International Water Management Institute

Water Issue Brief - 21

Putting research knowledge into action

Adaptive Innovation Scaling - Pathways from Small-scale Irrigation to Sustainable Development

Inclusive agriculture: Creating opportunities for women and youth in Mali's irrigated vegetable value chain

The context

Agriculture is the bedrock of food and nutrition security and a major source of income and employment in many developing countries. Therefore, investing in agriculture-led economic growth is a long-term approach to ending poverty, hunger and malnutrition (USAID 2021). Inclusive agriculture specifically provides opportunities for women and youth who have historically been excluded from agriculture-led economic growth. In Africa, women comprise a significant proportion of the agricultural labor force but are more likely than men to engage in informal, lower-paid work. At the same time, the continent has the world's youngest population and high rates of youth unemployment (AfDB 2018a). In Mali, 17.4% of youth aged 15-24 were unemployed in 2020 (World Bank 2022). Improving gender and youth inclusion in high-value, irrigated vegetable value chains has the potential not only to increase production of nutrient-rich, profitable vegetable crops but also to create attractive and sustainable job opportunities for currently disadvantaged groups.

Key messages

- Production of high-value irrigated vegetables has significant socioeconomic potential for women and youth.
- A comprehensive policy and intervention analysis identified the factors enabling or hindering gender and youth inclusion in the irrigated vegetable value chain.
- The recommendations resulting from this analysis could, if implemented, support successful and inclusive irrigation interventions.

Key issues

Irrigation has the potential to boost agricultural productivity in sub-Saharan Africa by at least 50%, significantly improving food and nutrition security and economic growth, and helping farmers adapt to climate change (Shah et al. 2020). With the rising demand for fresh vegetables, particularly in urban areas, irrigated vegetable crops provide a potentially lucrative and stable source of income for farmers, while increasing the availability and accessibility of nutrient-rich foods on local markets. However, just 6% of the total cultivated area in sub-Saharan Africa is equipped for irrigation (Shah et al. 2020). Several key reasons for this have been identified (see, e.g., Nakawuka et al. 2018; Merrey and Lefore 2018; Lefore et al. 2019). They include land tenure insecurity, a lack of infrastructure (e.g., roads, access to electricity), limited access to innovative irrigation technologies (e.g., solar-powered pumps) and after-sales services (e.g., maintenance and spare parts), limited access to credit and extension services as well as a lack of reliable input and output markets.

These challenges create barriers that prevent smallholders from entering or advancing within irrigated agricultural value chains, and specifically the irrigated vegetable value chain (IVVC). Women and young farmers face additional gender, labor and market-related constraints, while also being insufficiently considered and included in agricultural and water

Farmers attending a field demonstration of solar-powered irrigation equipment in Sikasso, Mali (*photo*: Thai Thi Minh/IWMI).

policymaking. Moreover, policy implementation has lagged, in part due to limited capacity and differing visions of irrigation development. The extent of these challenges prompted the International Water Management Institute (IWMI) to analyze the enabling environment to understand the factors influencing the participation of women and youth in the IVVC, and to use this understanding to support successful and inclusive farmer-led irrigation interventions (Ekpe and Minh 2022). The work was carried out under the CGIAR Research Program on Water, Land and Ecosystems (WLE), Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) and Innovation Lab for Small-Scale Irrigation (ILSSI) projects.

Analyzing the enabling environment

In Mali, the focus of this brief, IWMI carried out a comprehensive policy and intervention analysis, using a previously developed enabling environment analysis tool adapted to the IVVC (Minh et al. 2021) (Figure 1). In total, 40 policies and 48 interventions were analyzed and categorized into clusters based on thematic areas. Cluster and cross-cluster analyses were then conducted, focusing on the policies and interventions that enable or hinder gender and youth inclusion in the IVVC. Finally, results from the policy and intervention analysis were synthesized. This synthesis analysis focused on the actor and stakeholder landscape, highlighting barriers to and opportunities for an inclusive IVVC created by the policies and interventions.

Policy environment insufficiently inclusive

The Malian government has committed to reducing poverty, in part through legislative and regulatory reform related to inclusive economic growth, food security and rural development. For this first part of the analysis, policies were categorized into seven thematic clusters: (1) general development policies; (2) gender, youth and social inclusion and decentralization; (3) climate change and environment; (4) food security; (5) agricultural development; (6) water resources development and management; and (7) irrigation development.

The results show that **general development policies** promoting gender equity and inclusion have been developed, revised and implemented across the identified clusters over the past two decades. For example, the Cadre Stratégique pour la Relance Économique et le Développement Durable (CREDD) (Strategic Framework for Economic Recovery and Sustainable Development) (GoM 2019a), introduced in 2015 and revised in 2019, intends to 'create a favorable environment for economic diversification and strong and inclusive growth'.

The **gender, youth and social inclusion and decentralization** cluster sets the basic conditions for gender and youth inclusion and empowerment, allowing women to legally access productive assets such as water, land and credit. Several policies aim to strengthen women's and youth's organization and social capacity to restore degraded land, access land and inputs for productive activities, and integrate professionally. These policies include the Politique Nationale Genre du Mali (PNG-Mali) (National Gender Policy) (GoM 2012a), introduced in 2012 and revised in 2014, and the Programme Décennal de Développement de la Formation Professionnelle pour l'Emploi (PRODEFPE) (Ten-Year Vocational Training Development Program for Employment) (GoM 2015).

The **climate change and environment** cluster promotes agricultural intensification and diversification to support value chain development, income-generating activities for women and socioeconomic integration of youth. At the same time, the cluster indirectly oversees private sector investment in climate change adaptation, e.g., Politique Nationale sur les Changements Climatiques (PNCC) (National Climate Change Policy) (GoM

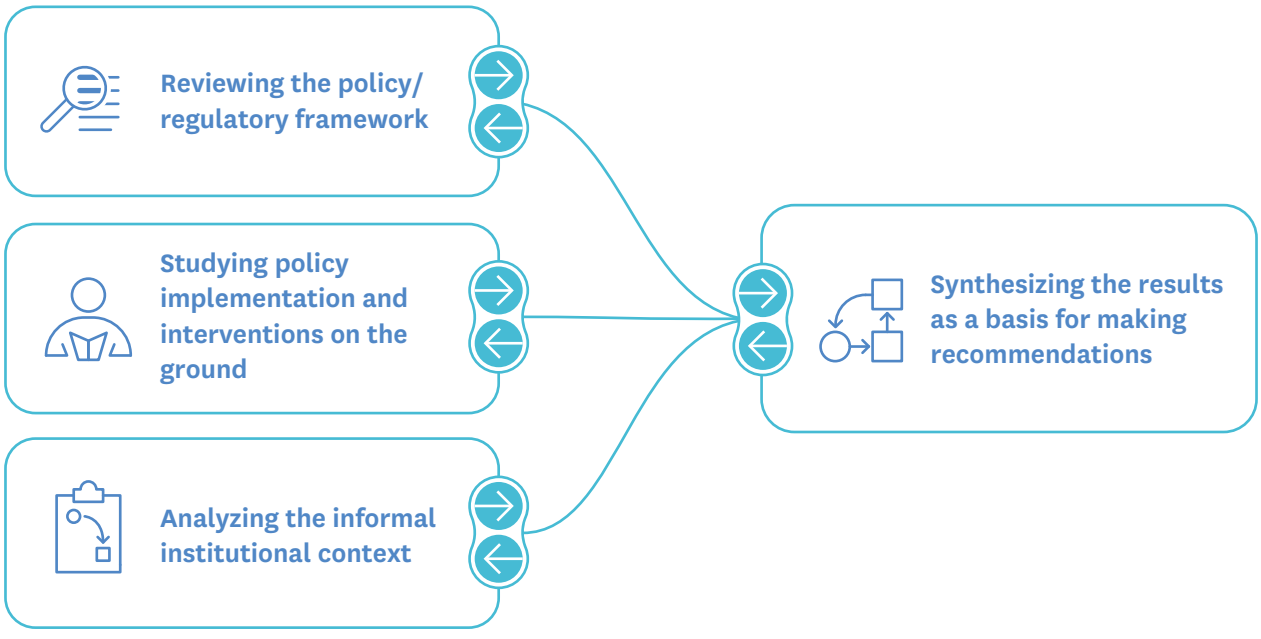

Figure 1. Framework for analyzing the enabling environment for gender and youth inclusion in Mali's irrigated vegetable value chain.
Source: Minh et al. 2021.

2011a); Stratégie Nationale Changements Climatiques (SNCC) (National Climate Change Strategy) (GoM 2011b); and the Fonds Climat Mali Plan d'Investissement 2019-2023 (Mali Climate Fund Investment Plan 2019-2023) (GoM 2019b).

The **food security** cluster aims to diversify and improve food production as well as support processing, storage, transport and marketing infrastructure and integration. Policies include Stratégie Nationale de Sécurité Alimentaire au Mali (SNSA) (National Food Security Strategy) (GoM 2002), and Plan Stratégique National pour l'Alimentation et la Nutrition (PSNAN) (National Strategic Plan for Food and Nutrition) (GoM 2005a). The cluster also promotes the cultivation of nutrient-rich crops such as fruits, vegetables and legumes through market gardening schemes to ensure year-round availability for household consumption, e.g., Politique Nationale de Sécurité Alimentaire et Nutritionnelle: Plan d'Actions 2019-2028 (PolNSAN) (National Food and Nutrition Security Policy: Action Plan 2019-2028) (GoM 2019c).

The **agricultural development** cluster emphasizes equal access to productive resources for women and youth and aims to allocate (agricultural) land based on the preferences of women, youth and vulnerable groups, e.g., Loi d'Orientation Agricole (LOA) (Agricultural Orientation Law) (GoM 2006a); and Politique de Développement Agricole du Mali (PDA) (Mali Agricultural Development Policy) (GoM 2013). According to Article 13 of the Loi Foncière Agricole (LFA) (Agricultural Land Law) (GoM 2017a), 'at least 15% of land development by the state or local authorities is allocated to groups and associations of women and young people established in the area concerned'. Similarly, the Politique Foncière Agricole du Mali (PFA) (Agricultural Land Policy) (GoM 2014) promotes women's empowerment by enhancing rural women's participation in decision-making and leadership as well as supporting their entrepreneurial activities with production, service and processing equipment.

The **water resources development and management** cluster aims to create opportunities for women to undertake income-generating activities in the water sector, e.g., Politique Nationale de l'Eau (PNE) (National Water Policy) (GoM 2006b); and Plan d'Action National de Gestion Intégrée des Ressources en Eau (PAGIRE) (National Action Plan for Integrated Water Resources Management) (GoM 2007). It also promotes private sector investment in gender-sensitive technologies such as market garden wells and micro-irrigation equipment, e.g., Schéma Directeur d'Aménagement et de Gestion des Ressources en Eau du Bassin du Sourou – Portion Nationale du Mali (Master Plan for Development and Management of Water Resources in the Sourou Basin) (GoM 2012b).

In the **irrigation development** cluster, pay-as-you-own financing schemes encourage youth involvement in irrigated farming as well as secure and equitable land access for women and young farmers, e.g., Programme National d'Irrigation de Proximité (PNIP) (National Program for Small-Scale Irrigation) (GoM 2012c). The cluster also promotes capacity building to enhance women's role in irrigation infrastructure development planning.

As these results show, attempts have been made to improve gender and youth inclusion in agriculture. However, specific strategies promoting inclusion in the IVVC are absent. Indeed, the policy framework seems to prioritize crops other than vegetables. Similarly, input and service strategies are general, with no specification made for vegetables. Theoretically, access to inputs and services is equal. In reality, it is difficult for women and youth to access – and thus benefit from – these inputs and services.

Interventions reflect policy shortcomings

The subsequent intervention analysis assessed the interventions initiated by both government and nongovernmental organizations to implement the policies. As in the policy analysis, the interventions were grouped into seven clusters: (1) general and private sector development; (2) climate change and environment; (3) food security; (4) agricultural development; (5) agricultural finance; (6) water resources management; and (7) irrigation development.

The **general and private sector development** cluster has several aims, including irrigation infrastructure development and management, agricultural value chain development and improved competitiveness of the private sector. Specific interventions target women's engagement and technical and managerial capacity along the value chain, e.g., Projet d'Appui à la Réinsertion Socio-Économique des Populations du Nord Mali (PARSEP-NM) (Socio-Economic Reintegration Support Project for the Population of Northern Mali (AfDB 2016). Women farmer groups and cooperatives are encouraged by providing support such as microfinance intended to diversify and increase their income-generating activities, e.g., Rural Development Support Project of the Daye, Hamadja and Korioume Plains (PARR) (ADF 2000).

The **climate change and environment** cluster contributes to gender and youth inclusion in several ways. For example, the promotion of irrigated vegetable production emphasizes community market gardening, the construction or rehabilitation of irrigation infrastructure as well as water collection and storage facilities such as wells and ponds. Interventions include Programme Intégré de Développement et d'Adaptation au Changement Climatique dans le Bassin du Niger (PIDACC) (Integrated Programme for Development and Adaptation to Climate Change in the Basin of Niger) (AfDB 2018b). In addition, the cluster addresses women and youth empowerment in production and marketing through the construction of processing facilities for agricultural and horticultural products, e.g., Renforcer la Capacite d'Adaptation et la Resilience des Communes de Sandare, Massantola, Cinzana et M'Pessoba Face aux Changements Climatiques dans le Secteur Agricole au Mali) (Strengthen the Adaptive Capacity and Resilience of the Municipalities of Sandare, Masantola, Cinzana and M'Pessoba in the Face of Climate Change in the Agriculture Sector in Mali) (GoM 2017b).

The **food security** cluster intends to strengthen the production and (infrastructure) management capacities of public, private

and community institutions in the agriculture sector, e.g., Projet de Renforcement de la Sécurité Alimentaire et Nutritionnelle dans la Région de Koulikoro (PReSAN-KL) (Koulikoro Region Food and Nutrition Security Enhancement Project) (AfDB 2013). In terms of inclusion, emphasis is placed on training, monitoring and supporting youth in the use of agricultural machinery and cultivating diverse crops including vegetables, e.g., Projet de Renforcement de la Sécurité Alimentaire par le Développement des Cultures Irriguées (PRESA/DCI) (Project for Food Security Consolidation through Development of Irrigation Farming) (AfDB 2013). Women's leadership in community resource management is also promoted (PReSAN-KL). Finally, women and youth are helped to develop business plans and access finance.

The **agricultural development** cluster supports many aspects of irrigated vegetable production through irrigation infrastructure development. Specific interventions for gender and youth inclusion along the value chain are highlighted. For example, women and youth are prioritized in accessing irrigation schemes and market gardens and are provided with financial and technical support for their small- and medium-sized processing enterprises, e.g., Northern Regions Investment and Rural Development Programme (IFAD 2005); Project for the Support to the Seed Sector (AfDB 2009a).

The **agricultural finance** cluster aims to support agricultural development by facilitating access to financial services, e.g., Inclusive Finance in Agricultural Value Chain Project (INCLUSIF) (IFAD 2018). Interventions fostering gender and youth inclusion have a significant capacity building component. This emphasizes financial literacy, knowledge of natural resource management and participation in decision-making. The use of cost-effective technologies for developing vegetable gardens and climate-smart production techniques is also promoted, e.g., Inclusive Green Financing Initiative (IGREENFIN) (IFAD 2020).

The **water resources management** cluster promotes efficient water use, e.g., Project to Support the Implementation of the Integrated Water Resource Management Action Plan (AfDB 2017), as well as private investment in irrigation development and agricultural equipment manufacturing. Regarding inclusion, the Office du Niger irrigation scheme allocates 10% of the developed irrigated land to women and youth, although this is lower than the 15% set by the LFA (GoM 2017a).

The **irrigation development** cluster contributes to the engagement of women and youth in irrigated vegetable production, enabling them to take up agriculture as a profession by developing their technical and managerial capacity, e.g., Programme de Développement de l'Irrigation dans le Bassin du Bani et à Sélingué (PDI-BS) (Irrigation Development Program in Bani Basin and Sélingué) (AfDB 2009b); and Projet Développement de l'Agriculture Irriguée Commerciale en Zone Office du Niger (PDAIC-ZON) (Project for the Development of Commercial Irrigated Agriculture in the Office du Niger Zone) (GoM 2017c). Specific emphasis is placed on developing market gardens and transferring the management responsibility to women, e.g., Projet de Développement des Bas-fonds dans le Cercle de Yélimané (Lowland Development Project in the Yélimané Circle) (GoM 2005b).

As in the policy analysis, the intervention analysis reveals that while broad efforts have been made to increase inclusion in agricultural value chains, many shortcomings exist. These include poor policy implementation, weak coordination within and between ministries, an absence of gender strategies in project design, modest capacity building of youth, low involvement of the private sector, prioritization of crops other than vegetables and limited attention paid to value chain linkages beyond production (e.g., collection and marketing).

Barriers to and opportunities for inclusion

In the final stage, results from the policy analysis were compared with the intervention analysis to complete a synthesis analysis. The synthesis analysis identified the public, private and civil society actors and stakeholders in the IVVC, their roles in and influence on IVVC policies and interventions, and how these create barriers to or opportunities for gender and youth inclusion. An overview of the barriers and opportunities is presented in Table 1.

The synthesis analysis shows that the current policy and intervention framework insufficiently supports gender and youth inclusion. Where gender and youth inclusion are addressed, there is often a disconnect between a policy's stated goals and clear guidance on policy implementation that would help achieve these goals. In addition, technical, human and financial capacity is frequently missing at national and local authority levels, further hampering policy implementation. The policy framework also tends to focus on agricultural value chains in general and pays little attention to the IVVC. As an illustration of this, while the Malian government is pursuing a crop diversification policy to ensure year-round food availability for household consumption, significant subsidy support is allocated to cotton, cereal and rice cultivation (FAO 2017). Consequently, vegetable seeds are expensive for farmers. They are also imported and may not adapt to local conditions.

In other areas such as processing, gender inclusion is addressed in the form of strategies to improve women's access to modern conservation and processing techniques. However, youth are overlooked. Moreover, the strategies target general agro-food processing, with shallots being the only vegetable specified.

Overall, IVVC actors are not as well organized as groups involved in the cultivation of crops such as mango, cashew and gum arabic. The barriers to better coordination in the IVVC include insufficient financial resources and access to credit, and poor communication and information sharing among actors. The effects of weak coordination exacerbated by security problems in some locations as a result of armed conflict have limited the development of irrigation-related infrastructure.

As with other strategies, investment in irrigation tends to focus on staple and cash crops and not specifically on vegetable

Table 1. Barriers to and opportunities for gender and youth inclusion in the IVVC.

Category	Barriers	Opportunities
New drivers	• Covid-19 and consequences of the August 2020 coup d'état	• Government-initiated support programs for farmers in response to Covid-19
Policy and governance	• Limited number of agricultural diversification strategies • Weak policy support for the vegetable and horticultural subsectors • Conflicting strategies regarding family farm promotion and agribusiness development • Modest integration of women in integrated water resources management • Ineffective multi-sectoral approach • Decentralization challenged by the resource allocation process due to the local authority's capacity • Unbalanced participation of stakeholders in shaping policy decisions	• Promotion of crop diversification, climate-resilient inputs and infrastructure • Promotion of favorable conditions for self-sufficient food production and market linkages • Holistic approach to water resources management in the policy framework • Promotion of agricultural entrepreneurship • Recognition of family farms • Development of private sector and agro-industrial zones • Expanded research institutions • Regionalization as a new approach to decentralization
Interventions	• Inefficient implementation of interventions in irrigation infrastructure development • Weak coordination of intervention activities and unsuccessful partnerships between key actors • Absence of vegetable-specific irrigation development • Weak ownership of irrigation schemes • Financial challenges during implementation of interventions	• Implementation of interventions promoting climate-resilient seeds, seed storage, and rehabilitation of irrigation • Facilities, training on fertilizers • Interventions based on approaches defined in the government's PNIP • Provision of additional funds • Sensitive evolution of gender inclusion in the decision-making process
IVVC-related inclusive development	• Absence of gender- and youth-specific strategies in the IVVC • Gender- and youth-specific strategies and interventions focused on production • Percentage of irrigated land allocated to women and youth is less than the law requires • Unclear water access guidance for gender and youth inclusion in irrigation development	• Sensitive evolution of gender inclusion in the decision-making process • Priority integration of women and youth in agricultural professions • Support for gender and youth engagement along the value chain

production. This is often because vegetables are not considered strategically important for food security at the national level. As a result, vegetables are frequently overlooked in national food security policies, despite the need for greater crop diversity at the local level. Also missing from the policy and intervention framework are specific strategies for gender and youth investment in irrigation. This results in weak irrigation infrastructure and the limited use of pumps, both petrol/diesel and solar-powered pumps. Vegetables are occasionally promoted in the off-season (October-February). Consequently, intensive production of vegetables is limited.

Lastly, gender- and youth-inclusive policies and support programs, where they exist, tend to emphasize agricultural production. This is despite the fact that women and youth play – or could play – a substantial role at all stages of the IVVC. For example, over 80% of horticultural products are marketed by women in both rural and urban areas (Diakité et al. 2014).

The way forward

The findings show a strong political will to develop Mali's agriculture sector. However, irrigated vegetable production is not a policy or intervention priority compared to other crops such as cotton, cereals and rice. To create a sustainable and inclusive IVVC with the potential to improve incomes, nutrition, health, knowledge and representation of women and youth, the following actions are needed.

Enable a policy and institutional environment and governance mechanisms that support gender and youth inclusion in the IVVC.

- Strengthen agricultural policies and programs to effectively address challenges to gender and youth inclusion. This includes eliminating policy incoherence and resolving the disconnect between policy goals and policy implementation.

The mismatch between national-level policymaking and local needs should also be addressed.

- Provide policy support for the IVVC and horticultural subsector development to enable gender and youth inclusion and benefits.
- Support policy interventions on family farming development to ensure that investment policies protect the rights of local populations.
- Support an in-depth review of existing agricultural policies, standards and programs as well as a revision of agricultural input policies.
- Develop gender- and youth-sensitive input subsidy policies and programs.
- Create, strengthen or revitalize the policy consultation framework and process at national and grassroots levels.
- Strengthen and promote inclusive planning, collaboration, coordination, communication, and monitoring and evaluation of agricultural policy and program implementation.

Enable private sector investment in irrigation supply chains, the IVVC and horticultural subsectors.

- Create an enabling environment in which domestic manufacturers, irrigation and input suppliers, and small processing businesses can grow.
- Accelerate sustainable financing models to help de-risk private sector investments in irrigation markets. This applies especially to innovative products and services such as pay-as-you-go and gender-sensitive credit assessment tools that support gender and youth inclusion.
- Foster partnerships between entrepreneurs, farmer groups, cooperatives, and private and public sector actors.

Enhance IVVC interventions that promote gender and youth inclusion and economic empowerment.

- Enable inclusive access to resources and requirements for IVVC investment.
- Strengthen the readiness and capacity of women and youth to engage in the IVVC.
- Improve financial and information services, and collective action.

Transform gender and youth inclusion and economic empowerment at the system level.

- Support policy and institutional capacity development.
- Create and operate multi-stakeholder dialogue spaces at various levels (Minh et al 2020).
- Invest in research for development, specifically targeting the commercialization of underutilized indigenous and traditional crops and fertilizer production, nature-based solutions for land and water resources management, and irrigation development. These are essential for developing domestic agribusiness capacity.

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