

Gender (In)Equality in the Voluntary Carbon Market

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The voluntary carbon market (VCM) has gained popularity as a mechanism to mitigate greenhouse gas emissions and achieve climate targets. While the importance of embedding Sustainable Development Goal 5 (SDG5) gender equality considerations into climate change action is increasingly recognized, there is a gap in understanding how the VCM may impact SDG5 because previous research has explored the integration of gender equality and the VCM in specific cases or focused on individual standards. Our study analyzed 675 VCM offset projects on a Gender Inclusion Scale and found that recent vintage, Gold-Standard-certified, household devices, removal, and African/South American projects have higher levels of gender inclusion. To improve the baseline level of gender inclusion, mandatory disclosure of SDG5 impacts and collaboration with women-focused NGOs or local governments is recommended. This research highlights the importance of considering gender equality in VCM projects to provide additional benefits toward sustainability goals.

Key words: gender; gender equality; voluntary carbon market; carbon offsets.

Introduction

Gender inequality and climate change are two of our time's most pressing issues, and their interconnected nature continues to receive focus from the global community. International policies to address climate change are directed toward keeping global warming below 1.5°C by reaching net zero emissions in 2050 (Paris Agreement 2016). Endeavors toward sustainable development are concentrated on the United Nations (UN) 2030 Agenda. Seventeen Sustainable Development Goals (SDGs) are to be addressed in the

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next decade, with a recognition that SDG5 Gender Equality is crucial to the achievement of the other sixteen goals (UN 2015), one of which is climate action (SDG 13). Gender equality and empowerment in the context of climate change action have received greater acknowledgment in recent years. In 2022, the themes for International Women's Day and the 66th Commission on the Status of Women (CSW66) focused on achieving gender equality in climate change action (UN Women 2022). UN Women (2021) affirms that women and girls are leading the charge on climate change adaptation, mitigation, and response despite being more vulnerable to climate change impacts than men.

Ecofeminists have long recognized the connections between the exploitation of women and the environment, and contemporary research suggests that increased gender equality outcomes can also result in positive environmental outcomes (McKinney and Fulkerson 2015; Ramstetter and Habersack 2020; Ergas et al. 2021). The United Nations Beijing Women's Conference in 1995 introduced the concept of gender mainstreaming to policy- and decision-making. The case for gender mainstreaming in the context of climate change is supported by factors such as women being more vulnerable to its impacts, which inherently requires any policy addressing the issue to consider gender differences (Lambrou and Piana 2006). In response, many governments and groups, such as the IPCC (2022) and FAO (2011), integrate SDG5 into climate change action and policy (Nhamo 2014). The connection between gender equality and climate change is strong and needs to be a focus of actions moving forward.

At the same time as these international organizations highlight the relationship between gender and climate change, the private sector is also accelerating efforts to become more socially and environmentally sustainable. Many corporate and industry groups are setting decarbonization targets and increasing investments in carbon credit (offset) projects sold in the voluntary carbon market (VCM). VCM offsets are also eligible for use in emerging international carbon markets such as the Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) (ICAO 2016). The VCM is, therefore, expected to grow and become a prominent mechanism in climate change action. As a component of climate change action and a significant and growing source of emission reductions, it is crucial to understand how VCM projects contribute to SDG5 outcomes. This could help better integrate gender equality in a broader range of actors' climate change plans.

This article seeks to understand how the VCM impacts SDG5 at a broad level. By assessing VCM projects across registries, project type, vintage date, and location, we aim to establish to what extent SDG5 is integrated into the VCM globally, something that has not yet been determined in existing research. Findings provide recommendations for ways to better incorporate gender considerations into VCM projects. The remainder of the paper is divided into four sections. The following section is a literature review that focuses on the interaction between SDG5 and the environment, focusing on interactions

between gender equality, climate change, and environmental decision-making. This section also outlines existing research on how SDG5 outcomes are (not) achieved in offset projects. Next, we present the methodology and provide details of the Gender Inclusion Scale (IS Scale) used to score VCM projects. We then proceed to analyze these scores, and offer a descriptive analysis and statistical models to provide an understanding of factors that may make an offset project more or less likely to be gender inclusive. Finally, conclusions and recommendations are presented, including a call for action to improve SDG5 outcomes in the VCM.

Background and literature

The VCM is a relatively nascent market with limited literature regarding how its projects contribute toward SDGs, much less SDG5 (Phillips et al. 2022). For this reason, the first section of our literature review explores existing knowledge on the relationship between gender equality and women, the environment, and climate change. This knowledge establishes the rationale for exploring how SDG5 is mainstreamed in the VCM, as global dynamics determining relationships between gender equality and climate change are also likely to play out within the VCM. The second section builds on this knowledge to explore growing insights into the relationship between SDG5 and the VCM.

The need for gender equality in the VCM

Gender equality is defined as equality in rights, responsibilities, and opportunities between men and women (UN Women 2022) and is an ambition that is yet to be achieved anywhere in the world (UN 2020; WEF 2021). The UN's SDG5 is gender equality, and is considered central to achieving all other SDGs (UN 2015). The targets of SDG5 include ensuring participation and opportunity across spheres and increasing policies and technologies that improve women's access to resources. Achieving SDG5 by 2030 will require extensive global efforts (UN 2021). The World Economic Forum (WEF 2021) benchmarks gaps in gender equality across four dimensions. In 2021, the average distance to parity across these dimensions was 68 percent, with 96 percent of the health and survival gap considered closed, followed by educational attainment (95 percent), economic participation (58 percent), and political empowerment (22 percent) (WEF 2021).

Gender inequality is experienced differently by every individual and can intersect with aspects of identity such as race, class, and sexuality (Crenshaw 1989). Ecofeminists contend there is also an intersection between patriarchal values, the oppression of women, and the exploitation of the environment (D'Eaubonne 1974). Traditional male and Western models of science and development are considered to have led to this exploitation while failing marginalized

women (Shiva 1988). Women are disproportionately affected by climate change impacts (Lambrou and Piana 2006; Neumayer and Plümper 2007; Terry 2009; Nellemann, Verma, and Hislop 2011; Goh 2012; Coelho 2018; Chanana-Nag and Aggarwal 2020; IPCC 2022) due to factors that are shaped by the social organization of women's reproductive and productive labor such as poverty, education, property, and income (Pearse 2017). These impacts include gender-specific risks and lower life expectancies for women in natural disasters (Neumayer and Plümper 2007; Nellemann, Verma, and Hislop 2011). Furthermore, women are disproportionately exposed to exploitation in scenarios of climate-induced conflict and migration (Nellemann, Verma, and Hislop 2011; Coelho 2018). Male migration caused by climate change also increases burdens for women and reduces access to resources at the household level (Lambrou and Piana 2006). For these reasons, climate change poses a severe risk to achieving SDG5 and gender parity, and accordingly, women have a larger stake in climate change action (UN 2020). Given all of this, the VCM, as a climate change mitigation tool, must reduce risks to gender equality within offset projects, mainstream SDG5 considerations, and create opportunities for SDG5 contributions.

Mainstreaming SDG5 into the VCM will require nuanced consideration of regional differences in gender gaps. Broadly, the gender gap is considered narrower in Western Europe, North America, Latin America, and the Caribbean, where the WEF (2021) estimates the gap will be closed in fifty–seventy years. The gap is estimated to take 100–200 years to close in all other regions including Africa, Eastern Europe, and Asia. However, these estimates cannot reflect the full picture of gender equality or inclusion and there are a number of climate-focused initiatives in regions with wider gender gaps that successfully mainstream gender considerations. Examples include Kenya's Hunger Safety Net Program, which provides anticipatory payments before climate disasters and primarily benefits women, and India's Self-Employed Women's Association (SEWA) initiatives, which provide extreme heat insurance for women informal workers and include community-based adaptation strategies (UN Women 2024).

Alongside the VCM needing to advance SDG5 to safeguard women against disproportionate climate impacts, it may also benefit from encouraging women's participation due to their effectiveness as environmental decision-makers (Norgaard and York 2005; Ergas and York 2012; McKinney and Fulkerson 2015; Mavisakalyan and Tarverdi 2019; Ramstetter and Habersack 2020; Ergas et al. 2021). In a study across nine countries primarily focused on Europe and Asia, Norgaard and York (2005) find nations with higher proportions of women in parliament are more likely to ratify environmental treaties (Norgaard and York 2005).

Likewise, evidence from Europe shows that women in parliament are more likely to support proenvironmental decisions (Ramstetter and Habersack 2020). In Africa, the percentage of women in national parliaments is positively

associated with increased contributions to SDG7 (affordable and clean energy) (Opoku, Kufuor, and Manu 2021).

Globally, higher ratios of women in decision-making positions have been attributed to outcomes such as lower regional CO₂ emissions (McKinney and Fulkerson 2015; Mavisakalyan and Tarverdi 2019), and emissions per capita (Ergas and York 2012; Ergas et al. 2021). Studies focused on the Global North (Gonenc and Krasnikova 2022), the United Kingdom (Liao et al. 2015), and Canada (Ben-Amar, Chang, and McIlkenny 2017) show that voluntary climate change disclosure increases with the level of gender diversity on companies' boards. The evidence that women in leadership positions lead to more proenvironmental decisions and outcomes suggests that the VCM would be more effective at its goal (to mitigate climate change) if women were empowered as decision-makers.

Connecting the VCM and SDG5

Women are disproportionately affected by climate change impacts (Terry 2009; Pearse 2017) and should therefore be protected against these impacts by mechanisms that address climate change such as the VCM. The VCM is also likely to be more effective at addressing climate change with women in decision-making positions, given the relationship between women and proenvironmental decisions and outcomes (Norgaard and York 2005; Gonenc and Krasnikova 2022). We should, therefore, examine how the VCM mainstreams and achieves goals of gender inclusivity and equality.

The VCM is a carbon pricing instrument (CPI) in which entities trade carbon credits, also known as offsets, each representing one tonne of CO₂ equivalent (tCO₂e) from projects that remove or avoid greenhouse gas (GHG) emissions. Various CPIs have been used worldwide, including carbon taxes, emission trading systems, and offsetting programs. Some CPIs, such as carbon taxes, have been found to place a greater burden on women (Chalifour 2010). Women have also been historically excluded from carbon-pricing policy-making, suggesting their specific needs, vulnerabilities, and interests have been ignored (World Bank 2021).

Unlike some forms of CPIs (emission trading systems, for example), the VCM is largely unregulated and driven by voluntary commitments. While the VCM registered its first offset project in 2004 (Broekhoff et al. 2019), demand is accelerating, and the number of credits traded on the VCM could reach 430 Mt–2 Gt by 2030 (TSVCM 2021; Trove Research and UCL 2021). This growth occurs as firms increasingly face pressure from stakeholders to address their climate change impacts (Coppola et al. 2019). A typical response to this pressure is setting targets to reduce emissions to net zero by 2050 to limit temperature changes by 1.5°C, aligned with the Paris Agreement (2016). As of 2021, 21–40 percent of large global companies have a net zero target (Black et al. 2021; Kreibich and Hermwille 2021; Climate Impact Partners 2022), although these targets vary in detail and ambition (Day et al. 2023). However,

many corporates' net zero targets do not align with these recommendations, with most net zero targets planning to use carbon offsets for 23–45 percent of emissions (Day et al. 2023). In addition, entire sectors have begun to develop programs that rely, in large part, on the VCM. The international aviation sector's CORSIA is a perfect example.

Many believe that offsets should not play such a prominent (or indeed any) role in climate change mitigation. Those in this position often believe that the VCM could prevent decarbonization efforts if offsets are used instead of absolute reductions (Hyams and Fawcett 2013). Offsets are not suited to replace internal emission reductions as most offset projects do not lead to an absolute reduction of 1 tonne of CO₂ equivalent (1 tCO₂e) in the atmosphere but a reduction of CO₂ flow when all factors are considered (Becken and Mackey 2017). From a wider lens, commodifying the environment can lead to perverse incentives and unequal distributions of benefits (Corbera and Brown 2010). Here, we do not take a position on the quality or appropriateness of the mechanism but understand that demand for projects in the VCM will grow for the foreseeable future. As such, ensuring maximum benefit (climate and otherwise) should be a priority.

Offset projects in the VCM frequently report 'co-benefits' or sustainable development outcomes beyond SDG13 climate action (Phillips et al. 2022). VCM standards have intentionally emphasized additional sustainable development benefits to move away from the criticisms of the Clean Development Mechanism (CDM) (Blum and Lövbrand 2019)—an early version of compliance and voluntary emissions trading developed through the Kyoto Protocol. A study on CDM projects found that they did not contribute significantly to sustainable development outcomes (Olsen 2007), with impacts primarily concentrated on employment and economic growth (Olsen and Fenhann 2008). Despite efforts to integrate sustainable development considerations into the VCM, the experiences of project stakeholders indicate that the benefits of offset projects are still not equally distributed. Before accounting for gender inequalities, projects unjustly serve host communities due to barriers such as capital, knowledge, and technology (Corbera and Brown 2010; Mathur et al. 2014).

Gender equality and inclusion can be reported in the VCM through various labels and certifications (Phillips et al. 2022). VCM standards increasingly require projects on their registry to report at least two SDGs beyond SDG13—Gold Standard in 2015 and Verra in 2021. Twenty percent of all Gold Standard projects are certified with SDG5. At the same time, Verra lists eleven out of twenty-four projects contributing to SDG5 in its Sustainable Development (SD) Vista certification program, and 19 percent of Verra's Climate, Community, and Biodiversity (CCB)-certified credits are Community Gold level (requiring the projects benefit women in terms of well-being and participation) (Phillips et al. 2022). Gold Standard is consistently identified as having the most robust coverage of gender equality and

2022), and women face barriers to access and opportunity in project development and implementation that prevent such inequalities from being appropriately addressed by the VCM (Boyd 2002; Brown et al. 2004; Khadka et al. 2014; Lee et al. 2015; Wang and Corson 2015; Gay-Antaki 2016; Lehmann 2019; Löw 2020). We also understand which standards have more gender-inclusive projects and policies (Galt 2010; Phillips et al. 2022; Wissner and Schneider 2022). These studies help determine the level of gender inclusion in the VCM, though much of our knowledge is based on single or small case studies. In light of SDG integration and market growth, we need a better handle on how SDG5 is being addressed across registries, locations, project types, and vintage dates in this evolved market. This study aims to establish this handle by estimating baselines of gender inclusion and discerning which attributes are more likely to make a project more gender inclusive.

Methodology

This research explores gender (in)equality in the VCM by assessing at a high level how attributes such as registry and project type may impact the level of gender inclusion within an offset project. Case studies have provided vital insights into how gender equality considerations are integrated into specific offset projects (Boyd 2002; Brown et al. 2004; Khadka et al. 2014; Lee et al. 2015; Wang and Corson 2015; Gay-Antaki 2016; Lehmann 2019; Löw 2020) and which offset registries (Galt 2010; Phillips et al. 2022; Wissner and Schneider 2022) and project types (Boyd 2002; Brown et al. 2004; Lee et al. 2015; Gay-Antaki 2016; Blum and Lövbrand 2019) may be more gender inclusive. We can also make broad assumptions, based on regional gender gaps, as to which regions may have a higher level of gender inclusion in VCM projects (WEF 2021, UN Women 2024). However, research has not yet established general baselines of gender inclusion for different VCM project characteristics.

We should note here that scoring projects based on public disclosures does not offer a detailed insight into the gender equality contributions and power dynamics of each specific project. The study assesses the level of gender inclusion, or assumed SDG5 contributions, according to third-party assessments and documentation of the projects. We are unable to evaluate complex themes such as the level of women's agency in each project through such documentation. Assessing women's agency would, at the minimum, require the assessment of multiple dimensions such as sexual and reproductive health, decision-making dynamics within households, participation in economic activities, involvement in community decision-making bodies, and engagement in national politics (Hanmer and Klugman 2016). While the documentation could provide insight into one or more of these dimensions, the depth and breadth of data available are not directly comparable. Instead, this study's aim is to establish the first high-level understanding of the overall level of gender

inclusion in the market. Establishing these baselines can help us understand how the VCM does or does not contribute toward SDG5 and prioritize the needs of women in the global VCM.

Using a IS Scale, 675 offset projects are assigned an IS. Then, multivariate linear regression models are estimated to understand better the relationship between gender inclusion and vital independent variables (results in [Table 3](#)). These independent variables are the VCM registry, project type, vintage date, location (continent), and type of offset (reduction or removal). In this way, the research uses a mixed-methods approach, including conducting qualitative content analysis and reporting findings in a quantitative format, as [Williams \(2007\)](#) outlined. To score projects and analyze them quantitatively, we created an IS Scale ranging from 0 (no inclusion) to 4 (proof of impact). This IS Scale was established using existing VCM and SDG5 assessment methods alongside gender mainstreaming and inclusion frameworks. [Table 1](#) provides details regarding each level of the scale and how it is informed by existing knowledge and literature.

A stratified sample of VCM projects was drawn from the issuance datasets of the leading VCM registries as identified by [Ecosystem Marketplace \(2021\)](#). In total, 2993 projects from the datasets of [CAR \(2021b\)](#), [ACR \(2021\)](#), [Gold Standard \(2021\)](#), [Verra \(2021b\)](#), [Climate Forward \(CAR 2021a\)](#), [City Forest \(2021\)](#), and [PlanVivo \(2021\)](#) were downloaded on October 1, 2021. Ecosystem Marketplace also includes EcoRegistry and ProClima in their analysis. These were removed because there is no indication of a vintage date for the former and no public documentation available for projects in the latter. Projects were filtered for vintage dates of 2015 or later, as the UN's 2030 Agenda and SDGs were adopted in 2015 ([UN 2021](#)), so projects cannot be expected to align with SDG5 before this date. The issuance date of a credit is the date it was distributed to the market, while the vintage date refers to the year the emission reduction occurred. After this filtering, 1628 projects remained. ACR and CAR also issue compliance credits through California's Air Resources Board (ARB), so ARB compliance projects were excluded. Duplicate project IDs and VPAs (Voluntary Project Activities) in the exact location were removed to ensure only one entry for each project. The filtered dataset was 1255 projects. A sample of 676 (50 percent of projects) was selected, within the sample range of projects from similar research—22 by [Lehmann \(2019\)](#) and 744 by [Olsen and Fenhann \(2008\)](#). The projects were then stratified by the six project types identified by [Ecosystem Marketplace \(2021\)](#): Forestry and Land Use, Renewable Energy, Energy Efficiency and Fuel Switching, Agriculture, Waste Disposal, and Household Devices. Ecosystem Marketplace's categorization was used as they are one of the leading data providers in the VCM and support those such as the [World Bank \(2021\)](#) with analysis. Each project's category was determined by registry data, alongside whether the project type is considered a removal or reduction/avoidance credit as defined by the Oxford Principles for Net Zero Aligned Carbon Offsetting Taxonomy ([Allen et al. 2020](#)). The sample

Table 1. IS Scale.

	Criteria	Supporting literature
0—No Inclusion	No recognition, representation, target, or proof of impact of SDG5 contributions. These project disclosures do not acknowledge gender to any extent, nor have women been involved in decision-making.	World Bank (2021) describes how women have also been historically excluded from carbon pricing policy-making, suggesting their specific needs, vulnerabilities, and interests have been ignored. If project documents do not contain women or gender considerations, it is assumed they are excluded at IS 0.
1—Basic Representation	Evidence of basic representation of women and gender considerations in the project. This may consist of photographs of women at the project site or gender-segregated data.	The first step in Longwe's (1995) Women Empowerment Framework is that women's basic needs such as food and income are met. In this case, the recognition of gender or mention of women is considered basic consideration for them and their needs. Galt (2010) used "women/woman/female/gender" meaning units as the first step to rank VCM standards on a 1–5 scale. When coding interview data from participants in a VCM project, Gay-Antaki (2016) looked for (1) the role of gender in carbon markets; (2) gender relations of carbon markets; and (3) resident participation in carbon markets. Through text containing only acknowledgment of women/gender, we consider the role of gender in projects to be that women do not participate in decision-making and no contributions to SDG5 are made at IS 1.
2—Participation	If the public project documents evidence female participation at any stage in the project. This evidence could be descriptions of women's participation in stakeholder assessments, or that a project developer or verifier has a feminine name/title.	IS 2 is the midpoint on the scale and the first point at which women are involved in the project, but an overall net positive contribution to gender equality is assumed to not be achieved. Arnstein (1969) describes three general forms of citizen participation: non-participation, degrees of tokenism, and degrees of citizen power. Degrees of tokenism include informing, consultation, and placation. At this stage, women are engaged in the project to some level but there is no

Continued

Table 1. Continued

	Criteria	Supporting literature
3—Positive Impact	Beyond participation, the project would positively impact women according to the targets of gender equality, specifically the nine targets of SDG5, or other areas (mentions of family, time saved, gendered work) of development that have a greater distributional impact on women.	evidence of positive impact. In a case study of a Kenyan agricultural VCM project, Lee et al. (2015) focused on themes of gender equity in access, decision-making, and outcomes. At IS 2, there is gender equality in access and some decision-making, but no evidence of gender equality in outcomes. Project documentation shows resident participation in carbon markets (Gay-Antaki 2016)
4—Proof of Impact	The projects best positioned for contributing to achieving SDG5 would mainly target women and be certified for these efforts to ensure integrity. Proof of impact is likely to be in the form of certification such as SDG5 through Gold Standard, W+ through Verra, or CCB Certifications which validate data with a positive impact on women.	Projects achieving IS 3 would contribute to the goals of SDG5 (UN 2015), and contribute to closing gender gaps as defined by WEF (2021) . IS 3 is also informed by the W+ Standard, which looks for improvements in time savings, health, education and knowledge, food security, income and assets, and leadership. Case studies of women in the VCM have looked for similar meaningful contributions such as gendered equality in outcomes (Lee et al. 2015) and household care and income generation (Lehmann 2019). IS 4 is the highest level of gender inclusion on the scale and is achieved by certification for gender equality by a standard (e.g. Gold Standard, CCB, or SD Vista). IS 4 projects can prove their impact, and therefore can be considered within the participation and control levels of women's empowerment (Longwe 1995) and aligned with Arnstein's (1969) degrees of citizen power: partnership, delegated power, and citizen control. There may not be full gender equality in the project, but a net positive impact on women is certified.

Table 2. Sampled projects by registry and project type.

		Project type					
		Agriculture	Energy efficiency/ fuel switching	Forestry	Household devices	Renewable energy	Waste disposal
Registry	Total	13	47	136	93	323	63
ACR	47	1	34	10		2	
CAR	85	10	1	36			38
City Forest	6			6			
Climate Forward	4				3	1	
Gold Standard	225		4	13	80	125	3
PlanVivo	1			1			
Verra	307	2	8	70	10	195	22

Table 3. Sampled projects by vintage date and continent.

Vintage date	Total	Continent	Total
2015	97	Africa	111
2016	74	Asia	331
2017	61	Europe	8
2018	78	North America	171
2019	134	Oceania	1
2020	202	South America	53
2021	28		
2022	1		

had 13 agriculture projects, 47 energy efficiency/fuel-switching projects, 137 forestry and land-use projects, 93 household devices projects, 323 renewable energy projects, and 63 waste disposal projects. An outlier Gold Standard project with a Vintage Date 2049 was removed from the dataset. [Tables 2 and 3](#) provide details on the data.

Content analysis of public materials on the registry projects page, such as Project Design Documents, verification, and SDG reports, was conducted to categorize each project on the IS Scale ([Table 1](#)). This approach is like that of [Olsen and Fenhann \(2008\)](#), a study that assessed 744 CDM PDDs by the level of sustainable development. An initial intercoder reliability assessment of fifty projects was conducted to ensure objectivity in the IS Scale and, as a result, of this research's conclusions ([Allen 2017](#)). Krippendorff's alpha reliability

estimate produced a result of .78 similarity, where 1 is full agreement. This is acceptable at $.667 < \alpha \leq .800$ for content analyses (Krippendorff 2004). Upon reviewing the reasons for score differences, the IS Scale was modified to explicitly include verifiers as decision-makers for a project to be eligible for a score of 2, which was the main reason for differing scores between the two coders. Verifiers were included as decision-makers because they undertake physical verification of projects (Phillips et al. 2022) and have the power to influence project activities regarding certification.

Once ranked, the IS was used as the dependent variable, and multivariate regression models were estimated to help understand the relationship between IS and other vital factors. These factors are vintage date, continent, registry, project type, and type of emission reduction. Projects with a more recent vintage date are expected to be more gender inclusive. There has been more time to incorporate SDGs into such projects, and global gender equality has improved over the years (UN 2021; WEF 2021). Making assumptions around regional differences may be more complex considering that, while Western Europe and North America demonstrate smaller gender gaps (UN Women 2024, WEF 2021), there are a number of climate initiatives in regions with wider gender gaps such as Asia and Africa that excel in integrating gender considerations (UN Women 2024). Considering this study aims to discover macro trends in gender inclusion, we can assume projects in regions with smaller gender gaps will be more gender inclusive, while recognizing project-level gender inclusion may reflect more nuanced dynamics than regional estimates. The literature on how different standards in the VCM address gender considerations suggests that Gold Standard will be more gender inclusive than others (Galt 2010; Phillips et al. 2022; Wissner and Schneider 2022). Finally, sectoral and VCM-specific evidence suggests that domestic-based projects such as clean cookstoves will have more of a focus on women than industrial projects such as energy and waste (Lee et al. 2015; Gay-Antaki 2016), whereas NBS projects will attempt to include women, but women will not necessarily be the intended beneficiary as with cookstoves (Boyd 2002; Brown et al. 2004; Gay-Antaki 2016).

Results and discussion

The results of our study are presented alongside a discussion about how the findings relate to existing research and raise additional questions. We begin by presenting a descriptive analysis of the different projects included in the research and then provide the results of our multivariate linear regression model.

The breakdown of ISs across the 675 projects is provided in figure 1. IS 2 (Participation) was the most common IS, followed by IS 3 (Positive Impact), IS 0 (No Inclusion), IS 4 (Proof of Impact), and finally IS 1 (Basic

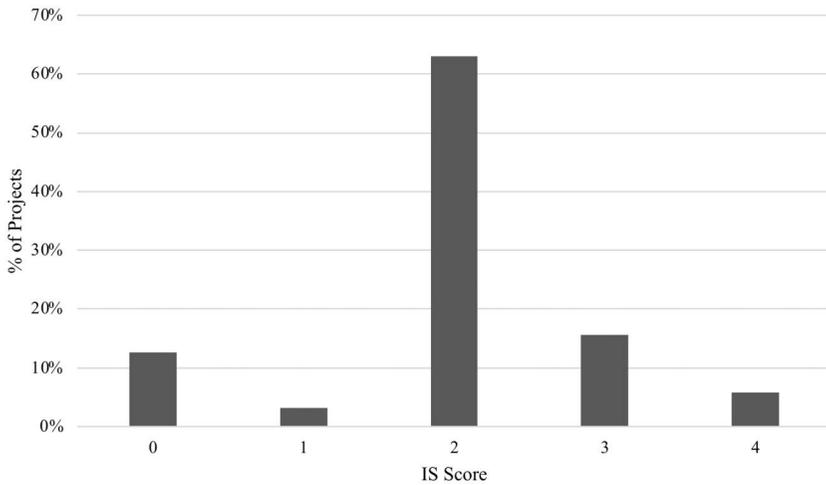


Figure 1. Percentage (%) of total projects by IS score.

Representation). While there are more projects with ISs of 3 or 4 than 0 or 1, over double the number of projects had an IS of 0 versus IS 4. There are also noticeably more 0s than 1s. Most projects documenting women's representation (IS 1) would then provide evidence of a woman participating (IS 2) or specify the benefits the project provides for women (IS 3). Project materials often either reported the benefits to or involvement of women (IS 2+) or did not mention or recognize gender at all (IS 0). Overall, most projects did not create positive impacts for women as only 21 percent of projects received IS 3 or 4, meaning the remaining 79 percent had a woman involved in the process at most and did not document any positive impact on women. Even for the 62 percent of projects scoring a 2, many had less than 50 percent of women involved as stakeholders or developers, and women were more frequently present as verifiers than as those with direct influence on the project. Considering that most verifiers have a more minor role to play than project developers, this may indicate that the women on the ground in these projects are less able to participate meaningfully at the decision-making level. This supports the thinking of those such as [Shiva \(1988\)](#), who emphasize that marginalized women are often excluded from climate decision-making processes, which is a clear downside given what we know about the positive interactions between women in decision-making roles and climate action ([Norgaard and York 2005](#); [Ben-Amar, Chang, and McIlkenny 2017](#); [Ramstetter and Habersack 2020](#)).

The general finding that most VCM projects do not positively impact women (i.e. have an IS >2) is aligned with the consensus that gender equality between men and women is yet to be achieved ([UN 2020; 2021](#); [WEF 2021](#)). It

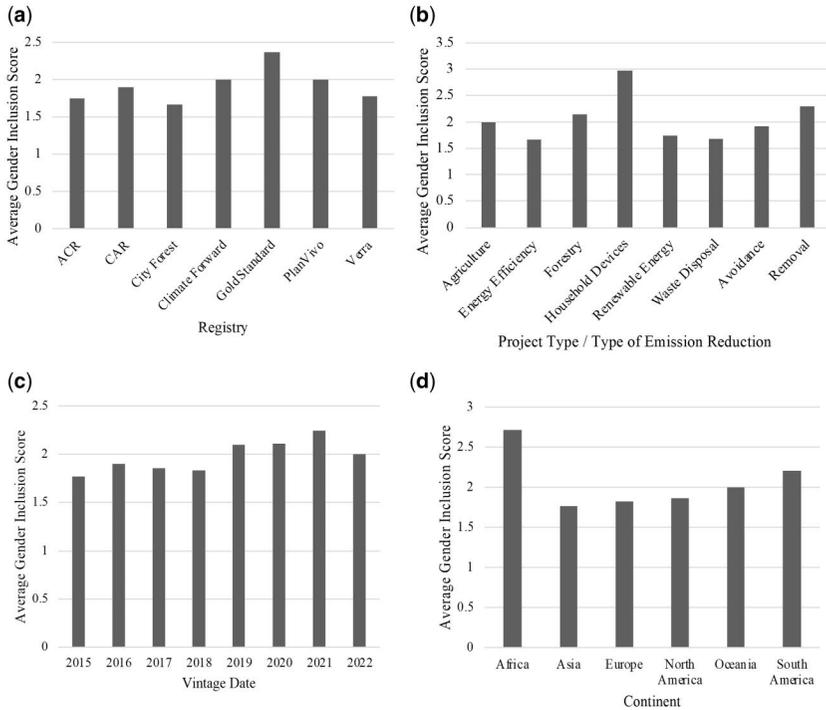


Figure 2. A. Average IS by registry, project type, vintage date, and continent.

also supports the [World Bank's \(2021\)](#) claim that carbon pricing mechanisms have ignored women's specific needs, vulnerabilities, and interests. This finding further supports research within the VCM, suggesting that projects meet women's needs without advancing their interests ([Boyd 2002](#)) since there are only a minority of projects that create positive impacts for women. Preliminary analyses point to the data confirming some of our expectations—that offset projects certified by the Gold Standard registry ([fig. 2a](#)), household device projects ([fig. 2b](#)), and projects with more recent vintage dates ([fig. 2c](#)) would see higher ISs. On the other hand, expectations about location, that is, that European projects would have higher ISs, seem to fail ([fig. 2d](#)). Gold Standard projects made up 79.5 percent of IS 4s and 61.9 percent of IS 3s, despite consisting of only 1/3 of the sample size ([fig. 2a](#)). They also comprised 95 percent of IS 1s and significantly fewer IS 0s. This is likely because Gold Standard requires a gender safeguarding and sensitivity assessment. At the same time, other standards do not, so projects scoring a 1 would have likely scored a 0 were it not for the gender policy of Gold Standard. Gold Standard projects will report on gender-desegregated data in the project regardless of whether these positively impact women. While gender-desegregated data may

not differ between projects in other registries, because they are disclosed as a requirement, ISs are higher. Gold Standard has also required certification of SDG impacts longer than any other standard. Projects registered elsewhere with positive gender equality impacts do not have the same infrastructure for recognition without using (and paying for) certifications such as SDVista. Without the requirement of co-benefit certification, fewer projects are likely to do so.

Figure 2b provides a breakdown of IS by project type and finds that household devices were the only project type that was not weighted toward participation (IS 2) and instead had more projects that delivered a positive impact (IS 3) and proved this impact (IS 4). Women gained positive impacts more frequently beyond participation in the project, further supporting its position as the most gender-inclusive project type. Most cookstove projects reported positive impacts of reducing health impacts and saving time, compared to others that focused more on economic opportunities or charitable activities outside the project boundary (e.g. funding girls' schools). Considering that the WEF (2021) estimates the economic participation and opportunity and political empowerment gaps (58 percent and 22 percent closed) to be larger than the health and survival gap (96 percent closed), it could be inferred that improving women's health based on these baselines requires fewer resources than improving economic and work opportunities. The funding of schools outside of project activities, when the educational attainment gap is 96 percent closed, instead of focusing on employing women in projects may also result from the fewer resources and social reorganization required. To strengthen this suggestion, no waste disposal or energy efficiency projects scored a 3 or 4, indicating those project developers are much less likely to target projects to women in sectors of low gender diversity (Buckingham et al. 2021; UN 2021)—whether due to willingness, a lack of awareness, or a focus on more industrial co-benefits.

To better understand these relationships, six multivariate linear regression models were estimated. The dependent variable is the IS, and the independent variables are vintage date, registry, project type, type of emission reduction (removal or avoidance), and continent (Table 4). Reference categories for ordinal variables were selected as the variables with the most projects attributed to them—Verra for Registries, Renewable Energy for Project Type, and Asia for Continent.

Of all registries, only Gold Standard was found to have a statistically significant positive relationship with IS. Compared to Verra, Gold Standard projects' ISs were .453 .590 points higher (depending on the model estimated). This is not surprising considering existing research demonstrating that Gold Standard (with CCB) is the most gender-sensitive standard (Galt 2010; Phillips et al. 2022) and the only one with a gender policy (Wissner and Schneider 2022). Further, Gold Standard specifically markets itself as a registry focused on sustainable development (Blum and Lövbrand 2019).

Table 4. Multivariate linear regression model results.

	1—Vintage	2—Registry	3—Project Type	4—Continent	5—Removal	6—Full model
Vintage Date	0.070*** (.019)					0.037* (0.018)
ACR		-0.034 (0.145)				-0.091 (0.215)
CAR		0.116 (.113)				-0.017 (0.172)
City Forest		-0.112 (0.381)				-0.480 (0.370)
Climate Forward		0.221 (0.466)				-0.416 (0.429)
Gold Standard		0.590*** (0.081)				0.453*** (0.090)
PlanVivo		0.221 (0.927)				0.975 (0.851)
Agriculture			0.257 (0.244)			0.209 (0.260)
Energy Efficiency			-0.083 (0.135)			-0.006 (0.188)
Waste Disposal			-0.060 (0.119)			-0.026 (0.145)
Household Devices			1.235*** (0.101)			0.773*** (0.138)
Forestry			0.404*** (0.088)			-0.509* (0.198)

Continued

Table 4. *Continued*

	1—Vintage	2—Registry	3—Project Type	4—Continent	5—Removal	6—Full model
Africa				0.956*** (0.101)		0.338** (0.120)
Europe				0.056 (0.123)		-0.040 (0.118)
North America				0.101 (0.088)		0.174 (0.158)
Oceania				0.235 (0.902)		0.373 (0.853)
South America				0.443** (0.135)		0.352** (0.133)
Removal					0.363*** (0.098)	1.070*** (0.200)
Constant		0.1779*** (0.053)	1.743*** (0.048)	1.765*** (0.055)	1.927*** (0.040)	1.386*** (0.090)
Observations	675	675	675	675	675	675
R ²	0.019	0.081	0.201	0.129	0.020	0.278
Adjusted R ²	0.018	0.073	0.195	0.122	0.019	0.259

Standard errors in parentheses. * $P < .05$, ** $P < .01$, *** $P < .001$.

The positive relationship between more recent vintage dates and ISs may reflect global gender equality improvements (UN 2021; WEF 2021). It could also reflect how there has been more emphasis on sustainable development by registries in recent years (Blum and Lövbrand 2019; Verra 2021a). Higher scores for more recent projects (fig. 2c) support the concept that requiring disclosure can lead to greater awareness and, therefore impact—as demonstrated in the case of Gold Standard’s ISs. Another explanation could be that, as time goes on and projects have higher revenues from offsets sales to reinvest, project developers introduce schemes for SDG impact later in the project’s lifetime.

Household device projects scored .773–1.235 higher on the IS Scale than Renewable Energy projects (depending on the model). This coefficient is large yet unsurprising as the literature consistently suggests that cookstove projects are targeted toward benefits in the domestic sphere for women and girls (Putti et al. 2015; Wang and Corson 2015; Lehmann 2019). We know that waste and energy industries are generally not gender diverse (Scheinberg, Muller, and Tasheva 1999; Buckingham et al. 2021; UN 2021), and we find little evidence that VCM projects take steps to address these disparities. Removal projects scored .363–1.070 higher than Avoidance projects. This finding suggests that alongside Removal projects being (arguably) preferred by the market (Allen et al. 2020), they are superior in terms of gender equality outcomes compared to Avoidance projects. The exact reasons for this are beyond this project’s scope but deserve future investigation.

While Western Europe and North America are considered to have the smallest gender gaps globally (WEF 2021) these differences in gender gaps region-to-region are not reflected in our sample, where projects in Africa and South America had higher scores than their European, Asian, and North American counterparts. Figure 2d shows that African projects had much higher average ISs than all other continents. The regression models confirm this as well. This could be attributable to increased awareness of the need to empower women in regions with wider gender gaps. There is likely to be more comprehensive awareness of gender inequalities in developing countries, where they are typically amplified (WEF 2021). Project developers may be more likely to report on activities that positively impact women than those developing a project in a region with greater gender equality, such as Europe or North America. These results may also reflect the nuanced nature of gender equality and inclusion, and how overall regional gender gaps may not be directly translated to regional gender inclusion differences in climate change mitigation projects.

Overall, some projects in the VCM demonstrate potential for this market to address gender equality concerns. Yet, positive impacts are largely concentrated in Gold Standard projects, household devices, particular locations, and recent vintage dates. Efforts must be made to address gender equality and

women's vulnerability to climate change across project types, registries, and locations.

Conclusion and recommendations

This research builds on existing work looking at the nexus of gender equality outcomes and the VCM and contributes to research that finds and identifies barriers to gender equality in projects and standards (Boyd 2002; Brown et al. 2004; Galt 2010; Khadka et al. 2014; Lee et al. 2015; Wang and Corson 2015; Gay-Antaki 2016; Lehmann 2019; Löw 2020; Phillips et al. 2022; Wissner and Schneider 2022). It advances knowledge in this area by considering how different variables may impact the inclusion of gender equality considerations. The results support previous evidence of cookstove projects' focus on SDG5 integration (Putti et al. 2015; Wang and Corson 2015; Lehmann 2019) and findings of Gold Standard being the most gender-inclusive registry (Galt 2010; Phillips et al. 2022; Wissner and Schneider 2022). It also presents unexpected findings in terms of regions with larger gender gaps, such as Africa, being more likely to have gender considerations integrated into projects compared to regions with the smallest gender gaps, such as North America (WEF 2021). While analysis of project materials may be limited in identifying on-the-ground realities such as women's agency, our conclusions provide a snapshot of the integration between SDG5 and the VCM in its current state.

Recommendations for various actors in the VCM space—registries and standards, project developers, and buyers—can be drawn from this research. Our findings indicate that much work must be done to fully mainstream SDG5 considerations into the policy and practices of VCM actors. The first recommendation is to mainstream and increase disclosure of SDG5 impacts to improve the baseline of gender considerations in offset projects. The second calls for future work looking at how SDG5 impacts can be improved in project types and locations where we find gender inclusion falls short.

Our first recommendation is for VCM actors such as standards, oversight bodies, and ratings agencies to mainstream gender into their programs and require gender disclosures. This recommendation comes directly from our finding that Gold Standard projects were more inclusive of gender considerations than other standards. It seems plausible that the Gold Standard requirement for disclosure of gender impacts for all projects likely contributed to the registry having the highest ISs (Galt 2010; Phillips et al. 2022; Wissner and Schneider 2022), so making this type of disclosure mandatory across all registries in the VCM would mean that baseline ISs would likely increase across the board. This mandatory disclosure could be brought in, for example, through oversight bodies such as the Integrity Council for the VCM. It may well be that project developers are not attuned to their impact on gender equality

because its consideration is not required in registries or by integrity bodies. A mandatory disclosure requirement has the potential to change this. For example, a project developer in North America may assume that gender outcomes do not need to be reported on in a country where the gender gap is smaller (WEF 2021); however, our findings show that such projects have low ISs, so required reporting may help identify such blind spots. Phillips et al. (2022) suggest this first recommendation, to mainstream gender considerations through standards, integrity bodies, and other stakeholders, would be best achieved through designing VCM standards of gender inclusion with influence from the international development community.

Our second recommendation focuses on how new policies and practices can advance and mainstream SDG5 outcomes where they fall short. Such projects include those in industrial and energy-focused industries and locations with little participation from women and less focus on their needs. Active engagement and discovery of how SDG5 considerations can be integrated can be made by learning best practices of projects that do this well or engaging external women-focused organizations and local governments. Examples of this work already exist for forestry projects within the UN REDD program. Recognizing the underrepresentation of women in the VCM, the program coordinates dialogue to understand where gendered gaps exist (UN REDD 2023), and seeks to close gaps through a 'Gender and Voluntary Carbon Markets' group to encourage knowledge sharing for project stakeholders such as project developers (Forest Climate Solutions 2023).

Engaging women-focused organizations in this manner can also improve SDG5 integration by understanding women's needs in that specific project type/location. Collaboration between project developers and stakeholders such as local governments can help project developers direct financing intended for development outcomes to activities that best impact women and girls outside of the project boundary, especially when SDG5 integration is complex in direct project activities. Local governments would be able to provide information about which schools may need more support to advance girls' education, areas where a women's center would be most impactful, or villages where women need work or currently perform unpaid work. As finance flowing to the VCM increases, women-focused groups and project developers themselves must have the expertise to direct this capital to advance SDG5 outcomes.

Conflict of interest. None declared.

Data availability

The datasets were derived from sources in the public domain: American Carbon Registry (ACR) Issued Credits Report (accessed October 1, 2021) <https://acr2.apx.com/myModule/rpt/myrpt.asp?r=112/>; City Forest. Credits Carbon Project Registry (accessed October 1, 2021) <https://www.city>

forestcredits.org/carbon-credits/carbon-registry/; Climate Action Reserve (CAR). Climate Forward Project Mitigation Units Issued (accessed October 1, 2021) <https://climateforward.apx.com/myModule/rpt/myrpt.asp?r=112/>; Climate Action Reserve (CAR). Public Registry (accessed October 1, 2021); <https://thereserve2.apx.com/myModule/rpt/myrpt.asp?r=111/>; Gold Standard. Impact Registry Credit Issuance <https://registry.goldstandard.org/credit-blocks/issuances?q=&page=1/>; PlanVivo. 2021. Public Reports (accessed October 1, 2021). https://mer.markit.com/br-reg/public/index.jsp?entity=issuance&sr=false&name=&standardId=100000000000004&acronym=PV&additionalCertificationId=&unitClass=&sort=account_name&dir=ASC&start=180&categoryId=100000000000001/.

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