Agroecology Initiative Technical report

Multicriteria assessment of agroecology in Senegal

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1. Introduction

1.1. Context

Senegalese agriculture, which is mainly family-based, extensive and rainfed, plays a crucial role in the country's socio-economic development. It accounts for 17% of gross domestic product (GDP) and provides 32% of jobs (IFAD, 2020). It is traditionally based on cash crops such as groundnuts and cotton, as well as subsistence food crops such as millet, rice, sorghum and maize. Recently, production of high-value-added fruit and vegetables (onions, mangoes, watermelons, tomatoes) has increased thanks to support policies, particularly those focused on water management (IFAD, 2020).

However, Senegalese agriculture is particularly susceptible to the impacts of climate change due to its reliance on rainfall and the availability of arable land, especially in the groundnut basin at the center of the country (Badiane et al., 2000). This region experiences a Sahelo-Sudanian climate characterized by a prolonged dry season and irregular rainfall, primarily concentrated between July and September. Since the 1970s, recurrent droughts have led to the abandonment of long-cycle crops such as cotton, rice, and late millet, prompting a shift towards early millet and groundnuts (Dalauray, 2017). Additionally, soil salinization in some areas has further diminished agricultural productivity (Amar et al., 2024).

The Fatick department, located south of the groundnut basin and bordered by the Atlantic Ocean to the west, supports a diverse agricultural landscape where farming, livestock raising, agroforestry, and fishing coexist. Positioned between the Sahelian agro-pastoral zone and a humid agricultural zone, Fatick receives 600 to 800 mm of rainfall annually. Its soils range from ferruginous to hydromorphic, halomorphic, and mangrove types. Water resources include permanent rivers such as the Sine and Saloum, along with groundwater reserves. The region is also characterized by rich vegetation cover, including classified forests. Fatick's population grows at a rate of 3.5% annually, reaching a high density of 136 inhabitants per square kilometer (ANSD, 2023).

In a context of climate change, this strong demographic growth, combined with agro-pastoral activities, imposes significant pressure on productive resources (forests and soils), potentially leading to environmental degradation. In the coming decades, in the absence of adaptation and mitigation measures, the Fatick department will face major challenges in ensuring food security and improving the incomes of a rapidly growing population. It is crucial to increase production in the face of the threats posed by climate change to crop yields, while focusing on protecting the environment and improving the quality and diversity of products.

To meet these challenges, since the end of 2022, civil society organisations (CSOs) in the Fatick department have been actively promoting the agro-ecological transition through a citizens' movement called the Dynamique pour la Transition écologique locale (Dytael-Fatick). This new form of local multi-stakeholder platform involves multiple stakeholders such as farmers' organizations, NGOs, members of the research community, local authorities, decentralised government technical services and private stakeholders. Dytael is part of a national organisation promoting agroecology in Senegal, Dytaes (Dynamique pour une Transition Agroécologique au Sénégal), which was set up in 2019.

Dytael has carried out a prospective analysis to make Fatick an agro-ecological region by 2035. This vision serves as a compass for developing an action plan for the agro-ecological transition. The general objective of this plan is to promote agro-ecological practices for the agri-environmental and socio-economic resilience of family farms in the department of Fatick. To achieve this, Dytael is developing strategic actions aimed at strengthening advocacy in favour of agroecology. These actions involve (i) raising awareness, among the administrative and political authorities and the population of the department, of the need to adopt agro-ecological practices, (ii) building the capacity of Dytael's member producer organisations in agro-ecology, (iii) promoting agro-ecological products through visits and fairs, and (iv) encouraging new attitudes towards preserving the environment.

The CGIAR agroecological initiative in Senegal falls within this context. The Dytael is thus considered an 'agroecological Living Landscape' (ALL). Dytael's efforts to transform Fatick into an agroecological territory are supported through Workpackage 2 of the project, which focuses on assessing agroecological performance. This assessment, conducted at both farm and territorial levels, provides Dytael with a comprehensive overview of the current situation. It enables the establishment of performance indicators to monitor progress and identify areas for improvement, guiding the transition towards agroecology.

1.2. Vision to action of the ALL

The vision of Dytael for Fatick is for the department to become an agro-ecological territory by 2035, based on an inclusive development model and respect of the agro-ecological principles. This model is called 'Made in Fatick' and based on the diversification of food systems and the development of a local industry promoting local products under the 'Made in Fatick' label. As part of this vision, agroecology, which integrates agriculture, livestock farming and forestry, efficiently enriches the soil and increases productivity through the use of modern equipment.

The vision for the ALL was built using a process involving two successive and complementary phases. The first phase, a broad foresight exercise, led to the design of several development scenarios of the territory, including the one entitled 'Made in Fatick'. To turn this vision into

reality, a second, in-depth foresight exercise was carried out, focusing only on agro-ecology, in order to define specific levers for action.

To translate this vision into action, an agro-ecological transition path has been co-constructed with Dytael stakeholders using a backcasting approach. This approach is based on two main elements: the results of the HOLPA survey (current situation), and the visioning, which projects towards the desired future with precise entry points needed for initiating the agroecological transition. The co-construction of this transition path, carried out during multi-stakeholder workshops, was based on back-and-forth exchanges between the desired future (defined by the visioning) and the current situation (HOLPA results), thus making it possible to specify the stages required for an effective transition, both at farm level and for the region as a whole.

Six pillars structure this vision: (i) access to water and sustainable management of water resources, (ii) restoration of degraded land and climate resilience, (iii) sustainable management of forest and pastoral resources, (iv) agro-ecological transition with integration of agriculture and livestock farming, (v) adding value to local products and economic development, and (vi) territorial planning integrating agro-ecology into local public policies (Figure 1).

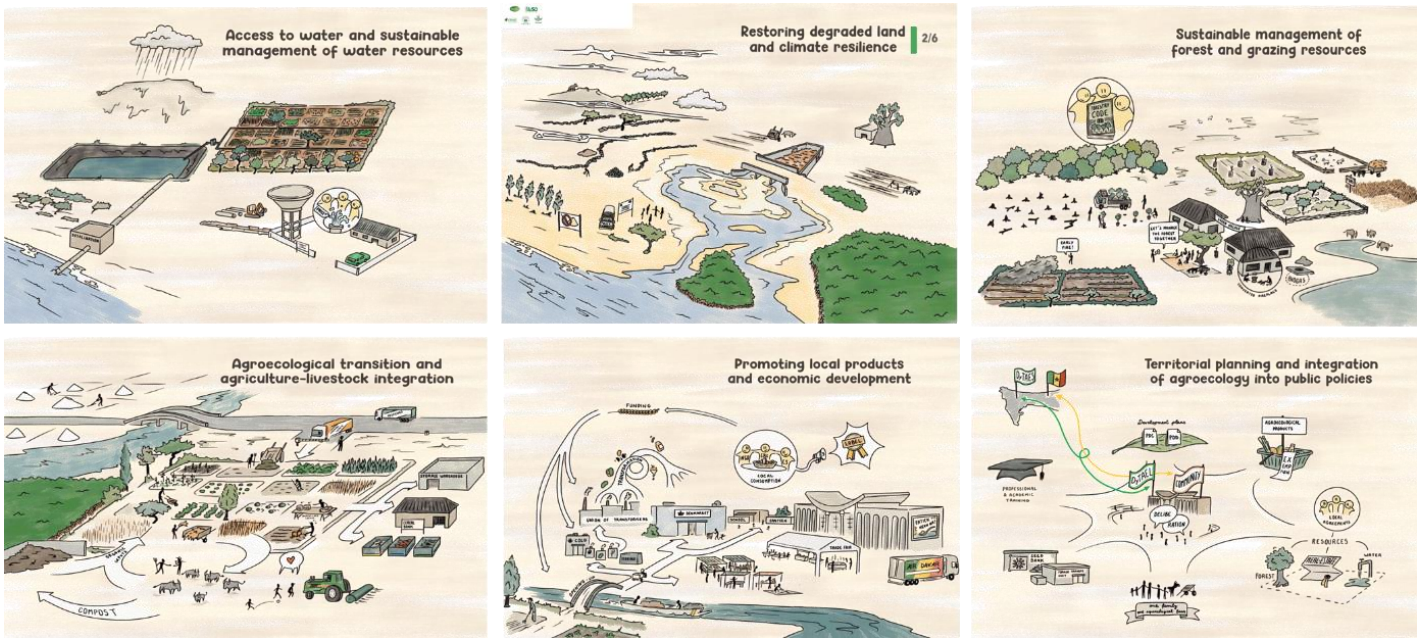

Figure 1 : Diagram of the six entry points of the agroecological territory ideotype for the Fatick department

2. Assessment of agroecology with HOLPA

2.1. Objectives of the agroecology assessment in the department of Fatick

Evaluating agroecological performance is crucial for understanding the current stage of the agroecological transition in the department. It helps identify key indicators where agroecology in Fatick is performing well and indicators requiring further improvement. The research questions guiding this study were as follows:

- What is the current level of agroecology in Fatick and the degree of adherence of farmers to its principles?
- On which indicators are the most 'agroecological farms' performing better or worse compared to less agroecological ones?
- Are there constraints and opportunities for the development of agroecology across different types of farms? What are the challenges to its development at the territorial level?

2.2. Overview of HOLPA survey

In order to produce locally relevant and globally comparable data on the impact of agroecology, the Initiative has developed the HOLPA (Holistic Localized Performance Assessment) framework. HOLPA is designed to help determine which types of agricultural practices lead to sustainable results, at different scales and in different contexts, throughout the food chain. Eight countries are involved in the study (figure 1).

HOLPA consists of 3 survey modules, (1) the context module, (2) the agroecology module, and (3) the agroecology performance evaluation module (Figure 3). The data collected in these modules are presented in Tables 1 and 2 and Figure 4.

Figure 2 : The 8 initiative countries in which the HOLPA tool has been deployed

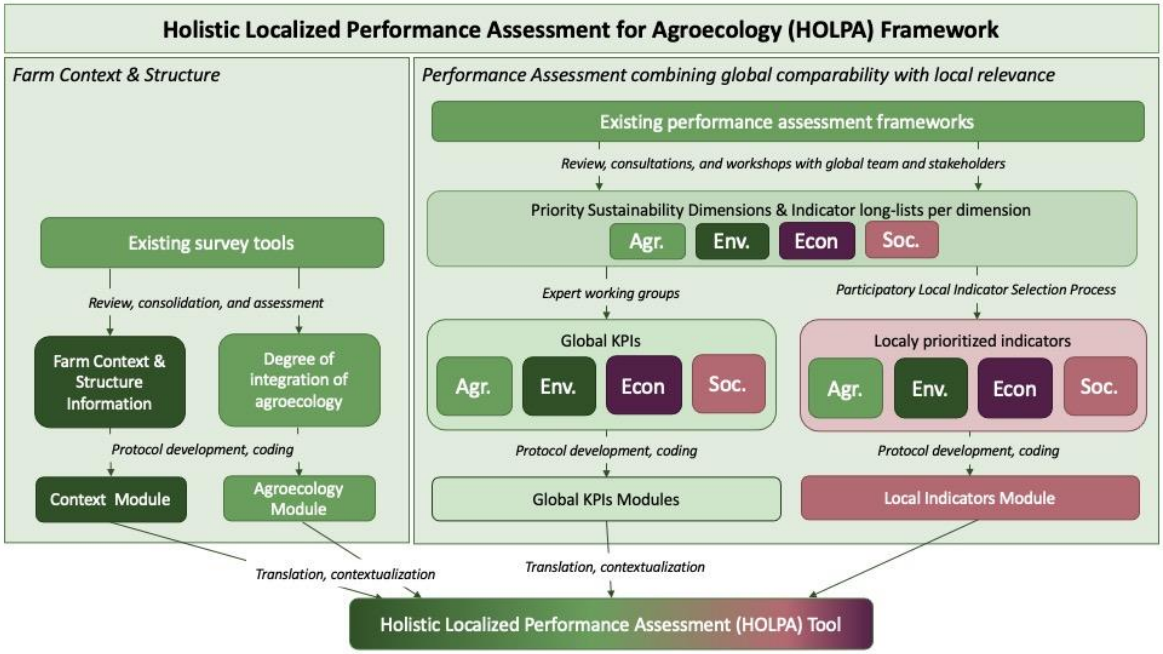

Figure 3 : The HOLPA tool: a survey tool that can be used to evaluate the level of agro-ecological transition in a given landscape and the performance of agro-ecology.

Table 1 : Variables in the context module

Theme	Detailed content
Respondent characteristics	Age, gender, ethnicity, education, marital status, occupation, number of years lived in the village, relationship with the head of household, involvement in farm activities, involvement in producers' associations, involvement in agricultural research and development programs
Farm and household characteristics	Household structure, production system on the farm, outlets and use of farm produce, fertilisation and pest management methods, farm size, landholding
Political context	Policies affecting production and food systems
Motivations for agroecology	Personal and societal perspectives on agroecology

Table 2 : Variables in the agroecology module

Which principle ?	How is it assessed ?		
Improve resource use efficiency			
Recycling	Where do you source your seed, energy, compost/manure and genetic resources for breeding?	**Min. score = 1**	**Max score=5**
		100% sourced externally	100% self-produced
Input reduction	Over the last 12 months, what have you done to improve soil fertility, manage pests and diseases, feed your livestock and look after your animals?	**Min. score = 1**	**Max score=5**
		Only applying fertilisers/pesticides, buying external feed, anti-bio treatments for livestock, etc.	Only ecological practices are used: legumes, compost, manure, bio-pesticides, no feed purchases, etc.
Improve resilience			
Soil health	What ecological practices do you use?	**Min. score = 1**	**Max score=5**
		None	4 or more of the following agroecological practices: agroforestry, cover crops, mulch, fallow land, hedges, crop associations, living hedges, border plants, grass strips, flower strips, push-pull, etc.
Animal health	Are your animals happy and healthy? What are your practices ?	**Min. score = 1**	**Max score=5**
		Animals suffer from hunger, disease and thirst all year long	The animals do not suffer from disease, hunger or thirst throughout the year. Provision of shelter and regular health checks
Biodiversity	How many species are cultivated and bred, and what is the diversity of trees and natural areas?	**Min. score = 1**	**Max score=5**
		1 specie per hectare	More than 5 species/ha, more than 5 different tree species, more than 5 species in natural areas
Synergy	What ecological practices do you use (see soil health), + pasture management?	**Min. score = 1**	**Max score=5**
		None	See soil health + manure collection, forage species...
Economic diversification	What are your sources of income diversification (agricultural activities/breeding to be counted)?	**Min. score = 1**	**Max score=5**
		1 source	5 or more
Equity and social responsability			
		Min. score = 1	**Max score=5**

Co-creation of knowledge	What is the level of information exchange with other stakeholders: NGOs, consumers, traders, researchers?	Never	Having exchanged with these stakeholders 5 times/year or more
Social values (food)	Do you and your family have access to healthy, varied, seasonal and traditional food?	**Min. score = 1**	**Max score=5**
		No access	Good access
Price equity	Are you getting a good price for what you produce on your farm?	**Min. score = 1**	**Max score=5**
		Never	Always
connectivity	To whom are your products sold?	**Min. score = 1**	**Max score=5**
		Nobody	Direct selling to consumer
Governance	How often are you involved in decisions concerning the management of land and natural resources? How often are you involved in decisions? Do you consider that they are well managed?	**Min. score = 1**	**Max score=5**
		Does not participate, does not take decisions, poorly managed resources	Participate, contribute to decisions, well-managed resources
Participation	How effective are associations and POs in supporting farmers?	**Min. score = 1**	**Max score=5**
		No support	High support

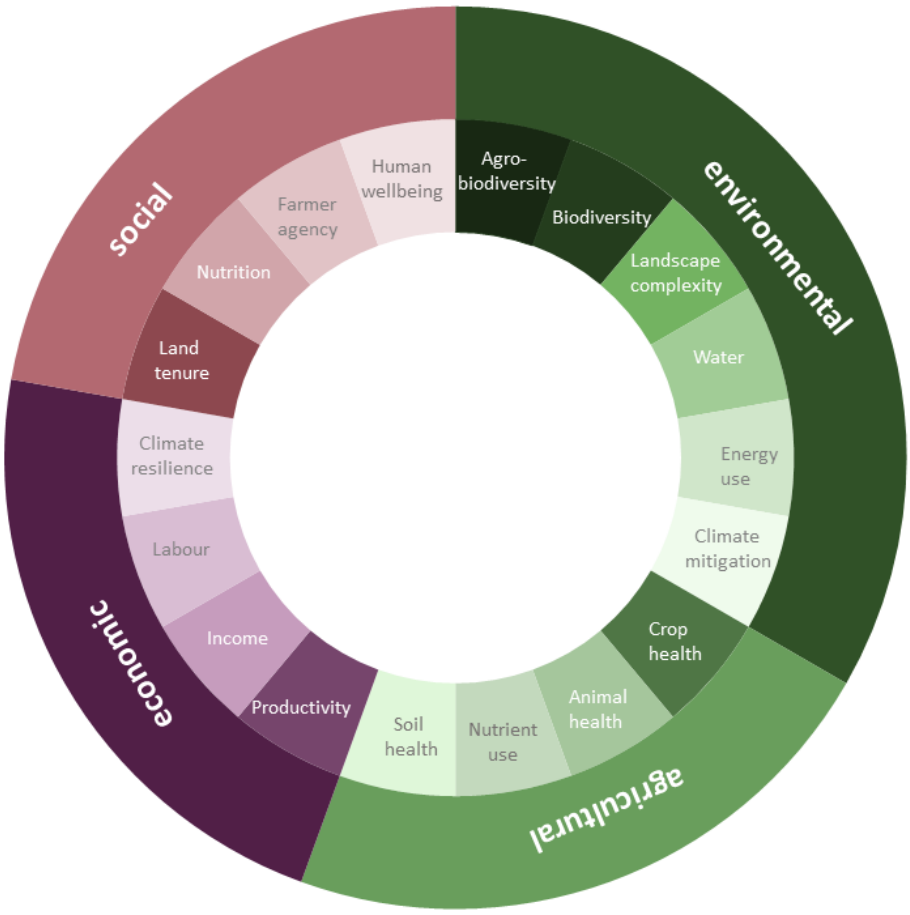

Figure 4 : The global indicators assessed by all the countries in the initiative

3. Method

3.1. Localization process of HOLPA survey: workshop to identify local indicators

The global HOLPA framework has been adapted to Senegal, with some indicators added as a result of a localization workshop with Dytael stakeholders. The aim of the workshop was to co-develop, with Dytael stakeholders, a set of local indicators relevant to Dytael farming systems and important for the stakeholders. A number of producers (farmers and livestock breeders), processors, members of the technical agricultural services (agriculture and livestock), local representatives, NGOs, members of the Dytael technical committee and researchers took part in the workshop.

The workshop agenda included the following key points:

- Identification of stakeholders' perceptions of agroecology and of an agroecological farm,
- Clarification of the concept of indicators and their usefulness to assess agroecological performance,
- Voting on the most relevant local indicators by the stakeholders.

The workshop was structured as a 'world café' to encourage productive dialogue and the exchange of ideas. Participants were divided into four groups, each focusing on a specific dimension: agro-zootechnical, social, economic, and environmental. To promote balanced participation, the groups were composed to be gender-homogeneous, allowing women to express themselves more freely, while being diverse in terms of professional fields and local origins. Due to the lower number of women present, one of the four groups consisted entirely of women, while the remaining groups were composed of men. Each group was guided by a dedicated facilitator responsible for steering the discussions and ensuring active participation from all members. Additionally, one or two experts were assigned to each dimension to provide explanations, clarify concepts, and address any questions or points requiring redirection during the discussions.

The workshop followed a structured 'world café' format. Initially, each group was assigned a specific dimension, presented by an expert, and tasked with reflecting on and proposing important local indicators for that dimension. Groups then rotated through all dimensions, contributing insights to each. At the conclusion of this process, all proposed indicators were consolidated and categorized into dimensional sub-themes (e.g., water, soil, trees). Indicators that closely matched the global KPIs from the HOLPA tool were identified and specified. Each dimension's indicators were then presented in a plenary session, and stakeholders returned to their groups to select on a maximum of three indicators per dimension. The votes of each group were grouped to determine the most relevant local indicators according to stakeholder consensus (see table 3).

Table 3 : List of local indicators selected by stakeholders

Dimension	Indicator	Plenary discussion
Environnement	Quantity of pesticide used	
	Water quality (irrigation and livestock, salinity)	
	Density of fertilising trees	
Agronomy	Crop yield	
	Changes in soil fertility	Indicators to be grouped together: level of soil fertility and practices to improve it over the long term.
	Level of soil fertility	
Social	Farmer autonomy	Organisational, social, self-production of inputs and fodder, etc.
	Reducing conflicts linked to animals roaming	
	Security dimension (demotivation linked to cattle theft)	
Economic	Added value of the harvest	
	Storage systems for agricultural product	+Enclosure (crop protection)
	Household saving	

All the indicators initially selected and the detailed indicator sheets can be found in appendices 1 and 2.

3.2. HOLPA implementation

3.2.1. Household sampling

We carried out 200 surveys in the department of Fatick from January to April 2024. These surveys were carried out by a team of 9 interviewers and three supervisors. The HOLPA guidelines required 160 selected farms to show strong adherence to the principles of agroecology. It was very difficult to identify such farms *a priori*, so we proceeded with a sampling based on zoning according to the characteristics of the environment and the accessibility of the farms to roads and urban centers (Figures 5 and 6).

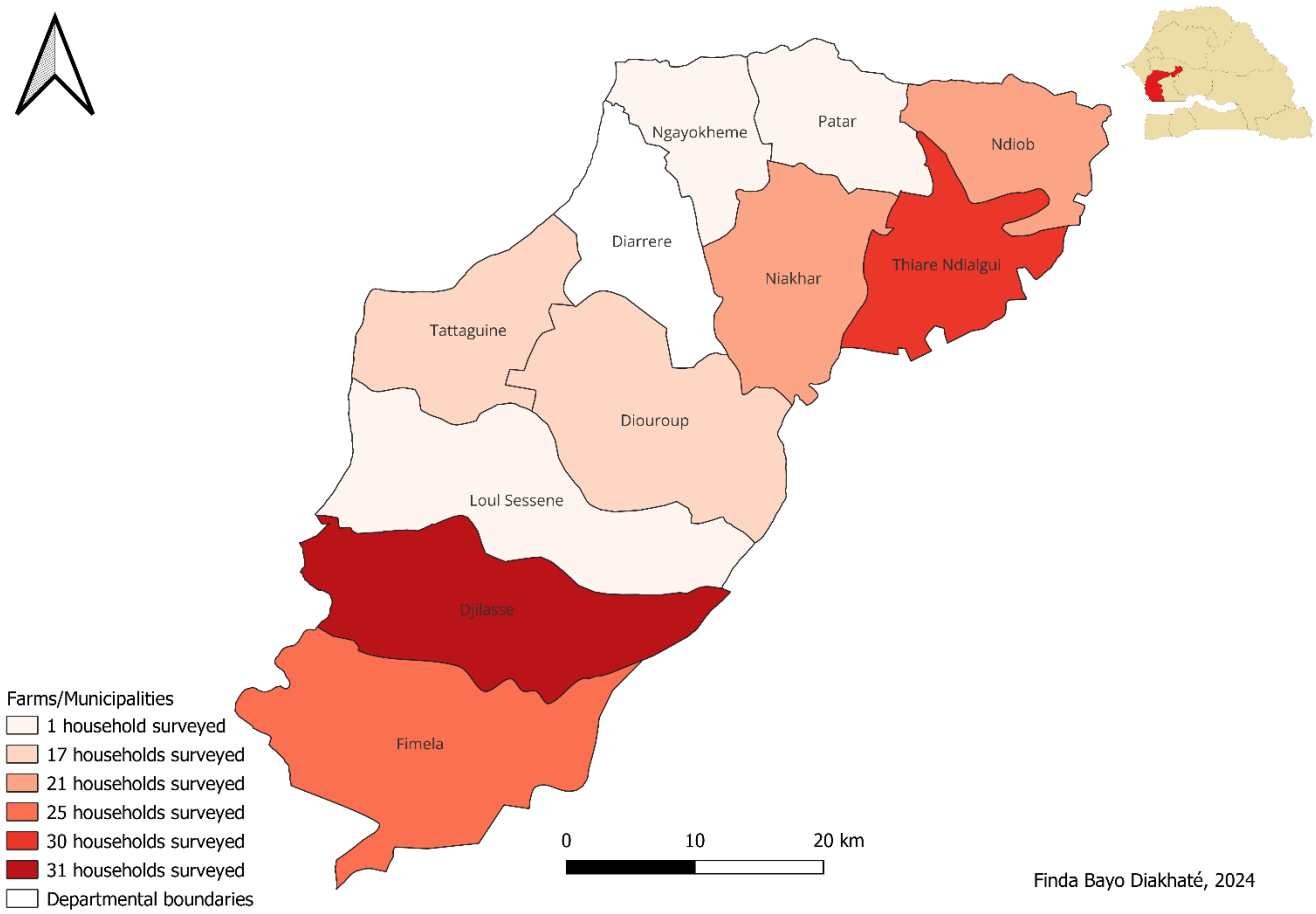

Figure 5 : Map of Fatick department showing the number of households surveyed by commune.

The farms were selected from the following 6 zones:

- Urban or peri-urban farms: farms in urban centres and populated areas (33%);
- Farms strongly influenced by roads: farms located close to major roads. In particular, along the motorway axis (Tattaguine-Fatick-Kaolack) (3%);
- Fossil valley farms: farms located on fertile valley land (more market gardening, orchards, rice) (21%);
- Farms in the groundnut basin (in the Sérère zone): farms in the groundnut basin (millet, groundnuts, livestock, etc.) (25%);

- Farms in the rural environment of the south of the Fatick department: farms in wetter areas with fishing, mangroves (19%).

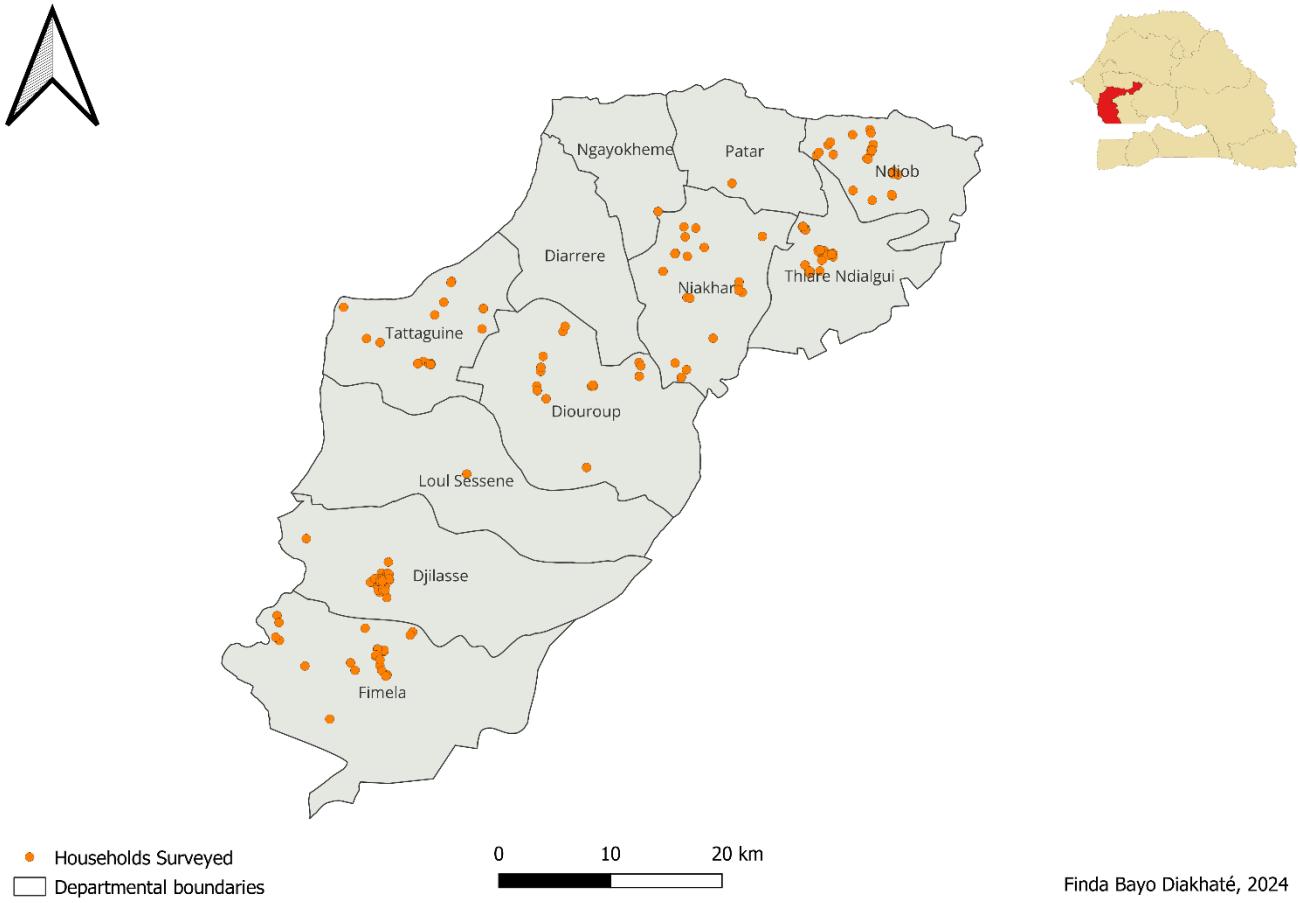

Figure 6 : Map of Fatick department showing the spatial distribution of households surveyed in the HOLPA survey

3.2.2. Method to analyze the Data

The median scores for each agroecological principle (see Table 2) were calculated for the entire sample to provide an overview of the area's agroecological transition. To distinguish the most and least agroecological farms, we applied the following criteria: farms with a median total score above 3.3 were classified as 'most agroecological,' while those scoring below 2.3 were labeled 'least agroecological.' The scores across individual principles for both groups were compared to identify which principles were most or least effectively implemented in farms considered 'more agroecological.' Additionally, the characteristics of these farms (e.g., total area, livestock units, crop types) were examined, and the specific practices adopted by the most agroecological farms were analyzed. Finally, the performance of the more agroecological group was compared with the less agroecological group using key performance indicators (KPIs) and local metrics.

4. Results of HOLPA survey

4.1. The level of advancement in agroecology in the studied area

Of the 200 farms surveyed, only 30% reported having a clear understanding of agroecology (Figure 7), despite nearly all respondents expressing agreement that Agroecology is a positive approach for managing farms and food systems. This limited understanding is likely linked to how agroecology was translated into Wolof by the interviewers as *Mbaay mou sell*, which, in French, means "healthy agriculture." The term's broad and non-specific nature makes it easy for most farmers in the area to relate to, potentially leading to a positive general perception.

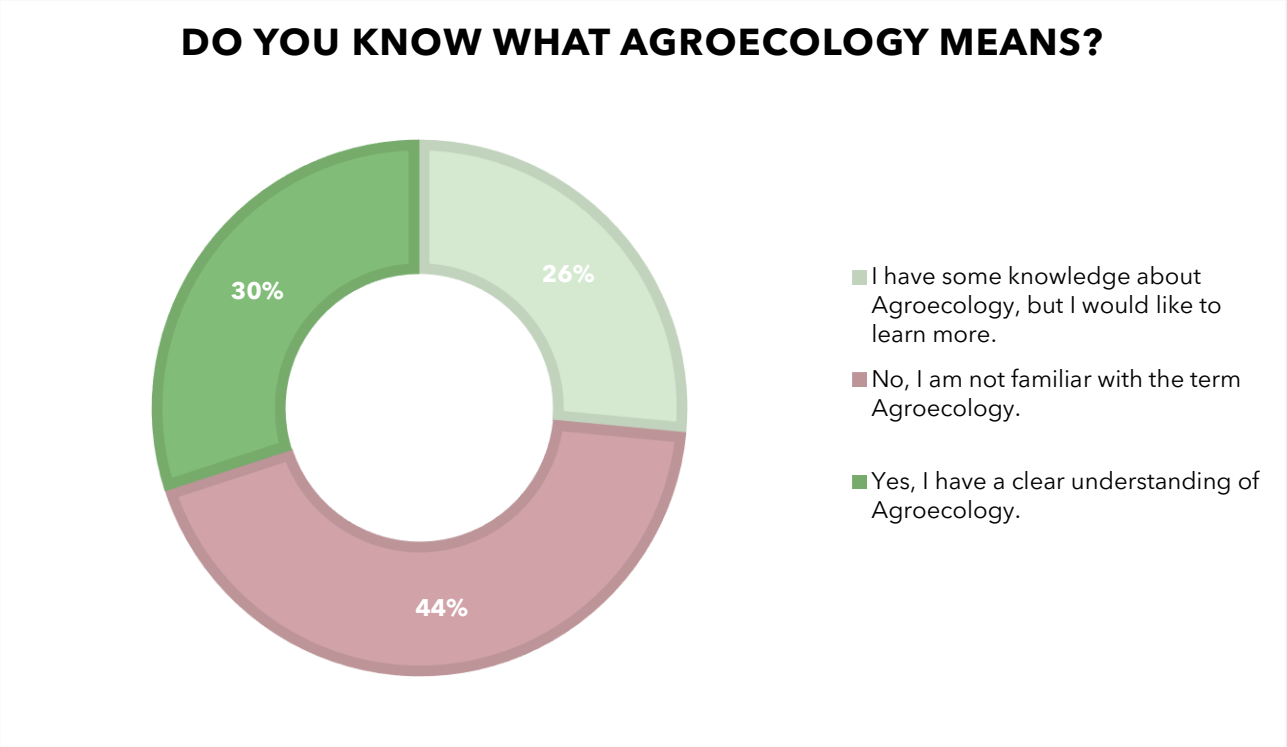

Figure 7 : Respondents' level of understanding of agroecology.

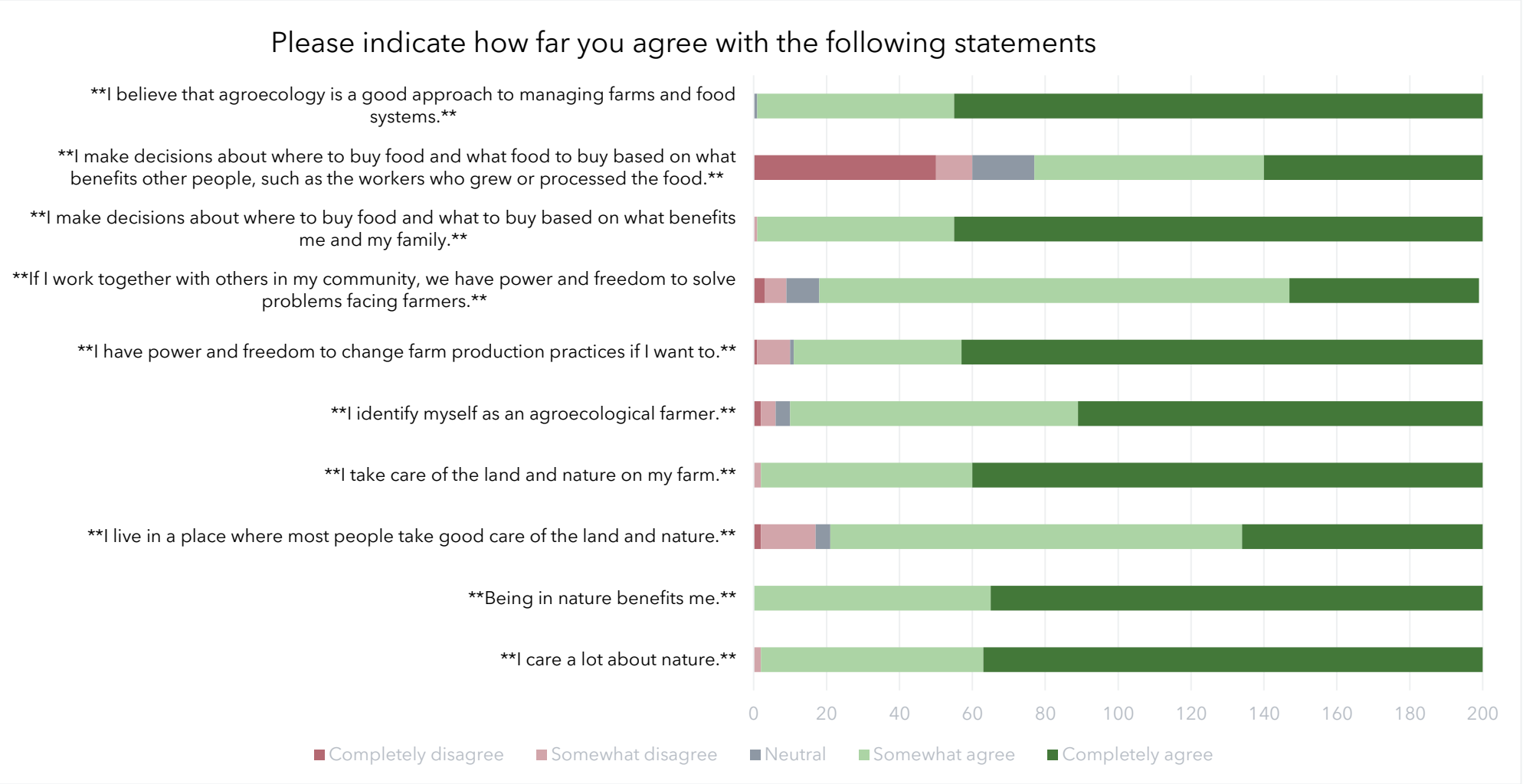

Figure 8 : Opinion on agroecology

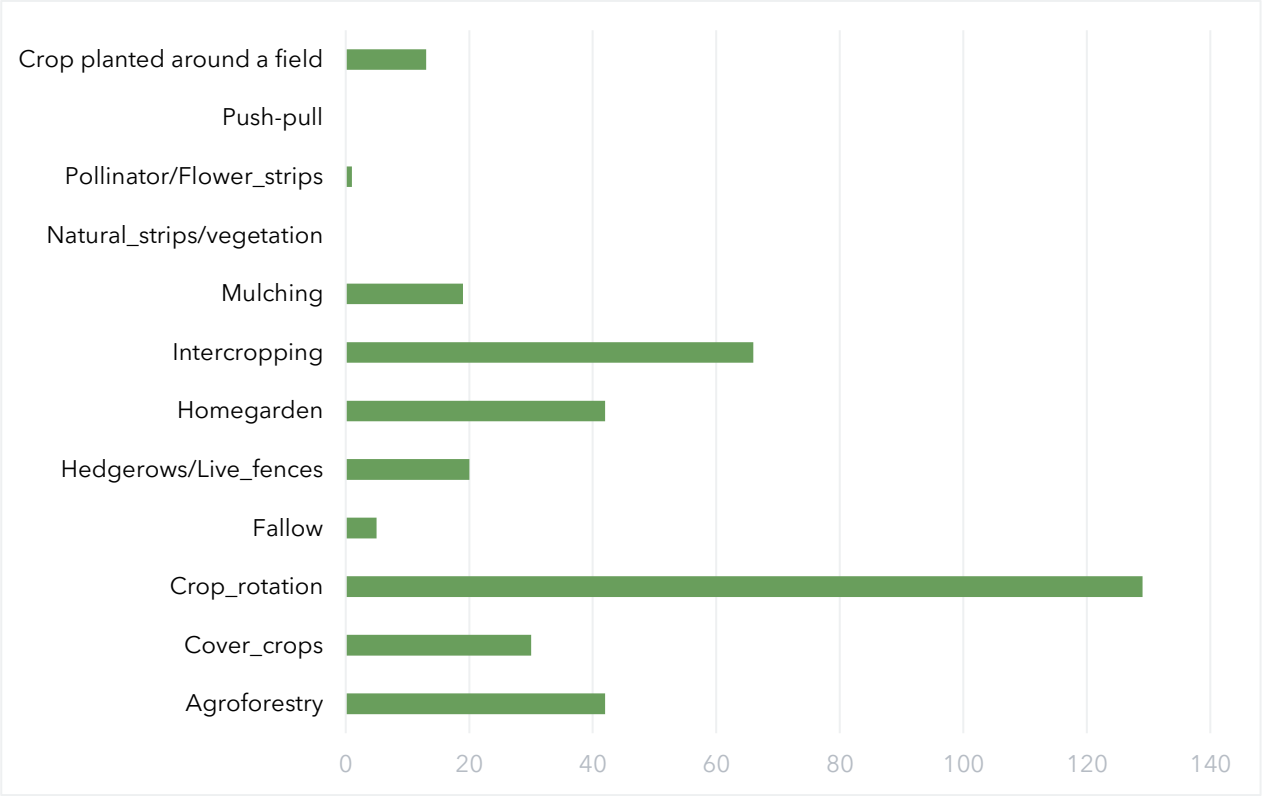

Figure 9 : Agroecological practices and their frequency on the sample of 200 farms

Few farmers in Fatick use agroecological practices. Crop rotation (millet-groundnut) is the main agroecological practice used, followed by crop association.

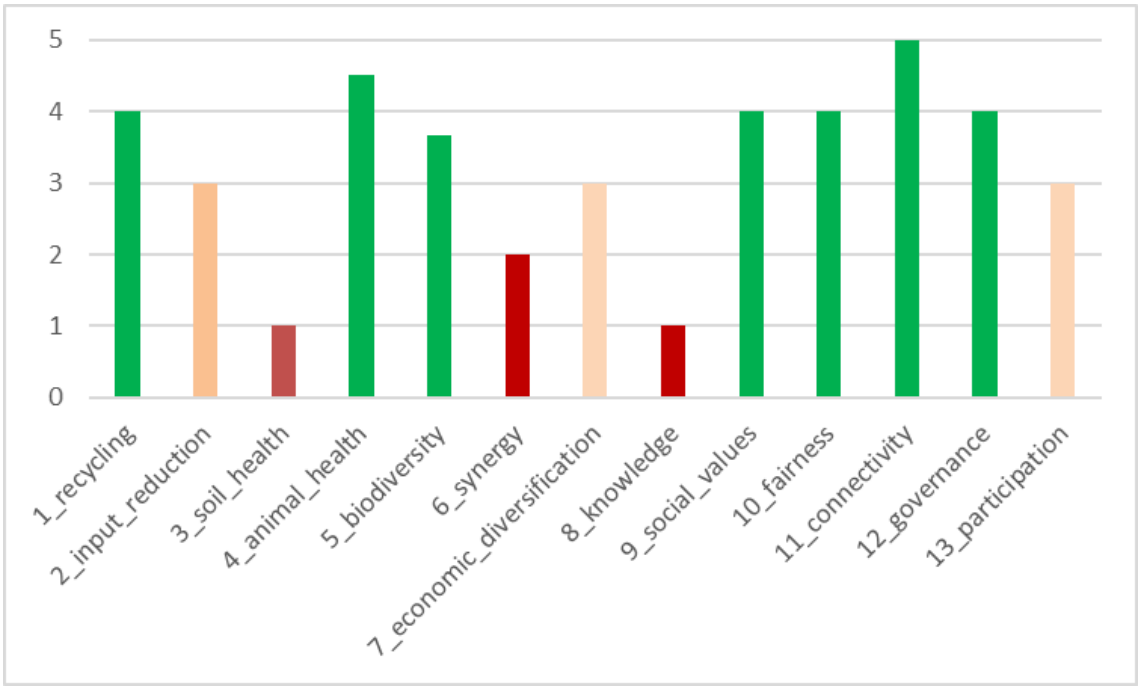

Figure 10 : The level of agroecological transition in the Fatick area, assessed by the median scores obtained by the 200 respondents on agroecological principles.

Agroecology in the region appears to be primarily practiced "by default." The high median scores of 4/5 and 3/5 for the principles of recycling and reducing inputs suggest that farms mainly rely on their own resources and use minimal external inputs, likely due to limited financial resources. However, resilience—encompassing soil health, economic synergy, and diversification—remains a significant challenge. Enhancing these aspects would require adopting more ambitious practices, which are currently not widely implemented (Figures 9 and 10). Conversely, the median scores for connectivity, governance, and social values are relatively strong (4/5). Connectivity, which reflects the fact that most sales occur directly between farmers and consumers, reached the highest median score of 5/5.

Figure 11 reveals that when comparing the most agroecological farms (median score across all principles >3.3) with the least agroecological farms (median score <2.3), the latter show significantly lower scores across several key areas. Their scores for cultivated/raised and natural biodiversity are halved, they have fewer sources of economic diversification, weaker connectivity (with sales more frequently directed to retailers rather than directly to consumers), and lower participation levels, as they are less often supported by associations and producer organizations. However, no significant differences were observed between the two groups regarding input reduction and soil health principles.

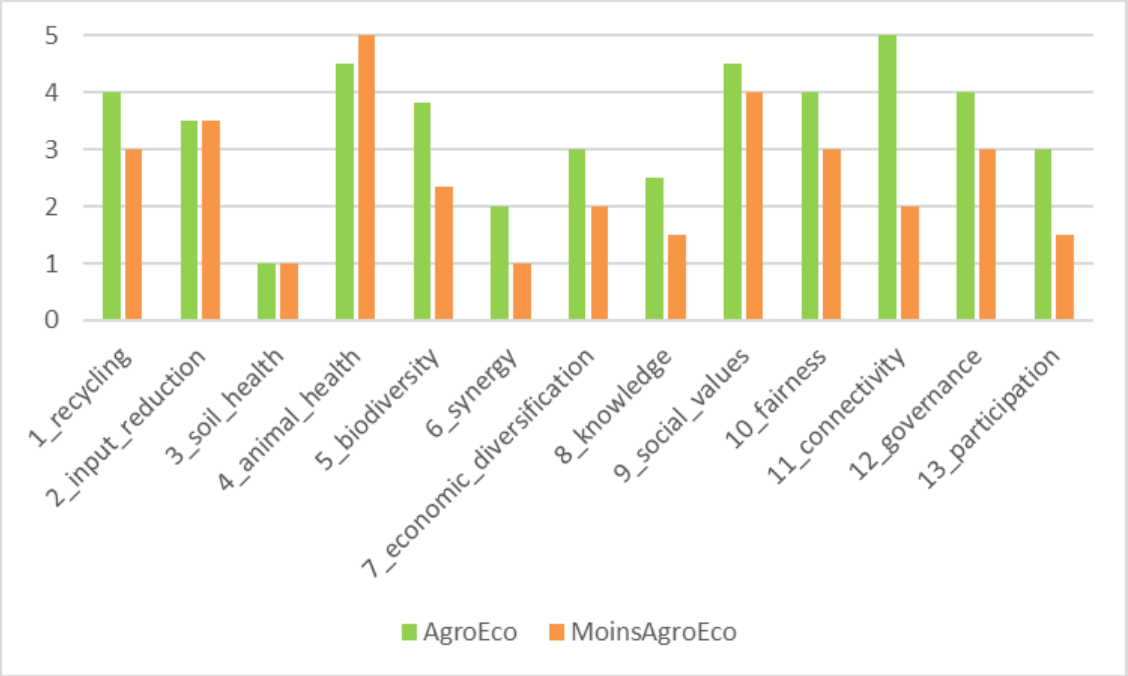

Figure 11 : Comparison of the median scores on the principles for the most agroecological group, known as 'AgroEco' and the least agroecological group, known as 'LessAgroEco'; these groups having been defined by the overall median score with a threshold greater than 3.3 for the most agroecological and least than 2.3 for the least agroecological.

The farms identified as agroecological in the department, with a median score above 3.3 across all principles, primarily represent subsistence farming systems. These farms tend to be self-sufficient, driven more by limited access to resources and financial constraints than by a deliberate adoption of advanced agroecological strategies. As a result, the implementation of deeper, transformative practices for agroecological transition remains very limited.

Analysis of the variables relating to the farm structure of the more agroecological farms (Table 4) shows that they have an average area of 5.6 hectares (vs. 2 ha, means not significantly different), and that they raise more livestock (5.52 livestock units, vs. 0.77). They are also more often involved in market gardening (51% of the more agroeco group, vs. 13% of the less agroeco group) and arboriculture (77% vs. 45%).

Tableau 4 : Farm characteristics that distinguish agro-ecological farms from least agroecological farms. A star indicated a significant difference (khi-2) between the 2 groups

Variables	Fermes agroécologiques	Fermes moins agroécologiques
Share of sample	28%	8%
Area (ha)	5.6	2
Tropical Livestock Units (TLU)	**5.52***	0.77
Household size	13.7	11.3
% Farmers involved in arboriculture	**77%***	31%
% Farmers involved in rainfed agriculture	96%	94%
% Farmers involved in market gardening	**51 %***	13 %

4.2. Agroecology performance in Fatick

4.2.1. Peformance achieved regarding agronomic indicators

More agroecological farms perform better in terms of crop and animal health and nutrient use (wilcox.test). At the workshop where the results were presented to the stakeholders, they explained that better crop health in agroecology could be due to better monitoring and the use of a mix of local and improved disease-resistant varieties. They also pointed out that biological seed conservation products ensure better germination in the following cycle. These aspects need to be quantified in the future.

However, it is important to note that nutrient use performance remains low (<50/100), even among the most agroecological farms. This indicator is measured by subtracting nutrient outputs (such as biomass removal when residues are not left on the soil and grain harvesting) from nutrient inputs (including fertilizer, manure, or compost additions). A low score indicates that, across the area—whether agroecological or not—soil inputs are insufficient to balance nutrient losses. This imbalance reflects significant challenges faced by stakeholders, including limited access to organic matter sources and insufficient resources to supplement soil fertility with chemical fertilizers.

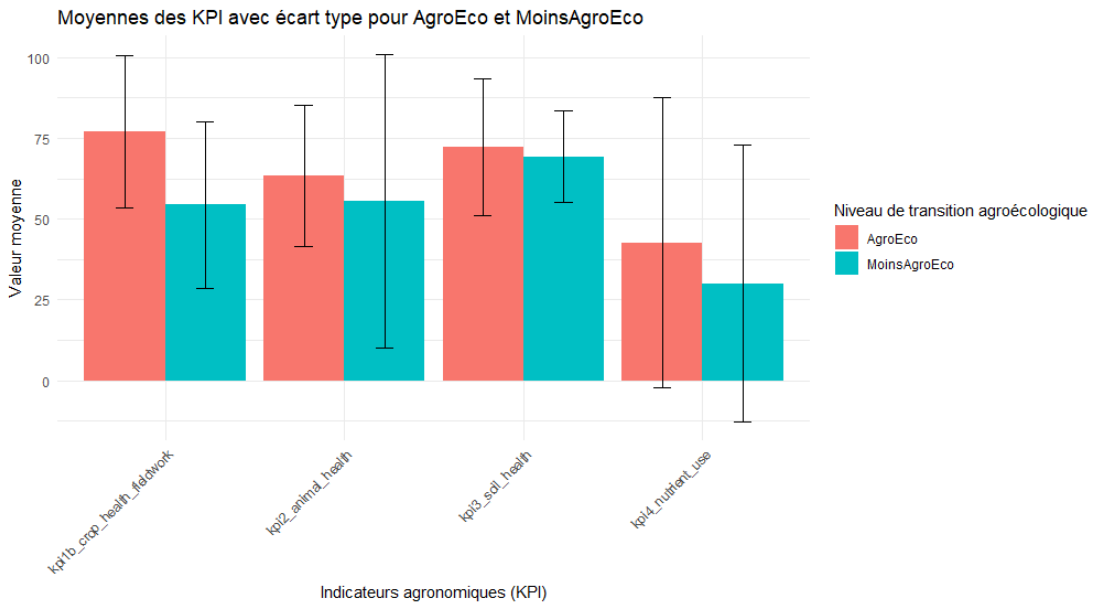

Figure 12 : Comparison of agronomic performance between the 'Agroecological' and 'Less agroecological' groups

4.2.2. Performance achieved regarding environmental indicators

The indicators for which the agroecological group performs better than the less agroecological group (wilcox.test) are: tree diversity and crop richness index. However, the latter remains low for the more agroecological group (average of 28/100). The less agroecological farms performed better on the varietal diversity indicator, whereas we had expected the more agroecological farms to perform better on this indicator. No differences were statistically observed for the other indicators. The indicators of climate change mitigation and landscape complexity were very low for both groups.

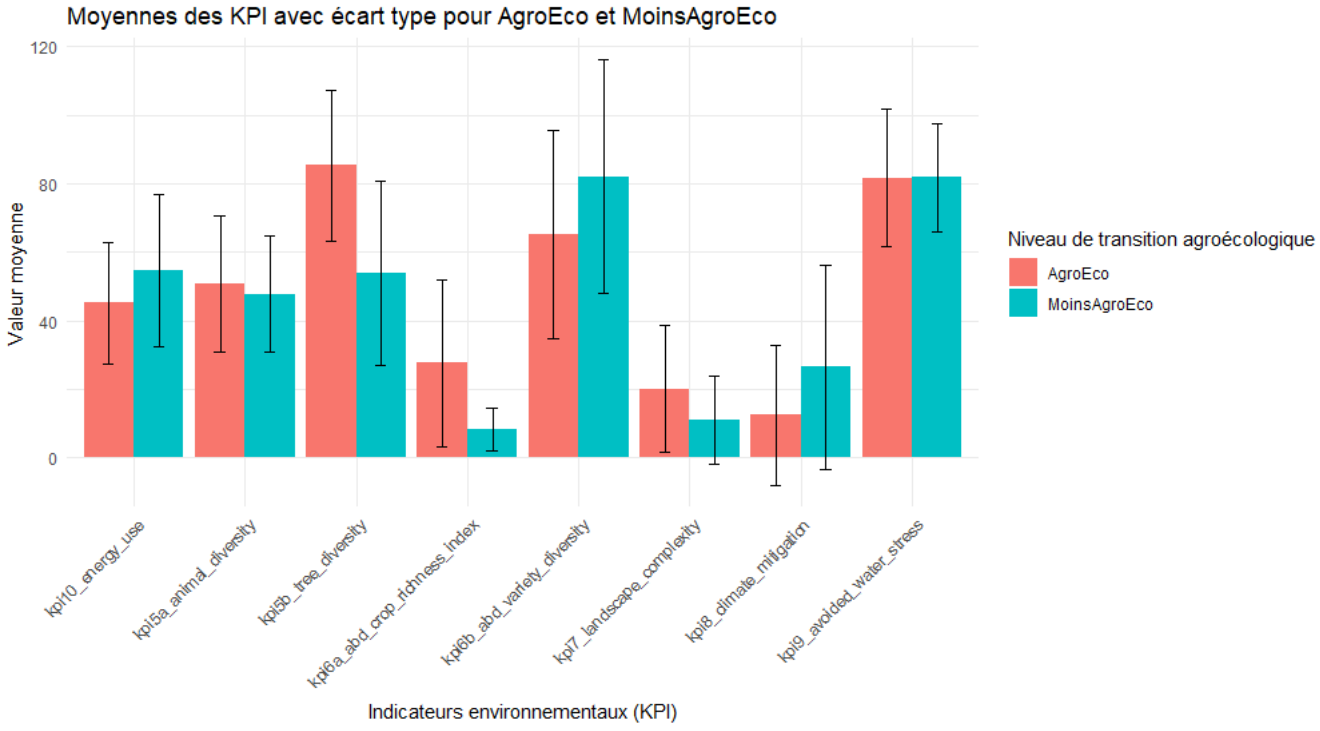

Figure 13 : Comparison of environmental performance between the 'Agroecological' and 'Less agroecological' groups

4.2.3. Performance achieved regarding economic indicators

The more agroecological farms performed better in terms of annual income, but there were no differences observed in terms of agricultural productivity (yield gap). This indicates that the higher income for agroecological farms is not due to better crop productivity. We hypothesise that this better income is a prerequisite for practicing agroecology, and that it is this better income and capacity for investment in the farm that could have enabled these farms to evolve. In fact, these farmers seem to have more land and more livestock and carry out income-generating agricultural activities such as arboriculture and market gardening, whereas the 'less agroecological' group is more oriented towards subsistence farming with the production of annual crops (millet, groundnut).

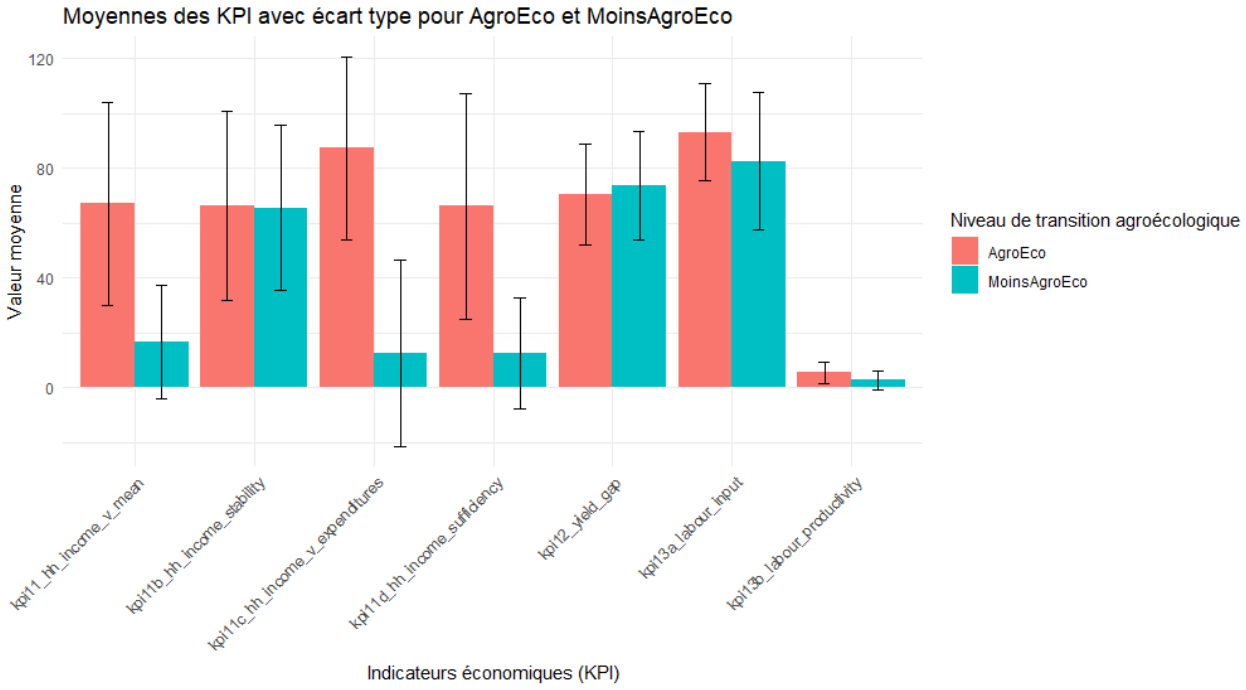

Figure 14 : Comparison of economic performance between the 'Agroecological' and 'Less agroecological' groups

4.2.4. Performance achieved regarding social indicators

Social indicators are good overall. Agroecological farms perform better in terms of resilience to climate change and land security, and respondents in this group have a better perception of their level of human well-being.

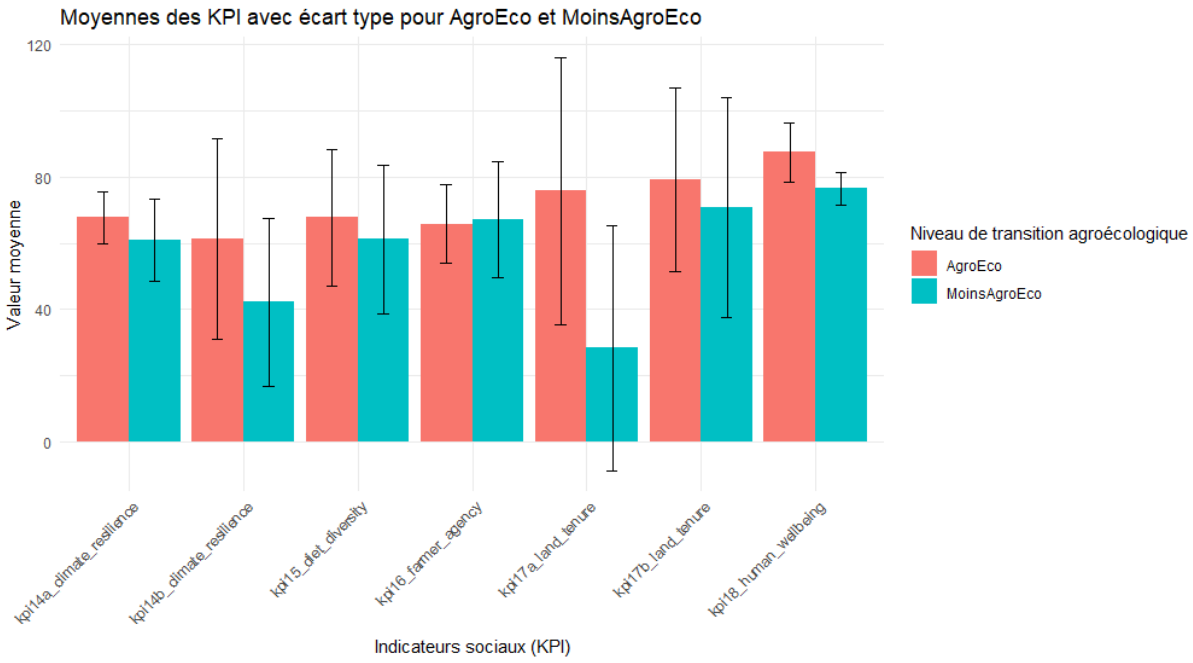

Figure 15 : Comparison of social performance between the 'Agroecological' and 'Less agroecological' groups

4.2.5. Performance achieved regarding local indicators

No significant differences were observed between the two groups regarding local indicators, even for those where variation was anticipated, such as pesticide use (as very few farms use pesticides), self-sufficiency, and actions to improve long-term soil fertility. Overall, indicators related to breed improvement, production conservation, value addition through processing, and savings levels remain low across both groups.

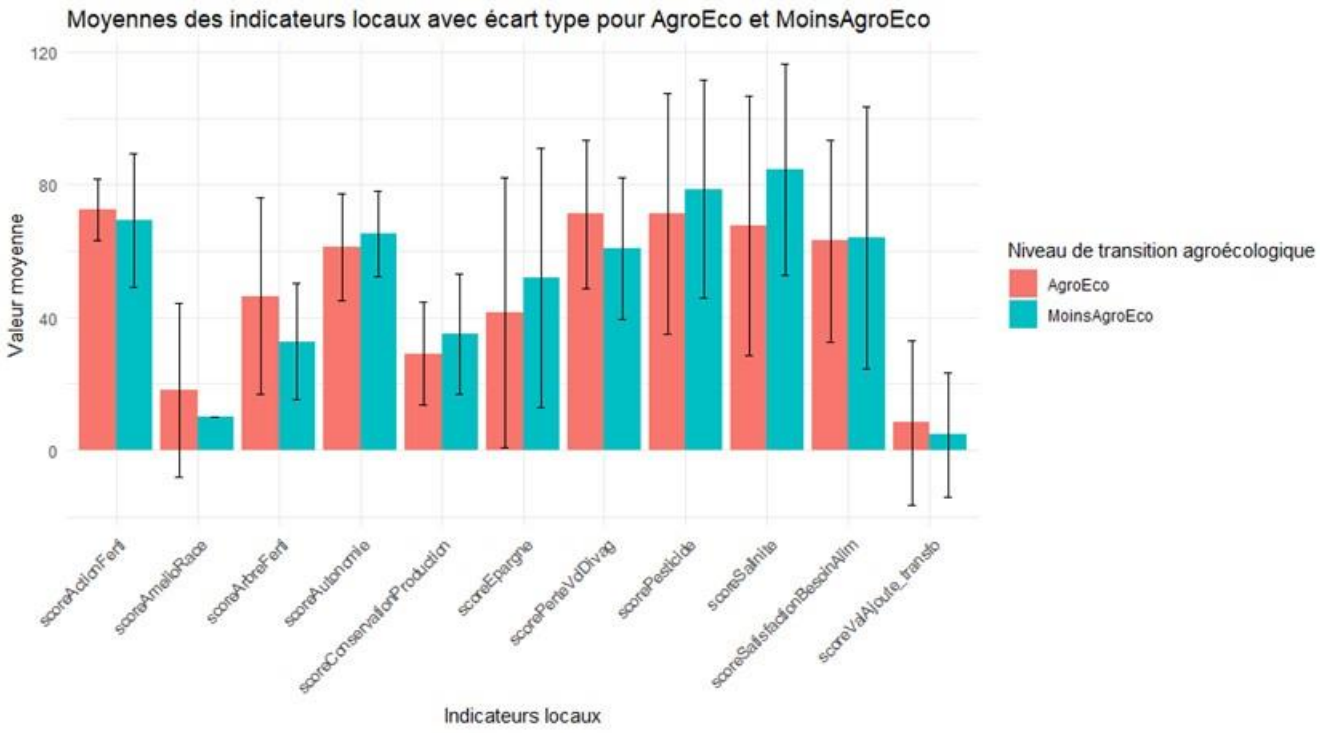

Figure 16 : Comparison of performance on local indicators between the 'Agroecological' and 'Less agroecological' groups

4.2.6. Summary of agroecological performance

Agroecological farms show superior performance in several key areas, including crop and animal health, nutrient use, tree diversity and crop richness index. These farms also have higher annual incomes and better perceptions of human well-being, as well as greater resilience to climate change and improved land security. However, certain limitations remain:

1. **Nutrient use:** Although agroecological farms are doing better, this indicator remains low overall (<50/100), reflecting an imbalance between nutrient inputs (fertiliser, manure, compost) and exports that is insufficient to maintain soil fertility, whatever the system. This is a key issue for the development of agroecology in Fatick;

2. **Agricultural productivity:** No significant difference was observed between the two groups (yield gap). This suggests that the higher income of the agroecological farms is not linked to better production, but to other factors to be identified in a complementary study; we hypothesize that it is the farms that are already better endowed (land, livestock, agricultural diversification with arboriculture and market gardening) that are able to implement a truly ambitious agroecology (as opposed to one carried out by default due to a lack of resources).
3. **Environmental and social indicators:** Although agroecological farms are more resilient to climate change, indicators of climate change mitigation and landscape complexity remain low in both systems. In addition, certain aspects such as farm autonomy or actions to improve long-term fertility are no different between the two groups.

These results highlight the benefits of agroecology, but also its current limitations. One promising avenue would be to strengthen the capacity of farmers to implement truly ambitious agroecological practices on their farms in order to achieve sustainable improvements in soil fertility and productivity. This capacity is limited by a lack of resources (human, financial, etc.). Systemic reflection on public policies and economic incentives could encourage a more complete transition towards agricultural models combining sustainability, productivity and resilience, while integrating more global issues such as adaptation to climate change.

4.3. Farmers' constraints in the territory

The HOLPA survey identified a number of constraints affecting agriculture in the region in general, but which could also specifically hinder the development of agroecology in the area.

4.3.1. Soil salinity

Salinity is a constraint for 38% of respondents. It mainly causes yield losses on part of the cultivated areas (1-24% of affected areas; 76% of cases where all crops are still cultivable but with lower yields).

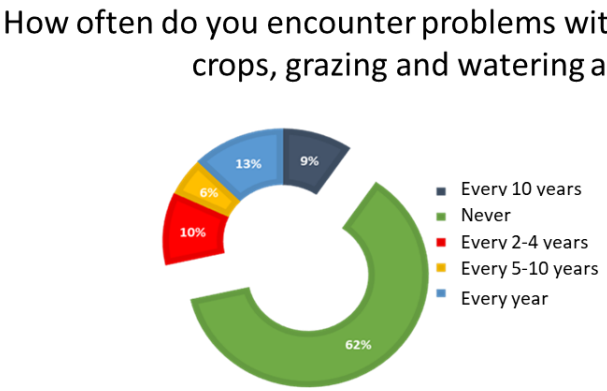

Figure 17 : Frequency of issues linked to soil salinity

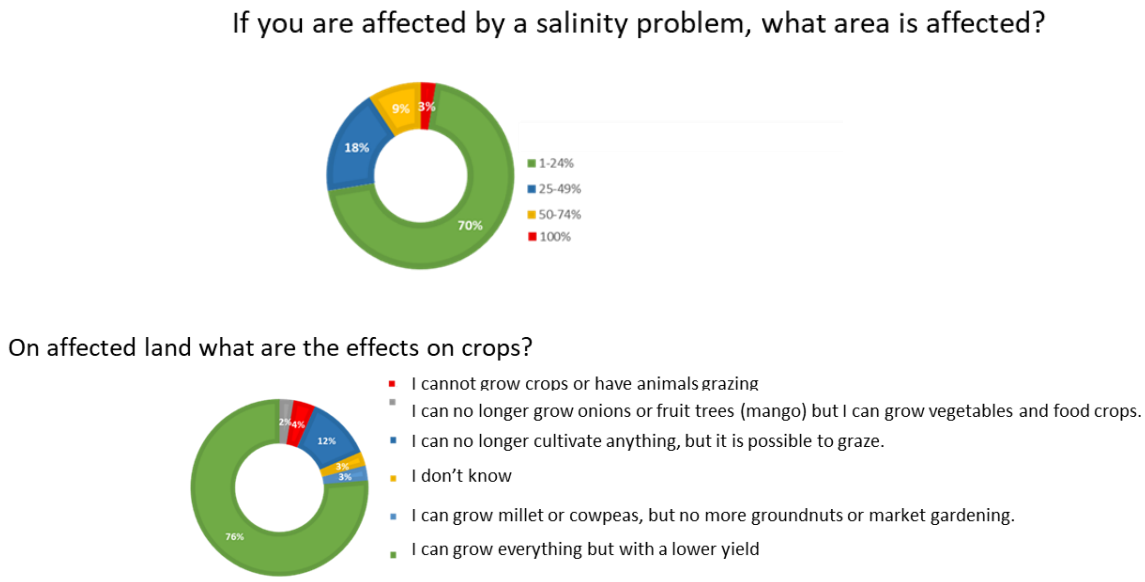

Figure 18 : Proportion of land affected by salinity and effects on crops

4.3.2. Access to manure and compost

Access to manure and compost is essential for agro-ecological intensification. Strictly speaking, it has not been quantified; only the proportion of farmers using it has been assessed (96%). It would be necessary in another study to assess the quantities used and the proportion of the land area concerned.

4.3.3. Access to finance/loans

A third of respondents have needed credit in the last 5 years, but have not been able to obtain it. Only 9% of the sample have needed credit and have been able to obtain it. Most of these loans are granted by banks (56% of cases).

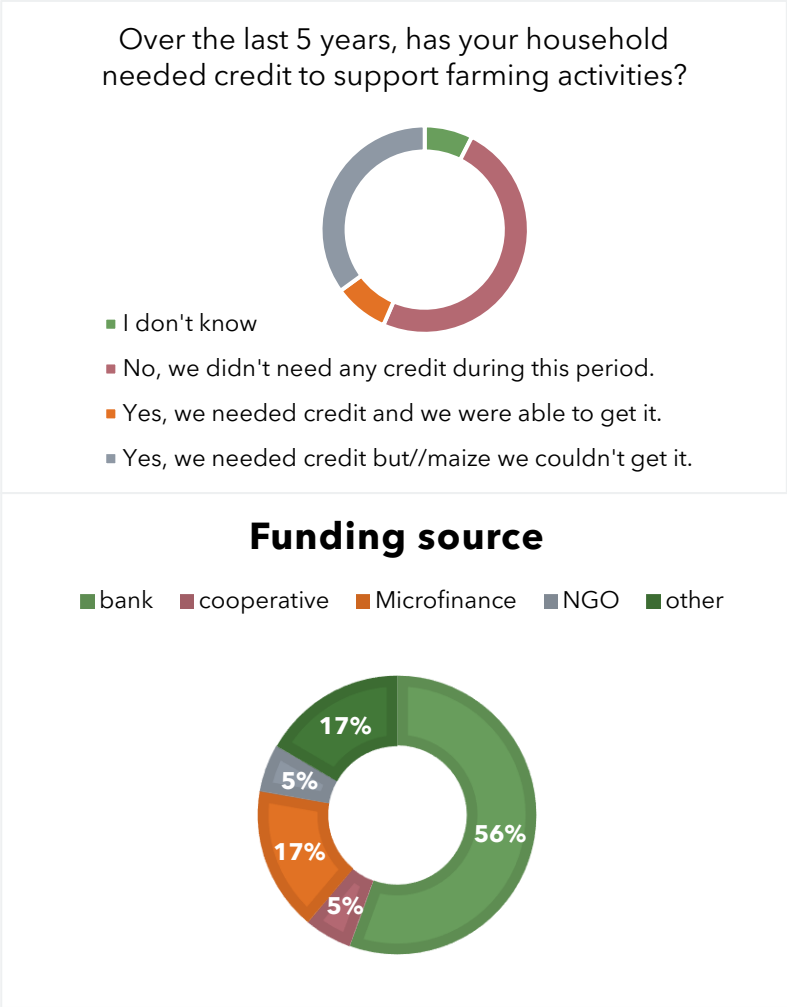

Figure 19 : Credit requirements and types of suppliers

In the department, another source of funding is the tontine, an informal system of voluntary contributions whose funds is allocated to participants in turn. These tontines are mainly used to finance social events and buy seeds.

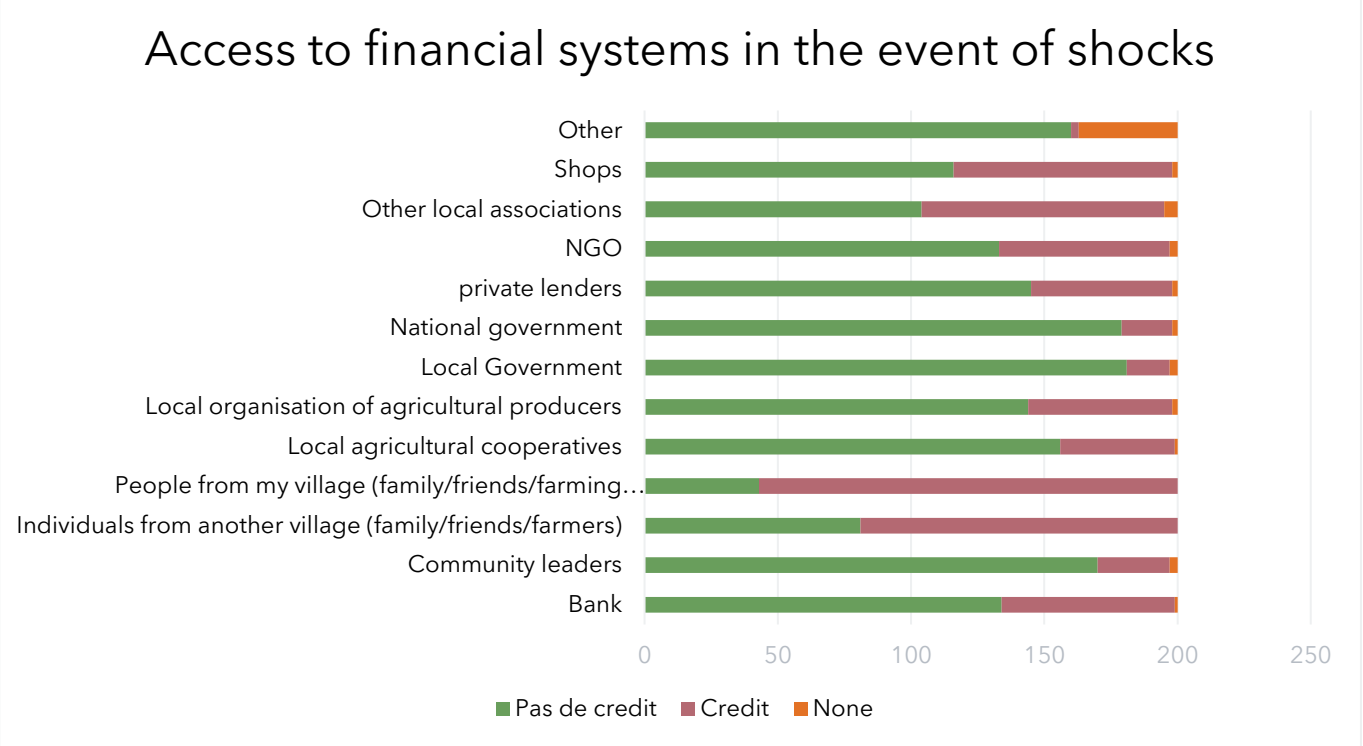

Figure 20 : Access to financial systems

4.3.4. Land tenure security

Land tenure security seems to be good for 58% of the sample, but we note that a significant proportion (62%) of respondents mentioned a risk, ranging from moderately likely to extremely likely, of losing ownership or rights to use their land in the next 5 years. This feeling of insecurity of tenure may be an obstacle to the agro-ecological transition, which requires long-term investment in fertility, fencing and other permanent improvements.

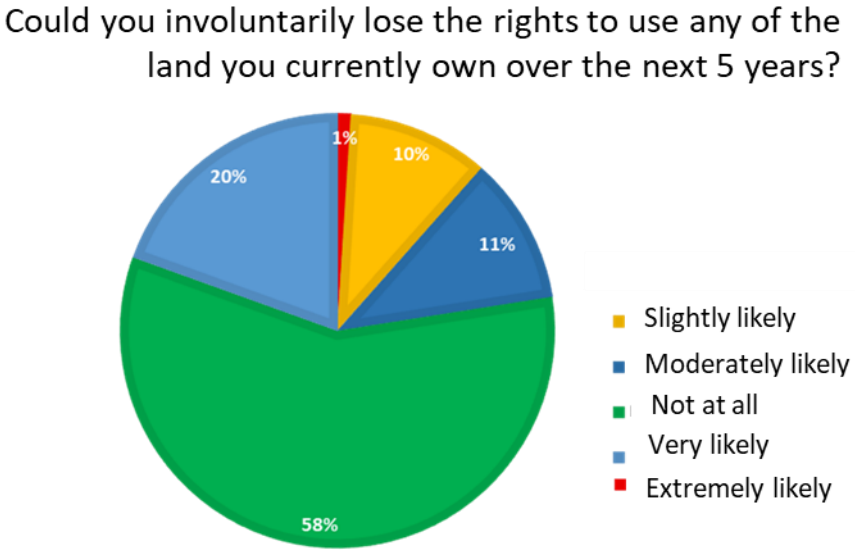

Figure 21 : Land tenure security

4.3.5. Market access and price fluctuations

Fluctuating prices for agricultural products affect 22% of respondents. Respondents say that they get a fair price 52% of the time for crops, and 67% of the time for livestock products.

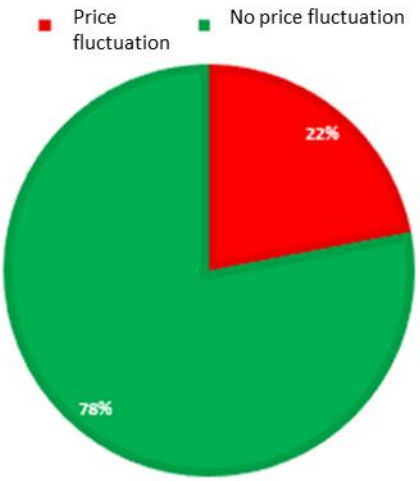

Figure 22 : Price stability

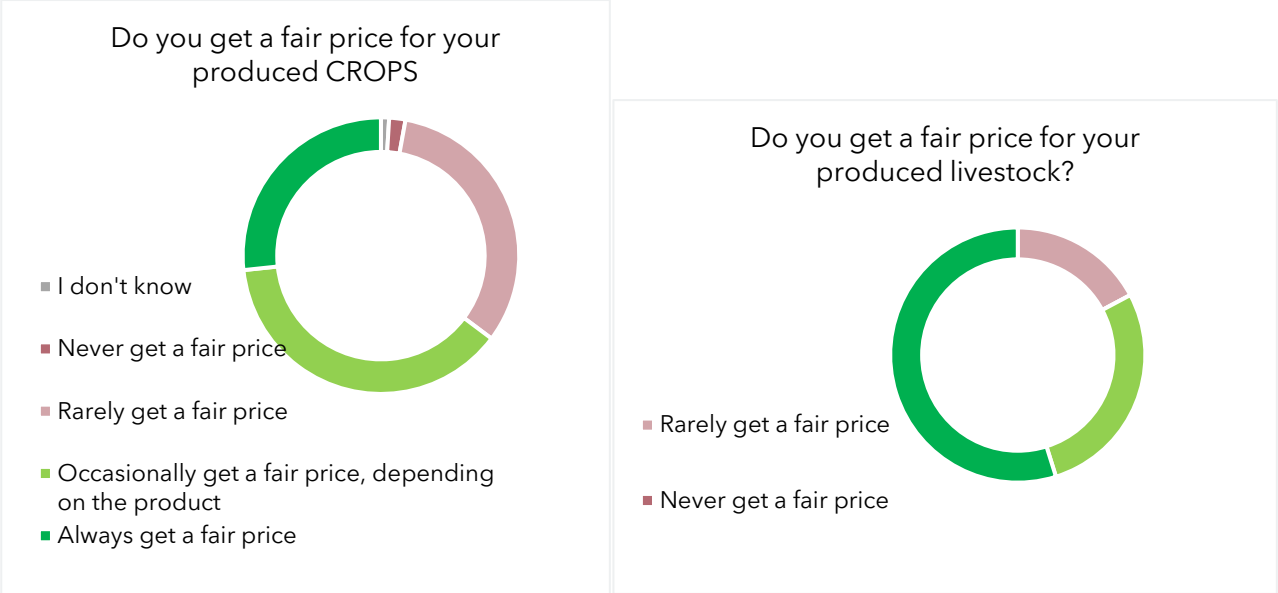

Figure 23 : Price equity

The distance to the nearest market varies, but half the respondents said it was relatively short (<5km).

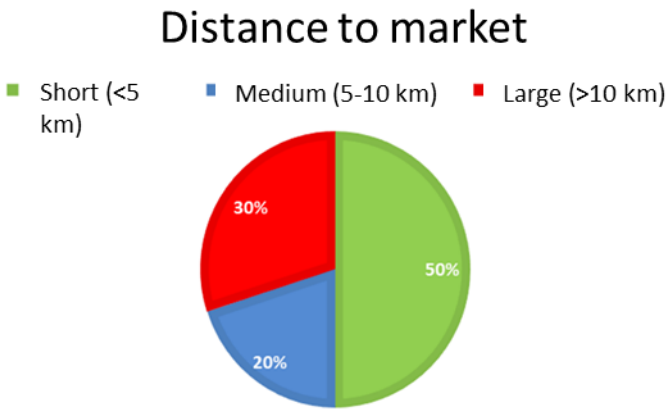

Figure 24 : Distance to the nearest market

4.3.6. Crop Losses due to theft/Livestock roaming/climate

A large proportion of respondents (84%) said that they had suffered damage or loss to their crops in the past year. This damage and loss was mainly due to animals roaming (64% of cases) or to climatic hazards (22% of cases). The main climatic hazards are flooding, excessive rainfall and drought.

4.3.7. Summary of these constraints on the development of agroecology

In summary, the HOLPA survey reveals several key constraints hindering both farming productivity and the advancement of agroecology in the region. Soil salinity is a significant challenge, leading to yield losses in parts of the cultivated areas, though most crops can still be grown with reduced productivity. While manure and compost use—crucial for improving soil fertility in agroecological systems—is already widespread, its availability appears limited. Access to credit is another major barrier: a third of farmers reported being unable to secure financing despite needing it in the past five years, while only 9% successfully accessed credit, primarily from banks or informal tontines, the latter often used for social expenses or seed purchases. Furthermore, 62% of respondents expressed concerns about insecure land tenure, fearing they might lose their land or usage rights within five years, which discourages the long-term investments essential for agroecological transition.

On the commercial front, although half of the farmers are located within 5 km of markets, 22% face challenges due to fluctuating sale prices of agricultural products, limiting farm profitability. Additionally, 84% of surveyed farmers reported losses in the past year, primarily caused by livestock straying (64%) and adverse weather conditions. These overlapping challenges create a complex web of constraints, hindering both agricultural productivity and the broader adoption of agroecological practices in the region.

5. Feedback from stakeholders on results and lessons learned

5.1. Stakeholders' feedback on results

On 29 October 2024, a workshop was held to present the results of the HOLPA survey to ALL stakeholders. Synthetic results were presented following a preliminary analysis of the data and the stakeholders were divided into 3 groups: 'socio-eco', 'environment' and 'agro-zootechnical', respecting the homogeneity of the groups for the type of stakeholder and the zones in the Fatick department.

The stakeholders were asked to consider two questions:

- What surprises you about the strengths and weaknesses of agroecology? Did you expect these performances? If so, why, if not, why not?
- What impact will these results have on you in the future?

Discussions on the results of the survey highlighted key points on the strengths, weaknesses and prospects for agro-ecology in the Fatick department. The participants were not surprised by most of the results, validating the positive impact of agroecological practices on farm incomes. In particular, they pointed out that agroecological farms have greater security of land tenure, which enables them to invest even more in this type of practice in the long term. However, the results concerning the absence of differences in the processing of agricultural products between agroecological and non-agroecological farms gave rise to debate. The participants felt that agroecology should result in higher yields and better access to training for farmers, and thus encourage better processing of agricultural products. Stakeholders believe that the poor processing of agroecological products is due to a lack of resources and skills of farmers.

With regard to satisfying food needs, the lack of difference between the two groups can be explained by the lack of land and financial resources, which limits farmers' ability to cultivate large areas relative to the size of the families they have to feed, whether they use agroecology or not. However, in the long term, agro-ecology is seen by stakeholders as a model capable of generating a virtuous circle: the use of organic fertiliser improves soil fertility, encourages the natural regeneration of trees and increases yields. These increased yields produce more agricultural residues, which are used to feed the animals, thereby generating more organic manure for the crops. Stakeholders also perceive that agroecologically grown produce is better stored after harvesting, an advantage that needs to be quantified using specific indicators.

The discussions highlighted several strengths of agroecology, including active community involvement, strong local dynamics (such as Dytael), and effective training programs. However, several weaknesses were also identified, such as limited access to organic inputs and agroecological seeds, insufficient consumer awareness, challenges in water management, and a lack of dedicated markets. Regarding crops and livestock, key strengths included the use of climate-resilient seeds and efforts to reduce animal straying, which allowed for better health monitoring and control. Despite these advances, crop losses due to straying remain a challenge, animal health monitoring is still inadequate, and crop conservation techniques need further development. Additionally, two specific challenges were identified: the restoration of saline land in severely impacted areas like Fimela, and the improvement of agroecological practices to maximize yields. Enhancing animal breeds is also a priority, as the current low productivity of livestock poses a long-term threat to both the quantity and quality of livestock populations.

5.2. Lessons learned and perspectives

We had identified 3 entry points for using the HOLPA results (1) to determine the level of agroecological transition and describe it, (2) to assess the issues that need to be improved in agroecology, and (3) to identify the opportunities and constraints at farm and territorial levels for its development.

The results have not yet been used at this stage, but will serve as a basis for developing Dytael's action plan for the coming years, with a view to gearing it towards the ‘made in Fatick’ vision.

The participants in the presentation of the results of the HOLPA survey called for stakeholders to be better organised in order to boost food security and promote agroecological product processing units, in particular to empower women. They stressed the need to extend the surveys, to stratify the analyses (food crops and market garden crops) and to integrate indicators such as the conservation of products or the areas farmed using agro-ecological practices. Finally, they called for clear land-use policies and greater awareness of agroecological practices in order to ensure their long-term adoption in the region.

2. Conclusion and next steps

The HOLPA process allowed us to conduct a diagnostic of the level of agroecological transition in the Fatick region. The method used to identify "agroecological" farms in the sample needs improvement. Indeed, the approach involved setting a high median threshold across all principles. However, in a region like Fatick, which is already low in farming intensity, this method does not effectively distinguish farms based on the implementation of practices that are genuinely transformative compared to traditional practices or those adopted “out of necessity” by farmers due to limited resources. A “on-farm innovation tracking” methodology at the farm level could help better identify farms that are truly advanced in the agroecological transition.

HOLPA survey also enabled us to identify key issues on which the ALL should focus in the future to improve the overall performance of agroecology across all dimensions. Finally, the diagnostic of the department’s constraints highlights the numerous challenges faced by farmers, such as access to credit, markets, and land salinization. Although overcoming these obstacles often exceeds the direct scope of the Living Lab’s intervention, their identification provides a valuable foundation for Dytael to develop targeted advocacy for an agricultural policy focused on the development of agroecology.

6. Acknowledgements

A big thank you to the 200 farmers who took the time to respond to the HOLPA survey and share their experiences with great patience and availability. Thanks also to the team of field researchers for their work on the ground, and to Élodie Richomme and Samba Sy for their valuable contribution to the development of the KOBO questionnaires and the data compilation. Your involvement was crucial to the success of this project, and we are deeply grateful. We also thank Maryline Darmaun for her support and dedication in assisting the team in Senegal.

7. Appendixes

ANNEXE 1 : LISTE GLOBALE DE TOUS LES INDICATEURS LOCAUX IDENTIFES PAR LES AGRICULTEURS

Tableau 1 - Liste des indicateurs identifiés par les parties prenantes à Fatick pour la dimension environnementale

ENVIRONNEMENT		Indicateurs globaux
Arbres	Densité d'arbres	X
	Densité d'arbres fertilitaires/fertilisants	
	Nombre de types de valorisations possibles avec les arbres de l'exploitation (collecte ou interne ferme ?)	
Eau	Disponibilité en eau (accès)	X
	Qualité de l'eau pour l'irrigation (bétail ?)	
Sol	Surface régénérée par la technique de RNA	
	Surface érodée	
	Qualité du sol : taux d'éléments nutritifs dans le sol	X
	Taux de séquestration de carbone dans les sols	
	Surface de terre salinisée	
	Longueur des brise-vents/haies vives (lutte contre érosion)	
	Risque de dégradation sol causé par la divagation des animaux (Proportion d'animaux parqués)	
	Surface de culture en brulis	
	Qualité biologique du sol	X
Biodiversité	Diversité végétale	X
	Diversité animale	X
	Mesures de réinsertion de biodiversité végétale/réintroduction d'espèces locales disparues	
	Taux de perte de la biodiversité	
Pollution	Quantité de pesticides chimique utilisés	
	Niveau de présence de résidus de plastique dans la ferme	
	Proportion de surface irriguée à l'aide d'énergie photovoltaïque	

Tableau 2 - Liste des indicateurs identifiés par les parties prenantes à Fatick pour la dimension agronomique

AGRONOMIE (agriculture et élevage)		**Indicateurs globaux**
Productivité	Rendement des cultures	
	Nombre d'animaux élevés	X
	Taux de mortalité	
	Prolificité	
	Recours à l'insémination artificielle	
	Amélioration des races (croisements)	
	Taux de prophylaxie des animaux	X
	Niveau d'intégration de la lutte biologique contre les maladies animales	
	Autonomie/disponibilité fourragère	
	Conservation des récoltes fourragères	
Arbres-cultures	Surface en RNA	
	Intégration des arbres dans les surfaces cultivées	X
	Rendement de la production sylvicole	
Eau	Qualité de l'eau (sel)	
	Maîtrise de l'eau (avoir de l'eau tout l'année)	X
Sol	Niveau de fertilité du sol	X
	Evolution de la fertilité (les pratiques améliorent/détériorent-elles la fertilité ?)	
Biodiversité	Diversification des espèces/variétés ou races animales ou végétales	X
Pratiques	Taux de paillage/couverture du sol (résidus au sol)	
	Surface en cultures associées	
	Type de fertilisation et traitement phytosanitaires	X
Ravageurs	Capacité de l'exploitation à faire face aux ravageurs	
	Capacité à lutter contre les mauvaises herbes (striga)	

Tableau 3 - Liste des indicateurs identifiés par les parties prenantes à Fatick pour la dimension sociale

SOCIAL		**Indicateurs globaux**
Bien-être	Bien-être (santé)	X
	Augmentation des revenus	
	Augmentation du temps de travail	
	Lourdeur et pénibilité des tâches	
	Autonomisation des producteurs	
	Division sociale du travail (répartition des tâches entre jeunes/femmes/hommes)	X
Sécurité du travail dans le temps	Accès à la terre	X
	Assurance agricole	X
	Accessibilité de la main d'œuvre extérieure	
	Qualité des ressources humaines (main d'œuvre de qualité)	
	Dimension sécuritaire (démotivation face au vol de bétail)	
Aspect communautaire	Partage d'expérience (diffusion des pratiques entre les producteurs)	X
	Recours aux travaux communautaires (renforcement de la dynamique organisationnelle)	
	Diminution des conflits liés à la divagation des animaux	
	Renforcement de la solidarité communautaire	
	Conflits liés à la dénonciation des coupeurs de bois	
Alimentation	Diversification de l'alimentation	X
	Qualité nutritionnelle des aliments	
	Taux de consommation/présence de produits bio [ou issus de l'agroécologie] dans l'alimentation	
	Transformation artisanale (ou de petite industrie) en limitant les produits chimiques de longue conservation	
Autres	Renforcement de capacités (accès aux formations, nombres de formations)	X

Tableau 4 - Liste des indicateurs identifiés par les parties prenantes à Fatick pour la dimension économique

ECONOMIQUE		**Indicateurs globaux**
Stratégie de limitation des coûts	Autoproduction d'intrants (part ou quantité d'engrais et autres fertilisants autoproduit utilisée dans l'exploitation)	
	Autoproduction d'aliment pour le bétail (part du fourrage et autres produits issus de la récolte consommée par le bétail par rapport à l'aliment concentré)	
	Coût de production (prix des intrants, couts entretiens/réparation des équipements, transport, clôture de l'exploitation)	
	Accès aux informations du marchés (prix des intrants et prix des produits agricoles)	
Stratégie de maximisation des profits	Bénéfice ou marge brute	X
	Production commercialisée (part de la production commercialisée)	
	Valeur ajoutée de la récolte (Utilisation de la récolte pour la transformation et valorisation des produits dérivés ou des résidus)	
	Système de conservation des produits (espace clôturé, espace non clôturé ou en vrac)	
	Diversification des marchés (stations-services, supermarchés)	
	Obtention de certificat FRA (autorisation de fabrication et de mise en vente)	
	Diversification des activités (agriculture, transformation, pêche)	X
	Accès aux marchés plus éco-exigeants	
Travail	Rendement du travail (Quantité de production, surface exploitée, quantité d'intrants utilisée par unité de surface)	X
	Production perdue (due à la divagation des animaux)	X
	Nombre de têtes de bétails élevé dans l'exploitation (petits ruminant, gros ruminants et volaille)	X
	Niveau de mécanisation (Nombre d'équipements utilisé)	X
	Productivité de la Main-d'œuvre utilisée (familiale et salariale)	X
	Expérience dans l'activité (Nombre d'années passé dans l'activité)	X
	Nombre d'actifs agricoles (évolution des équipements agricoles, évolution des animaux utilisés dans l'exploitation)	
	Pénibilité du travail (effort physique, …)	
Financement, dettes, épargne	Autofinancement de la campagne (part de fonds propre utilisé pour le financement)	
	Répartition du revenu issu de l'activité agricole (part du revenu destiné aux femmes et aux jeunes)	
	Taux de satisfaction des besoins du ménage (éducation, alimentaire, soin)	X
	Sécurité alimentaire pour le ménage	
	Sécurité alimentaire pour le bétail	
	Transferts, Appuis et aides financières ou équipements reçus	
	Épargne du ménage (participation des membres de la famille à des Tontines)	
	Niveau d'endettement (coût du crédit)	X
	Remboursement des prêts en cas de chocs économiques ou environnementaux (animaux ou matériels vendus)	

Accès aux ressources	Accès à l'eau potable (distance par rapport à la source d'approvisionnement la plus proche)	X
	Accès au matériel végétal (semences)	X
	Accès à l'eau d'irrigation (distance par rapport à la source d'approvisionnement la plus proche et la profondeur de la nappe)	X
Accès aux services	Accès au poste de santé (physique et financière)	X
	Taux de scolarisation des enfants	X
	Taux d'alphabétisation des adultes	X
	Accès aux services vétérinaires (Distance par rapport au service véto le plus proche, nombre de bétail vacciné)	X
	Cadre de vie (accès à l'eau, électricité et toilettes conformes)	X
	Accès aux services d'appui/conseil/Formation	X
Autres	Connaissance des pratiques agroécologiques (Transmissibilité, …)	X

ANNEXE 2: LES MODES DE CALCUL DES INDICATEURS LOCAUX

Usage de pesticide	Choix	Score
Aucun pesticide	Ne veut pas en utiliser Ne peut pas en utiliser et pas besoin	100
	Ne peut pas malgré un besoin	80
Pesticide bio		70
Pesticide bio et chimiques		20
Pesticides chimiques		0

CONTRAINTE DE LA SALINITÉ

Fréquence de cette contrainte	Surface affectée	Effets cultures	Score
Jamais			100
Tous les 10 ans	entre 1 et 24%	Je peux tout cultiver mais avec moins de rendement.	90
		je ne peux plus cultiver une culture	90
		je ne peux plus rien cultiver	70
	entre 25 et 49	Je peux tout cultiver mais avec moins de rendement.	90
		je ne peux plus cultiver une culture	90
		je ne peux plus rien cultiver	60
	50 et 74	Je peux tout cultiver mais avec moins de rendement.	80
		je ne peux plus cultiver une culture	80
		je ne peux plus rien cultiver	50
	100%	Je peux tout cultiver mais avec moins de rendement.	70
		je ne peux plus cultiver une culture	70
		je ne peux plus rien cultiver	40
5-10 ans	entre 1 et 24%	Je peux tout cultiver mais avec moins de rendement.	70
		je ne peux plus cultiver une culture	70
		je ne peux plus rien cultiver	60
	entre 25 et 49	Je peux tout cultiver mais avec moins de rendement.	60
		je ne peux plus cultiver une culture	60

		je ne peux plus rien cultiver	50
	50 et 74	Je peux tout cultiver mais avec moins de rendement.	50
		je ne peux plus cultiver une culture	50
		je ne peux plus rien cultiver	40
	100%	Je peux tout cultiver mais avec moins de rendement.	40
		je ne peux plus cultiver une culture	40
		je ne peux plus rien cultiver	30
2 ans	entre 1 et 24%	Je peux tout cultiver mais avec moins de rendement.	40
		je ne peux plus cultiver une culture	40
		je ne peux plus rien cultiver	50
	entre 25 et 49	Je peux tout cultiver mais avec moins de rendement.	30
		je ne peux plus cultiver une culture	30
		je ne peux plus rien cultiver	25
	50 et 74	Je peux tout cultiver mais avec moins de rendement.	20
		je ne peux plus cultiver une culture	20
		je ne peux plus rien cultiver	15
	100%	Je peux tout cultiver mais avec moins de rendement.	15
		je ne peux plus cultiver une culture	15
		je ne peux plus rien cultiver	10
tous les ans	entre 1 et 24%	Je peux tout cultiver mais avec moins de rendement.	15
		je ne peux plus cultiver une culture	10
		je ne peux plus rien cultiver	5
	entre 25 et 49	Je peux tout cultiver mais avec moins de rendement.	10
		je ne peux plus cultiver une culture	10
		je ne peux plus rien cultiver	0
	50 et 74	Je peux tout cultiver mais avec moins de rendement.	5
		je ne peux plus cultiver une culture	5
		je ne peux plus rien cultiver	0
	100%	Je peux tout cultiver mais avec moins de rendement.	0

		je ne peux plus cultiver une culture	0
		je ne peux plus rien cultiver	0

ARBRES FERTILISANTS

nombre arbres	%fertilisant	score
pas d'arbres		0
1 à 20	1-25%	5
	26-50%	10
	51-75%	15
	76-100%	20
21 à 50	1-25%	12,5
	26-50%	25
	51-75%	37,5
	76-100%	50
plus de 50	1-25%	25
	26-50%	50
	51-75%	75
	76-100%	100

SATISFACTION DES BESOINS ALIMENTAIRES

Nombre de mois où vous avez besoin d'acheter des compléments pour remplacer la principale (en quantité) culture produite sur l'exploitation qui est consommée par le ménage ?

Score satisfaction = % de l'année avec besoin d'achat

AMELIORATION RACE

****La reproduction de votre cheptel se fait :****

	score
En apportant des animaux ou du matériel génétique (pour l'insémination artificielle) extérieurs au troupeau	100
Uniquement en interne au troupeau	10

METHODE DE CONSERVATION DES RECOLTES

Quelles méthodes (matériaux et produits) de conservation employez-vous sur l'exploitation ?

Sacs de stockage	Grenier traditionnel	Fût métallique	Bouteilles plastiques	Magasin	Tente	Produits naturels	Produits chimiques

nombre de méthodes de conservation	score
Aucune méthode ou stocker au champs	0
1	11
2	22
3	33
4	44

5	55
6	67
7	78
8	89
9	100

REVENUS ISSUS DE L'AGRICULTURE POUR SUBVENIR AUX BESOINS DE VOTRE FAMILLE

Gagnez-vous suffisamment de revenus de l'agriculture pour subvenir aux besoins de votre famille ?	score
Non, les besoins en nourriture et autres produits de première nécessité ne sont pas satisfaits.	0
Non, seuls les besoins alimentaires sont couverts, pas de surplus de revenu.	10
Oui, les besoins alimentaires sont couverts, mais pas de surplus pour l'épargne.	40
Oui, les besoins alimentaires sont couverts et les surplus génèrent des liquidités pour les produits de première nécessité et de l'épargne sporadique.	60
Oui, tous les besoins sont satisfaits et l'épargne est régulière.	100

VALEUR AJOUTEE ISSUE DE LA TRANSFORMATION DES PRODUITS AGRICOLES

	score
Transfo anim + veg	100
Transfo anim	75
Transfo veg	75
Rien	0

AUTONOMIE

Autonomie alimentation bétail	score
La totalité de l'alimentation du bétail de l'exploitation est achetée sur le marché.	0
75% de l'alimentation du bétail est achetée sur le marché et 25% est autoproduite, pâturée ou échangée avec d'autres producteurs.	25
50% de l'alimentation du bétail est achetée sur le marché et 50% est autoproduite, pâturée ou échangée avec d'autres producteurs.	50
25% de l'alimentation du bétail est achetée sur le marché et 75% est autoproduite, pâturée ou échangée avec d'autres producteurs.	75
La totalité de l'alimentation des animaux de l'exploitation est autoproduite, pâturée ou échangée avec d'autres producteurs.	100
Autonomie pour le compost et le fumier	
Tout le fumier et le compost sont achetés sur le marché.	0
75% du fumier et du compost sont achetés sur le marché, les 25% restants sont autoproduits ou échangés.	25
50% du fumier et du compost achetés au marché, les 50% restants sont autoproduits ou échangés	50
25% du fumier et du compost sont achetés sur le marché, les 75% restants sont autoproduits ou échangés.	75

Tous les fumiers et composts sont autoproduits, échangés avec d'autres agriculteurs ou gérés collectivement.	100
Provenance des semences	
Toutes les semences sont achetées sur le marché (par exemple, agrovet, magasins de semences, coopératives d'agriculteurs, fournisseurs de semences, etc.).	0
75% des semences sont achetées sur le marché, les 25% restants sont autoproduits ou échangés.	25
50% des semences sont achetées sur le marché, les 50% restants sont autoproduits ou échangés.	50
25% des semences sont achetées sur le marché, les 75% restants sont autoproduits ou échangés.	75
Toutes les semences sont autoproduites, échangées avec d'autres agriculteurs ou gérées collectivement.	100
****Êtes-vous satisfait de votre sécurité nutritionnelle ?****	
Quelque peu insatisfait.	25
Neutre	50
Plutôt satisfait.	75
Complètement satisfait.	100
Approvisionnement en énergie	
Toute l'énergie est achetée sur le marché.	0
75 % de l'énergie sont achetées sur le marché, les 25 % restants sont produits à la ferme ou échangés avec d'autres membres de la communauté.	25
50 % de l'énergie est achetée sur le marché, les 50 % restants sont produits à la ferme ou échangés avec d'autres membres de la communauté.	50
25% de l'énergie est achetée sur le marché, les 75% restants sont autoproduits ou échangés.	75
Toutes les énergies sont autoproduites, échangées avec d'autres agriculteurs ou gérées collectivement.	100
Ressources génétiques pour l'élevage	
Toutes les ressources génétiques animales (poussins, jeunes animaux, semence, par exemple) sont achetées sur le marché.	0
75 % des ressources génétiques animales sont achetées sur le marché, les 25 % restants sont autoproduits ou échangés.	25
50% de l'élevage est acheté sur le marché, les 50% restants sont autoproduits ou échangés avec des fermes voisines.	50
25 % des ressources génétiques animales sont achetées sur le marché, les 75 % restants sont autoproduits ou échangés.	75
Toutes les ressources génétiques animales sont autoproduites, échangées avec d'autres agriculteurs ou gérées collectivement.	100

Le score final « autonomie » est la moyenne des 6 scores.

PERTES par vols et Divagation

Avez-vous subi des dommages ou pertes sur vos cultures durant les 12 derniers mois (entre janvier 2023 et décembre 2023) à cause des raisons suivantes ?			
Vol	Divagation de ses propres animaux	Divagation d'animaux du voisinage	Divagation d'animaux en transhumance

	score
Aucune perte/dommage	100
1 source de perte	75
2 sources	50
3 sources	25
4 sources	0

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