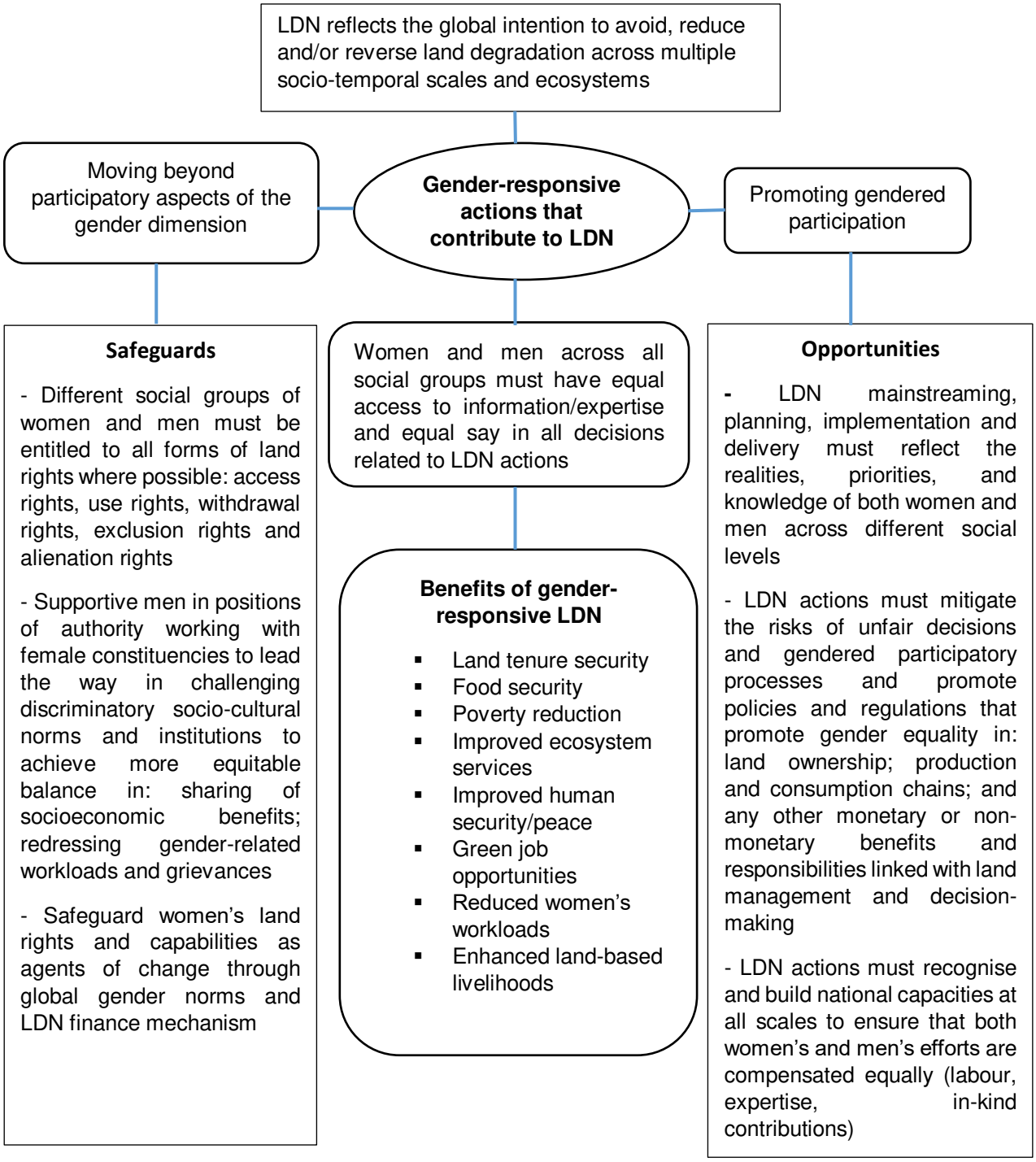

Figure 1. Gender-responsive land degradation neutrality framework

The majority of the LDN-related projects we examined limit women's empowerment only to participation in decision-making, overlooking actions that can empower women to: promote and protect their rights, manage their workloads, and use their knowledge to negotiate for fairer laws and policies. Priorities for a strategic gender-responsive approach that enables female empowerment can be better shaped by: i) ensuring that project plans align with existing country-level women's empowerment processes (such plans should not constitute an

additional process); and ii) linking the land and gender indicators captured in the SDGs, specifically indicators 1.4.2, 5.a.1 and 5.1.2 which account for gender-differentiated roles and responsibilities, heavy women's workloads and barriers to women's land rights. In addition, engaging gender experts in LDN projects can facilitate a nuanced context analysis of these indicators across diverse socio-cultural and geographical settings in ways that can systematically integrate gender varied dimensions in refining meaningful LDN targets at the national level (Orr *et al*., 2017; UN Women, 2018).

Assumed homogeneity of women as a group is prevalent in the majority of projects examined. This has tended to undermine considerations for key social differentiators such as class, age, ethnicity and income status. Adopting a broader gender-responsive approach would require that answers from more gender-related socio-cultural questions (such as who should be included in LDN actions; who should negotiate LDN cost/benefits and who should benefit and how; and how much is fair and just) be synthesised to inform the planning, execution, and monitoring/evaluation of LDN initiatives (Thompson-Hall, 2016).

Removing structural and institutional barriers that limit women

The literature on gender equality in natural resource contexts reveals that discriminatory gender norms and practices relating to resource control (Agarwal, 2001), exclusionary agendas and institutions (Arora-Jonsson, 2011) and skewed financial and information sharing mechanisms (Larson *et al*., 2015), among other factors, often undermine gender equality/relations. To tackle discriminatory gender norms/practices and institutional barriers at various scales would require the following.

First, men in positions of authority need to work with female role models and agencies (e.g. the UNCCD mechanisms on gender) to: spearhead gender-equitable conditions that challenge discriminatory socio-cultural norms and institutions (Mwangi, 2017); and promote and safeguard the rights of women so that their views, interests and priorities are adequately reflected in LDN planning and implementation, fostering equal sharing of LDN-related benefits between men and women across various social strata (Chant, 2008).

Second, there is a need to develop LDN-facing policies that align with relevant global conventions on gender rights, e.g. to mandate cultural changes and movement away from patriarchal land ownership norms towards practices that enable equally balanced gender rights. One way to do this would be to incorporate directives domiciled in the Convention on the Elimination of Discrimination against Women (CEDAW) to guide the planning and implementation of LDN projects. Article 4 of the CEDAW instructs parties to modify socio-cultural practices and conducts that marginalise women, and to take appropriate measures to uphold rural women's rights to land tenure security as part of efforts to eliminate all forms of discrimination and stereotypes against women (see CEDAW, 2004). A good example of a land-based intervention where the CEDAW protocol was used to spur women's rights and gender equality in ecological restoration is the *Azraq Oasis Restoration Project* in Jordan (see Broeckhoven and Cliquet, 2015).

Third, a mix of environment-related conventions and instruments advocating for human rights and gender equality (e.g. the Convention on Biological Diversity (CBD), UNCCD and Ramsar Convention on Wetlands) can serve as guiding instruments for gender mainstreaming in LDN processes. The CBD provides "how to" tools for gender integration applicable to land-based projects, emphasising steps to be taken to integrate women's and men's concerns and experiences in project planning (see CBD-GPA, 2014). In addition, several UNCCD protocols, in particular the Gender Plan of Action (see UNCCD-GPA, 2018) and the Advocacy Policy Framework (see UNCCD-APF, 2017) promote gender-specific ways in which to tackle land degradation and achieve the LDN target. The Ramsar Convention on Wetlands acknowledges gender and social issues as essential in efforts to manage wetlands (see Ramsar, 2018).

Further, the United Nations Environment Programme (UNEP) provides a gender checklist to ensure gender is integrated into UNEP-funded projects (see IUCN, 2012). Adapting the checklist to the LDN process can provide a gender framework to guide LDN actions. Several other international policy tools and documents (e.g. the UN Declaration on the Rights of Indigenous Peoples[8]; the Voluntary Guidelines on the Responsible Governance of Tenure of Land, Fisheries and Forests[9] under the coordination of the Committee on World Food Security and the FAO; the International Covenant on Economic, Social and Cultural Rights[10]; and the Beijing Declaration and Platform for Action[11]) further reinforce a focus on women's empowerment and gender equality in rights, access and control of natural resources, presenting cross-cutting issues for advancing gender-responsive actions.

While there are limited strategic patterns for tackling structural and institutional barriers that limit women at different levels in the projects we examined, merging gender-related conventions and commitments with country-level gender equality mechanisms can provide a pathway for advancing gender-responsive LDN. Such a process grounded in a logical framework to follow-up on the status of gender equality in LDN-related national initiatives (see Table S3) can be initially supported by a dedicated UNCCD Women's agency and national women's right associations (with relevant expertise), and by promoting mandated gender analysis of the LDN Target-Setting Programme (LDN-TSP) to inform the development of transformative gender-responsive LDN projects.

An example of a national gender equality mechanism/agency rooted in equality and human dignity is Kenya's National Gender and Equality Commission[12] – which promotes gender and human rights, and laws on land, inheritance and marital property by challenging power dynamics through democratic participation, accountability and transparency. Innovative approaches for tackling structural and institutional barriers to land rights exist in many countries, e.g. use of land certificate programmes in Ethiopia (Melesse *et al*., 2015); use of communal land boards comprising women and men in Namibia to assist women to successfully acquire titles to traditional land (PLAAS, 2015); and systematic land registration procedures in Cambodia that enable distribution of land titles jointly to husband and wife (Cismas and Paramita, 2015). The Chipko Movement in India and the Green Belt Movement in Kenya (see Samandari, 2017)) are two well-known examples that offer good practices that can serve as models and inspiration for promoting gender equality in LDN.

Harnessing the gender elements in different finance mechanisms to inform the LDN fund

Several international finance mechanisms now consider gender-specific issues and action plans before projects are funded, including projects under the UNCCD and other Rio Conventions. Both the Global Environment Facility (GEF) and the Green Climate Fund (GCF) have a gender equality guide with requirements for national-level project planning and financing (see GEF, 2015; GCF, 2017). Many gender elements in the projects we analysed comply with the GEF gender equality action requirements, such as to: integrate gender analysis in projects; undertake stakeholder consultation; engage gender experts, and women and women's groups to foster gender equality in project design and execution; develop and collect sex-disaggregated data; and initiate gender-related budget items for gender-specific activities. An independent LDN fund has recently been created to finance SLM and land restoration projects (UNCCD News, 2017), although it has been criticised as tending to

[8] UNDRIP, 2007
[9] FAO, 2012
[10] ICESCR, n.d
[11] BDPA, 1995
[12] NGEC, 2013

prioritise 'returns on investment' over a gender equality ideal that promotes benefit-sharing and financial access to women and women's groups (UN Women, 2018). GEF and GCF finance mechanisms, including the UNCCD-GPA framework and other gender-related conventions and commitments, can provide guidance and institutional legitimacy for creating a rights-based and gender-responsive LDN funding landscape that delivers multiple benefits to women.

CONCLUSIONS

Promoting gender equality and female empowerment can have a wide-ranging positive effect on achievement of land degradation neutrality (LDN) in many low and middle-income countries where women face gender-related barriers. Although land degradation is known to have a strong gender component, to date gender disparities in efforts to avoid, reduce and reverse land degradation have hardly been considered in LDN programming. We argue that to achieve LDN in regions with deeply entrenched socio-cultural norms would require LDN to be gender-responsive, accounting for the varied gender components of land degradation. Three LDN-related projects examined in this study excluded gender issues (i.e. they appear to be completely gender blind). This does not suggest (potential) project failure; crucially LDN efforts that support or promote gender equality and/or account for women's interests may not always be the most efficient option to reach all LDN targets (e.g. ecosystems may be restored but food security is undermined). At the minimum, gender-responsive LDN can enhance greater equality in decision-making at various levels, but may not contribute towards addressing discriminatory land practices if it does not challenge national land tenure systems that undermine women's land rights.

Initiatives to avoid, reduce and/or reverse land degradation in the context of the SDGs can become gender-responsive by using a generic LDN gender framework that is adaptable to local contexts (e.g. see Figure 1). Such initiatives can thrive on a gender-sensitive finance mechanism that is backed by human rights principles/laws and institutions, and targeted to: reduce women's workload; link land rights to land ownership and safeguard tenure security; enable gender review and analysis to foster information sharing; mandate provision of incentives and training to enhance women's resilience to land degradation and climate change; and encourage national bodies to promote gender-responsive LDN actions. Indeed, recognising and securing women's rights represent an explicit cross-cutting catalyst for confronting rural poverty (Goal 1), achieving family food/nutrition security (Goal 2), and reaching gender equality (Goal 5).

Planning and implementing gender-responsive LDN requires multi-stakeholder collaboration and training. Women, in particular, need to be trained in the skills required to engage in LDN planning and execution. Identifying gender needs and gaps early on at project inception phase can facilitate the development of sound gender capacity-building programmes to develop women's skills in identifying opportunities to articulate their priorities and advocate for their rights; as well as developing indicators to ensure that gender-based skill gaps are closed and the entry points for women's engagement and empowerment are identified starting from the project inception phase throughout the project's life cycle. At the same time, since rural women hold valuable ecological knowledge on land use and management, promoting gender-specific ways of documenting and preserving women's knowledge should be central to LDN efforts. Increasing women's presence in high-level community-based committees, including raising the number of women contributing to important land use plans and decisions will play a pivotal role in closing the gender gap in land ownership and management, and in revolutionising actions towards a land degradation neutral world that is gender-responsive.

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