



# Collaboration Wageningen University & Research and the Sahel Region

2020



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# Preface

## Sahel: the shore of hope

The Sahelian region forms the cultural boundary between the Middle East and North Africa to the North and sub-Saharan Africa to the South. Literally, the Arabic term Sahil means shore or coast, and one can easily imagine the Sahara as a sea of sand seen from both the Maghreb mountain ranges and from the African savannas. The Sahel, an area of 3 million km<sup>2</sup> covering 15 countries has its own rich history, starting with the earliest Hominids and featuring fabled cities like Timbuktu. But its history has been punctuated by droughts, warfare and colonialism. For many people the word Sahel is another term for hopelessness.

Yet the reality is far more complex. Food production is diverse, both in terms of livestock and crops. Terrain and weather determine its potential, from the inland flood deltas of the Niger to the drylands where, with luck some millet and groundnuts can survive. It is a harsh life for farmers, easily at risk of overstocking, looting bandits and semi-military groups and fundamentalists. Overgrazing is a continuous threat; age-old conflicts between farmers and herdsmen have been aggravated by migration and population growth.

Indeed, the challenges are enormous and will possibly grow. Economic and geo-political destabilization and lack of safety are major hurdles. Yet it is totally obvious that the Sahelian region requires our attention more than ever before, if only because a destabilized Sahel will destabilize its neighbours, including Europe. Fortunately, politicians in the region and in Europe and the rest of the world are increasingly aware of the plight and the potential of the Sahel. I gladly notice the willingness to consider investment in long-term development, even if most of this still has to materialise.

Wageningen University & Research has been involved in the Sahel for approximately half a century. The great drought of the early 1970s was a major impetus to study in detail the climate and soils, livestock and crops, natural vegetation as well as socio-economic systems and the role of women. Many great Wageningen scientists have spent time in the Sahel. In the late 1980s and early 1990 we had several research stations there. The wealth of interdisciplinary data collected then can be put to good use to work on long-term scenarios for the region. Obviously, this must be done in close collaboration with the countries and communities concerned, with donors as well as NGOs and, of course, the research community. As one of the leaders in the field of agriculture, food and environment,

and with longstanding experience in the region, we stand ready "to find answers together"!



Prof.dr.ir. Louise O. Fresco  
President Executive Board, Wageningen University & Research  
photo: Jeroen Hofman

# Introduction

As the political, economic and social situation in the Sahel Region is deteriorating and affecting the livelihoods of many vulnerable people, deeper understanding of the processes that can help mitigate the conflicts and insecurity in the Region is needed. Problems jeopardizing the livelihoods of people in the Sahel Region require a trans-disciplinary approach, fundamental as well as applied research, and strengthening of capacities. Wageningen University & Research (WUR) is committed to contribute to this. By stimulating internal coordination and collaboration within the diverse units of WUR, we endeavor to increase our impact. Together with longstanding and new partners in the region, we will actively co-create sound evidence for policies and interventions, and strengthen the capacities of organisations to respond to the needs of the people in the Region.

The recently established 'OneWageningen Sahel core group and Sahel platform' will focus on 'Food Systems Transitions in the Sahel Region'. More information on the objective, purpose and scope of the Sahel platform can be

found on pages 6 till 9. Five themes that will guide our future engagements in the Sahel Region have been identified:

- Governance and sustainable land and water use
- Supplying (semi) urban consumers with healthy food options
- Closing the rural dietary gap
- Complementary roles sedentary farming and pastoralism
- Adapting to climate change

In this brochure you will also find an overview of projects that WUR is implementing or has implemented in the past 5 years in the Sahel Region. This overview is far from complete but we hope that it will give you an impression of the wealth of research and development activities that we, together with many partners, implement in the Sahel. In addition to strengthening current partnerships, we welcome new ones if these enable us to create new forms of value that could benefit the Sahel Region.



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# Towards a research & development agenda for the Sahel Region

## Core Group Sahel

### Background

The Sahel region has for long represented a multitude of opportunities and challenges to its inhabitants. More recently, the political, economic and social situation in several countries in the Sahel Region is deteriorating, affecting the livelihoods of many vulnerable people. Climate change, land degradation, increased inequality between societal groups and urbanisation have progressive impacts on food systems in the Region.

In response, governments, local stakeholders and international organisations are reconsidering their policies and interventions. More than ever, deeper understanding of the processes that can help mitigate the conflicts and insecurity in the Region are needed.

Wageningen University & Research (WUR) has a long standing partnership in most of the Sahel region and hundreds of alumni involved in research, education, agri-business, policy and development. WUR aspires to contribute to poverty reduction, zero hunger, reduced inequalities and strong institutions. Our interdisciplinary and dedicated **Sahel Platform** envisages to do this by stepping up value creation of knowledge for policy makers, engaged civil society and agri-businesses. In addition WUR pursues strengthening the capacity of organisations – be it public, private or civil – to respond to acute and longer term, emerging needs of the people in the region.

### Objective, Purpose and Scope

The **objective** of the Sahel Platform is to support strategic and credible stakeholders in the region and their external partners with knowledge, advice, evidence-based research findings and relevant networks that could enhance the societal impact of their interventions.

The **purpose** of the Platform is to identify, design and conduct research and development projects with these stakeholders that address acute and more long term problems and are within WUR's scope of competence. The platform will actively co-create and share information with all key stakeholders, stimulate internal collaboration and act as main gateway to partners. As such, the platform aims to **facilitate** between (local) demand for- and supply of knowledge and information on problems jeopardizing the livelihoods of people in the Sahel region. We are aware that acting as a 'broker' comes with the respon-

sibility and necessity to involve other knowledge holders active or interested in the region, contributing through policies, rule of law, knowledge, capacity- and leadership development or direct interventions to improve the quality of life.

The **scope** of the Platform is '**Food System Transitions in the Sahel Region**' as a fundamental requirement to ensure long-term food and nutrition security, environmental sustainability and political stability.

### Towards Food Systems Transitions

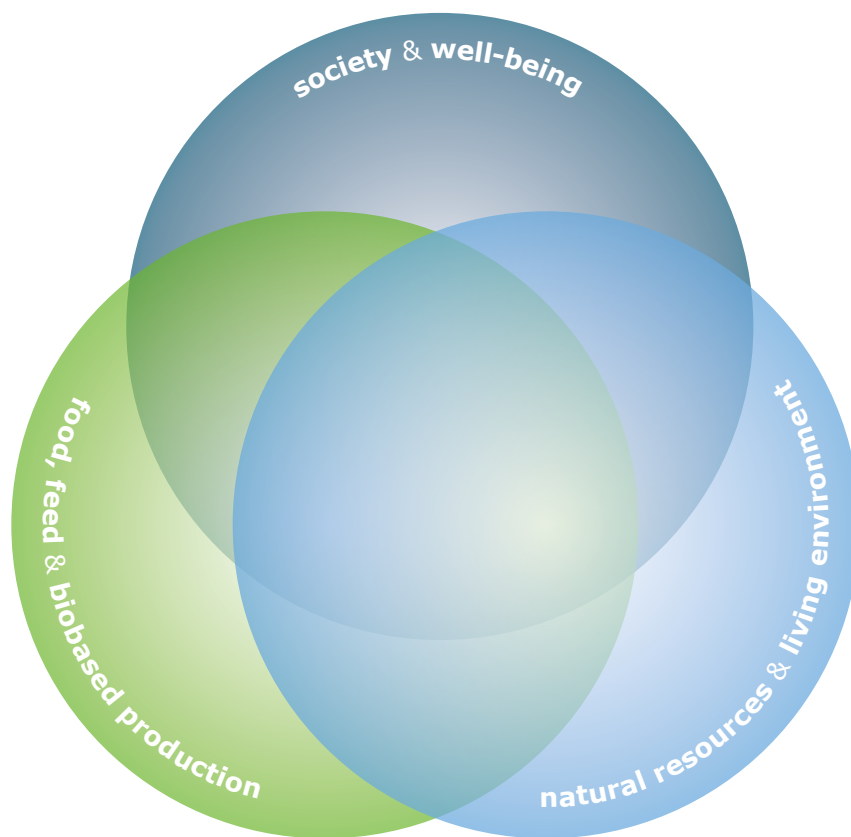
Within the scope, further matching between the needs expressed and the expertise and capacities available will result in clearly defined knowledge and capacity questions, corresponding policy advice and research projects.

Food systems in the Sahel have to meet increasing and changing demands from society, varying from provisioning healthier diets to generating employment for women and young people. Population mobility in the region is high, rapidly increasing consumer demands from people who are excluded from productive assets like land and capital. People who are active in agricultural production face systemic constraints, like exclusivity of land rights (constraining land ownership by women), heritage systems (leading to fragmentation) and erosion of land use practices (constraining access to water and grazing sources by pastoralists), access to other production inputs and markets (leading to sub-optimal productivity and losses), etc.. Environmental drivers, such as climate change, impose progressive challenges on many, if not all, current food systems.

Food systems in the Sahel are changing, but how to evolve them towards food system configurations that can deliver the desired outcomes? We would like to explore with our partners this meta question by addressing five, focussed themes that will guide our future engagements in the Sahel region:

#### 1 Governance and sustainable land and water use:

Over the past two decades Sahelian countries such as Mali, Niger and Burkina Faso have decentralised their government. Generation and gender conflicts, scarcity in public resources and deteriorating security resulted in insufficient public service delivery in rural areas.



Wageningen's domain: Food and Living Environment

Moreover, the capacity to collectively govern natural resources has been restricted through increasing conflicts between user communities. Meanwhile, land and water resource degradation has progressed at alarming pace. *This raises the question how can restoration of collective governance of natural resources and the 'social contract' between the local government and rural and urban communities enable the transition towards sustainable land and water use?*

## 2 Supplying (semi) urban consumers with healthy

**food options:** Latest World Bank data show that in Niger 42% of children suffer from stunting, while this number reaches 30% in Mali and 27% in Burkina Faso. A growing number of these children live in (semi-) urban areas. Though a middle class is emerging slowly, the majority of

people in (semi-) urban areas live close to the poverty level. They have restricted access to affordable, safe and healthy food. Across the Sahel, and generally speaking, 30% of smallholder farmers produce over 70% of all food available to (semi) urban consumers. These enterprising smallholders offer opportunities for improving food supplies in terms of quantity, quality and affordability of nutritious, safe food. *How can domestic availability, access and affordability of healthy foods to (semi) urban consumers be enhanced, thus impacting on the quality of diets of the (semi) urban poor?*

**3 Closing the rural dietary gap:** Many rural households in the Sahel face increasing deficiencies in their diets as their production is insufficient to feed the family and generate a living income. Producing grains or commodi-



Towards a Research & Development Agenda for WUR in the Sahel region

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ties (e.g. cotton) on their smaller acreages with increasing soil and water constraints becomes less and less a viable option. According to the World Bank, Niger's arable land per capita shrank from 1.4 hectares in 1996 to 0.8 in 2016. Non-commercial smallholders turn increasingly to other opportunities for income generation, often travelling large distances and across country borders as their labour is not well remunerated by their own agriculture. Women face limited access to necessary inputs and labour shortages while being responsible for nourishing the family. Recent research reveals a lack of diverse foods on the rural market needed to comprise a healthy diet during the hunger season – even if households could afford them. *What are the options to close the yield gap in a sustainable way? What are alternative land uses for these rural households – disarticulated by gender - that improve their diets and living income?*

#### **4 Complementary roles sedentary farming and**

**pastoralism:** One of the most immediate problems in the Sahel is the increasing number and intensity of conflicts between mobile (nomadic) pastoralists and sedentary farmers, that manifest themselves in inter-community violence. Pastoralism and farming fulfil complementary roles. Pastoralists are often dependent on farmers for their provision of staple cereals. Nomadic pastoralism is a crucial and environmentally sustainable component of the Sahelian food system as it provides nutritious products for non-nomadic (urban and rural) populations and recycles organic manure in food systems. However, over time with demographic growth, expansion of cropping areas, decentralization and political instability, the mobility of livestock has been restricted leading to increasing conflicts with farmers. Within pastoral and sedentary societies there is an increasing gap between haves and have-nots, contributing to the presence of many un(der)employed youth. *How can enhanced governance capacity and new smart technologies that are able to monitor and coordinate resource use reduce these conflicts and enhance synergies?*

**5 Adapting to climate change:** Farmers in the Sahel have always coped with high variability in the weather. However, with progressive climate change effects, weather conditions become more extreme and unpre-

dictable, resulting in more uncertainty to farmers. Historically developed coping mechanisms are often not adequate anymore to mitigate these effects. This may result in more mobility and further urbanisation. There is a demographic shift from the Sahel to better rainfall zones resulting in challenges how to integrate millions of migrants not only in urban areas but also in rural areas of the more fertile coastal countries, leading to pressure on land, pastures and water resources. Various 're-greening' efforts are implemented to re-establish natural resilience. More climate smart agro-forestry systems and better forecasting may help farmers reducing their vulnerability to climate shocks. Experience has shown though, that 'regreening' efforts can also lead to an increase in population growth. *What do resilient food systems look like and what are effective and innovative copying mechanisms for farmers? How can urban food systems be strengthened in a changing Sahel region? What are possible trade-offs?*



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In the following pages you will find examples of projects that WUR is currently implementing or has implemented in the past 5 years in the Sahel Region. We hope that it will give you an impression of the wealth of research and development activities that we, together with many partners, implement in the Sahel.





# Identifying options for public investments in Sahel food systems through the Food System Decision-Support Tool

Just Dengerink & Bart de Steenhuijsen Piters

Identifying options for public investments in Sahel food systems through the Food System Decision-Support Tool

## Background

In Burkina Faso and Niger, large parts of the population remain under the poverty lines and consumption patterns show a consistent trend of insufficient intake of nutrients. High population growth, in combination with climate change and land degradation, continues to put pressure on the natural resources.

The increased rate of conflicts further raises the concerns for the food & nutrition security and stability in the Sahel region. The two major agricultural production systems – rain-fed cereal production and pastoralist livestock production – are increasingly competing for the same land and water resources, contributing to local outbursts of violence.

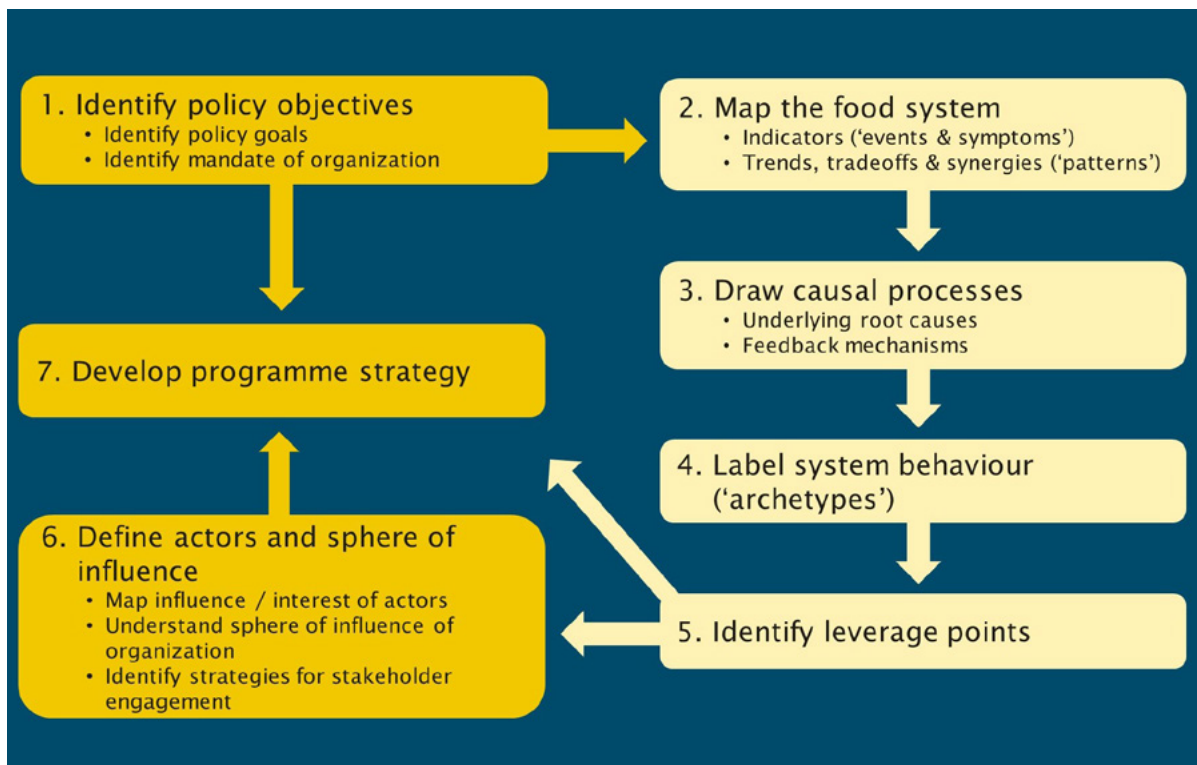


Figure 1. Steps used in the Food Systems Decision-Support Tool



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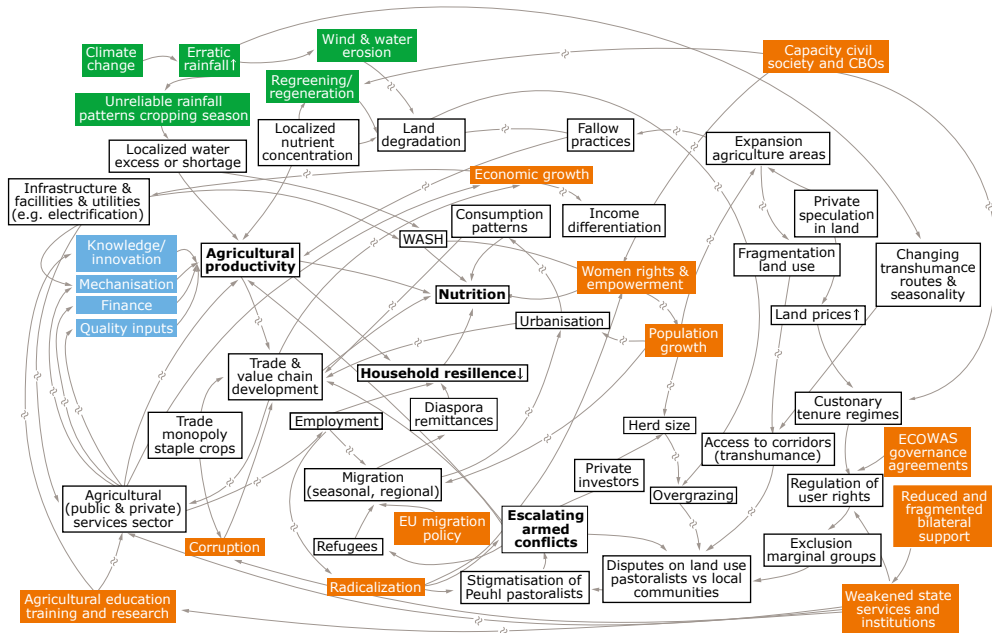


Figure 2. Food system causal map for Niger and Burkina Faso, highlighting the complexity of the system in terms of trade-offs and other relations.

## Project

Dutch ODA has prioritized the Sahel region and policy makers are in process of identifying investment options that optimize public good creation. The Food System Decision-Support Tool was applied to identify these areas for future Dutch ODA involvement.

Methods applied included literature review, expert interviews, workshops with stakeholders and validation



meetings. The tool identified, amongst others, drivers and leverage points for change, causal processes and archetypical system behavior.

## Results

Economic, social and ecological resilience is key in a fragile, risk-prone region like the Sahel. Interventions should thus seek to strengthen diverse and complex livelihood strategies. There is a strong plea among the key informants and practitioners to strengthen the civil society and look for grassroots technical and social innovations by working with local CBOs, NGOs and local groups representing youth and women.

Restoring the 'contrat social' between local governments and communities, strengthening local institutions, sustainable management of land and water resources, and strengthening household resilience are thought to be important intervention points for the envisioned Sahel program.

## Partners

This study was conducted by Wageningen Economic Research in collaboration with the Royal Tropical Institute. A selection of experts resident in the Netherlands has provided information to conduct the analysis.

## More information

Website: <https://www.wur.nl/nl/Onderzoek-Resultaten/Onderzoeksinstituten/Economic-Research/Themas/De-wereld-gezonder-voeden/Food-Systems-Decision-Support-tool.htm>

# Drylands Facing Change: Interdisciplinary Research on Food Security, Climate Change, Political Instability

Han van Dijk (Chair)

## Drylands Facing Change

COST action CA16233 is a network programme aiming to achieve more collaboration and coordination between disciplines (physical geography, agriculture, environmental sciences, social sciences, economics, political science, human geography, anthropology, history), and across institutional and regional boundaries (European, international and African, Middle Eastern and West and Central Asian institutions) with a view to create a research network whose members will be able to work together on strategic research (agendas) that contribute to long-term solutions for problems in dryland areas.

## Context

The drylands surrounding Europe are among the most food insecure and politically unstable areas in the world. This includes Sahelian and East African countries, which

are plagued by poverty and increasingly frequent and more extreme weather events, inhabited by a population with little formal education, and have up to now limited development potential. Drylands are defined as areas where mean evapotranspiration is at least 1.5 times the long-term mean of rainfall (Middleton & Thomas 1997). They comprise 41% of the world's terrestrial earth surface and host around 2 billion people (MEA 2005). Most dryland countries have a predominantly young population, high unemployment rates and high levels of political tension based on religious and ethnic divisions. It becomes increasingly clear that attention has to be given to long-term solutions that will address the economic, political and ecological problems in dryland areas. A credible multi-pronged strategy has to be developed to foster economic and institutional development, and to seek solutions to the political conflicts.



Figure 1: examples of soil and water conservation technologies



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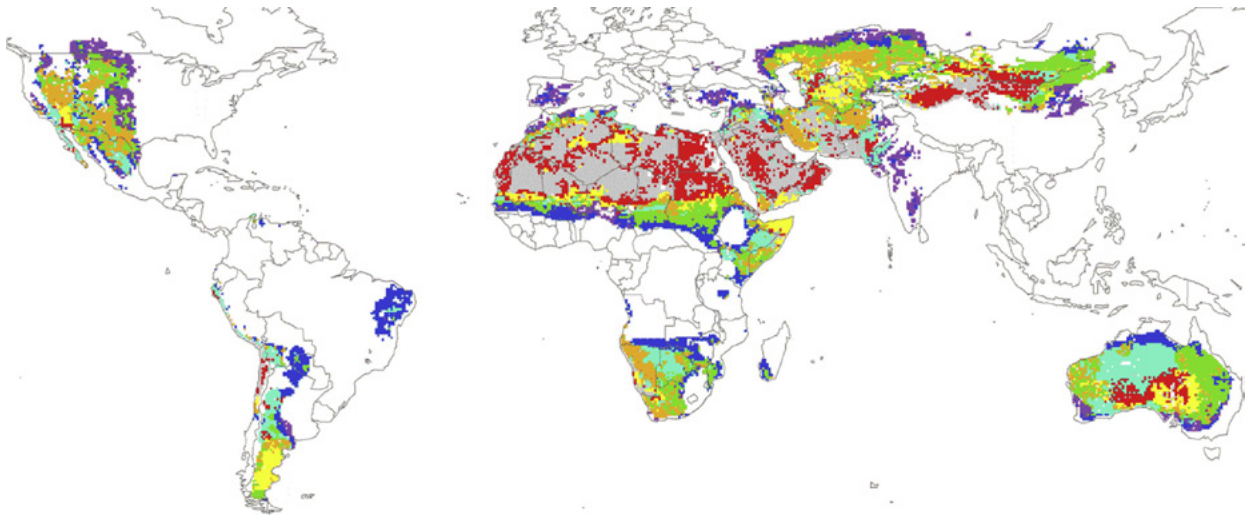


Figure 2. Cluster of vulnerability in the world's drylands (Neumann et al 2015)

### Project

The 4 working groups of the COST action meet regularly to pool expertise and disciplines to come up with innovative ideas for research and development agendas for drylands. They produce review papers, policy briefs and research agenda documents to identify and prioritize research and development goals and strategies

### Themes

#### **Working Group 1:** climate – food security – population

The dynamics of climate variability, population growth and land degradation (such as salinization and desertification) and restoration in drylands in relation to food (in-)security in rural and urban areas.

**Working Group 2:** conflict – institutions – natural resource governance causes, patterns and consequences of conflicts and institutional changes regarding the governance of natural resources in the drylands such as pastures, forests, water points, rivers, floodplains, including large-scale external investments

#### **Working Group 3:** Human development

Various dimensions of human development, such as education, health and nutrition linking and contextualizing human development problems within the economic, institutional, social and security challenges and changes

#### **Working Group 4:** Insecurity – youth – mobility

The creation of employment and future prospects for millions of young dryland inhabitants. In the absence of this, criminal activities, armed militia, labour migration and extremism offer attractive alternatives for young men and women.

#### **Working Group 5:** Interdisciplinary collaboration

To ensure the interdisciplinary character of the Action. And to produce synthesis reports based on deliverables of the other 4 working groups

#### Partners

Researchers from 30 European countries are involved in this COST action. Attempts are made to involve colleagues from the dryland regions but the funding does not provide sufficient means for that.

#### More information

<https://www.cost.eu/actions/CA16233/#tabs|Name:overview/>

[www.drylands.org](http://www.drylands.org)

# Minimum emission pathways to triple Africa's cereal production by 2050

Martin van Ittersum, Renske Hijbeek, Hein ten Berge, Marloes van Loon, Hugo de Groot, Kindie Tesfaye<sup>1</sup>

## Key messages

Cereal demand in SSA is projected to increase between

2015 and 2050 by a factor 2.8, due to population increase and dietary changes (Fig. 1).

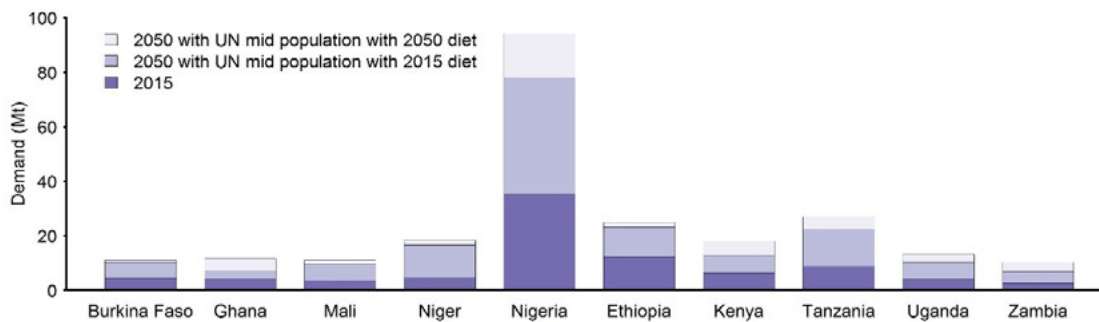


Figure 1. Projected increase in cereal (maize, millet, rice, sorghum and wheat) demand in ten countries in sub-Saharan Africa. (Source: Van Ittersum et al., 2016).

Cereal self-sufficiency in SSA by 2050 on current cropland area requires an unprecedented trend break in yield patterns for rainfed systems in the world, from ca.

20-40% of water-limited yield potential today to ca. 80% in 2050 (Fig. 2 and 3).

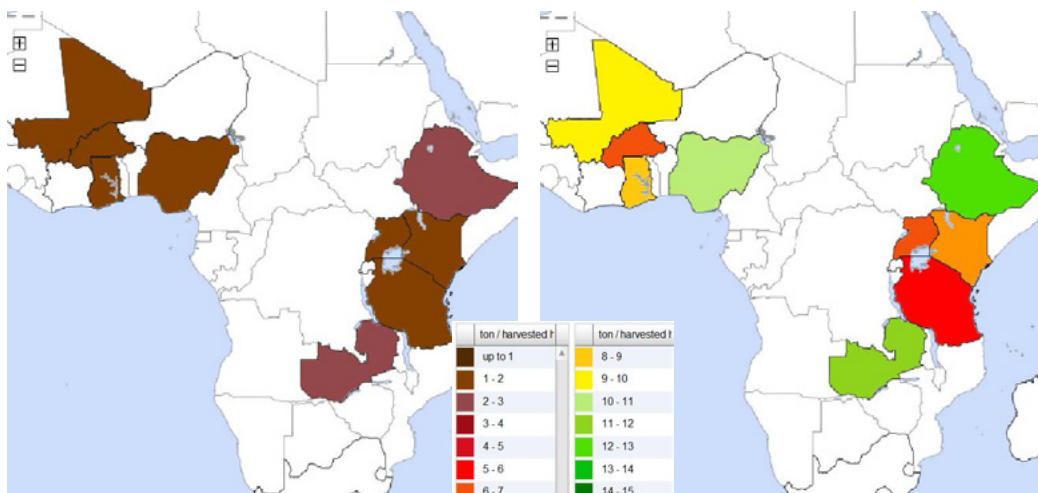


Figure 2. Actual and potential maize yield under rainfed conditions (www.yieldgap.org).



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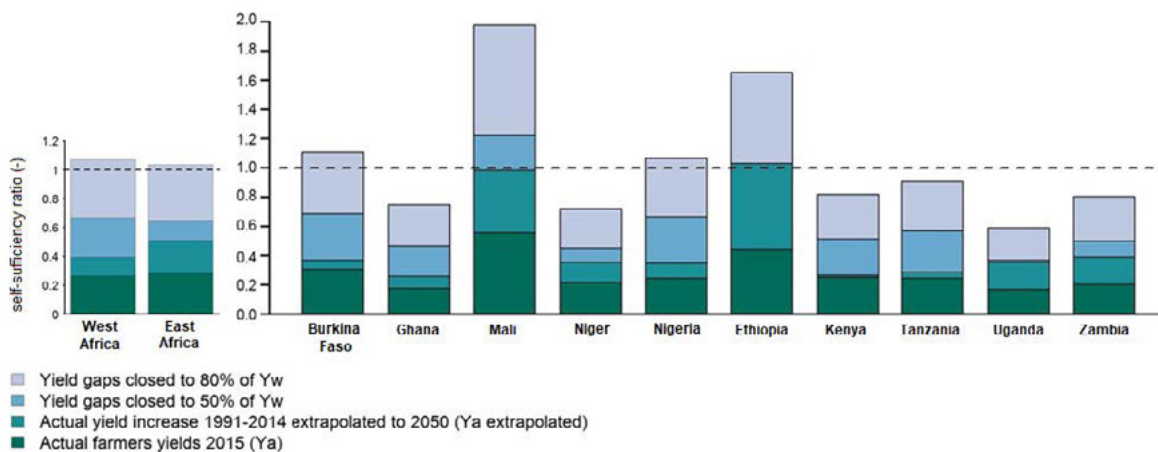


Figure 3. Potential cereal self-sufficiency for four intensification levels on existing cropland. (Source: Van Ittersum et al., 2016).

To enable steep yield increases, crop nutrient requirements will have to increase 9 to 15 times, as current

yields are achieved at the expense of soil nutrient mining (Fig. 4).

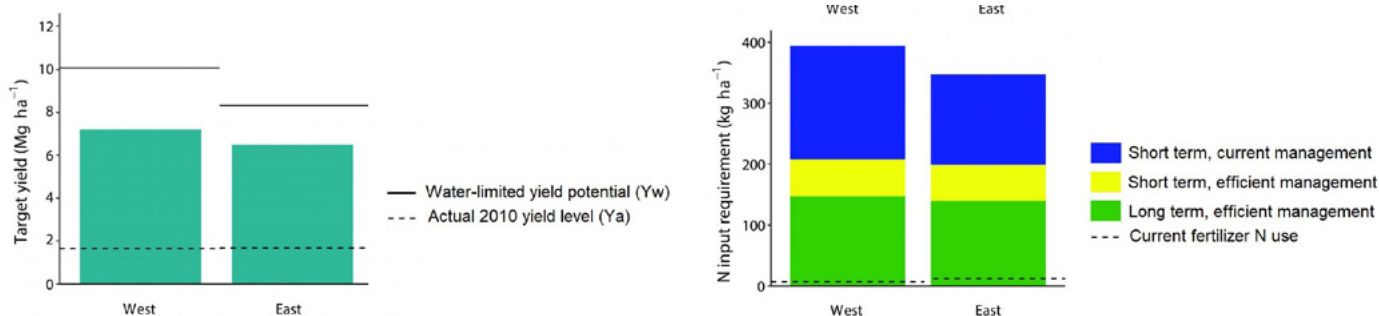


Figure 4. Target maize yields for West and East Africa to achieve maize self-sufficiency (top two graphs) and corresponding nitrogen input requirements (bottom two graphs) for different levels of agronomic nitrogen use efficiency. (Source Ten Berge et al., 2019).

By 2050 greenhouse gas emissions from cereal production in SSA will be at least two times higher than in 2015, no matter whether scenarios of intensification or crop area expansion will be followed (Fig. 5).

Intensification of cereal production with efficient use of fertilizers will lead to lower GHG emissions compared to agricultural area expansion, but this requires excellent, climate-smart, agronomy (Fig. 5).

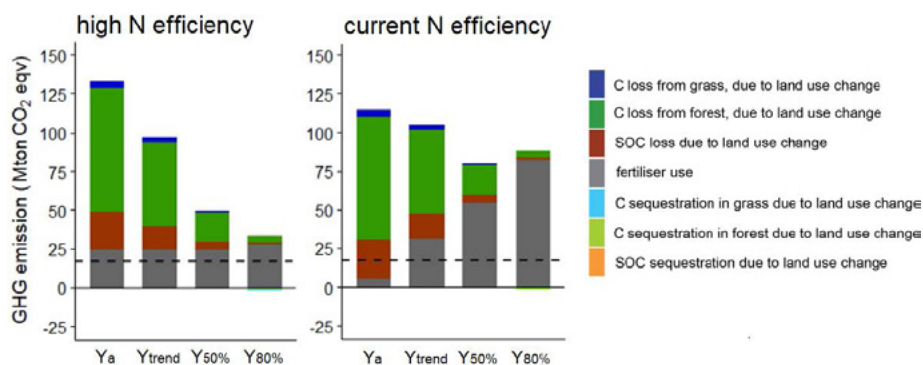


Figure 5. Greenhouse gas emissions for four scenarios of maize self-sufficiency in SSA, with different levels of intensification and area expansion. (Source: Van Loon et al., 2019).

### Partners

This work is a collaboration between Wageningen University & Research, national African partners, University of Nebraska-Lincoln, CGIAR institutes and CRPs (CIMMYT, CCAFS) and the fertilizer industry. Funding was obtained from the Bill and Melinda Gates Foundation, CCAFS-CGIAR, Wageningen University & Research and the International Fertilizer Association.

### More information

- [www.yieldgap.org](http://www.yieldgap.org)
- van Ittersum, M.K., et al., 2016. PNAS 113 (52), 14964-14969.
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- van Loon, M.P., et al., 2019. Global Change Biol. 25, 3720-3730.



# Fostering an Agroecological Intensification to improve farmers' Resilience in the Sahel (FAIR)

WUR partners: Katrien Descheemaeker (Plant Production Systems) & Annemarie van Paassen (Knowledge Technology & Innovation)

## Background

In the Sahel, a large part of the population experiences food insecurity, due to the low productivity of the agricultural system. This food problem is expected to deteriorate as the rapid population growth leads to increased competition for land, degradation of natural resources and the abandonment of certain irrigation areas. Furthermore, the agricultural system is highly vulnerable for the extreme variability of the weather, which may be aggravated by climate change. The main challenge is to induce a transformation of the agricultural system towards new forms of intensification with more efficient use of resources and nutrients available, and long-term conservation of water, soil and biodiversity.

## Objectives

- To identify, experiment with, assess and promote new combinations of agricultural practices at farm- and landscape level, that allow farm households to adapt to the new climate conditions, and attain more revenue with a minimum of negative environmental impacts. Special attention will be given to Integrated Natural Resource Management, Integrated Pest Management and Crop-Livestock Integration.
- To develop, co-design and assess methodologies to engage farmers as well as value chain actors, agricultural advisory services, and policy makers at various administrative levels in the research- and innovation process, so as to create conducive conditions for the transformation of agriculture towards Agroecological Intensification (AEI).

## Intervention Zone

The research takes place in three countries of the Sahelian and Sudano climate zones: Senegal, Mali and Burkina Faso. The project focusses on AEI in areas of (a)

dry rainfed agriculture, (b) sub-humid rainfed agriculture, and (c) the irrigated valleys. In each country the action research takes place in two different areas, and covers two to three villages linked to one 'terroir'.



Figure 1. Bio-climate regions West Africa with the countries of intervention: Senegal, Mali and Burkina Faso

## Project duration

2020-2023 (4 Years )

## Partners and work components

The research project is led by CIRAD and involves IRD, WUR, ZALF, and CSIC based in Europe. In the Sahel there is close collaboration with the national agricultural research institutes ISRA (Senegal), IER (Mali) and INERA (Burkina Faso), and various NGOs involved in AEI advisory services and innovation. The work is organised along 5 components or work packages as illustrated in Figure 2.



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Funded by DeSIRA , European Commission

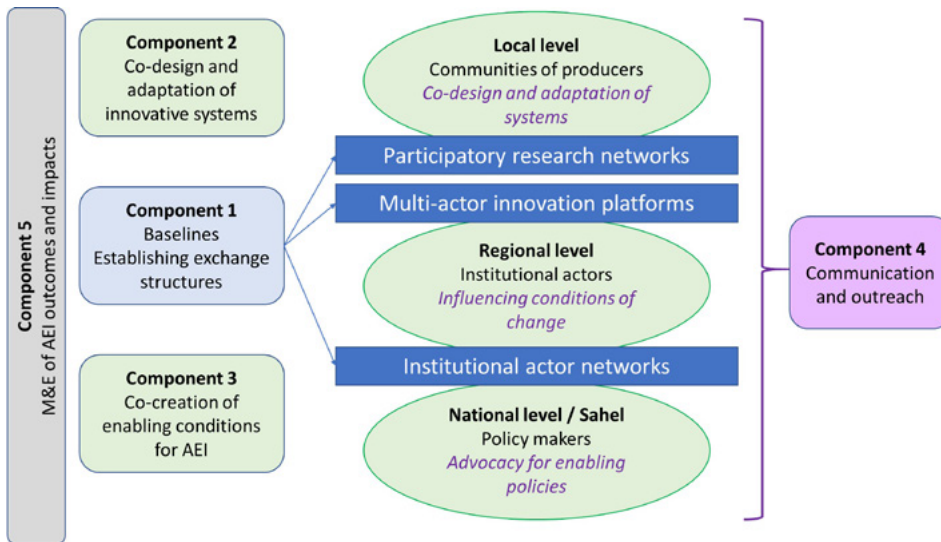


Figure 2. Organisation of the FAIR project activities in 5 components or work packages.



WUR engagement: 2 PhDs

#### PhD-1 // Farm level

##### **Co-design of innovative farm systems based on systems agronomy at crop, livestock herd and farm level**

To co-design innovative farm systems, this PhD research will conduct participatory on-farm testing and evaluation of crop and livestock options that are promising for AEI and climate adaptation. On-farm experiments and participatory modelling exercises will be implemented in adaptive cycles of learning with stakeholders. Besides the exploration of effects in current conditions, scenario analysis and modelling will be used to explore impacts under future climate and institutional conditions.

#### PhD-2 // Communal/Landscape level ("Terroir")

##### **Co-design of institutional change at terroir level to enhance inclusive resilience**

To co-design institutional change, the action research in this PhD will use agent-based modelling and serious games to enable social learning and co-design feasible and fair organizational options for better natural resource management at the terroir level. Additionally, the effectiveness of the brokerage role of the innovation platform will be investigated in order to optimize the support for the institutional change process at community level.



# Roles of Agroforestry in sustainable intensification of small farms and food security for societies in West Africa (RAMSES II)

Verina Ingram (Wageningen team coordinator), Jan Brouwers, Frans Bongers and Jolanda van den Berg

## Trees and crops, a profitable life insurance!

Ancient agroforestry practices in West Africa provide multifunctional environmental, economic and social solutions to sustainably contribute to food and income security, while at the same time contributing to climate change adaptation and mitigation. These practices however are currently facing multiple threats. The question posed by RAMSES II project is: "How can agroforestry be intensified sustainably?"

## Context: key assumptions

- Short term yields undermine long-term agricultural productivity;
- Ecosystem services (e.g. health, food & income) under increasing pressure;
- Insufficient knowledge of what works in sustainably intensifying agroforestry parklands on the farm and

landscape levels, traditional knowledge often ignored;

- Disabling institutional and organizational environment to support change towards sustainable intensified agroforestry parklands;
- Women and young men sustaining household food security often excluded from decision-making.

## Project

To maximize their adoption, RAMSES II aims at providing Innovative Scenarios for Managing Sustainable Intensification (ISMSI) that will be co-built with all the stakeholders involved in the four most common Sudano-Sahelian agroforestry parklands based on cereals food crops: *Piliostigma* and shea (*Vitellaria paradoxa*) parklands in Burkina Faso; *Guiera senegalensis* and *Faidherbia albida* in Senegal.

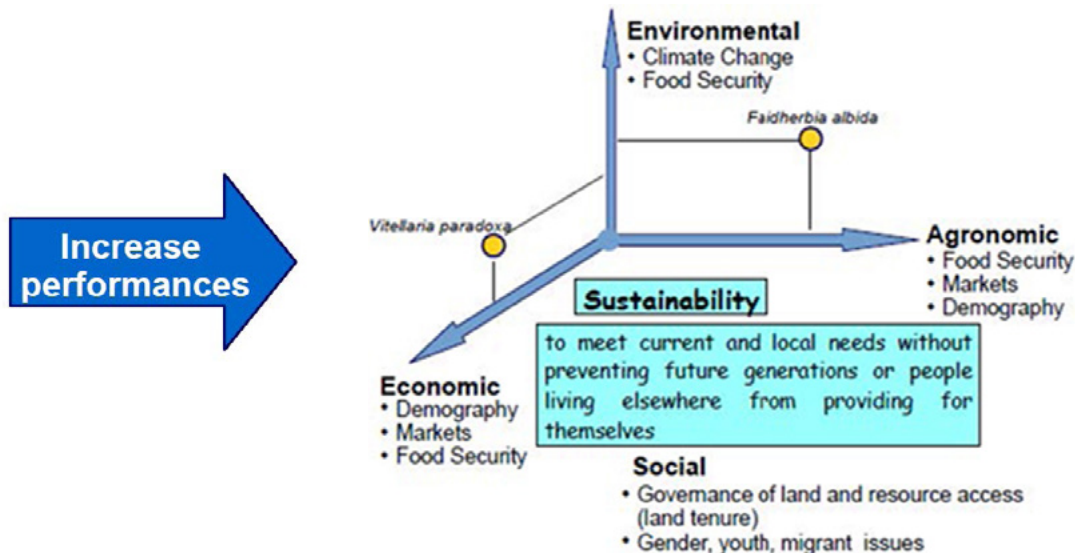


Figure 1. Project approach



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Figure 2. Karité parklands – *Vitellaria paradoxa* trees with millet and maize near Bobo, Burkina Faso

## Results

Intensification scenarios selected and tested by key players in the area; and supported by governance arrangements validated by all stakeholders, including the most vulnerable. For example, women's empowerment has important effects on children's nutrition, and tree and shrub products are a source of income for women.

**Envisioned impacts:** Agroforestry landscapes thrive and regenerate around the studied areas, with food security is sustainably improved and poverty significantly reduced.

## Partners

Institute for Research for Development, France (IRD), Center for International Cooperation in Agricultural Research for Development, France (CIRAD), Institute for the Environment and Agricultural Research, Burkina Faso (INERA), West African Science Service Center on Climate Change and Adapted Land Use, Burkina Faso (WASCAL), Senegalese Research Institute Senegalese, Senegal (ISRA), Wageningen University & Research, the Netherlands (WUR)

**Associated partners:** NGO Association for the Promotion of Fertilized Trees, Agroforestry and Forestry (APAF), Birdlife International, Global Shea Alliance (GSA)

## More information

<https://josianeseghieriwixsite.com/ramsesii>

# What drives natural regeneration? Farmer-managed natural regeneration as a scalable restoration technique

Madelon Lohbeck<sup>1,2\*</sup>, Peggy Albers<sup>1</sup>, Laetitia Boels<sup>1</sup>, Frans Bongers<sup>1</sup>, Samuel Morel<sup>1</sup>,  
Fergus Sinclair<sup>2</sup>, Bertin Takoutsing<sup>2</sup>, Tor Vågen<sup>2</sup>, Leigh Winowiecki<sup>2</sup>,  
Emilie Smith-Dumont<sup>2</sup>

<sup>1</sup> Wageningen University and Research (WUR). <sup>2</sup> World Agroforestry (ICRAF)

## What is FMNR?

Farmer Managed Natural Regeneration is a low-cost land restoration technique based on natural regeneration and used to combat poverty and hunger amongst poor subsistence farmers by increasing food and timber production and resilience to climate extremes. Under FMNR, farmers actively revegetate their fields by nurturing natural woody regeneration, while keeping the field under the primary function of crop production. FMNR can reverse the loss of tree cover and diversity in dryland systems, increase crop yield and raise household income.

To date however little is known about how regeneration dynamics is influenced by social and environmental conditions, which may hamper its successful scaling up.

## Approach

*How do human impact, land degradation and environmental factors drive natural regeneration?*

We take a functional ecology approach to understand regeneration dynamics where drivers impose habitat filters that affect species differential success based on their functional traits.

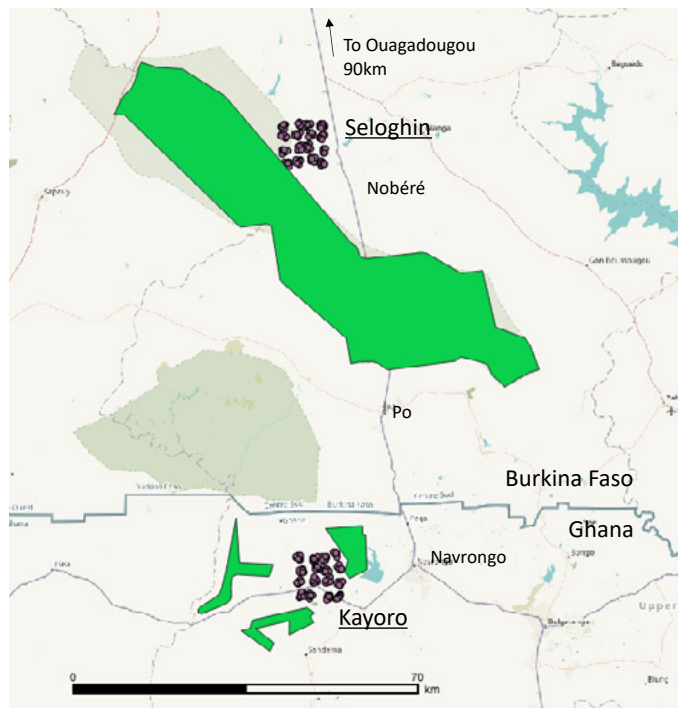


Figure 1. Map with study locations; Seloghin in Burkina Faso and Kayoro in Ghana. Each site has approximately 160 plots (total N = 316) and is located close to forest reserves (in green). Picture: farmer in the study region with *Vitellatia paradoxa*, the most abundant tree species



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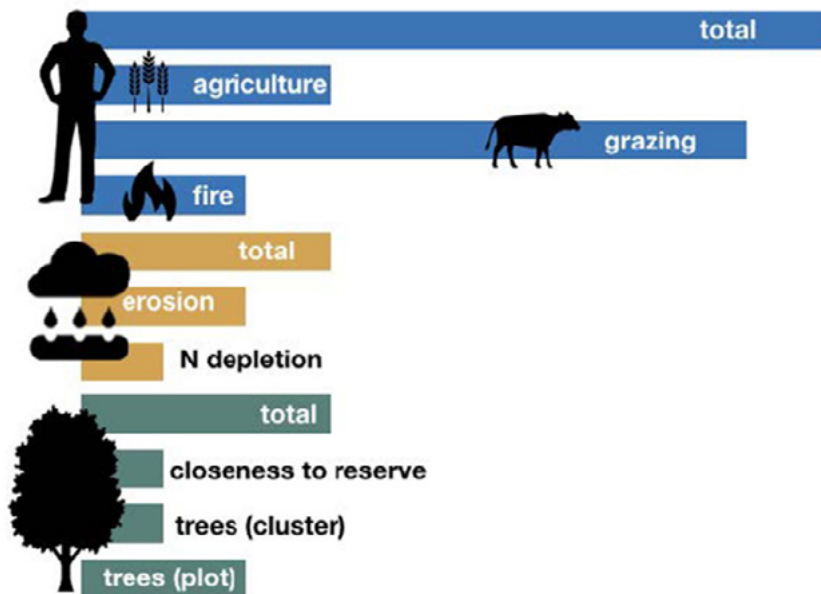


Figure 2. Conceptual model that was tested with structural equation models. For each regeneration variable a separate model was constructed, resulting in 19 structural equation models. The length of the bar indicates the relative number of models in which that factor was significant in explaining structural and functional properties of the regenerating community.

Regeneration is quantified by 19 different structural and functional variables: regeneration occurrence, regeneration abundance, species richness, community-weighted mean of adult height, deciduousness, N<sub>2</sub> fixing, invasiveness, exotic, wood density, twig dry matter content, resprouting capacity, seed mass, specific leaf area, leaf area, leaf dry matter content, leaf density, chlorophyll content, chlorophyll fluorescence, leaf thickness.

### Research

We systematically assess the effects of human impact (intensity of agriculture, grazing and fire), land degradation (erosion, soil nutrient depletion) and environmental drivers (trees in the landscape, distance to reserve) on structural and functional properties of woody regeneration across 316 plots in agroforestry parklands of North Ghana and South Burkina Faso (fig 1).

### Results

Human activity was the most important factor influencing regeneration. Grazing was associated with enhanced regeneration which is explained by the fact that grazing is concentrated in fallows. We further found that land degradation did not inhibit regeneration and that the high tree densities in Sahelian Agroforestry parklands make these sites very suitable for farmer-managed natural

regeneration. Directional shifts in functional composition with management intensity and land degradation warrant that natural regeneration may enhance or deteriorate land functionality depending on the functions of interest. For the successful implementation of FMNR across agricultural landscapes we need to move beyond 'regreening' and identify what functional groups regenerate under what social and environmental conditions and how this affects specific restoration targets, such as carbon storage, soil fertility or food security. Where natural regeneration is likely to be insufficient additional planting may be needed.

### Partners

This research is part of the West Africa Forest-Farm Interface (WAFFI) project

### More information

<https://www.cifor.org/waffi/>



# Earth Observation for better-informed Decision Making (EODM)

Les technologies d'observation de la terre pour la prise de décisions éclairées dans la transformation de l'agriculture paysanne en Afrique de l'ouest et centrale

Tomaso Ceccarelli and Wouter Meijninger

## What were our objectives ? What did we achieve?

EODM is an IFAD grant running from 2016 to 2019 with use cases developed in Senegal, Mali and Cameroun. The main objective was to generate awareness, capacity and use of Earth Observation (EO) and Geographical Information Systems (GIS) technologies in IFAD projects, supporting smallholder farmers. In the case of PADAER in Senegal, we performed a 'spatially explicit' value chain analysis. In Mali we supported the PAPAM-ASAP project mapping and monitoring land cover, especially forest land, through satellite data (Sentinel 2).

## What was the context of the project ?

PADAER wanted a tool to prioritize rural investments in the cereal value chain such as warehouses and all-weather

feeder roads. This for both the current production capacity and potential production scenarios.

PAPAM-ASAP needed methods and capacity to run large scale land cover mapping and monitoring, for assessing the impact of project interventions such as bio-digestors.

The projects aimed at sustaining smallholders' production promoting environmental sustainability, in the case of Mali especially in terms of woody biomass:

For Mali, with our partner Geoville, we developed image classification procedures and tools integrated with field survey data collection



Figure 1. Satellite data for current crop mapping and as input in value chain analysis



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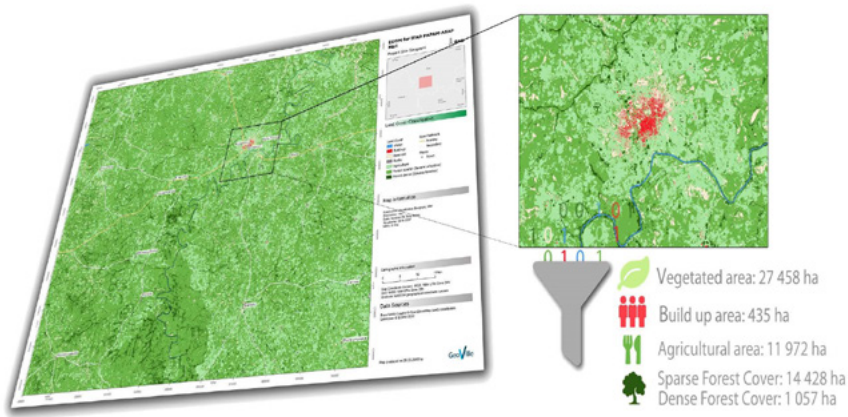


Figure 2. Methods for large scale land cover (forest) monitoring in Mali

### What results did we achieve ?

For Senegal, with our partner VITO, we have created procedures and tools for mapping current production by means of satellites and geo-referenced data (location of infrastructures, farmers groups, etc.). For future production scenarios we have developed approaches based on GIS, multi-criteria and Agent Based Modelling techniques (the latter with our partner Sensonomic).

### How will the project results be applied by the users ?

We developed datasets, tools and models, but most importantly, we contributed to creating more awareness on what can be done with satellite and geo-information. With our European and African partners, we also invested

a lot in supporting national and local capacity to do so in the future.

### Partners

EODM is a consortium between WUR (WENR), VITO, Geoville and Sensonomic. In Senegal we partnered with the CSE and PADAER. In Mali with DNEF-SIFOR, IER, University of Bamako, and PAPAM-ASAP.

### More information

IFAD Blog: <https://ifad-un.blogspot.com/2019/04/using-geospatial-data-to-analyse-and.html>

YouTube: <https://www.youtube.com/watch?v=DoDFsXb-CFjE&feature=youtu.be>

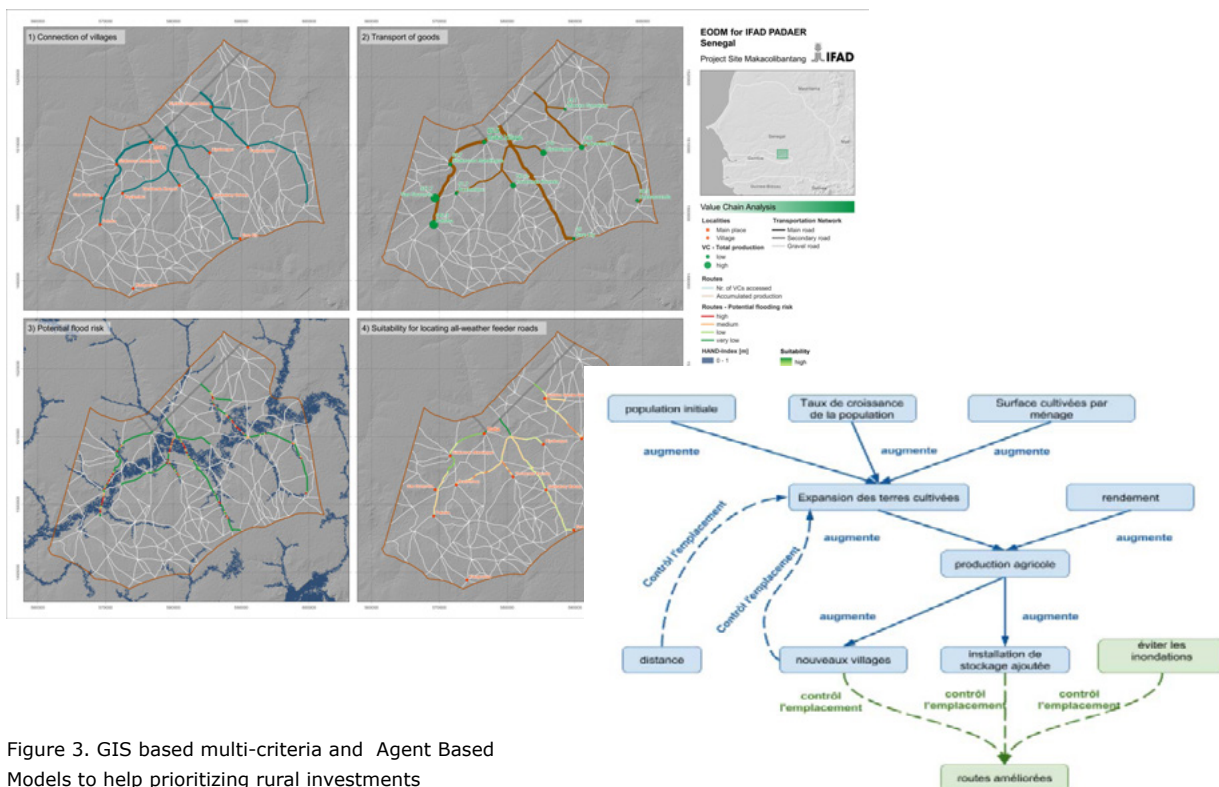


Figure 3. GIS based multi-criteria and Agent Based Models to help prioritizing rural investments



# Geospatial soil fertility management platform with relevance for the Sahel

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## Geospatial soil fertility & crop nutrition management platform with relevance for the Sahel

Soil fertility is recognised as a prime factor limiting agricultural productivity in sub-Saharan Africa including the Sahel. It needs crop and site specific management, at scale, for being cost efficient and risk averse. Towards this goal, ISRIC – World Soil Information developed a geospatial framework for soil-crop-response modelling and mapping. Proof of concept was provided for ECOWAS/CEDEAO in collaboration with IFDC and NARs by upscaling fertiliser recommendations for major crops in West Africa. This generic framework is made more specific in a long term R&D collaboration with OCP Africa. This collaboration develops and tests crop and site specific multi-nutrient fertiliser formulations for important agro-ecosystems across Africa. Spatiotemporal nutrient gap analysis is at the basis of the approach wherein crop nutrient demands are compared with soil nutrient supplies and fertiliser

efficiencies are codetermined by water-nutrient interactions. A pilot is carried out for irrigated rice in selected areas in Mali and Senegal. A next pilot will target rainfed crops in Northern Ghana.

### Context

Soil fertility is limiting agricultural productivity in sub-Saharan Africa and is declining. Use of organic and inorganic fertilisers is needed but the necessary investments are considered too high and risky by the majority of farmers. Therefore, targeted, crop and site specific, nutrient management is key which requires targeted information.

### Projects

We developed an operational framework integrating soil-crop-response models with relevant geospatial input data such as the Africa SoilGrids\* and parameters derived from fertiliser trials and literature. This framework was applied to model and map fertiliser recommendations for

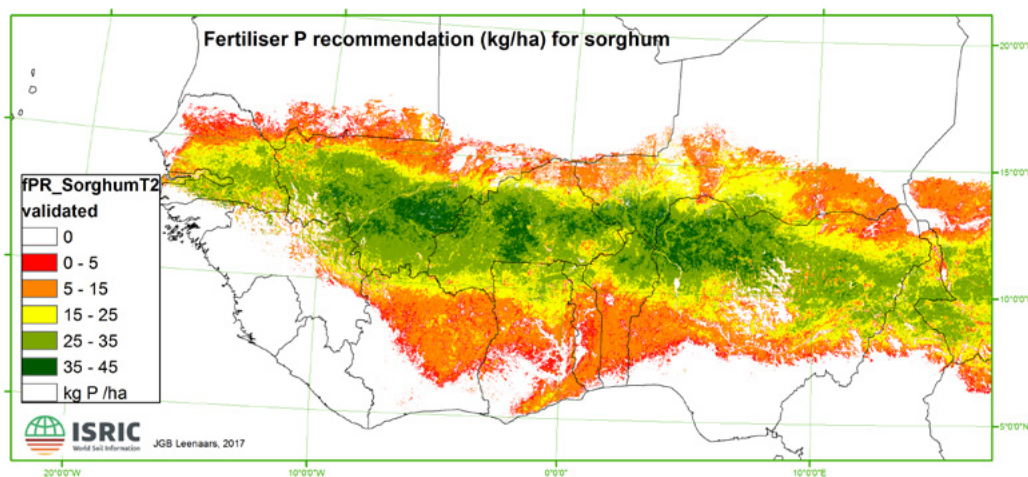


Figure A. Generic fertiliser P recommendation at 250m resolution



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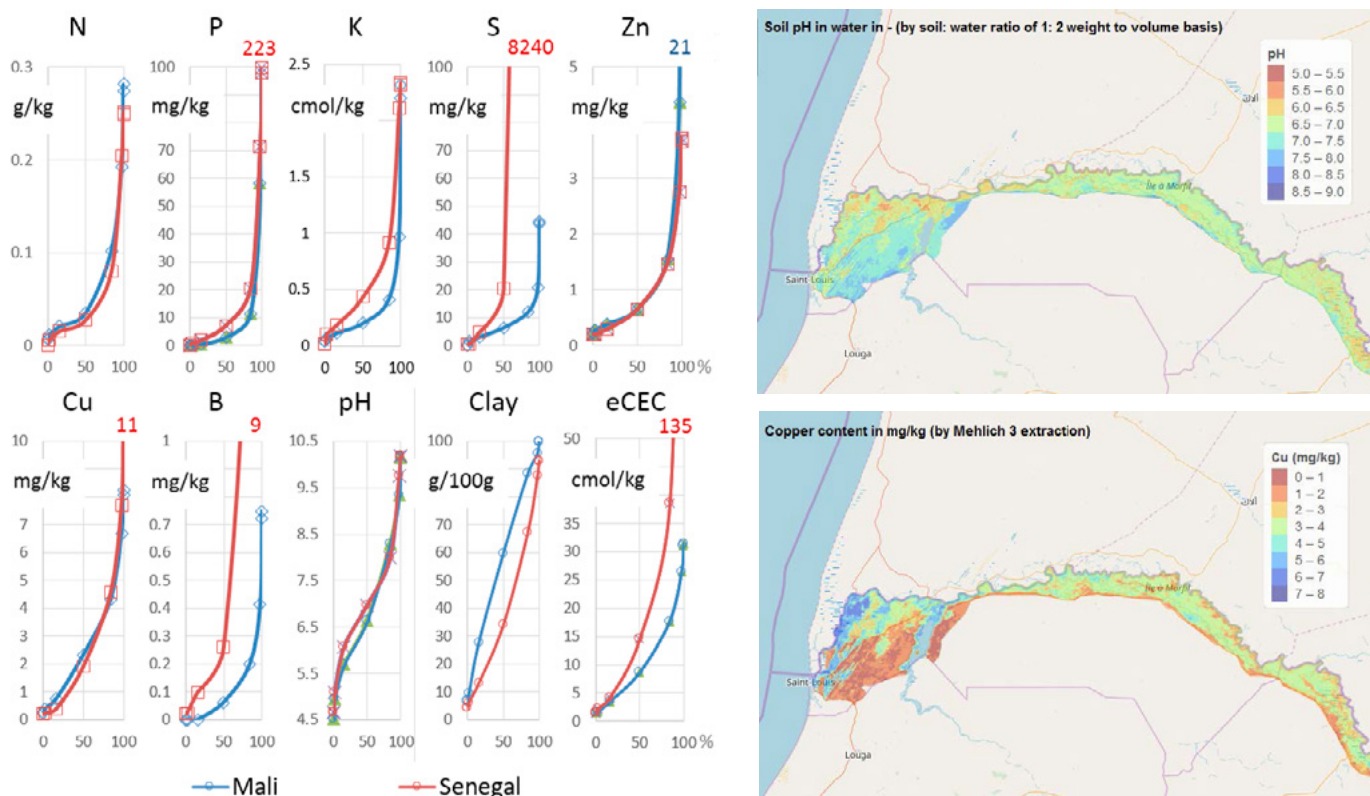


Figure B. Probability distributions and maps of soil analytical results (n=1238)

major crops in West Africa at a spatial resolution of 250m. The results have a generic nature and were made target area-specific (locally accurate, precise and valid) in collaboration with OCP Africa by adding locally collected data from the Office de Niger and the Senegal river valley and delta. We sampled the soil rootable depth and used the soil analytical results to produce area-specific updates of the Africa SoilGrids\*. Then we calculated and mapped the nutrient gaps, combining modules from the ORYZA, QUEFTS and INITIATOR models (in which we integrated S, Zn, Cu and B and made nutrient supply and uptake a function of attainable transpiration), followed by site-specific fertiliser formulas and application rates at a spatial resolution of 250m. The latter were generalised to three recommendation domains per country and were blended by OCP. These new products are currently tested on 360 on-farm trials relative to default recommendations (DAP and urea) and a control. The test permits to distinguish between the effect of micro-nutrients and of the site-specificity of NPK in the new formulae. The propagation of uncertainties introduced at each step in the process should be assessed to evaluate the approach.

## Results

The framework integrates models with maps and data from different projects. Transnational maps of generic fertiliser recommendations were produced permitting policy makers and the industry to develop targeted interventions. Local, more accurate, maps of specific fertiliser recommendations permit the private sector to

produce and distribute new fertiliser products and farmers to increase productivity cost-efficiently and possibly sustainably.

## Partners

- A <sup>1</sup> ISRIC – World Soil Information, <sup>7</sup> International Fertilizer Development Centre, CSIR-SRI (Ghana), University of Abomey-Calavi (Benin), Bunasols and INERA (Burkina Faso).  
 B <sup>1</sup> ISRIC – World Soil Information, <sup>2</sup> OCP Africa, <sup>3</sup> Nutrient Management Institute, Wageningen University & Research <sup>4</sup> Environmental Sciences Group and <sup>5</sup> Plant Sciences Group, <sup>6</sup> AfricaRice, ICRAF, Institut d’Economie Rurale (Mali), Institut Sénégalais de Recherche Agricole (Senegal), Office du Niger (Mali) and Société Nationale d’Aménagement et d’Exploitation des Terres du Delta et des vallées du fleuve Sénégal (Senegal).

- A Financial support: West Africa Fertiliser Program, USAID.  
 B Financial support: OCP AFRICA S.A.

## More information

- A [www.isric.org/projects/taking-fertilizer-recommendations-scale-major-crops-west-africa](http://www.isric.org/projects/taking-fertilizer-recommendations-scale-major-crops-west-africa)  
 B [www.isric.org/projects/development-implementation-soil-fertility-and-crop-nutrient-management-platform-pilot](http://www.isric.org/projects/development-implementation-soil-fertility-and-crop-nutrient-management-platform-pilot)

\* <http://data.isric.org> [Search for: Africa SoilGrids]

# Decision making for Sustainable Land Management (SLM)

Drs. GWJ van Lynden, ISRIC



The World Overview of Conservation Approaches and Technologies (**WOCAT**) is a global network that was established in 1992. WOCAT launched efforts to document, evaluate, disseminate, and apply sustainable land management (SLM) knowledge. In early 2014, WOCAT's SLM database was officially recognized by the UNCCD as the primary recommended Global SLM Database.

## Context

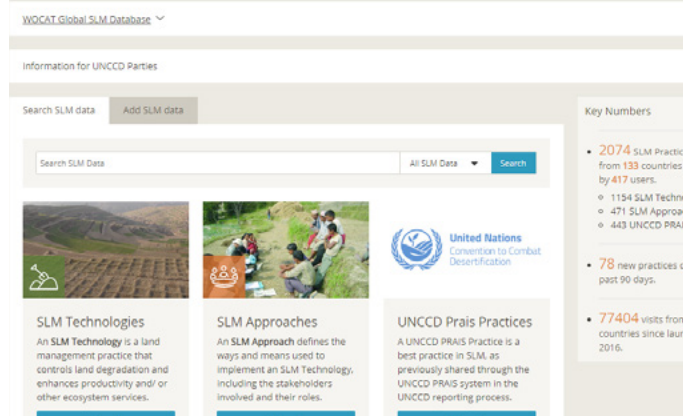
Poor land and water management and inappropriate governance lead to degradation of the land resources upon which rural communities and society as a whole depend.

Without **effective knowledge management and decision support tools**, land management will remain ineffective, all too often overlooking valuable knowledge and experience gained over the years in various regions.

## Project

### WOCAT constitutes:

- An open **global network** of specialists working in the field of **SLM** (since 1992) in >80 countries
- A framework for **Knowledge Management** and **Decision Support** for policy making
- A standardized **tool to document and evaluate** SLM case studies and **mapping land** degradation and SLM
- A **global database** on SLM with >2000 SLM practices from all over the world (primary recommended database by UNCCD)



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## Results

### What can we offer?

- A **knowledge base** for evidence-based decision-making
- Tools for **sharing experiences** with a wide community
- **Building capacities** in SLM
- **Bringing stakeholders together**
- Identify **what works where**
- Helping in **setting priorities** in appropriate land use planning

### Integrating knowledge in a Decision Support process



**Part I: Identification (stakeholder workshop / participatory learning approach)**

- Problems and possible solutions:
- creation / use of LUS maps
  - first inventory of LD and SLM practices



**Part II: Documentation & Assessment (evidence base)**

- mapping LD and SLM practices (Mapping Quest.)
- thorough inventory of LD and SLM practices (Technology and Approaches Quest.)



**Part III: Evaluation & Selection (stakeholder workshop: setting criteria → scoring → ranking)**

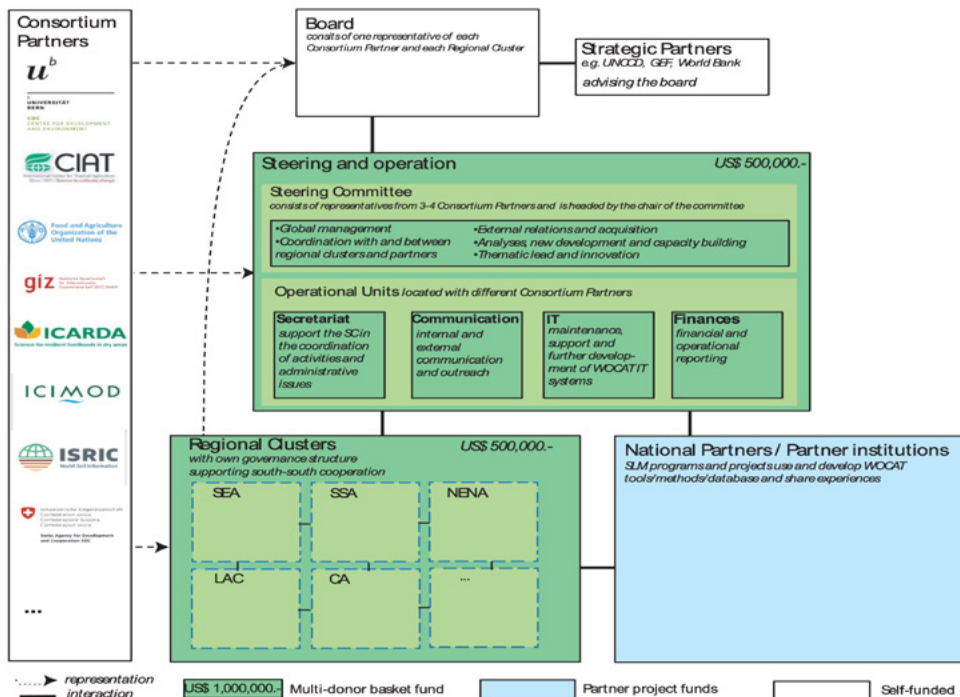
- selection of most promising SLM Ts&As → regional and local
- negotiation of SLM Ts&As



## Partners



### Organizational structure of WOCAT 2020+ The following entities comprise the WOCAT Global network.



More information  
[WWW.WOCAT.NET](http://WWW.WOCAT.NET)  
[wocat@cde.unibe.ch](mailto:wocat@cde.unibe.ch)



# Tailor-made weather and climate information services for sustainable agriculture in Ghana

Spyros Paparrizos,  
Erik van Slobbe (WATERAPPS team, WAGRINNOVA team)  
Cees Leeuwis (EVOCA team)

## Summary

Small scale farmers contribute more than 80% to the total agricultural production of Ghana.

Yet, they have limited access to climate information in order to manage their agricultural activities.

Time and location specific weather and climate information is crucial for decision-making in daily farming activities.

The main objective is to provide tailor-made forecast information by developing methods, approaches and tools (Apps) with and for farmers.

## Context

Climate in West Africa is highly variable. In Ghana, farmers depend strongly on rainfall for agriculture but they currently have limited access to tailored weather and climate information. Weather and climate communication is now only one-way, top-down approach.

**WATERAPPS, EVOCA** and **WAGRINNOVA** projects aim to improve accessibility and credibility of information. By establishing a two-way communication scheme, the



projects aim to build farmers' capacity and develop weather and climate information services for sustainable agriculture.

## Design framework

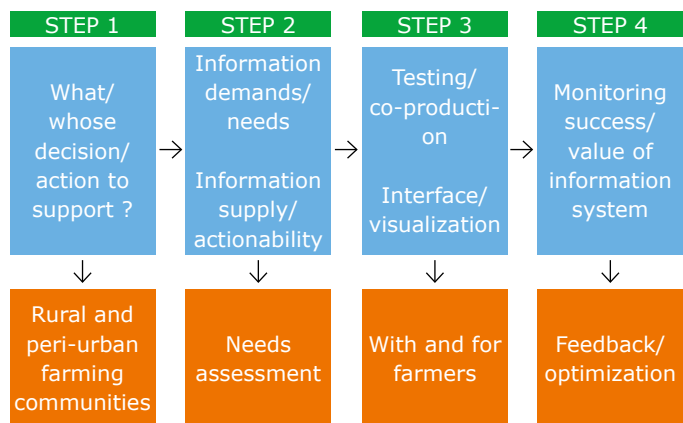


Figure 1. Involvement and activities in Ghana

## Outcomes

### Information needs

Time and location specific climate information (e.g. onset of the rainy season, dry spells occurrence, seasonal rainfall amount).

### Co-production of climate information services

Development of approaches and tools (Apps) integrating scientific & indigenous forecast knowledge for improved climate information.

### Building capacity

Farmers significantly enhanced their knowledge on weather and climate through trainings, field farmer schools and workshops.



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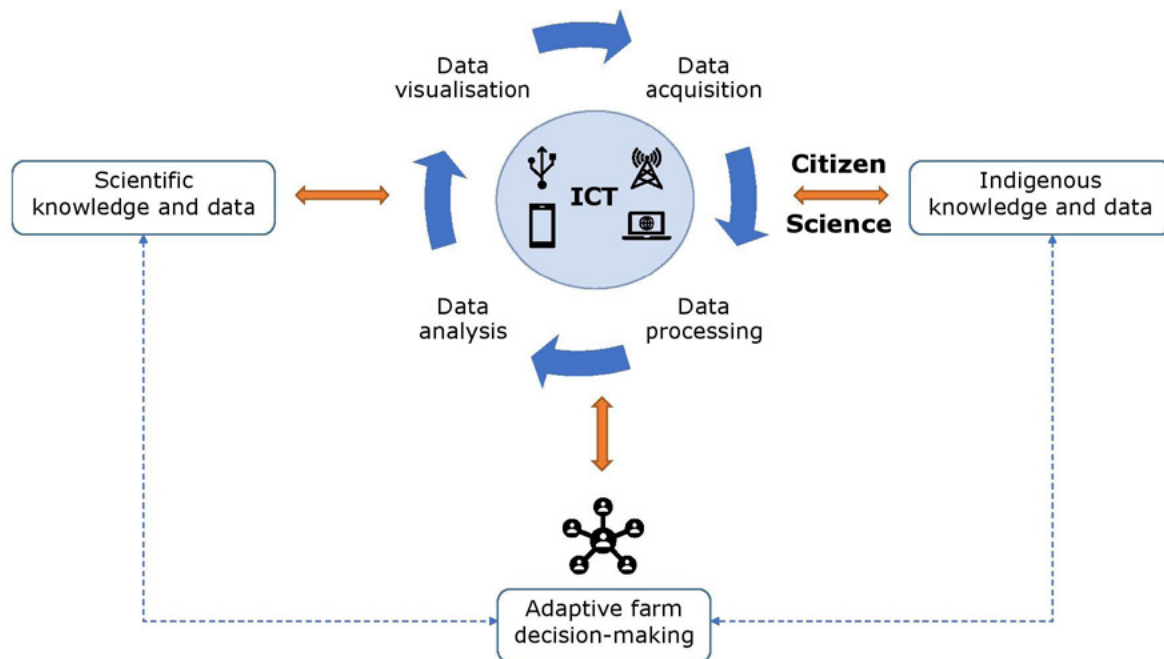


Figure 2. Schematic representation of projects nature

### Partners



### More information

**Waterapps:** [www.waterapps.net](http://www.waterapps.net)

**WAGRINNOVA:** [https://leap.iamb.it/?page\\_id=277](https://leap.iamb.it/?page_id=277)

**EVOCA:** <https://www.wur.nl/en/Research-Results/Chair-groups/Social-Sciences/KnowledgeTechnology-and-Innovation-Group/Research/research-projects/Responsible-life-science-innovations-for-development-in-the-digital-age-EVOCA-1.htm>



# Evaluation à mi-parcours Gestion Intégrée des Ressources en Eau au Mali

Philippe Ker Rault (WEnR), Caroline Desalos (WCDI), Mohammed Dicko (IER/Mali), Cor Wattel (WEcR)

Evaluation à mi-parcours du Programme Conjoint d'Appui à la Gestion Intégrée des Ressources en Eau (PCA-GIRE) au Mali

En 2017, une équipe d'évaluation indépendante composée de Wageningen University & Research et de l'Institut d'Economie Rurale a revu les résultats à mi-parcours du PCA-GIRE. Pour ce faire, l'équipe a déployé une méthodologie robuste, qualitative, participative et transversale. L'analyse cohérente a permis d'avoir un regard croisé sur les perspectives parfois opposées des différents acteurs, utilisateurs et gestionnaires de la ressource à différentes échelles. L'évaluation a décrit les principaux goulots d'étranglement de mise en œuvre du programme. Les conclusions et recommandations émises ont alimenté réflexions et actions au niveau du programme et du pays.

## Contexte

Le long fleuve Niger parcourt 8 pays depuis la Guinée jusqu'à son delta au Nigeria. Source de prospérité il est aussi sujet à de nombreux problèmes comme la pollution de ses eaux, des périodes d'inondations et de sécheresse mal gérées, une distribution de ses eaux entre pays et entre utilisateurs concurrentiels mal calibrée, allant même jusqu'à des conflits. Des défis de gestion avisée des ressources en eau sont réels.

Afin de contribuer à l'amélioration de la gestion du fleuve, les Ambassades des Pays Bas et de Suède au Mali appuient un programme de gestion intégrée des ressources en eau (GIRE). L'objectif global du PCA-GIRE est de renforcer la mise en oeuvre de la GIRE aux niveaux local,



Figure 1. Bassin du Fleuve Niger. Source: <https://onisdin.info/en/iwrm/topography>



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Figure 2. Bamako, septembre 2017. Parties prenantes travaillant sur la théorie des changements du PCA-GIRE lors de l'atelier de présentation des résultats de l'évaluation.

national et international en appuyant les autorités maliennes et les autres acteurs concernés par l'exécution de la politique nationale de l'eau'.

### Évaluation à mi-parcours

L'Ambassade des Pays-Bas a commissionné en juin 2017 l'évaluation à mi-parcours du PCA-GIRE. Cette évaluation cherchait à apprécier les progrès réalisés et non-réalisés, sur la base des critères d'évaluation de pertinence, efficacité, efficience, durabilité et impact.

### Résultats de l'évaluation

C'est grâce à un cadre très rationnel que l'évaluation de ce programme complexe a pu avoir lieu: une méthodologie basée sur la théorie, qualitative, participative et inclusive a été développée en détails.

Au delà d'une collecte des données approfondie sur Bamako, Ségou et dans des zones rurales pertinentes accessibles, l'équipe a réussi à articuler les opinions et défis rencontrés par les parties prenantes/utilisateurs variés et au niveau des différentes échelles propres à la GIRE grâce à une analyse cohérente.

Les discussions durant et après l'évaluation, les conclusions et recommandations présentées dans le rapport ont clairement mis en lumière les principaux goulots d'étranglement qui ont handicapé la mise en œuvre et l'efficacité du programme. L'évaluation a contribué à revoir la stratégie du programme et a convaincu de la nécessité de renforcer la capacité des parties impliquées.

### Equipe d'évaluation

Une équipe aux compétences complémentaires:



Figure 3. Les membres de l'équipe d'évaluation à Bamako, Mali  
 Cor (WEcR): Efficience, pertinence des investissements économiques  
 Caroline (WCDI): Méthodologie, focus groups et facilitation  
 Mohammed (IER): Irrigation, agriculture, adéquation au contexte local  
 Philippe (WEnR): Chef d'équipe, discussions stratégiques

Pour plus d'information

<https://edepot.wur.nl/428638>



# Climate change impact on irrigated rice in the Sahel

van Oort, P.A.J.<sup>1</sup>, S.J. Zwart<sup>2</sup>, K. Saito<sup>3</sup>

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<sup>2</sup> International Water Management Institute, Ghana; s.zwart@cgiar.org

<sup>3</sup> Africa Rice Center (AfricaRice), Côte d'Ivoire; k.saito@cgiar.org

## Background – rice in the Sahel

Irrigation schemes. The Sahel region hosts at least two large rivers (the Senegal River and the Niger) along which schemes with intensive irrigated rice and vegetable cultivation are found. The Office du Niger scheme in Mali is one of the oldest and largest irrigation schemes in Africa. Around 320,000 tons of rice are produced each year representing 40 percent of the total Malian production. With ample irrigation water, high fertiliser inputs and high radiation levels, high yields can be obtained.

**Seasons.** Three seasons are distinguished, with the following crops:

- 1 Hot Dry Season (HDS): March – June (rice)
  - 2 Hot Wet Season (HWS): July-Oct (rice)
  - 3 Cold Dry Season (CDS): Nov – Feb (vegetables)
- Rice in these systems is grown as a rice double crop (HDS + HWS) or in a rice (HWS) – vegetable (CDS) crop rotation.

## Objectives

- 1 Simulate climate change impact
- 2 Identify main causes of yield changes & uncertainties
- 3 Simulate adaptation options

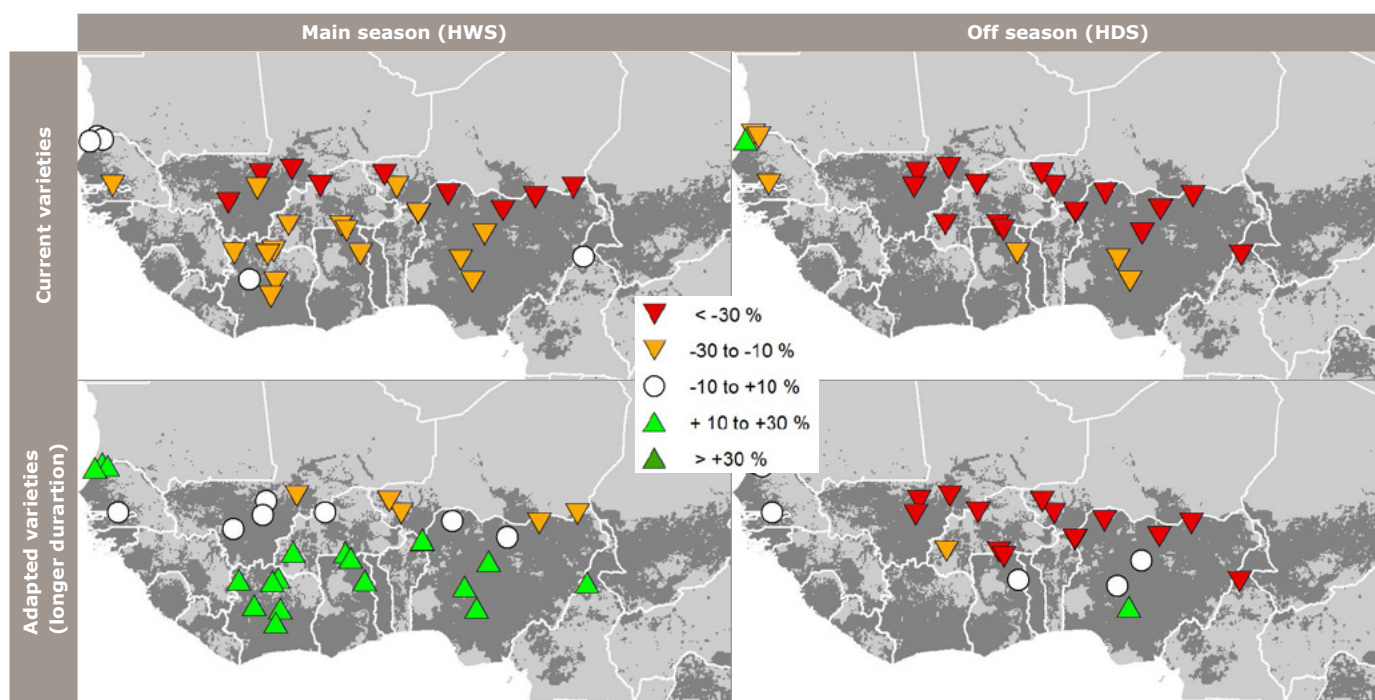


Figure 1. Change in crop yields (2000 to 2070, RCP8.5). Source: van Oort & Zwart (2018)



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## Materials and methods

### 1 Models:

- 1 ORYZA2000 model (Bouman et al. 2001, van Oort et al 2015)
- 2 CCC model (van Oort et al 2016)

**2 Climate scenarios:** 4 RCP scenarios, 4 timeslots (2000, 2030, 2050, 2070)

### 3 Adaptation options:

- 1 Varieties
- 2 Sowing dates

## Results

Figure 1 shows simulated yield changes from 2000 to 2070 in the worst case (RCP8.5) scenario.

**Impacts.** Without adaptation, climate change impact is overall negative and it is most negative in the hottest sites, i.e. inland sites in the hot dry season (Table 1, Figure 1). For example in Mali, irrigated rice yields in the “off” season would drop by 70-80%.

**Causes.** Two main causes of the yield declines are:

- 1 The growing period becomes shorter due to high temperatures
- 2 Above a critical temperature, ORYZA2000 predicts a collapse in photosynthesis. This is still very uncertain.

Region	Season	Current varieties	Adapted varieties (longer dur.)	Adapted var. + no collapse in photosynthesis
W. Africa	Main season (HWS)	-21%	+7%	+11%
	“Off” season (HDS)	-45%	-15%	+11%
Mali	Main season (HWS)	-33%	-7%	+2%
	“Off” season (HDS)	-80%	-70%	+2%

Table 1. Climate change impacts in irrigated rice in West Africa and Mali. The table shows changes in rice yields in 2070 (RCP8.5) compared with 2000. For current varieties, adapted varieties with longer duration and for a scenario with no collapse in photosynthesis at extremely high temperatures. Source: van Oort & Zwart (2018)

## Adaptation options

- 1 Longer duration varieties are important but only part of the solution
- 2 Negative impacts can be avoided with huge change in planting dates, shifting away from the hot dry season. See figure 2 (van Oort et al 2016, 2019) for a study in Niono (Mali)

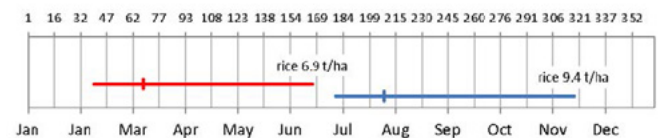


Figure 2. Potential yields and cropping calendars in 2000 and 2070 (RCP8.5) in Niono Mali. Simulated with ORYZA2000 and the CCC model. Source: van Oort et al. (2019)

## Conclusions

- Large negative impact without adaptation
- Adaptation options exist, BUT
  - Research needed: photosynthesis at extreme temperatures
  - Participatory trials needed: new rice varieties + changes in sowing dates + rice – vegetable options

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# Nomads Facing Change: Caught between the Hammer of Muslim Extremism and the Anvil of the State (Mali, Niger, Burkina Faso)

Han van Dijk (For African Studies Centre, Leiden University\* and 14 collaborators)

## Nomads Facing Change

This project investigated the increased participation of nomadic pastoralists in political movements and agitation. The Fulani in particular have so far been relatively invisible and apolitical, yet by far the largest nomadic pastoralist group in the Sahel region. What factors account for their current conflicts with the State, sedentary neighbours and alienation from their own elite? How will this emergent counter-discourse develop over time, and what are the implications for regional political, economic and sociocultural stability? What are the consequences of the increasing militarisation and securization of the Sahel.

## Context

The occupation of northern Mali in 2012 by a Tuareg secessionist group and Muslim extremists was a turning point in the history of the Sahel. It showed the decisive changes in the balance of power caused by the fall of Khadafy in 2011. Different Jihadist groups emerged in the area and precipitated international military interventions. However, this crisis has much deeper roots in decades of poverty, food insecurity, weak governance by Sahelian states and the marginalization of specific population groups. In addition high population growth leads to increasing pressure on crop and pasture land, opposing communities of sedentary farmers and nomadic pastoralists



Figure 1. Arrested Fulani in Central Mali



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\*Disclaimer: The coordinator of this project Han van Dijk, was delegated to African Studies Centre, Leiden University for the duration of the project



Figure 2. Some pictures distributed in WhatsApp groups

### S-O-S aux âmes sensibles

Nous venons encore d'accueillir une importante vague de déplacés à Bandiagara en provenance de 3 villages Déguembéré Goro et Tille Kanda.

Le besoin en nourriture , en soin et en eau se fait ressentir.

Que les âmes sensibles et Dieu nous viennent en aide au pays Dogon.



### Project

Studies were done in three countries (Mali, Burkina Faso, Niger) both in the field and on the web to investigate mobilization for political movements and the back ground of intercommunity conflicts. Field studies were done in the Inner Delta of the Niger and the plains east of the Bandiagara plateau (Mali) and in the frontier area between Niger and Mali (Nord Tillabery). Documentary studies were done on intercommunity conflict in Burkina Faso and on Facebook groups and WhatsApp communities in Mali.

### Results

There is an increasing mobilization of youth both among nomadic pastoralists and sedentary farmers, leading to violent clashes and massacres between these population groups. Mobilization is partly on religious basis (extremist Islam), but at the basis lie all kind of other grievances such as exploitation by state officials, unresolved or badly managed conflicts about natural resources. The situation has been aggravated by selective crack-down and blaming of nomadic pastoralists for adherence to Muslim extremist groups. As these groups come under pressure they indeed turn to Muslim extremist groups. As a result large areas have come under control controlled of these Muslim extremist groups, which has enormous impact on the lives of the population. There are also increasing number of IDPs in all three countries.

### Partners

Source of funding: NWO-WOTRO; programme knowledge Platform Security and the Rule of Law (October 2016-October 2019)

#### *Partners;*

Groupe ODYSSEE (Observatoire des Dynamiques Sociales Spatiales et expertise Endogène), Bamako, Mali  
 IRPAD-Afrique (Institut de Recherche et de Promotion des Alternatives de Développement en Afrique), Bamako Mali  
 LASDEL (Laboratoire d'Etudes et de Recherche sur les Dynamiques Sociales et le Développement Local), Niamey Niger  
 Université de Ougadougou, Ouagadougou, Burkina Faso  
 Leiden, University, African Studies Centre and Institute of History

#### *Co-researchers:*

Han van Dijk, Mirjam de Bruijn, Amagoïn Keita, Mamadou Togola, Oumou Cissé, Mamadou Goita, Modobo Galy Cissé, Amadou Oumarou, Moussa Mohammed Moussa, Ramatou Hassane, Aziz Dicko, Harouna Ousmane Ibrahim, Issiaka Sombié, Poussi Sawadogo, Angèle Diello

### More information

[www.Nomadesahel.org](http://www.Nomadesahel.org)

# Pathways to Agroecological Intensification of crop-livestock farming systems of southern Mali

Katrien Descheemaeker<sup>1</sup>, Eva Huet<sup>1</sup>, Arouna Dissa<sup>1,2</sup>, Myriam Adam<sup>4,5</sup>, Ousmane Sanogo<sup>2</sup>, Ousmane Dembele<sup>3</sup>, Oumar Samake<sup>3</sup>, Salif Doumbia<sup>2</sup>, Bougouna Sogoba<sup>3</sup>, Bouba Traoré<sup>2,4</sup>, Ken Giller<sup>1</sup>

Author affiliations: <sup>1</sup> Wageningen University, Plant Production Systems group, <sup>2</sup> IER, Mali <sup>3</sup> AMEDD, Mali, <sup>4</sup> ICRISAT, Mali, <sup>5</sup> CIRAD, France

## Summary

The Pathways to Agroecological Intensification (AEI) project follows a co-learning approach, whereby farmers and researchers collaborate to identify AEI options that fit the diverse farming contexts. Besides technical solutions to improve crop and livestock production, we co-develop farm management tools, ways to manage risk, and support farmers to engage in local value chains. Together with local stakeholders we identify the requirements of a transition towards sustainable and resilient farming systems.

## Context

In the cotton zone of southern Mali farmers rely mainly on cotton for income and on maize, sorghum and millet as food crops. Crop-livestock interactions are a key element. Stagnating crop yields in the region are problematic, given

the rapid population growth. Furthermore, producing more food is challenged by natural resource degradation and climate change. To face these intertwined challenges, agroecological intensification (AEI) is proposed as a way to increase agricultural productivity and nutritious food production, while maintaining healthy ecosystems and equitably improving livelihoods. As solutions are more effective when anchored in a conducive institutional environment, we apply approaches that combine technical AEI options with improvements in e.g. farm management, collective action and marketing.

## Project

The project implements interdisciplinary research combining insights from agronomy, economic and social sciences. The research is conducted in a participatory way through the involvement of farmer research networks in the



Figure 1. PhD student Arouna Dissa discussing farm management with a farmer (left); Value chain discussions at the AMEDD office (right)



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Figure 2. During the farmers' field day farmers show, discuss and evaluate tested options (here: different sorghum varieties and options for soil fertility management)

design, execution and evaluation of on-farm trials and modelling exercises. Researchers, farmers and value chain actors co-design improved farm systems and more equitable ways of organizing value chains. With various stakeholders we use exploratory scenario analyses to identify required incremental and transformational changes to reach a shared vision of sustainable and resilient farming systems.

### Results

- Strengthened farmer networks
- Baskets of AEI options, tailored to biophysical and socio-economic context. E.g. crop and varieties in combination with soil fertility management; livestock feeding options
- Decision support tools: Farm planning and budgeting tool
- Policy advice: required changes in policy and institutional settings for envisaged changes in food security and income
- Communication products and approaches
- Capacity building: Malian and international Engineer, BSc, MSc, PhD students
- Scientific publications: see below

### Partners

Two phases of research have been funded by the McKnight Foundation since 2012. A third phase will start in 2020.

WUR leads the project in collaboration with Institut d'Économie Rurale (IER), Association Malienne d'Eveil au Développement Durable (AMEDD) and International Crops Research Institute for the Semi-Arid Tropics (ICRISAT).

### More information



- Falconnier et al., 2015 Agric. Systems ; Falconnier et al., 2016 Field Crops Res. ; Falconnier et al., 2017 Eur. J. Agr. ; Falconnier et al., 2018 Land Use Policy
- Ollenburger et al., 2016 Agric. Systems ; Ollenburger et al., 2019 Exp. Agr.
- Descheemaeker et al., 2019 Exp. Agr.

# AFRICA-MILK Promote ecological intensification and inclusive value chains for sustainable African milk sourcing

Asaah Ndambi (WUR team leader)

## Background

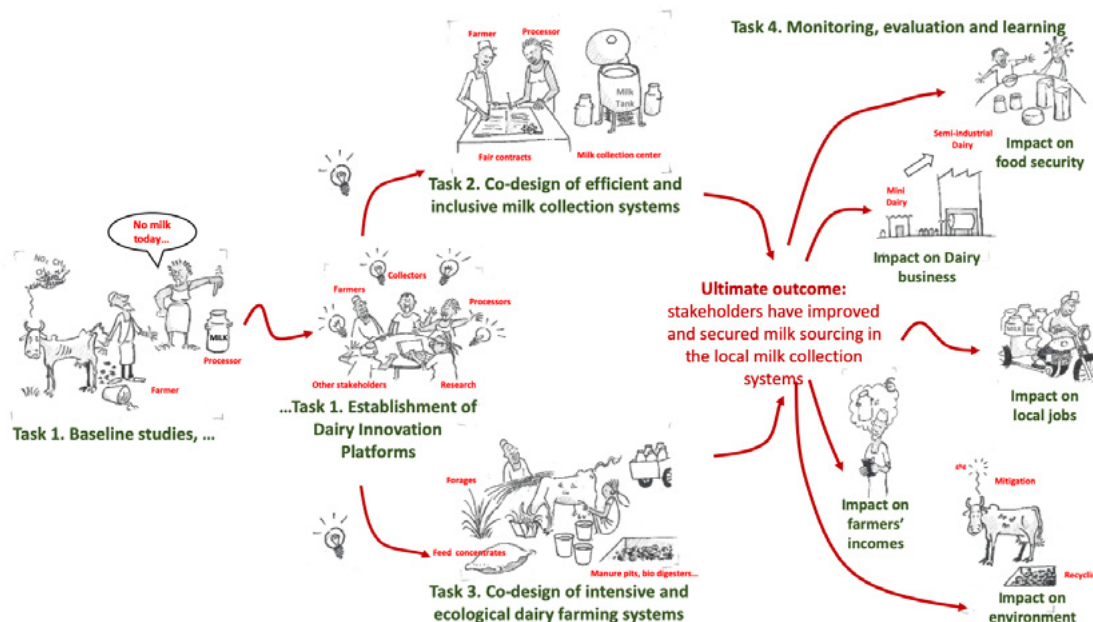
Today in Africa, demand for dairy products is rising. However, dairies have difficulties to source local milk in terms of volume, regularity and quality. Sustainability of dairy production, contribution of dairy to food security, and inclusion of producers in value chains (i.e. women and youth) are becoming major stakes.

## Aim and objective

Africa-Milk supports co-design and implementation of technical, organizational and institutional innovations to increase and secure local milk sourcing, considering the potential of ecological intensification of milk production and the development of inclusive milksheds to reach this objective

Africa-Milk is going to work with Nine processors in four countries (Senegal, Burkina Faso, Kenya, Madagascar), covering a variety of agro-climatic and production contexts

Type of dairy	Name (country)	L/day	Producers
Mini-dairies	Bonnet Vert (BF)	300	30
	Plateforme Lait de Banfora (BF)	800	100
	Sodimilk (MD)	1,500	150
Medium size dairies	Laiterie du Berger (SN)	4,000	900
	Kirène (SN)	4,000	100
	Happy Cow (KE)	9,000	2000
	Socolait (MD)	11,000	2,000
Industrial dairies	MCDCU (KE)	150,000	40,000
	nKCC (KE)	350,000	100,000



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Dairy farm  
photo: E.Vall



Photo: P. Salgado



Milk collection system  
Photo: Jan van der Lee



Dairy processor  
Photo: Jan van der Lee

### Results and Envisioned impacts

- Impact activities and preliminary results:
  - Final international scientific workshop, and cross-sectional scientific papers
  - Dairy stakeholders trainings (farmers, collectors, processors)
  - National workshops of presentation of the highlights of the project
  - Leaflets on feeding and agroecological management of dairy cows
  - Policy briefs : how to promote agroecological intensification of milkproduction and inclusive milk collection systems
- Opportunities and challenges for the future: Innovations in the downstream part of the dairy value chain (marketing, diversification of milk products, etc.)

### Consortium members

CIRAD (France), University of Nairobi (Kenya), INERA (Burkina Faso), FIFAMANOR (Madagascar), ISRA (Senegal), SNV Kenya and WUR (Netherlands) and nine processors in four countries (Senegal, Burkina Faso, Kenya, Madagascar), covering a variety of agro-climatic and production contexts

For more information:  
[www.africa-milk.org](http://www.africa-milk.org)



# Enteropathogens, livestock and hygiene: a survey among children in Burkina Faso

Hans Verhoef<sup>1-3</sup>, Aulo Gelli<sup>4</sup>, Derek Headey<sup>4</sup>, Laetitia Toe<sup>5</sup>, Rasmane Ganaba<sup>6</sup>, Abdoulaye Pedehombga<sup>6</sup>, Francis Ngure<sup>7</sup>, Jaco J Verweij<sup>8</sup>

## Introduction

Many children in developing countries carry enteropathogens (gut bacteria, protozoa, viruses and intestinal helminths) that are also found in animals, but the role of livestock as a source of transmission is uncertain. We aimed to assess to what extent carriage of selected human zoonotic enteropathogens in young Burkinabé children is associated with livestock ownership and hygiene conditions.

## Context

Animal husbandry typically is characterised by small numbers of animals, extensive farming systems, low investments and close contact with humans in the same household because of free-roaming animals. WASH (water supply, sanitation and hygiene practices) interventions can theoretically reduce or prevent infections, but there is limited evidence that these interventions are efficacious. Better knowledge of transmission sources and routes is important to tailor interventions.

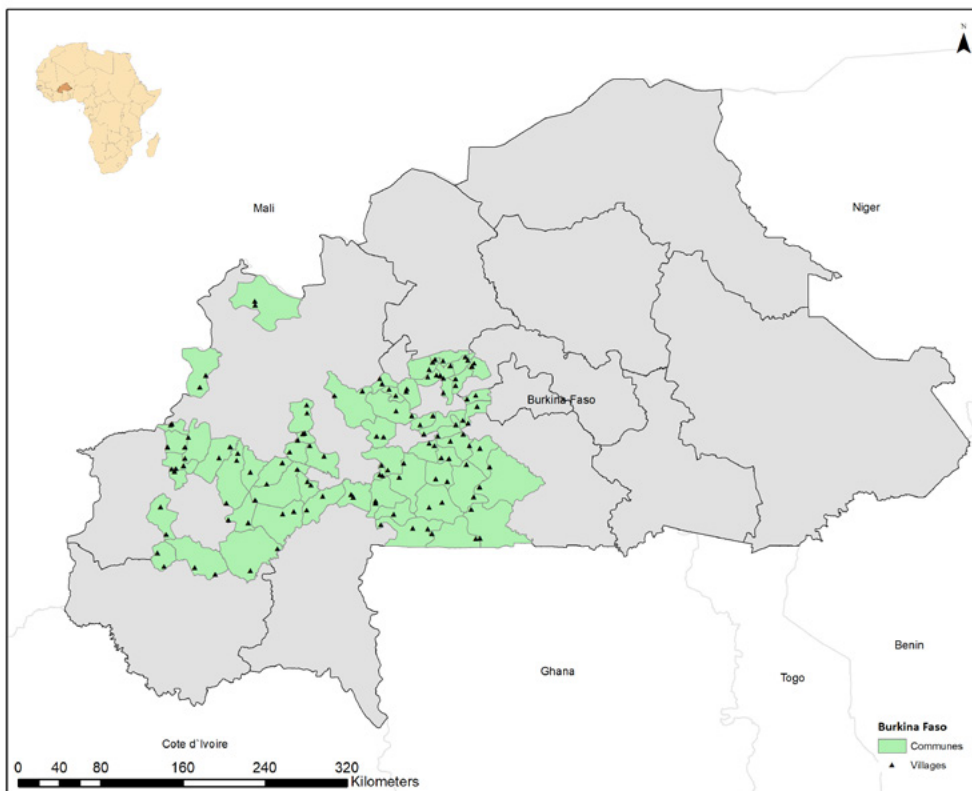


Figure 1. Map of the study area



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Figure 2. African donkeys are mainly kept for transport and field work

### Project

We conducted a survey among children aged 24-48 months in rural Burkina Faso to assess to what extent faecal carriage of selected human zoonotic enteropathogens is associated with household livestock ownership and hygiene conditions. The analysis included 1,070 children for whom stool samples were collected. We used DNA analysis to detect the presence and density in stool of selected enteropathogens.

### Results

Prevalence values were as follows: *Giardia intestinalis*, 84.4%; *Campylobacter* spp., 55.9%; *Shigella*/EIEC, 29.5%; STEC/*Shigella* carrying the stx1 gene, 24.5%; STEC carrying the stx2 gene, 18.1%; *Salmonella* spp., 7.8%; *Cryptosporidium* spp., 4.4%. Only 4.1% of children had none of these infections. 91.4% of households owned at least one chicken; corresponding values for other animals were: goats, 78.7%; sheep, 54.2%; donkeys, 55.1%; cattle 61.1%, pigs, 33.5%. There was strong evidence for an association between donkey ownership and *Campylobacter* spp. ( $p < 0.0005$ ): each additional donkey owned was associated with a relative increase in the prevalence of infection by 2.6% (95%CI: 1.0%-4.2%) and DNA content by 25.8% (1.6%-55.7%). Personal hygiene seemed associated with protection against *Giardia intestinalis* carriage. There was no evidence that ownership of chicken or sheep was associated with carriage of any of the enteropathogens investigated.

In conclusion, donkeys should be considered as a potential source of *Campylobacter* spp. transmission in African children.

### Partners

- 1 Division of Human Nutrition and Health, Wageningen University, Wageningen, The Netherlands;
- 2 Cell Biology and Immunology Group, Wageningen University, Wageningen, The Netherlands;
- 3 MRC Unit The Gambia at London School of Hygiene & Tropical Medicine, London, UK;
- 4 International Food Policy Research Institute, Washington DC, USA;
- 5 Department of Food Technology, Safety and Health, Ghent University, Belgium;
- 6 Agence de Formation, de Recherche et d'Expertise en Santé pour l'Afrique (AFRICSanté), Bobo Dioulasso, Burkina Faso;
- 7 International Food Policy Research Institute and Cornell University, Ithaca, NY, USA;
- 8 Laboratory for Medical Microbiology and Immunology, Elisabeth-Tweesteden Hospital, Tilburg, The Netherlands

### Funding

Bill & Melinda Gates Foundation

### More information

<https://www.ncbi.nlm.nih.gov/pubmed/28874177>

# The Interplay Between Nutrition, Social and Economic Trajectories During Adolescence Among Girls in Northern Ghana

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## Introduction

Investing in nutrition is vital for improving adolescent girls' health and development and that of their future offspring. However, limited knowledge on dietary intakes, nutrient gaps as well as type, timing and efficacy of needed interventions hampers progress. We designed an innovative research titled "Ten2Twenty-Ghana" to examine the interrelations between nutritional, social and economic trajectories of optimising nutrition of female adolescents for better health, family formation, education and labour participation in Ghana.

## Context

Limited research has focused systematically on girls' transition into adulthood, or acknowledged the interplay of

different and parallel life trajectories. For instance, the optimal timing and efficacy of nutrition interventions for adolescent girls in subsequent pubertal stages (before or after AAM) on attained height is unknown. No efficacy trial has examined the effect of intervening before or after menarche in optimising nutritional status and the trade-offs in the economic and social trajectories when optimising the nutritional status of adolescent girls. Hence, we designed and implemented Ten2Twenty-Ghana in the Mion District of Northern Ghana. The study population was apparently healthy adolescent girls ( $n \approx 1100$ ) aged 10-17 years residing in the Mion district, the Northern region of Ghana.

## Project

Ten2Twenty-Ghana started with a systematic review on the determinants and consequences of malnutrition among adolescents. The second phase of the project included a secondary analysis of data from the Ghana School Feeding Programme and the Demographic and Health Survey (DHS) data. The last phase of the work was a 2-year longitudinal study using an innovative mixed method design with an embedded 26-week double-blind randomised placebo-controlled trial (RCT). The study population for the longitudinal study consisted of 2 age cohorts (pre-menarche: 10-13 years and post-menarche: 14-17 years) of apparently healthy adolescent girls ( $n \approx 1100$ ) aged 10-17 years. A random sub-sample of 620 apparently healthy adolescent girls in the two age groups were enrolled into the RCT receiving either nutrition/health education (5 occasions) with: (1) a five-day per week multiple-micronutrient fortified biscuits (MMB) or (2) unfortified biscuits (UB) for 26 weeks. The MMB is fortified with 18 micronutrients.

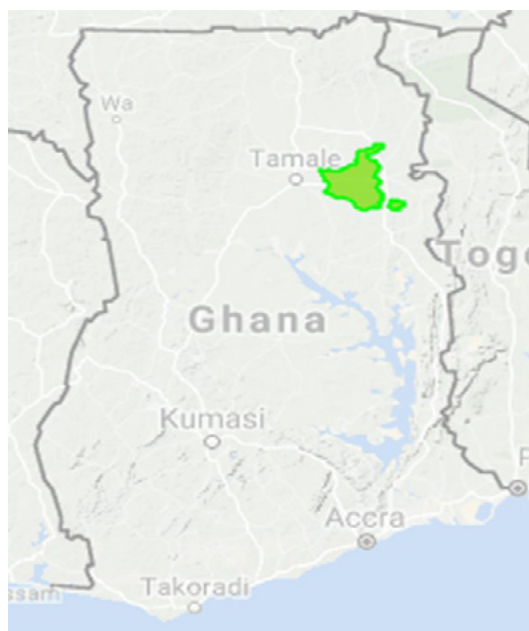


Figure 1: project location.



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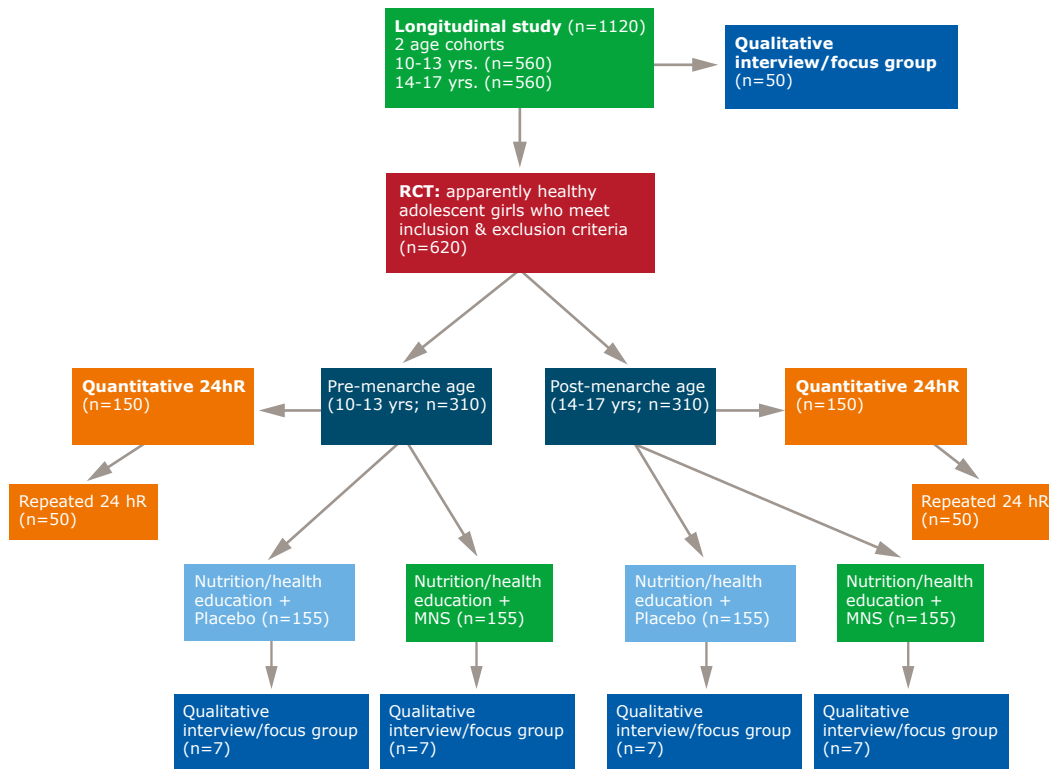


Figure 2. Schematic overview of the whole research project

## Results

Our secondary analysis showed that anaemia is a severe public health problem among girls in Ghana and we found no clear trend in the risk of anaemia over the years. The secondary analysis also showed a marginal decline in the risk of stunting but an increasing trend in the risk of overweight/obesity over the years

The project is presently in the analysis phase of the primary data of the RCT from the field. Preliminary results of the baseline survey of the RCT showed that the diet of adolescents consisted mainly of grains and grain products, and small quantities of vegetables. The girls consumed on average six food groups out of 10 and about 15% consumed a diet with an insufficient dietary diversity. Based on locally available foods, the diet could be optimized but still showed important nutrient gaps, indicating the need for introducing additional nutritious foods, such as fortified foods. Based on Stunkard figure rating scale showing female body sizes ranging from severe underweight (picture 1) to normal body sizes (picture 3 and 4) to morbidly obese (picture 9), most adolescent girls indicated body size pictures 8 and 9 as healthy body sizes,

and saw themselves as having body sizes 5 and 6. In general, the girls scored average on health-related quality of life, being more happy in the school environment but less content about their peers and social support. Cognitive performance was higher in normal weight compared to underweight girls, and higher for non-stunted compared to stunted girls.

## Partners

The study was a collaboration between Wageningen University and Research and the University for Development Studies

The study was supported by the Edema Steernberg Foundation, Judith Zwartz Foundation, Nutricia Foundation and Sight and Life.

## More information

- <https://drive.google.com/drive/folders/1wwFU26x7g-CGeggOyDI6UegO63g2acB5c>
- <https://www.researchgate.net/project/TenTwenty-Ghana-The-interrelations-between-Nutrition-Social-and-Economic-Trajectories-During-Adolescence-Among-Girls-in-Ghana>

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3 Department of Nutritional Sciences, School of Allied Health Sciences, University for Development Studies, Box TL 1883, Tamale, Ghana

4 Wageningen University & Research, Department of Social Sciences, Sociology of Consumption and Households, Wageningen, The Netherlands

# Micronutrient powders and malaria chemoprevention in young children in Mali

Natalie Roschnik<sup>1</sup>, Hawa Diarra<sup>2</sup>, Moussa Sacko<sup>3</sup>, Yahia Dicko<sup>4</sup>, Helen Moestue<sup>5</sup>, Karla Smuts<sup>6</sup>, Hans Verhoef<sup>6,7</sup>, Sian E. Clarke<sup>6</sup>

## Introduction

Home fortification with micronutrient powders is recommended by the World Health Organization where the prevalence of anaemia in children exceeds 20%. The efficacy and effectiveness of this recommendation continues to be debated. We examined the impact of home fortification, as part of a broader program combining seasonal malaria chemoprevention, parenting education and community-based preschools, in rural communities in Mali over a three-year period.

## Context

Two-thirds of African children aged <5 years have anaemia, mostly due to iron deficiency and malaria. Home

fortification of foods is recommended by the World Health Organization to mitigate or overcome the constraints associated with supplementation and industrial food fortification. In this new approach, powders containing a mixture of vitamins and minerals are supplied as small, single-serving packets, the contents of which can be mixed into semi-solid food prior to consumption.

There are concerns that iron interventions in children can result in increased incidence of malaria and malaria-associated death, presumably because iron supplementation leads to the formation of young red blood cells that are favoured for invasion and propagation by Plasmodium parasites.



Figure 1. Complementary food (porridge) preparation with home fortificants



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Dry Season							Rainy season (period of malaria transmission)					
	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
<b>2013</b>							<i>Project Start</i>	Seasonal Malaria Chemoprevention				
												Formative research
<b>2014</b>	MNP distribution				Quatitative survey			Seasonal Malaria Chemoprevention				
												Qualitative Evaluation
<b>2015</b>	MNP distribution							Seasonal Malaria Chemoprevention				
<b>2016</b>	MNP distribution				Quatitative survey		<i>Project End</i>					

Figure 2. Timing of the interventions and evaluation surveys

## Project

We conducted a cluster-randomised trial in 60 rural communities in the Sikasso region in Mali. In 2013, these communities were randomly allocated to intervention (all resident children aged 6-59 months received daily home fortification for four months with micronutrient powders) or control (all children received no micronutrient powders). All 60 communities received monthly malaria chemoprevention during peak transmission season, targeting children aged 3-59 months (hence separately in time from the distribution of micronutrient powders). In addition, micronutrient powders were delivered by a multidisciplinary group of community volunteers using community-based preschools, cooking demonstrations, and traditional communication networks to promote micronutrient powders, nutrition, hygiene, and child stimulation. The interventions were repeated over three



years. Two dry-season surveys were conducted after 1 year (2014) and 3 years (2016) of implementation to compare Plasmodium infection, nutritional indices and cognitive performance in children aged 3 and 5 years (n=1,136 and n=1,163 respectively).

## Results

Acceptability and uptake were high: 95% of mothers in the intervention arm reported their children liked micronutrient powders, and over 65% reported daily use of the powders in the previous seven days. Anaemia nonetheless remained highly prevalent, with no evident group differences in either 2014 or 2016. In 2016, after three successive years of implementation, the percentage of 3y olds with anaemia was 51.8% vs 48.9% in the intervention and control arms respectively. Among 5y olds, it was 46.6% vs 40.6%. In this population with a high prevalence of anaemia, there was no support to implement MNP combined with seasonal chemoprevention, despite high acceptability and adherence of both interventions.

## Partners

- 1 Save the Children, London, UK;
- 2 Faculté de Médecine et d'Odontostomatologie, Bamako, Mali;
- 3 Institut National de Recherche en Sante Publique, Bamako, Mali;
- 4 Save the Children, Bamako, Mali;
- 5 Save the Children, Washington DC, USA;
- 6 London School of Hygiene and Tropical Medicine, London, UK;
- 7 Wageningen University, The Netherlands

## Funding

Save the Children, UBS Optimus Foundation, World Bank Strategic Evaluation Fund

## More information

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6856685/>

# The Central African Republic: The centrality of the margin for understanding conflict dynamics

Lotje de Vries, Sociology of Development and Change Group

## Project summary

Studying the linkages between regional conflict dynamics and internal political disorder in the CAR, this project specifically looks into how both dynamics affect people in their everyday life. Through ethnographic methods, it seeks answers to questions such as:

- How do public authorities organize security and what are people's expectations of the state?
- Where and to whom do different segments of society turn to in case of conflict or crisis?
- How do chronic insecurity and marginality interrelate?

## Context

The Central African Republic finds itself at several crossroads. Situated at the edges of the Sahel, the Horn and the Great Lakes, regional conflicts reverberate onto people's lives in the CAR, e.g. through tensions over land-use. The country's underdevelopment and chronic political instability never attracted much international attention. Meanwhile the latest crisis (since 2013) displaced millions of people, resulted in a multiplication of rebel-groups, and continues to create violent divides between segments of society. Politically, the country's path

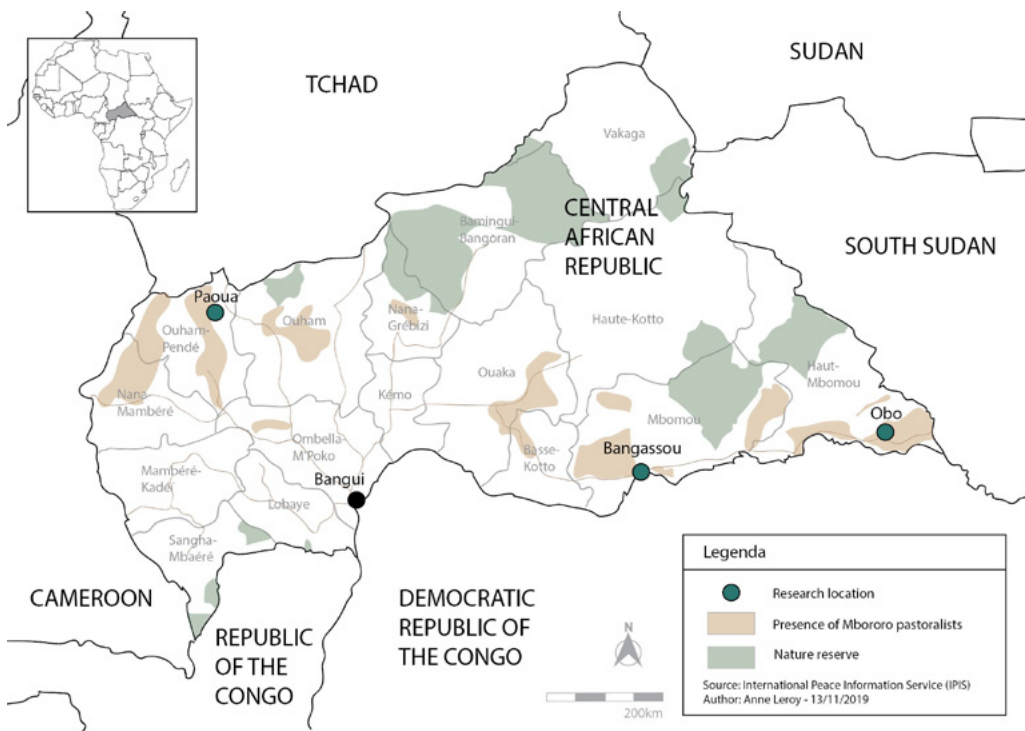


Figure 1. Map of the research area



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Figure 2. Cattle in Paoua town, north west CAR, February 2016, LdV

to democratic consolidation after the latest crisis is constrained by demands for the inclusion of rebel groups through power-sharing. Identity and livelihoods increasingly play an amplifying role in these conflicts. This leads to hardening fault lines between social groups despite interventions from international actors.

### Findings and results

- People aspire for the state to 'return', although it hardly ever was present. Meanwhile, security remains largely informally organized (e.g. through vigilantes and rebel groups).
- Minorities like the Mbororo pastoralists are victim to internal conflicts and regional politics. While enjoying citizenship, they are considered strangers and still mostly live in exile.
- The international community is more engaged than ever before, but this contributes to the new tensions and creates unhelpful social, economic and political side-effects.
- The crisis in the CAR started decades before 2013 and considering this longer-term perspective is key to creating lasting 'solutions'.

### Research output

- L. de Vries and A. Mehler (2019). "The limits of instrumentalizing disorder: Reassessing the neopatrimonial

perspective in the Central African Republic". *African Affairs* 118 (471), 307-327.

- De Vries, L. (2018). "Navigating violence and exclusion: The Mbororo's claim to the Central African Republic's margins". *Geoforum*. (Advance access)
- Glawion, T, L. de Vries, A. Mehler (2019). "Handle with Care! A qualitative comparison between the Fragile State Index's bottom three countries. *Development and Change*, 50 (2) 277-300.
- Glawion T. and L. de Vries (2018). Ruptures revoked: why the Central African Republic's unprecedented crisis has not altered deep-seated patterns of governance". *Journal of Modern African Studies*, 56 (3), 421-442.

### Collaborations and funding

GIGA Hamburg; Arnold Bergstraesser Institut Freiburg; ODI London; Université Paris 1 Panthéon-Sorbonne. Funding came from the German Science Foundation (SFB 700 Program)







In addition to carrying out research in development programmes, Wageningen University & Research also brings knowledge on food systems into action, by strengthening capacities for sustainable development in upcoming markets. The following pages highlight some examples.

# Faciliter la collaboration entre parties prenantes

Wageningen Centre for Development Innovation (WCDI)

## Faciliter la collaboration entre parties prenantes: des partenariats efficaces

Le gouvernement, les entreprises, la société civile et la science collaborent de plus en plus dans le cadre de partenariats multipartites (PMP) pour relever les défis complexes notamment ceux des objectifs du développement durable. WCDI facilite la collaboration entre parties prenantes, et conçoit et appuie des PMPs efficaces et efficaces, qu'ils soient axés sur un conflit, un problème ou une opportunité. En Afrique de l'Ouest et dans le Sahel, WCDI met par exemple en pratique (des éléments de) cette approche dans le projet FNS-REPRO et un projet financé par NUFFIC au Bénin.

## Contexte

Au sein de Wageningen University & Research (WUR), Wageningen Centre for Development Innovation (WCDI) crée de la valeur en mettant en action les connaissances générées par WUR afin de contribuer à créer des systèmes alimentaires intégrés et durables. WCDI s'organise autour de quatre lignes d'action: guider la transformation des secteurs, faciliter la collaboration entre parties prenantes, favoriser l'apprentissage tout au long de la vie et la gestion orientée vers l'impact. Ce poster détaille le travail effectué sur la ligne d'action 'Faciliter la collaboration entre parties prenantes' dans la région du Sahel/Afrique de l'Ouest.

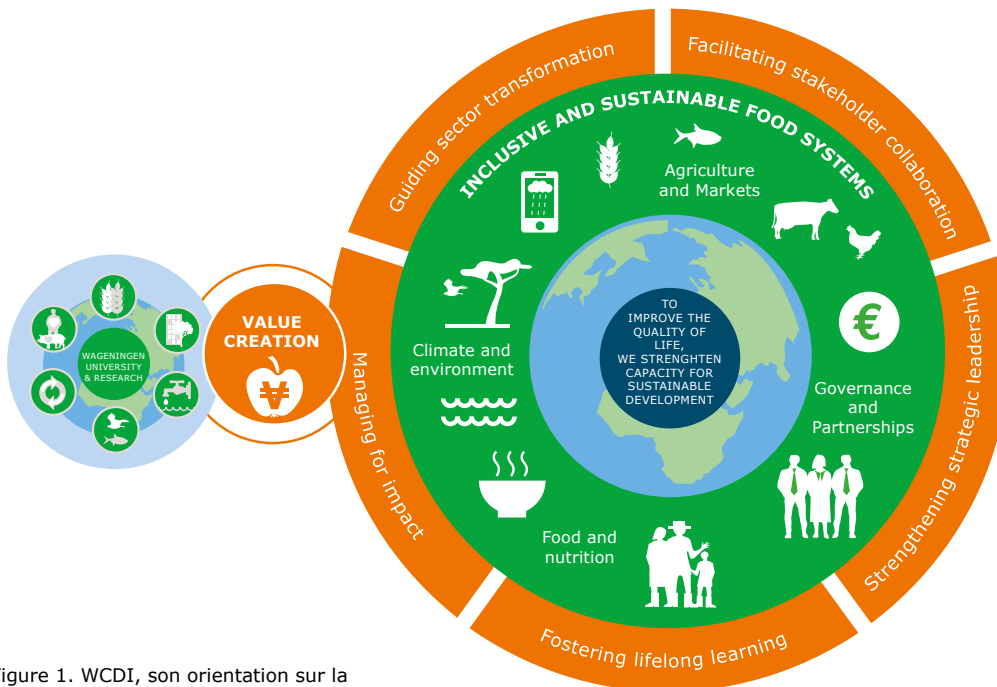


Figure 1. WCDI, son orientation sur la création de valeur et ses lignes d'action



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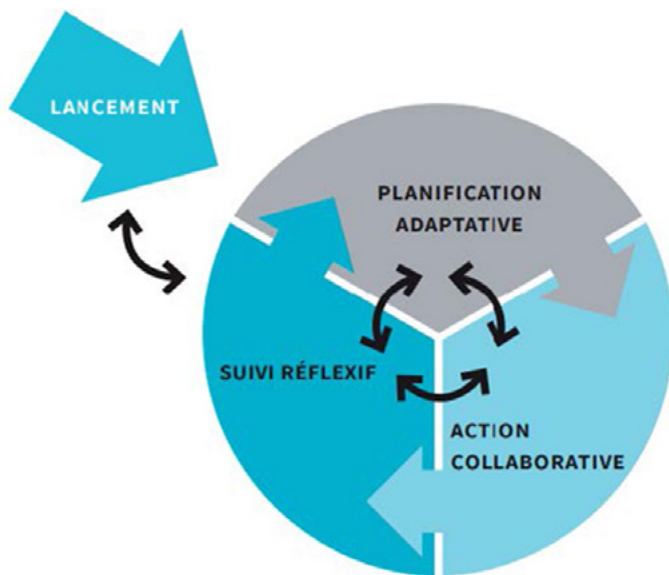


Figure 2. Modèle de processus, extrait de "Le Guide des PMP"

### Faciliter la collaboration entre parties prenantes' en détails

WCDI a regroupé, recoupé affiné son expérience de plus de dix ans dans les PMPs dans « Le Guide des PMP ». Ce livre fournit un cadre pratique et éprouvé pour les processus de collaboration qui transcendent les limites et les frontières des pays, secteurs ou affiliations. Il présente un modèle de processus et décrit les sept principes qui rendent un PMP efficace.

### Nos projets

Dans la plupart des projets que WCDI met en oeuvre des éléments du cadre de partenariats multipartites sont adaptés au contexte et mis en application. On peut citer par exemple le projet 3R dans les domaines aquacole,

laitier et horticole au Kenya, le projet BENEFIT en Ethiopie ou le projet Water4Virungas au Rwanda, Ouganda et dans la province du Nord Kivu en République Démocratique du Congo. Dans ce dernier projet, WCDI conseille la mise en place de PMPs pour transformer des conflits liés aux ressources en eau. Cette approche a déjà porté ses fruits et permis de renforcer la confiance entre les agriculteurs et les éleveurs. Cette expérience pourrait être mise en valeur dans la zone du Sahel.

Spécifiquement dans le Sahel, WCDI est impliqué dans le projet Food and Nutrition Security Resilience Programme (FNS-REPRO), débuté en octobre 2019, qui cherche à renforcer la résilience des systèmes alimentaires en situation de crises prolongées en Somalie, Soudan du Sud et Soudan.

Des éléments du cadre de PMP ont été utilisés au Bénin dans le projet NUFFIC qui a permis de créer un Institut de Sécurité Alimentaire, partenariat entre différentes facultés de l'Université d'Abomey Calavi et d'un lycée agricole. Le nouveau projet NUFFIC au Bénin, visant à renforcer dix lycées agricoles continuera avec la démarche.

### Nos partenaires

Dans le cadre du projet FNS-REPRO, WCDI travaille avec Food and Agriculture Organization of the United Nations et de nombreux organisations internationales et nationales. Au Bénin WCDI travaille avec KIT, iCRA, AERES, Woord en Daad (certains sont membres du Borderless Network), dix lycées agricole et l'ISA.

### Pour plus d'information

[http://www.mspguide.org/sites/default/files/case/msp\\_guide\\_french.pdf](http://www.mspguide.org/sites/default/files/case/msp_guide_french.pdf)  
[www.wur.eu/fr/wcdi](http://www.wur.eu/fr/wcdi)



# Guider la transformation des secteurs

Wageningen Centre for Development Innovation (WCDI)

## Guider la transformation des secteurs: intégrés, efficaces et durables

Les secteurs agro-alimentaires doivent se transformer de toute urgence afin de nourrir durablement 9 milliards de personnes d'ici 2050. Le défi de la transformation d'un secteur entier exige plus qu'une simple amélioration de la performance d'une chaîne de valeur unique. L'amélioration de la performance des secteurs nécessite une approche intégrée, une expertise technique et en matière de processus, une gamme d'outils et de méthodologies, et la prise en compte des intérêts des acteurs multiples. HortiFresh (Ghana et Côte d'Ivoire), Eplucher l'oignon (Niger) et VCA4D Mangués (Burkina Faso) sont des

exemples de projets visant la transformation des secteurs dans la région du Sahel/Afrique de l'Ouest.

## Contexte

Au sein de Wageningen University & Research (WUR), le Centre for Development Innovation (Wageningen CDI) crée de la valeur en mettant en action les connaissances générées par WUR afin de contribuer à créer des systèmes alimentaires intégrés et durables. WCDI s'organise autour de quatre lignes d'action: guider la transformation des secteurs, faciliter la collaboration entre parties prenantes, favoriser l'apprentissage tout au long de la vie et la gestion orientée vers l'impact. Ce poster détaille le travail

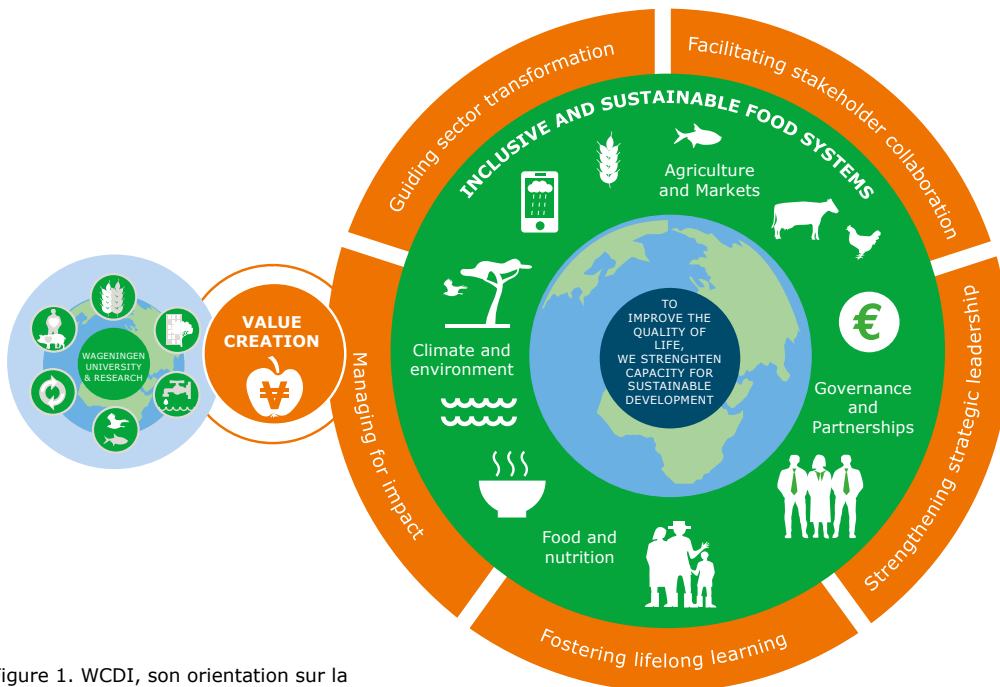


Figure 1. WCDI, son orientation sur la création de valeur et ses lignes d'action



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Figure 2. Recherches et actions impliquant les acteurs des sous-secteurs

effectué sur la ligne d'action 'Guider la transformation des secteurs' en Afrique de l'Ouest.

### Partenaires

En général, et pour la transformation des secteurs en particulier, WCDI collabore toujours avec plusieurs partenaires. Pour les projets décrits dans ce poster, il s'agit des organisations suivantes: Agrinatura, CIRAD, Union Européenne, Ambassade des Pays-Bas, des ONG's comme le SNV, des organisations paysannes et des bureaux d'expertise.

### Nos projets

Quelques uns des projets que WCDI réalise ou a réalisés dans cette ligne d'action sont les suivants:

- **HortiFresh** (Ghana et Cote d'Ivoire) vise le développement du secteur des fruits et légumes à travers une approche orientée par la demande de marché et le renforcement des capacités et la collaboration entre différents acteurs impliqués. Le projet a facilité la formation de formateurs, l'introduction de produits financiers et la mise en place de cinq plateformes professionnelles, qui adressent des enjeux stratégiques du secteur.

- **Éplucher l'oignon** (Niger). Ce projet de recherche-action visait l'identification de leviers pour que le sous-secteur de l'oignon devienne plus compétitif, durable et inclusif. Sur la base des évidences partagées par l'équipe de chercheurs, les parties prenantes de la filière ont formulé 25 résolutions, pour améliorer la performance de production, transformation et commercialisation, la transparence économique et la collaboration entre acteurs.

- **Analyse chaînes de valeur de la mangue** (Burkina Faso). Il s'agit d'une étude approfondie cherchant des options pour améliorer la contribution du sous-secteur à la croissance économique, d'une manière inclusive et socialement et écologiquement durable. Les sous-filières étudiées étaient: mangues fraîches (à destination de l'Union Européenne, Afrique continentale et marchés locaux); mangues séchées pour le marché international; mangues transformées en purée et nectar pour le marché national.

Pour plus d'information

[www.wur.eu/fr/wcdi](http://www.wur.eu/fr/wcdi)

# Gestion orientée vers un impact sur le développement durable

Wageningen Centre for Development Innovation (WCDI)

## Gestion orientée vers un impact sur le développement durable: prendre des décisions éclairées

La gestion orientée vers un impact sur le développement durable (M4SDI en anglais) s'articule autour des processus de planification, de suivi et d'évaluation associés à la gestion des initiatives de développement. Cela va au-delà du suivi et de l'évaluation (S&E) et souligne l'importance d'impliquer différents acteurs dans le changement. WCDI met à profit cette approche dans de nombreux projets dans la zone du Sahel et en Afrique de l'Ouest. Notamment le PCA-GIRE au Mali, le projet laitier FDOV avec Friesland Campina et CGIAR-A4NH, tous deux au

Nigeria, ou encore deux projets de collaboration institutionnelle du programme Orange Knowledge de NUFFIC (ReCaFop au Mali et celui au Bénin).

### Contexte

Au sein de Wageningen University & Research (WUR), Wageningen Centre for Development Innovation (WCDI) crée de la valeur en mettant en action les connaissances générées par WUR afin de contribuer à créer des systèmes alimentaires intégrés et durables. WCDI s'organise autour de quatre lignes d'action: guider la transformation des secteurs, faciliter la collaboration entre parties prenantes, favoriser l'apprentissage tout au long de la vie et la gestion

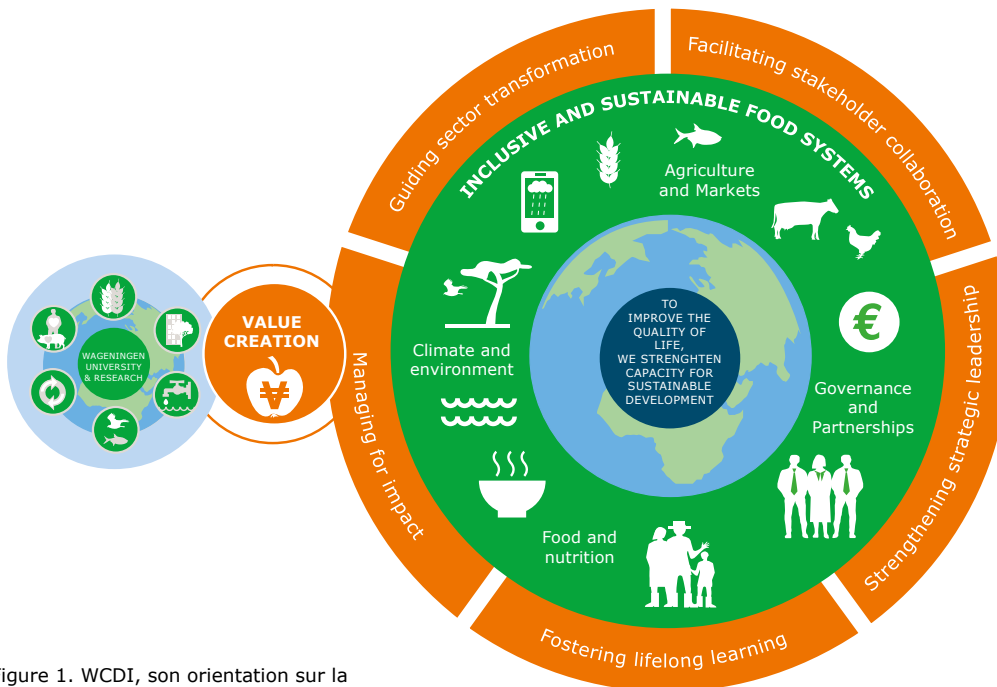


Figure 1. WCDI, son orientation sur la création de valeur et ses lignes d'action



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Figure 2. Bamako, septembre 2017. Parties prenantes travaillant sur la théorie des changements du PCA-GIRE lors de l'atelier de présentation des résultats de l'évaluation à mi-parcours.

orientée vers l'impact. Ce poster détaille le travail effectué sur la ligne d'action 'Gestion orientée vers l'impact' dans la région du Sahel/Afrique de l'Ouest.

#### 'Gestion orientée vers l'impact' en détails

Avec cette approche de gestion en tête, nous aidons à élaborer des stratégies efficaces basées sur de solides analyses de situation, et assurons des processus de S&E et d'apprentissage qui facilitent une gestion adaptative et des décisions éclairées et contextualisées pour le développement durable.

La gestion orientée vers l'impact ce sont différents éléments qui s'articulent dans un but : l'impact sur le développement durable.

#### Nos projets au Sahel et en Afrique de l'Ouest

L'approche M4SDI est insufflée dans les projets suivants:

- Appui au développement et mise en œuvre d'un système de S&E informant la stratégie et les opérations pour deux projets de collaboration institutionnelle du programme Orange Knowledge de NUFFIC: un au Bénin et un autre au Mali (ReCaFop) et pour le projet laitier FDOV avec Friesland Campina au Nigeria. **(3 projects)**
- Appui au suivi des initiatives de plateformes, à la réflexion critique et à l'apprentissage au sein du projet CGIAR A4NH visant à renforcer les systèmes alimentaires pour parvenir à des régimes plus sains au Nigeria. **(1 project)**
- Exécution de l'évaluation à mi-parcours du PCA-GIRE au Mali en 2017 où une méthodologie robuste, qualitative, participative et transversale a été déployée. L'analyse cohérente a permis d'avoir un regard croisé sur les

perspectives parfois opposées des utilisateurs et gestionnaires de la ressource à différentes échelles. Les conclusions et recommandations émises ont alimenté réflexions et actions au niveau du programme et du pays. **(1 project)**

- Renforcement de capacités stratégiques et dans le domaine de M4SDI en général au sein du PCA-GIRE (en 2018) et de ReCaFop (à venir) et auprès de plus de 120 individus qui ont participé à une formation courte annuelle et francophone de deux semaines facilitées entre 2011 et 2014 à Ouagadougou. **(2 projects that were already mentioned before)**

#### De nombreux partenaires

Dans le cadre de cette ligne d'action, WCDI a développé une relation de travail privilégiée avec Wageningen Economic Research (WEcR) et appuie aussi d'autres unités de WUR. WCDI travaille avec des consultants ou organisations des pays concernés comme par exemple l'Institut d'Economie Rurale, le CFASPAM et le CFP-PAS du Mali, l'Institut Supérieur des Sciences de la Population du Burkina Faso, de nombreux lycées agricoles au Bénin et son Institut de Sécurité Alimentaire. Depuis les Pays Bas et dans ces projets, WCDI collabore avec des entreprises privées comme Friesland Campina et des acteurs impliqués dans le renforcement des capacités au sein ou pas du Borderless Network (KIT, iCRA, HECh, Aeres, Bles dairies).

#### Pour plus d'information

[www.wur.eu/fr/wcdi](http://www.wur.eu/fr/wcdi)



# Favoriser l'apprentissage tout au long de la vie

Wageningen Centre for Development Innovation (WCDI)

## Favoriser l'apprentissage tout au long de la vie: investir dans les personnes

Favoriser l'apprentissage tout au long de la vie des individus est central pour atteindre les objectifs de développement durable. L'équipe du WCDI s'engage au quotidien dans le renforcement des capacités des individus et des organisations en mettant l'accent sur le co-apprentissage et l'adoption d'approches intégrées. Cet engagement se fait dans nos projets, comme ceux financés par NUFFIC (au Mali ou au Bénin) et au travers de formations courtes ou sur-mesure comme par exemple les formations « Agence Paysanne pour Economies Rurales » ou « Bâtir

la résilience climatique des systèmes agro-alimentaires futurs grâce à la jeunesse pour un avenir plus sûr ».

## Contexte

Au sein de Wageningen University & Research (WUR), Wageningen Centre for Development Innovation (WCDI) crée de la valeur en mettant en action les connaissances générées par WUR afin de contribuer à créer des systèmes alimentaires intégrés et durables. WCDI s'organise autour de quatre lignes d'action: guider la transformation des secteurs, faciliter la collaboration entre parties prenantes, favoriser l'apprentissage tout au long de la vie et la

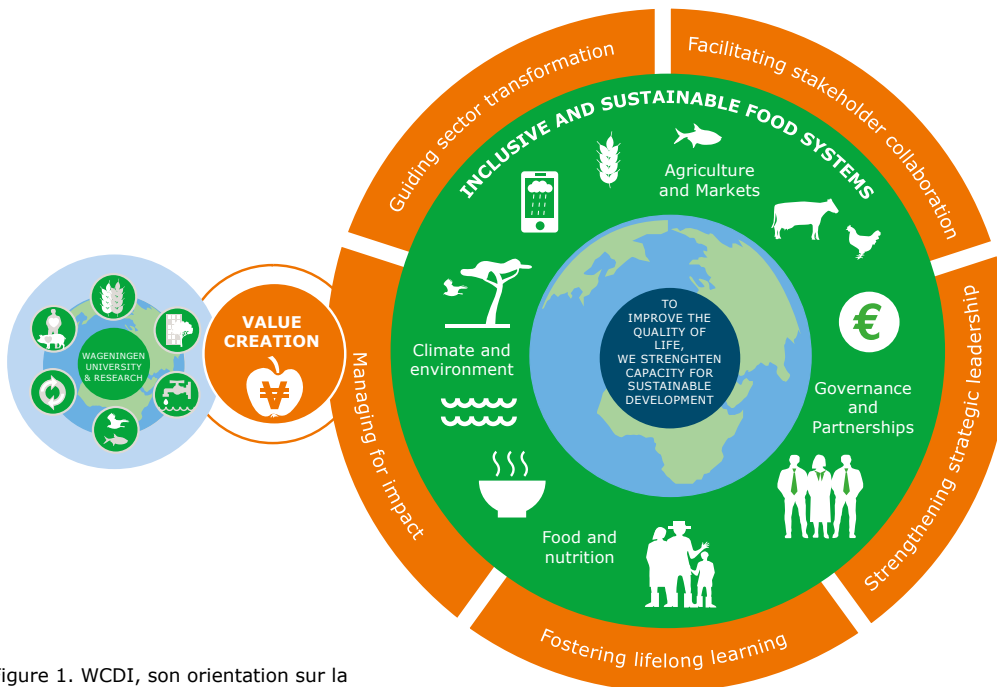


Figure 1. WCDI, son orientation sur la création de valeur et ses lignes d'action



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Figure 2. Atelier entre paysans de promotion de l'économie locale

gestion orientée vers l'impact. Ce poster détaille le travail effectué sur la ligne d'action 'Favoriser l'apprentissage tout au long de la vie' dans la région du Sahel/Afrique de l'Ouest.

### 'Favoriser l'apprentissage tout au long de la vie' en détails

Afin de renforcer compétences et capacités, nous combinons les connaissances pratiques et de terrain, avec de nouvelles perspectives et de nouvelles approches. Depuis plus de 60 ans nous sommes spécialisés dans l'apprentissage interactif et offrons l'opportunité aux professionnels de partager idées et expériences, de créer de nouvelles perspectives et de développer leur réseau.

### Exemples de projets en cours dans la zone

Outre les plus de trente formations courtes régulières conduites aux Pays-Bas engageant des professionnels du monde entier, le WCDI est engagé en Afrique de l'Ouest et dans le Sahel dans:

- Le projet **ReCaFop** financé par NUFFIC au travers du programme Orange Knowledge qui vise deux centres de formation professionnelle et où WCDI travaillera dans les domaines du changement climatique, de l'élevage, de la gestion intégrée des ressources en eau et au renforcement de la capacité organisationnelle et institutionnelle des deux centres. WUR s'intéressera à l'apprentissage hybride (blended learning).
- Le projet « **Renforcer la formation pour l'emploi dans les chaînes agro-alimentaires au Bénin** »

aussi financé par NUFFIC au travers du programme Orange Knowledge.

- La facilitation de la formation de trois semaines « **Agence Paysanne pour économies Rurales** » qui permet aux participants de développer leur compétences pour intégrer dans leur travail des approches inclusives vis-à-vis des fermes familiales et des outils pratiques pour promouvoir l'entrepreneuriat des paysans. L'ambition est de contribuer à l'essor de chaînes de valeur bénéficiant aux fermes familiales par leur inclusion.
- La facilitation de la formation de deux semaines « **Bâtir la résilience climatique des systèmes agro-alimentaires futurs grâce à la jeunesse pour un avenir plus sûr** » qui, grâce à une approche intégrée, tente d'appuyer les participants à concevoir les systèmes alimentaires de demain face aux enjeux de changement climatique, notamment par l'inclusion des jeunes générations.

### Nos partenaires

NUFFIC, iCRA, KIT, AERES, Woord en Daad (dont certains sont membres du Borderless Network), la Haute Ecole Charlemagne de Belgique, le Réseau International FAR, le CFASPAM de Mopti, le CFP-PAS de Gao et l'Université de Ségou (Mali), dix lycées agricoles et l'Institut de Sécurité Alimentaire du Bénin.

### Pour plus d'information

[www.wur.eu/fr/wcdi](http://www.wur.eu/fr/wcdi)

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The mission of Wageningen University & Research is "To explore the potential of nature to improve the quality of life". Under the banner Wageningen University & Research, Wageningen University and the specialised research institutes of the Wageningen Research Foundation have joined forces in contributing to finding solutions to important questions in the domain of healthy food and living environment. With its roughly 30 branches, 5,000 employees and 12,000 students, Wageningen University & Research is one of the leading organisations in its domain. The unique Wageningen approach lies in its integrated approach to issues and the collaboration between different disciplines.



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