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Women involved in forest regeneration and in the supply chain for improved cooking stoves. Photo: Métanga Justin Dembélé

How gender-responsive solutions are reshaping Mali's landscapes

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Gender-responsive climate action can generate more effective and sustainable results... When women lead, forests thrive.

Introduction

In terms of the gender-responsive management of forests and its resources, this article presents key approaches, results and opportunities of the Climate and Energy in Mali project (CEMALI) led by the United Nations Entity for Gender Equality and the Empowerment of Women (UN Women). Implemented between 2017 and 2019 under the leadership of the Government of Mali, CEMALI partnered with the Renewable Energy, Environment and Solidarity Group (GERES) and the private sector with funding by the Governments of Sweden and Norway through the Mali Climate Fund.

CEMALI aimed to reduce deforestation and greenhouse gas emissions through women's empowerment. It proposed an innovative climate-resilient and gender-transformative approach to reforestation by placing women and women's groups at the centre of activities as essential actors in establishing and managing regenerated forests and reducing the impact of logging on the environment.

The project contributed to restoring and preserving biomass resources, supporting the energy security of households in both rural and urban areas in the context of climate change through promoting women's entrepreneurship and leadership across the biomass value chain. This involved extensive work at the community level to support women's role in local economies, reduce their vulnerability related to deforestation and air pollution, build their capacity in leadership and management, and leverage Indigenous competencies in forest management.

Context

Mali is located in the Sahel region and is characterized by very large demographic growth, especially in urban areas, and by nearly 80% of its population living on less than USD 2 per day (CGIAR, 2016). Severe consequences of climate change, such as forest degradation and loss of biodiversity, play a critical role in the high levels of vulnerability of the people of Mali, which is ranked 177th of 178 countries in the Environmental Performance Index (BTI,

2016). Women and girls experience the greatest impacts of climate change, which amplifies existing gender inequalities and poses specific threats to their livelihoods, health and safety (UN Women, 2022).

In Mali, forests cover about 11% of the territory (World Bank, 2020), and 79.4% of these forests are in a state of severe degradation (UNEP, 2018). The remaining 20.6% of forests, despite being in a relatively stable state, face severe pastoral pressures, poaching and gold mining (MEADD, 2014). Agricultural clearing, extensive wood cutting (primarily for energetic consumption), bush fires and overgrazing have significantly contributed to deforestation, as have climate change effects. Only 2.8% of these forests have management plans in force, and these have little or no monitoring. Despite the Malian government's efforts to limit deforestation through multiple national strategies, the country loses 100,000 ha of its vegetation cover each year (NEF, 2017). From 2000 to 2020, Mali experienced a reduction of 256 ha (3.3% of the country's total) in tree cover (Global Forest Watch, 2020).



Women leaders, members of a village committee on forest management. Photo: Métanga Justin Dembélé

Implications of unsustainable wood use for energy production

In Mali, only 1.2% of the population has access to clean fuels and technologies for cooking (IEA et al., 2024), compared to 20.7% in the rest of sub-Saharan Africa (UN Women, 2022). Most households in both urban and rural areas lack access to alternative energy sources such as gas or electricity (UNEP, 2018). As a result, wood remains the primary source of domestic energy. Over 70% of the country's energy needs — especially for cooking and agricultural processing — is met through wood, charcoal and agricultural residues. This reliance on wood has driven a steady increase in national demand, rising from 4.5 million tons in 1990 to 7 million tons in 2006, with the city of Bamako accounting for 75% of the country's consumption of dry biomass (UN Women et al., 2017).

The increasing demand for dry biomass to meet energy needs places Mali's forests at significant risk. The widespread use of primary wood materials as fuel has far-reaching social, economic and environmental consequences for both the population and the planet. It

leads to forest degradation, loss of ecosystem services, impoverishment of local communities, and health issues caused by indoor air pollution and by the higher greenhouse gas emissions associated with climate change (FAO, 2022).

Women and girls are particularly vulnerable in this situation. They, along with children, are disproportionately exposed to indoor air pollution from cooking in confined spaces, especially when biomass combustion is incomplete. Additionally, deforestation forces women and girls to travel increasingly long distances to gather resources such as fuelwood, water and livestock feed. These longer journeys expose them to a heightened risk of gender-based violence and exacerbate their disproportionate workload of unpaid care and domestic chores (UN Women, 2023b), significantly increasing their time poverty (i.e., the lack of time needed to meet basic requirements for rest and leisure). In Mali, women account for nearly 80% of the total time spent on unpaid care and domestic work, spending an average of 21.6 hours per week on these tasks compared to just 5.7 hours for men (UN Women, 2023a). This disparity, with women spending



Woman using the three-stone cooking stove. Photo: Gaoussou Haïdara

almost four times as much time as men on unpaid labour, prevents them from engaging in paid work, education, rest or leisure, and perpetuates their income poverty. Women in greater income poverty must compensate for the lack of public services or their lack of access to or inability to afford timesaving technologies through multitasking and increased unpaid care and domestic work, often under harsh physical and environmental conditions (UN Women, 2019).

Development of a sustainable women-led bioenergy sector

CEMALI's innovative approach has contributed to a gender-just transition to a green economy in Mali by supporting women's entrepreneurship through clean-cooking initiatives in both urban and rural areas. The innovation lies in its sectoral approach, which simultaneously addresses both supply and demand for fuelwood, and thereby reduces the pressure on dry biomass for energy consumption. CEMALI influenced the demand side by developing a sustainable bioenergy sector to meet market needs for natural resources. This included creating an entire supply chain for improved, locally made cooking stoves, which enabled savings of 25% to 70% in charcoal and firewood consumption. On the supply side, initiatives promoting forest regeneration led to the establishment of managed forests, with strong involvement by women as forest managers.

Addressing each step of the supply chain of improved cookstoves — from tinsmiths to ceramists and retailers — facilitated the broader development of the entire supply chain. A variety of improved, energy-efficient and time-saving cookstoves were supported and developed through ten clean-cooking initiatives, resulting in the production of 114,315 improved cookstoves. The project supported technical, entrepreneurial and managerial training for 473 women stove builders and facilitated their aggregation in seven associations.

Women's involvement was also strengthened as vendors of metallic stoves with ceramic inserts, which retain heat much longer than traditional stoves, reducing wood use by 70%, and minimizing smoke and harmful burns. Women also played a central role in the production, distribution and maintenance of three-stone stoves, which are built entirely by local women using soil and natural materials. These three-stone stoves were notable for the close collaboration between the women service providers and the women beneficiaries. This collaboration created a valuable opportunity to transfer essential skills and

knowledge, enabling beneficiaries to properly maintain the stoves and protect them from severe weather conditions.

Women's involvement in cookstove production led to better-performing stoves compared to when men made them, since women, being the primary users, had a deeper understanding of their needs. This demonstrates that including women throughout the value chain, including production, brings additional benefits, contributing to both social and economic improvements. Strengthening women's roles in the fuelwood-energy sector at every step of the improved cookstove supply chain created job opportunities, increased household income, and expanded access to non-traditional green value chains.

Many of the women who participated in training travelled to Burkina Faso and other neighbouring countries to train more women in building the three-stone improved stoves. This represents the tremendous success of the project and challenges discriminatory social norms about women, who are now valued and recognized as active contributors to the development of their households and their communities.

Additionally, the three-stone cookstoves produced during and after the project are systematically assigned serial numbers to enable the future acquisition of carbon credits. This creates an opportunity for women stove builders' groups to use these carbon credits to launch and sustain income-generating activities for the women members of the newly created associations.

Women's role in reforestation and management of forests

CEMALI successfully achieved the objectives of regenerating forests, stimulating the establishment of managed forests and reducing the impact of logging on the environment. The project underscores the importance of supporting communities in recognizing and valuing women's efforts as stewards of forests, as well as their crucial contributions to the effective use of forest resources and reforestation — key strategies in combating forest degradation and the effects of climate change.

Thanks to CEMALI, women participants effectively embraced their role as forest managers, and engaged in community engagement initiatives focused on reforestation and forest regeneration. This was made possible by leadership training and activities aimed

at raising communities' awareness of the importance of reforestation in addressing the negative impacts of climate change.

Women also directly contributed to reforestation by enhancing their skills in nursery management for plant production and in tree planting. Their inclusion in forest management committees and related initiatives led to the reforestation of 1,105.6 hectares throughout the two years of the project.

The first phase of reforestation involved the production of 178,554 plants by 976 nurserywomen and 421 men, monitored by project agents with the support of Forestry Department authorities. The second phase saw the planting of 45,599 forest trees, 38,021 income-generating trees, and 37,655 plants that formed 37 kilometres of natural hedges. This phase achieved a very successful survival rate of 77% for the transplanted trees, and culminated in a partnership agreement with water and forestry services for their ongoing involvement in monitoring the reforested plots.

In terms of sustainable management of forests and natural resources, the project supported the development of six community plans with women in leadership positions. Women also established their presence on forestry committees, which contributed to the greater sustainability of the project's results and impact. Their involvement as stewards of forests was instrumental in raising awareness and building skills for the sustainable use of forests and natural resources. This was achieved through their active participation in community-level work and in tontines, traditional solidarity-based financial groups at the local level.

Local studies using the Accelerated Participatory Research Method (MARF) formed the foundation for developing the community plans. These studies provided analyses of the environment in its current state, including details on flora, fauna, hydrography and local climate, and also on population, production activities, social infrastructure, and local decision-making structures. Assemblies were held with village leaders, local authorities, women and youth associations, NGOs and community members to discuss the issues related to forest sustainability



Forest regeneration (eucalyptus). Photo: Métanga Justin Dembélé

and management and deliberate on mutually agreed solutions.

These discussions focused on principles of consensual management for degraded areas to allow for the sustainable integration of agriculture and environmental preservation, restoring vegetation while enhancing the resilience of local populations to the harmful effects of climate change, and increasing the potential of protected plots. Community plans identify ten-hectare forest plots, which are protected from exploitation for a period of ten years.

The plans outlined permissible actions within the protected plots, such as tree planting, collecting ripe fruits and walking, as well as forbidden actions, including tree cutting, hunting, collecting unripe fruits and dried leaves, and extracting traditional herbs (unless these are not found elsewhere and collection is authorized by the village chief). Village committees were assigned the responsibility of monitoring adherence to these rules, with penalties for misconduct outlined in the community plans. The plans also include a dissemination strategy to inform all community members about them, ensuring greater ownership and accountability. Additionally, income-generating activities were proposed to compensate for the loss of exploitation of parts of the forest, including the production of improved stoves, beekeeping, soap production, aquaculture, weaving, and post-harvest transformation of products.

The reforestation efforts were paired with activities focused on improving charcoal extraction from trees using environmentally friendly techniques. These new methods promote tree regeneration instead of causing tree death, as was the case previously. The project also helped form 12 cooperatives of foresters and charcoal producers, who had mostly been working informally using unsustainable methods. Through the project, members learned improved techniques for carbonization and charcoal extraction, as well as sustainable forest resource management practices. This knowledge enabled them to optimize the use of forest resources, thereby reducing pressure on the forests. As a result, a more sustainable carbon supply chain was established within the formal market.

New opportunities for women in forestry

The CEMALI project demonstrates that placing women at the centre of forest management and reforestation efforts leads to stronger social, economic and environmental outcomes. By actively engaging women in

the regeneration of forests, the project not only increased forest cover in Mali, but also improved the sustainability of these efforts through community-driven approaches. Women's leadership in reforestation activities resulted in higher tree survival rates and more sustainable forest-use practices, as they integrated traditional knowledge with newly acquired forest management skills. This success underscores the importance of recognizing women's stewardship in environmental conservation and climate resilience strategies.

The environmental impact of women's participation in the project is key. By reducing reliance on unsustainable biomass energy and promoting reforestation, the project contributed to mitigating climate change and reducing greenhouse gas emissions. Women-led forest management also helped combat deforestation, helping local ecosystems to recover and sustain livelihoods that depend on natural resources. Moreover, the well-planned involvement of women in biomass resource management directly addressed the root causes of deforestation, leading to long-term environmental benefits.

Beyond environmental gains, the project highlighted how women's economic empowerment reinforces positive social and economic outcomes. Women-led enterprises in the clean cooking sector not only created new income-generating opportunities, but also strengthened local economies by integrating gender-responsive innovations into energy solutions. The introduction of improved cookstoves, managed primarily by women, led to significant reductions in firewood consumption, alleviating the workload associated with resource collection and enhancing personal and household well-being. Furthermore, the transfer of skills within and beyond Mali, with trained women supporting capacity-building initiatives in neighbouring countries, underscores the project's transformative potential at the regional level.

The CEMALI project serves as a compelling example of how gender-responsive climate action can generate more effective and sustainable results. Compared to conventional reforestation and energy transition interventions that do not prioritize women's empowerment, the inclusion of women has led to more resilient social structures, improved environmental outcomes and increased economic opportunities. This evidence highlights the necessity of integrating women's leadership and participation in all climate mitigation and adaptation initiatives, ensuring that their contributions are recognized, supported and scaled for broader impact. The project's success reinforces the broader imperative: when women lead, forests — and communities — thrive.

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