From Roots to Resilience: Bridging Knowledge and People to Empower Mangrove Swamp Rice Smallholder farmers in Strengthening an Endogenous AKIS

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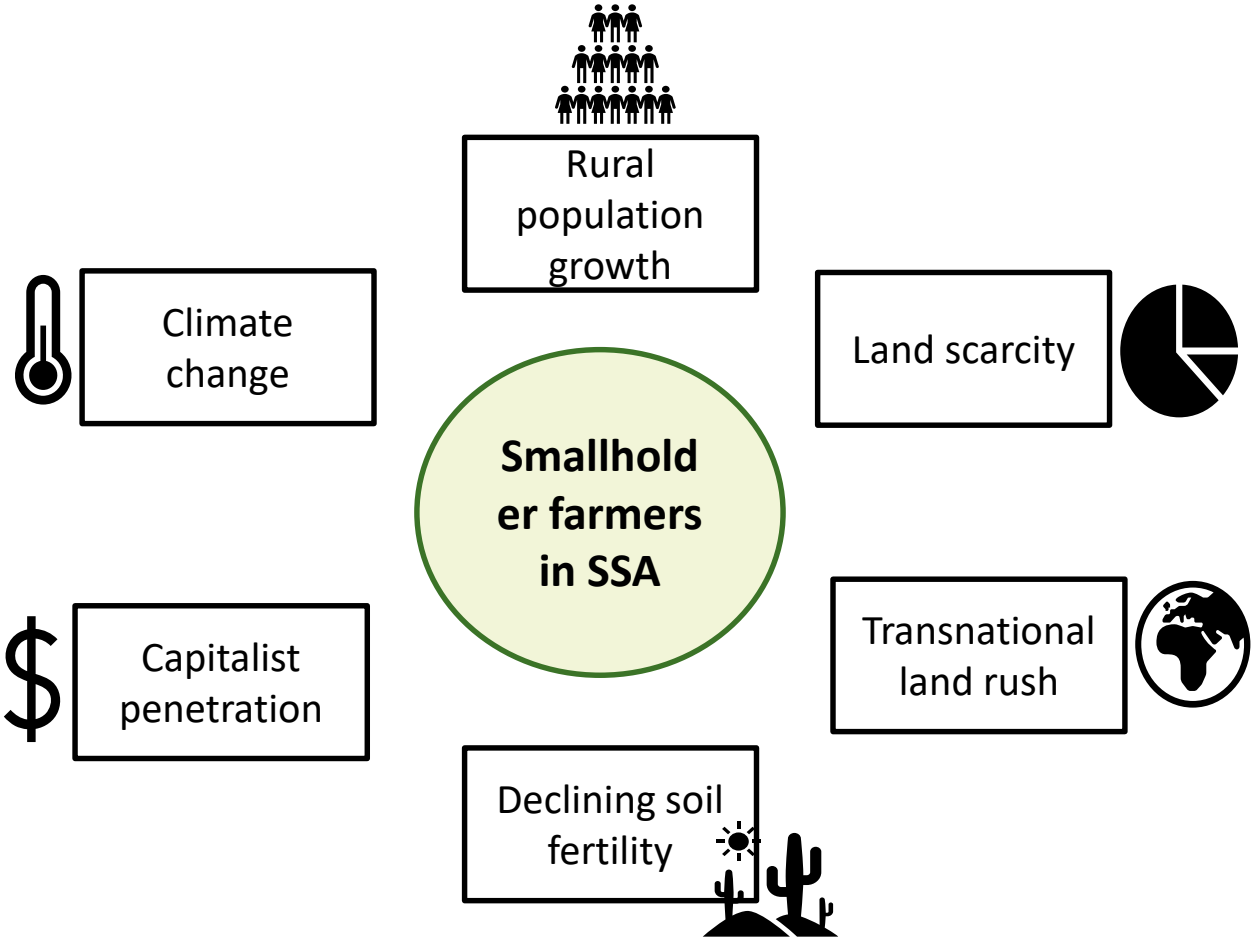
1.Introduction: Setting the broader context



Policies misreading rural realities

Oversimplified narratives: ”the rural population is ageing”; “youth are stuck in waithood”.

Overlook: farmers´ agency, diversity of rural livelihoods.

→ Beyond stereotypical image of full-time family farmer.

1.Introduction: Guinea-Bissau, Mangrove Swamp Rice and people

- **Balanta & Diola peoples**: "Deep rural societies", virilocal, patrilineal and gerontocratic

- **MSR is more than farming:**
  → Highly technical
  → Intimate ecological knowledge & labour mobilisation
  → Most productive rice system
  → Sustains hundreds of thousands along the coast


photo from Matilda Merkohasanaj

1.Introduction: MSR under pressure - history, challenges, and resilience

- **Pressures:** Stronger tidal surges, unpredictable rainfall, rising labour costs, and the exodus of youth
- **History of political & economic shifts**:

Colonial period: forced labour, taxation, top-down policies → disrupted traditional farming

1963-74 War of independence infrastructure destruction; youth resistance & social recognition

1974-86 Centralised economy state set low rice prices → farmers discouraged

1986 Structural adjustment cut public services, rural education, urban jobs, cashew monoculture

1998-99 Civil war flight to countryside, urban-rural ties strenghtened

Today Climate shocks, market liberalisation, weak state support; rice import reliance

1.Introduction: MSR under pressure - history, challenges, and resilience

Yet, this is not just a story of decline

- Balanta and Diola societies adapt:
  -> Hold on their rice-based identity
  -> Diversification: fishing, migration, off-farm activities, multi-sited households.

- "Culture is historically produced, and society is always in transformation" (Sahlins, 1985).
  -MSR: not static, but constantly reconfigured.
  -Social identity & knowledge drive adaptation to change.

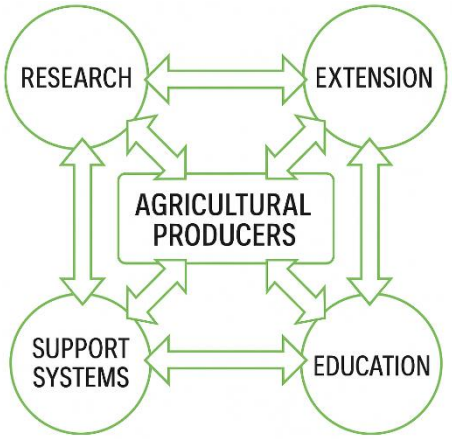
Fisherman preparing his net to cast into the river – Elalab, Cacheu © S.Conde, 2020

1.Introduction: Why strengthening grassroots AKIS?

Limited impact of agri-development in SSA & Guinea-Bissau:
→ Technologies poorly fits realities
→ "Participatory" approaches disconnected

SDG 2 – Zero Hunger remains out of reach

AKIS framework (Röling) : "Networks of actors, institutions, and processes that co-create, use, and share agricultural knowledge"



Decentralised, **dynamic**, and **demand-driven system**:

- Farmers are not passive recipients, but active co-learners, innovators, and extensionists.
- Farmers should exert **user control** over the system, influence other actors and build countervailing power from below.

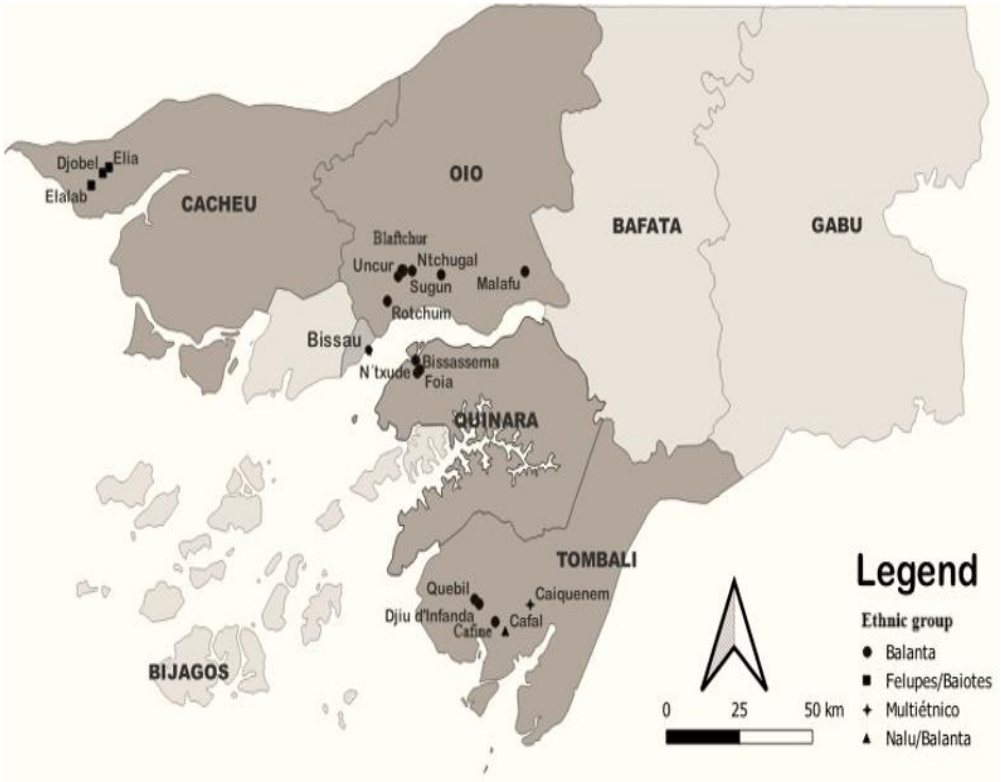
2.Study Goals: Understanding & supporting farmer innovation

(A) Exploratory dimension

- Understand the endogenous AKIS around MSR
- Explore livelihoods, agency, engagement in rural economy, learning processes & innovation pathways
- Move beyond generic models

(B) Interventionist dimension

- Co-develop & share best-fit innovations (e.g. composting)
- Strengthen farmers as agents of change
- Support co-learning & problem-solving



aligned with MALMON themes, 13 villages, relevant diversity

3.Important Highlights: Demography & food insecurity

(paper under review)

Methods:

- Mixed methods: household surveys, life-course biographies
- Intersectional, intergenerational, historical perspectives; concept of opportunity space

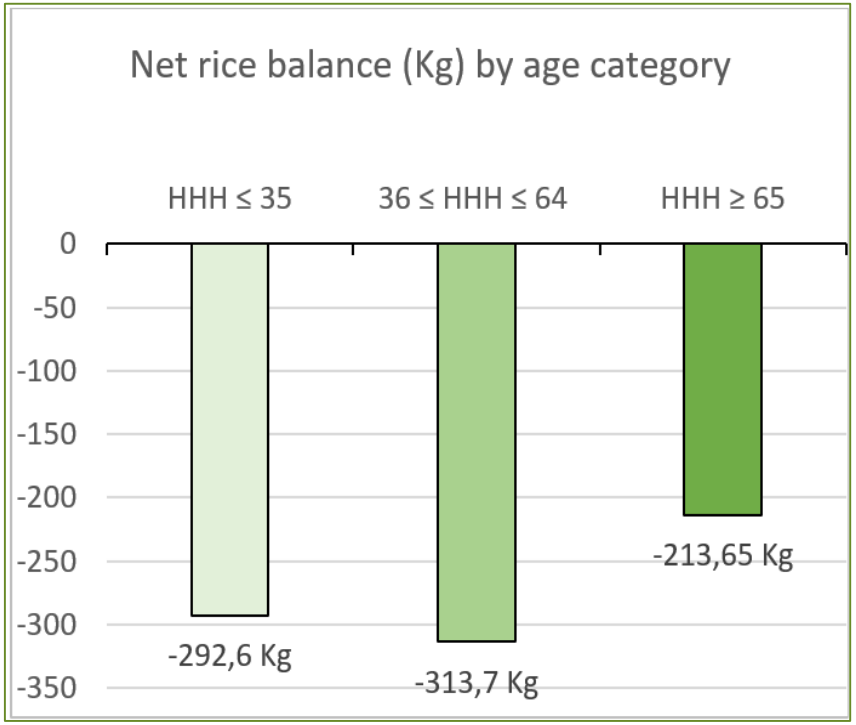
Demographic dynamics

- **63 % of the rural population is under 25;** only **~ 10 % are over 65**

Important role of youth in shaping future food system

Self-sufficiency among MSR farmers

- **Many farmers are not self-sufficient; negative average net rice balances**
- Climate pressures + poorly adapted market policies
- Since 1986 liberalisation: access to cheap imported rice → weakened local self-sufficiency



3.Important Highlights: livelihoods diversity, education, land access and youth engagement

(paper under review)

Livelihoods & education

- **Farming is the mainstray**, but diversification + growing off-farm work
- **Education: top priority for youth** → flexible, multi-sited livelihoods where spatial mobility is key
- Not all youth return to fields during school holidays


N´gif Na Nghol

Land & cashew economy

- **Youth access land** -> Elders' concessions + cashew rise
- Cashew: imported rice more accessible **but** rising youth labour costs, new consumption habits, more alcohol use, disinterest in MSR & field abandonment

3.Important Highlights: livelihoods diversity, education, land access and youth engagement

(paper under review)

Farming & identity

- Rural exodus + farming as last resort
- Others choose agriculture → identity, culture, belonging, innovation, adaptation and pride
- Rural investment needed: better schools, health services, roads, fair markets -> sustain youth engagement

Farmers (Canha N'Ferele and Psóle Na Saué) recording notes from an essay – Malafu, Oio © M.Merkohasanaj, 2022

3.Important highlights: Learning, innovation, and knowledge dynamics

(insights from 2 published papers)

Two complementary approaches:
Qualitative & mixed-method case study → Explore how MSR people navigate socio-technical change.

MSR knowledge:

- Dynamic, begins early through hands-on learning with family & peers
- Farming as "performance" (Richards, 1985): improvise, adapt, deep ecological knowledge
- Farmers are open to new opportunities


Marina Temudo

3.Important highlights: Learning, innovation, and knowledge dynamics

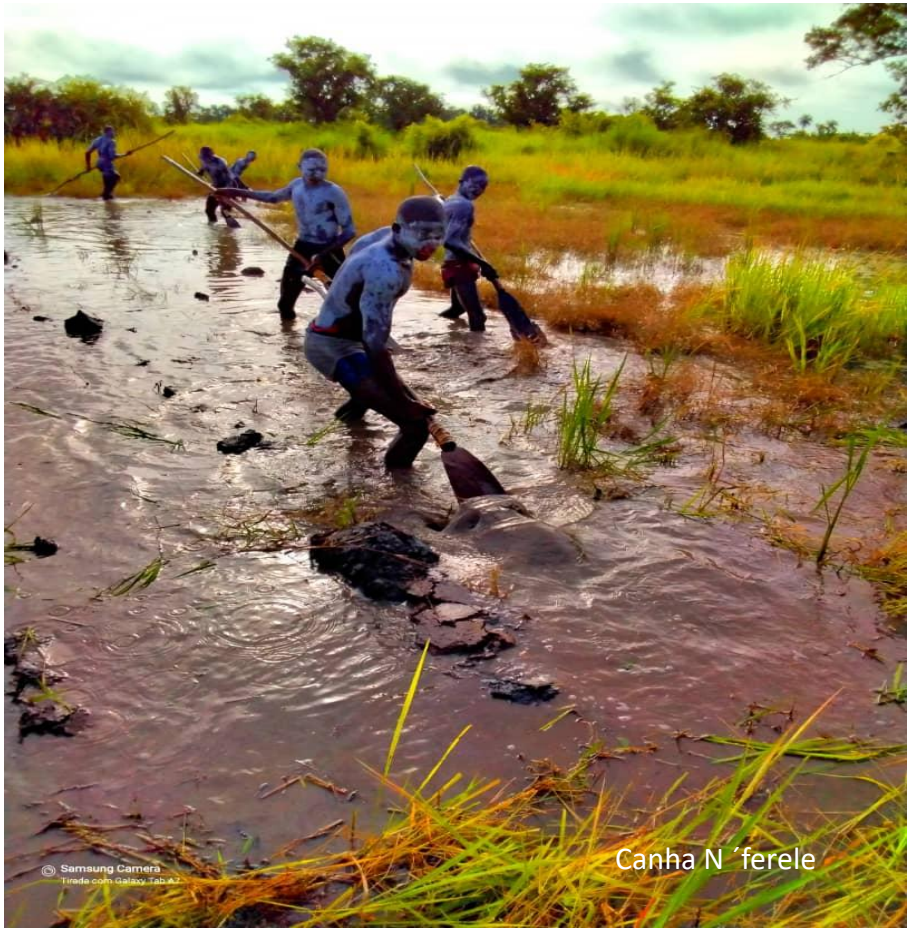
(insights from 2 published papers)

New "dispositions" in the recent decades:

- Elders support youth ideas & education, relax of some taboos
- Literacy increasingly used in farming (e.g. record-keeping, digital tools)
- "djunta mon" is growing
- Mobility spreads innovations

Innovation challenges

- Climate unpredictability, pests & diseases, declining varieties
- Social tensions: fear of evil eye, witchcraft concerns, social control weaker



3.Important highlights: Blurring boundaries & co-producing innovation

(insights from 2 published papers)

Innovation pathways

- Endogenous/exogenous divide blurred → what matters most is if it works
- Farmers draw on personal exp, ancestral practices, peer exchanges, external knowledge
- "Seeing is believing": tested in small → adopted gradually

Examples

- **Chance discovery**: pre-germination
- **Adapted tools from outside:** plastic sheet in dikes, flat iron shovels
- S. Balanta copied Mandjako techniques: dike building + ploughing under water

→ **farmers actively develop, rework, adapt & circulate ideas across communities**

3.Important highlights: Blurring boundaries & co-producing innovation

(insights from 2 published papers)

Water management & cooperation

- Innovations (canals, pipes, collective rules) stabilise production, reduce conflicts
- Success = technical design + strong cooperation
- Key cooperation areas: **routine dike patrols**, **repairs** & **advice** → build trust & social recognition

Role of external actors

- Go beyond one-way tech transfer
- Engage in field, Build CoPs and co-producing knowledge through shared experience, mutual learning & recognising the value of “fame” earned through commitment

4.Participatory Action-Research: From knowledge to action

Action-research informed by empirical insights

- **30 YFRs** → empowered as actors of change
- **FB2F approach**: strengthen local knowledge Systems + co-producing responses to real challenges
- **Decentralised CoPs**: task groups of farmers + scientists
- **Cyclical workshops**: debate findings, plan new exp, and foster learning

4.Participatory Action-Research: Knowledge exchange for dike construction

- **YFRs, Balanta and Felupe dike specialists & researchers** → Jointly build a dike in Djobel
- **Learning by doing**, comparing ideas, debating methods
- **Short film**

4.Participatory Action-Research: Knowledge exchange on transplanting techniques

- **Balanta & Felupe women farmers:** reducing rice plants densities
- **Process**: experimented in the field and facilitated debates on ways of transplanting and benefits of using fewer seedlings
- **Key benefits discussed**: savings seeds
- **Outcome:** Bridge local knowledge & experimental insights

4.Participatory Action-Research: Co-developing composting practices

(paper under review)

- Co-developed composting practices adapted to village situations and resource availability (Oio farmers)
- Idea: “Technology as something people do, make and remake” (Glover et al. 2019)

Methods: Farmer-led linear trials (visual) ; Random controlled trials (for publication)

Results:

- Thicker seedlings
- Faster plant growth
- Reduced termite attacks
- Reduced seedling densities → less seeds in nurseries (e.g. 110 kg → 45 kg)

4.Participatory Action-Research: Scaling out and building resilience

YFRs scaled out compost use:

- Experience → all nurseries → degraded MSR plots
- Sparkled interest among other farmers
- training activities for development practitioners: role reversal
- YouTube tutorial (screening tomorrow)
- Beyond addressing technical gaps: Bridge knowledge, Empower youth, Build resilience

5.Main Takeaways: from roots to resilience

1. **Agriculture alone is not enough:** Rural youth need better education, mobility infrastructure, health facilities, water management technologies, and revalue farming
2. **Technologies can take root and grow:** when grounded in farmers experiences -> farmers as co-creators
3. **To be effective, R4D must shift its approach**

   → Move from top-down tech transfer → support farmer capacity to develop, test, adapt, select

   → Build CoPs : knowledge shared, trust built, learning mutual
4. **Strengthen endogenous AKIS**

   → Empower farmer experimentation

   →Training young "formal" researchers alongside farmers

   → long-term farmer-led innovation

Thank you very much!

Meeting with the Farmers – Malafu, Oio © E.J.Rivera 2023

Publications

Scientific publications

- Leunda Martiarena, M., & Temudo, M. P. (Under review). Young men and agriculture in Guinea-Bissau: Is there a future for mangrove swamp rice farming? *Journal of Rural Studies*.
- Temudo, M. P., Sandoval, J., Leunda Martiarena, M., Merkohasanaj, M., Cossa, V., & Garbanzo, G. (2025). Joining the pen with the plough: Transdisciplinary collaboration and learning in mangrove swamp rice farming in Guinea-Bissau. Stories of Change, DeSIRA-LIFT.
- Merkohasanaj, M., Leunda Martiarena, M., Temudo, M., Cortez, N., Goulão, L., Andreeta, A., Céspedez, J., Jalo, A., Queda, C. (under review). Bridging Knowledge and Good Practices for Enhancing Rice Nurseries and Production in Guinea-Bissau Mangrove Swamp Rice. *Agriculture for Sustainable Development*.
- Leunda Martiarena, M., Céspedes, J., Varanda, M. P., Merkohasanaj, M., Dos Santos, A., & Temudo, M. P. (2024). The role and drivers of cooperation in managing hydraulic infrastructures for mangrove rice production in Guinea-Bissau. *Sustainability*.
- Leunda Martiarena, M., & Temudo, M. P. (2023). Endogenous learning and innovation in African smallholder agriculture: Lessons from Guinea-Bissau. *The Journal of Agricultural Education and Extension*. https://doi.org/10.1080/1389224X.2023.2169480

Scientific outreach films

- Leunda Martiarena, M., & Temudo, M. P. (2024, September 2–6). *Perspectives: A Future for Mangrove Swamp Rice in a Changing World* [Artistic intervention]. X Congress of Agroecology, Instituto Politécnico de Viseu, Viseu, Portugal. **https://www.youtube.com/watch?v=pbeP-Ldld4s&t=316s.**
- Leunda, M., & Temudo, M. P. (2022, October 31). *Esuk emanu: União pudi ku maré* [Film presentation]. Annual Workshop of DeSIRA Malmon Project, Amílcar Cabral University, Bissau, Guinea-Bissau. **https://www.youtube.com/watch?v=cNlo6QYsN5Q&t=6s.**