SCALING UP SMART-VALLEYS APPROACH FOR LAND AND WATER DEVELOPMENT IN INLAND VALLEYS IN MALI

Activity Report

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December 2024

To cite this report
Djagba, J.F., Kone, P., Doumbia, S., Dossou-Yovo, E.R., 2024. Scaling up Smart-Valleys approach for land and water development in inland valleys in Mali. Activity report. AICCRA project.

Acknowledgement
Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) is a project that helps deliver a climate-smart African future driven by science and innovation in agriculture. It is led by the Alliance of Bioversity International and CIAT and supported by a grant from the International Development Association (IDA) of the World Bank. Explore our work at aiccra.cgiar.org

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Titles in this series aim to disseminate interim research on the scaling of climate services and climate-smart agriculture in Africa, in order to stimulate feedback from the scientific community.

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Abstract

This report outlines the scaling-up efforts of the Smart-Valleys approach under the Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA) project in Mali. Focusing on sustainable land and water development in inland valleys, the initiative has expanded to 40 sites across 24 villages in the Sikasso, Koulikoro, and Segou regions, directly benefiting 1953 farmers, of whom 58% are women. The report highlights the collaborative efforts between AfricaRice and the National Institute of Rural Economy (IER) in capacity building, field demonstrations, and farmer engagement. The adoption of Smart-Valleys has improved water management, enhanced rice yields, and strengthened the resilience of agricultural systems, showcasing the potential of Smart-Valleys as a transformative tool for sustainable development in Mali.

Keywords: Smart-Valleys approach, climate-smart agriculture, adoption, inland valley development, farmers' school, Mali

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Contents

1. Introduction

The economic opportunities of inland valleys have been widely recognized and investments have been made to make these areas more accessible and profitable (Rodenburg et al. 2014). Agricultural intensification is occurring in inland valley agroecosystems in sub-Saharan Africa (Djagba et al. 2019). Such agricultural production requires the sustainable exploitation of the widely and abundantly distributed inland valleys (Rodenburg and Saito 2022). A wide range of technologies tested for their potential are available to increase rice-based production efficiently while being resilient to climate change. Smart-Valleys is one of the climate smart agriculture technologies, which was introduced in Mali under the auspices of the Accelerating Impacts of CGIAR Climate Research for Africa (AICCRA)" project to improve water control and rice yield while expanding the rice production area with limited impacts on ecosystem services (Arouna and Akpa 2019; Dossou-Yovo et al. 2022). This report provides an overview of the activities carried out and the collaborations formed with national institutions to expand the Smart-Valleys approach in Mali.

2. Partnerships between AfricaRice and the National Institute of Rural Economy for scaling Smart-Valleys in Mali

The partnership between AfricaRice and the National Institute of Rural Economy (IER) has been pivotal in scaling the Smart-Valleys approach in Mali through targeted capacity-building initiatives, field demonstrations, and farmers' field days. AfricaRice has taken the lead in providing technical expertise, developing training materials, and ensuring access to innovative tools and methodologies to enhance water management in inland valleys. Additionally, AfricaRice has facilitated the design and implementation of field demonstrations to showcase the benefits of the Smart-Valleys approach. Meanwhile, IER has played a critical role in mobilizing local stakeholders, leveraging its strong network of extension agents to engage farmers and community leaders. IER has also coordinated logistics for field events and ensured that the activities align with national agricultural development strategies. This collaboration has effectively combined AfricaRice's scientific knowledge with

IER's grassroots outreach capacity to promote sustainable and inclusive agricultural practices in Mali.

3. Selection of inland valleys suitable for Smart-Valleys approach implementation

The adoption of Smart-Valleys approach was accelerated through farmers participations in field days organized in 24 villages in the Cercles of Kadiolo (see Appendix section) and Segou (Sanogolo and Massadjalo via Cinzana), and Sélingué and surrounding villages including Dialakoro, Siramanan, and Niamakoroni. A total of 30, 6, and 4 inland valleys were explored in Kadiolo, Selingue, and Segou respectively (Figure 1). Through field visits, and meetings in villages with farm organizations (Figure 2), 15 inland valleys (including in Kadiolo, 4 in Sélingué, and 2 in Segou) have been prospected and validated the Smart-Valleys approach development with the initial adhesion of 210 inland users in Kadiolo, 86 in Sélingué, and 29 in Segou including 217 women.

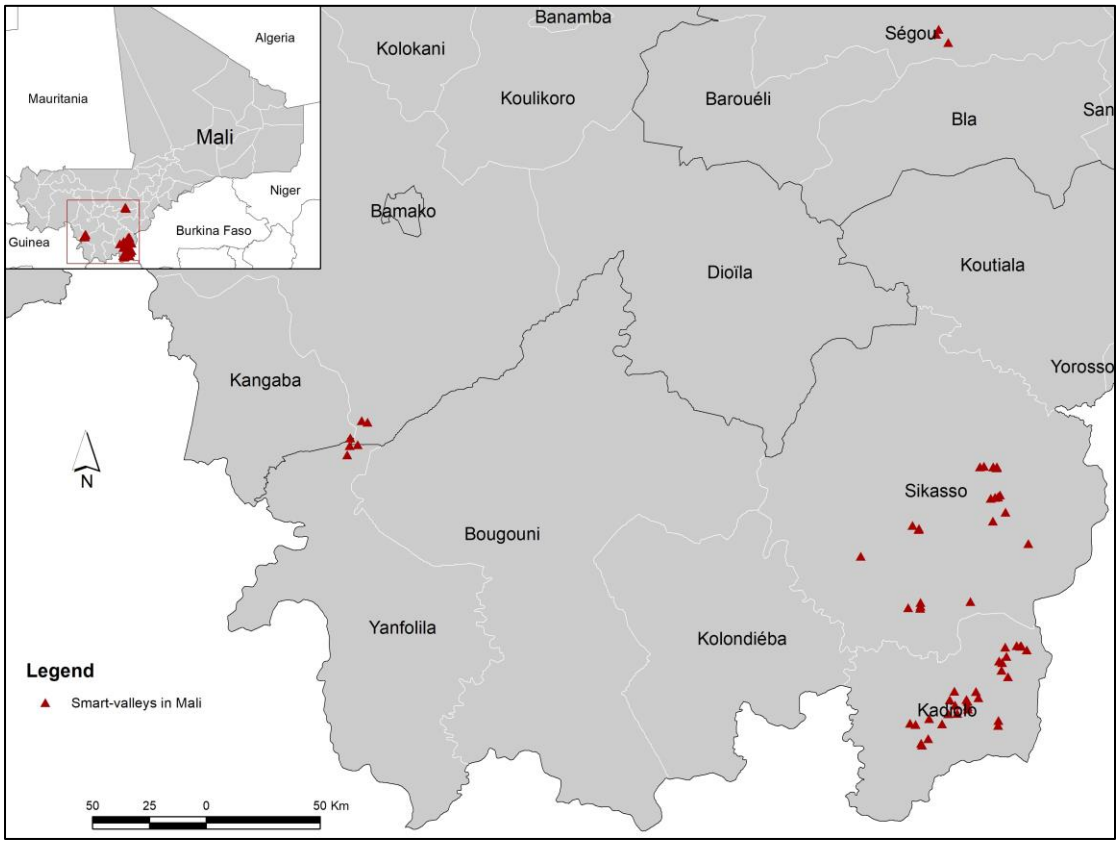

Figure 1: Location of Smart-Valleys demonstration sites in Mali

Figure 2: Meetings with inland valleys stakeholders belonging to farmers organizations in Koutamani (left), and Diou (right) during the prospection and validation of selected inland valleys

4. Land and water development in inland valleys using Smart-Valleys approach in Mali

For eight selected inland valleys, development plans have been designed for establishing Smart-Valleys demonstration sites in close collaboration with the users of inland valleys in eight villages (Figure 3). Each validated inland valley development plan exhibited a set of plots, irrigation and drainage canals, bunds, water flow, singularity points such as termite mounts, trees, water source, etc. and where possible water reservoirs (Figure 4, at left). The implementation process of the inland valley development plan (Figure 4, at right) and the effective development of inland valleys were supported by capacity-building initiatives for farmers at every stage, particularly during the execution of the development plan. The training primarily focused on practical, field-based accomplishments related to inland valley development using the Smart-Valleys approach. In total, 279 farmers were directly involved in the development of the Smart-Valleys demonstration sites. Currently, about 1953 farmers including 58% of women are using the developed Smart-Valleys in Kadiolo, Sélingué and surrounding villages of Sélingué (Table 1).

Table 1: Smart-Valleys sites and farmers' participation in Mali in 2024

Name	Village/Region	Participants involved in demonstation	Beneficiary farmers	Women (%)
Kadosso	Kadondougou/Kadiolo	58	406	76
Ngolowolokan	Dioumantene/Kadiolo	30	210	73
Monkolè	Diou/ Kadiolo	30	210	60
Kodjananlè	Koutamani/ Kadiolo	20	140	50
Laidjalani	Kambo/ Kadiolo	60	420	63
Fouka	Siramanan / Sélingué	38	266	5
Diguikoffè	Dialakoro / Sélingué	10	70	50
Sombè	Sélingué	33	231	79
Overall	**8**	**279**	1953	58

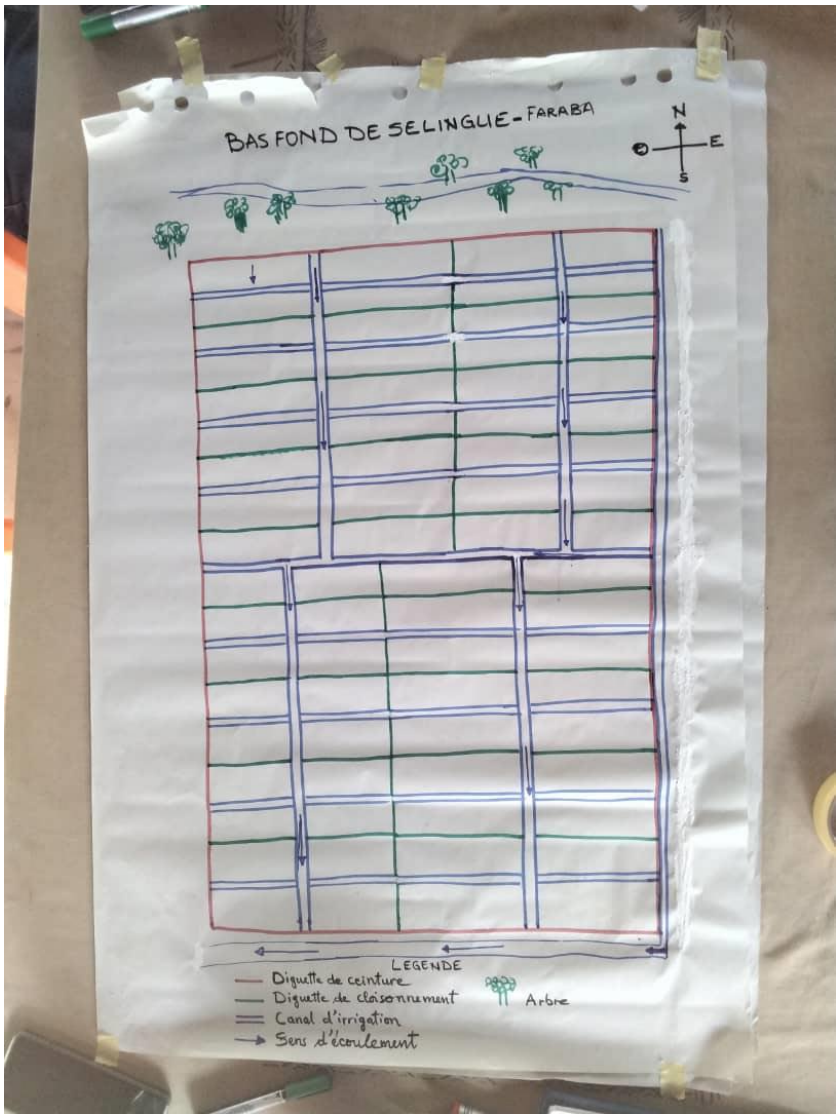

Figure 3: Development plans of inland valleys, Sombè in Sélingué.

Figure 4: Presentation for the validation of the development plan of Smart-Valleys site in Kambo (left), and the development plan implementation in Koutamani (right).

Figure 5: Development of inland valleys based on Smart-Valleys approach for rice-based production in the Cercle of Kadiola

5. Monitoring and management of Smart-Valleys sites in Mali

The Smart-Valleys developments were completed in Smart-Valleys by the inland valley users themselves. Capacity building was provided in sustainable cultivation practices, use of improved seeds of drought and submergence tolerant rice varieties, crop establishment, weed, water and fertilizer management. Also, the sustainable management of the Smart-Valleys sites such as monitoring of water control infrastructures after important rainfall, land restoration practices in developed inland valleys within the framework of Smart-Valleys approach. These sessions, just after the inland valley developments, enabled the assessment of the operations and the results obtained, and subsequently decided on the possible

maintenance, adaptations, and extensions to be carried out by the developed sites' users, themselves. Expert visits to Smart-Valleys sites played a crucial role in assessing ongoing outputs, addressing gaps in maintenance and practices, and reinforcing opportunities for the extension of Smart-Valleys areas (Figure 6). This approach was similarly implemented at Smart-Valleys sites in the Cercle of Sikasso in 2023. These expert interventions led to positive farmer feedback, including expressed satisfaction with the Smart-Valleys approach following the heavy rainfall events of 2024 (Figure 7).

Figure 6: Advice to inland valleys' users on GAP, maintenance, adoption, extension, and sustainable management of Smart-Valleys sites developed.

Figure 7: Expert visits to Smart-Valleys sites previously developed for helpful advice to farmers

6. Conclusions and recommendations

The scaling-up of the Smart-Valleys approach in Mali demonstrates significant progress in sustainable agricultural development, particularly in inland valley ecosystems. The initiative has successfully developed eight demonstration sites, engaging nearly 2,000 farmers and ensuring the active participation of women. Improved water control infrastructure and the adoption of climate-smart practices have enhanced rice yields and strengthened the resilience of farming communities. Capacity-building activities and expert support have equipped farmers with the skills and knowledge needed to maintain and expand these developments. The approach has also fostered collaboration between key stakeholders, including AfricaRice, IER, and local communities, aligning efforts to address climate change impacts and promote food security.

Recommendations

- Expand coverage: Scale up the Smart-Valleys approach to additional inland valleys in Mali, prioritizing areas with high agricultural potential and climate vulnerability.
- Enhance training: Organize more comprehensive capacity-building programs targeting women and youth to ensure equitable access to knowledge and resources.
- Strengthen monitoring: Develop a robust monitoring and evaluation system to track the performance of Smart-Valleys sites and ensure timely maintenance of infrastructure.
- Foster local ownership: Empower local farmer organizations to take ownership of site management, including the sustainable use of water and land resources.
- Integrate policy support: Advocate for the inclusion of Smart-Valleys in national agricultural development policies and funding mechanisms to ensure sustainability and scalability.
- Promote knowledge sharing: Establish platforms for farmers to share experiences, best practices, and lessons learned from Smart-Valleys implementations across regions.

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7. Appendix

Table: Exploration and identification of inland valleys suitable for the adoption of Smart-Valleys approach in Sikasso region via the Cercle of Kadiolo: criteria choice of 1st and 2nd orders

No	Inland valley/Village	Accessibility	Area	Nb. users /villages	Stream/ waterway	Dominant soils	Land access	Origin of users
1	Kagnaga/Nimbougou	All seasons	50 ha	300/1	Permanent	Silt-clay	Ownership	Koutiala,
2	Kakolohaie/Nimbougou	All seasons	10 ha	150/1	Permanent	Silt-clay	Ownership	Koutiala,
3	Moudoni/Nimbougou	All seasons	25 ha	100/1	Permanent	Silt-clay	Ownership	Koutiala,
4	Goulougnon/Nimbougou	All seasons	20 ha	100/3	Permanent	Silt-clay	Ownership	Koutiala,
5	Dougougnon/Katon	Less easy	30 ha	100/1	Intermittent	Clay	Ownership	Katon
6	Lougougnon/Diomatènè	All seasons	150 ha	300/1	Intermittent	Clay	Ownership	Diomatènè
7	N'golowolokan/Diomatènè	All seasons	300 ha	300/1	Intermittent	Clay-loam	Ownership	Diomatènè
8	Kapolodogo/Diomatènè	All seasons	200 ha	160/1	Intermittent	Clay	Ownership	Diomatènè
9	Gouhain/Borogoba	Less easy	50 ha	600/3	Permanent	Clay-loam	Ownership	Kadiolo, Lofinè,
10	Pouly/Borogoba	Less easy	20 ha	200/3	Intermittent	Silt-clay	Ownership	Kadiolo, Lofinè,
11	Balaie/Kotamani	Less easy	2000 ha	600/1	Intermittent	Clay-loam	Ownership	Kotamani
12	Kodjalanlaie/Kotamani	Less easy	500 ha	400/1	Intermittent	Clay	Ownership	Kotamani
13	Laidjalani/Kambo	All seasons	30 ha	200/1	Intermittent	Silt	Ownership	Kambo
14	Balaie/Kambo	All seasons	200 ha	300/2	Intermittent	Silt-clay	Ownership	Kambo, Lofinè
15	Loupèlè/Ziangolodougou	All seasons	25 ha	70/1	Intermittent	Clay-loam	Ownership & hiring	Ziangolodougou
16	Zabéléké/Ziangolodougou	All seasons	5 ha	30/1	Intermittent	Clay-loam	Ownership & hiring	Ziangolodougou
17	Kadôso/Kadondougou	All seasons	120 ha	500/3	Intermittent	Silt-clay	Ownership & hiring	Kadondougou,
18	Faavilé/Lofinè	All seasons	10 ha	40/1	Intermittent	Clay	Ownership	Lofinè
19	Laidjalani/Nianfigolodougou	Less easy	30 ha	40/1	Intermittent	Clay	Ownership	Nianfigolodougou
20	Balaie/Nianfigolodougou	Less easy	100 ha	200/4	Intermittent	Clay-loam	Ownership	Nianfigolodougo
21	Balaie/Borioni	All seasons	240 ha	170/1	Intermittent	Silt, clay	Ownership & hiring	Borioni

22	Tamassara/Kankonoma	Less easy	200 ha	200/1	Intermittent	Clay-loam	Ownership & hiring	Kankonoma
23	Laidjalani/Kafono	Less easy	15 ha	32/1	Intermittent	Silt-clay	Ownership & hiring	Kafono
24	Logôlô/Diou	All seasons	300 ha	3000/1	Intermittent	Silt-clay	Ownership & hiring	Diou
25	Monkôlaie/Diou	All seasons	300 ha	3000/1	Intermittent	Clay-loam	Ownership & hiring	Diou
26	Faaly/Wôrôni	All seasons	200 ha	200/1	Intermittent	Clay-loam	Heritage & hiring	Wôrôni
27	Laiba/ Wôrôni	All seasons	300 ha	300/1	Permanent	Clay, silt	Heritage & hiring	Wôrôni
28	Katawa/Zanso	All seasons	20 ha	1000/1	Intermittent	Silt-clay	Ownership & hiring	Zanso
29	Laie/Niérouani	All seasons	500 ha	1000/1	Intermittent	Silt	Ownership & hiring	Niérouani
30	Ganigani/Katogola	Difficult	2000 ha	3000/1	Intermittent	Clay, silt	Ownership	Katogola