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SUMMARY BASELINE SURVEY & DIAGNOSTIC STUDY REPORT VALIDATION

Strengthening CSO Support and Advocacy for Sustainable Production and Use of Organic Fertilizer in The Gambia (SAPOF)

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Contents

Executive Summary

The baseline and the diagnostic studies conducted under the project "Strengthening CSO Support and Advocacy for Sustainable Production and Use of Organic Fertilizer in The Gambia (SAPOF)" sheds light on the current landscape of agroecology and organic fertilizer practices in the country. Agriculture, a significant contributor to greenhouse gas emissions, faces challenges that agroecology seeks to address by integrating ecological principles into farming practices. These study aims to bolster the capacities of Civil Society Organizations (CSOs) in promoting and implementing organic fertilizer practices crucial for sustainable agriculture and food security in The Gambia.

Key stakeholders identified for the research include CSOs, community gardeners, community Kafos, and government agencies. The baseline study was primarily focused on the North Bank Region (NBR) and Central River Region (CRR) due to their heavy reliance on agriculture.

A mixed-methods approach was employed, encompassing qualitative and quantitative methods across three phases: preparatory, data collection, and data analysis. Through training and pilot testing, data collection tools were refined, leading to the surveying of 173 representatives from marketing federations in NBR and CRR for the baseline study while the diagnostic study had 1713 participants across the five regions. The diagnostic study targeted five key regions in The Gambia: North Bank Region (NBR), Central River Region-North (CRR-North), Central River Region-South (CRR-South), Lower River Region (LRR), and Upper River Region (URR), representing the country's farming communities.

Key Findings

1. Youth and Women Engagement: Youth and women were found to be actively involved in agroecology and organic fertilizer production, but their engagement was limited by inadequate access to resources such as land, tools, and market opportunities. Women, in particular, faced challenges related to poor fencing and lack of market access, which diminished their productivity.

2. Training Programs and Quality: While some training programs on compost production and agroecological practices were appreciated, they were often hindered by the lack of follow-up support and insufficient materials to apply the knowledge gained. There was also a lack of inclusive training for persons with disabilities.

3. Production Challenges: The major challenges identified included insufficient infrastructure (e.g., compost chambers), lack of tools and equipment, and difficulty in accessing raw materials for fertilizer production. These issues were particularly prevalent in regions such as CRR North and URR, where infrastructure is critically lacking.

4. Market and Economic Factors: Market access to organic fertilizers remains a significant barrier. High transportation costs and the distance to markets were cited as obstacles, and local production levels were often too low to meet demand.

5. Climate Change Impact: Unpredictable weather patterns and increased pest infestation, exacerbated by climate change, were frequently reported as challenges to agroecology. Many

participants had shifted to using local pesticides as a more sustainable alternative to chemical options.

6. Socio-Economic Impact: Agroecology presents opportunities for economic empowerment, particularly for women and youth. However, without the necessary support systems—such as access to modern tools, better market access, and continuous training—these opportunities remain largely untapped.

Conclusion and Recommendations: The study concluded that while there is a strong foundation of engagement in agroecology and organic fertilizer production, significant gaps in resources, training, and market access prevented the full realization of these sustainable practices. Recommendations include increasing investments in infrastructure (particularly in CRR North and URR), improving access to tools and raw materials, enhancing market linkages, and providing ongoing support and training, especially for marginalized groups such as women and persons with disabilities.

The Government of The Gambia's assistance in organic fertilizer provision is limited but satisfactory in terms of fertilizer quality. However, there's a call for more consistent and accessible support to promote the widespread adoption of organic fertilizers and sustainable agricultural practices.

Overall, the studies underscore the importance of addressing gaps in training, support, and policy awareness to foster sustainable agricultural practices and improve farm productivity in The Gambia. By targeting these areas, stakeholders can enhance community engagement, empower farmers with the necessary skills and resources, and promote environmentally friendly agricultural approaches. To improve access to organic fertilizer, training in organic fertilizer production and use may be conducted using educative materials and methods that will be easily understood at the grassroots level. The training may be conducted by experienced and skilled experts in the production and use of organic fertilizer. For effectiveness, the training may be tailored for participants who can easily learn using a hands-on approach. For continual improvement purposes, this kind of training should be conducted at least biannually. Thus, priority should be given:

1) First to educate the grassroots and the stakeholders on the importance and benefits of organic fertilizer,

2) The requisite resources should be made available to motivate the grassroots in the engagement of the production and use of organic fertilizer, and

3) Government support and commitment in the transition from inorganic to organic fertilizer should be forthcoming without any hindrance or delays.

1.0 INTRODUCTION

This baseline study was conducted to satisfy one of the key and clearly outlined activities in the project: **Strengthening CSO Support and Advocacy for Sustainable Production and Use of Organic Fertilizer in The Gambia (SAPOF).** Agriculture is the second largest emitter of greenhouse gases (GHG) after the energy sector, accounting for approximately 30% of total GHG emissions[1]. When agroecology first emerged in the early 1980s, it was most often viewed as a form of alternative to the changes sweeping through the food system as a result of the green revolution, simplification through monocultures, industrialization of all aspects of food production, processing, and distribution, and the increasing corporate control and dominance of the food system[2]. The most common definition of agroecology during the early stages was the application of ecological concepts and principles to the design and management of sustainable agroecosystems, or the science of sustainable agriculture[3,4].

In its early years, agroecology's primary focus was on the farm or farm agroecosystem[2]. This approach encouraged farmers to shift away from conventional industrial farming inputs and practices (particularly fossil fuel-based chemicals and fertilizers) and toward certifiable organic production systems[5,6]. Farmers also began to restore diversity to their farming systems when it became clear that simply substituting inputs was insufficient to address the issues common to monoculture systems. Farming systems were redesigned to be resistant to these problems[2]. By the late 1990s, the definition of agroecology had expanded to include the ecology of the entire food system[2]. The agroecosystem was no longer just the farm; it had to encompass all aspects and participants in the food system since everyone eats, including the entire human race. This included the importance of re-establishing close relationships between those who grow the food and those who consume it, as well as reducing the negative effects of the intermediary system that connects the two. Agroecology evolved into a method of creating relationship-based market systems that are fair, just, and accessible to all [7].

Therefore, the definition of agroecology, according to Gliessman (2018), has evolved to the following: “agroecology is the integration of research, education, action and change that brings sustainability to all parts of the food system: ecological, economic, and social. Agroecology is transdisciplinary in that it values all forms of knowledge and experience in food system change. Agroecology is participatory in that it requires the involvement of all stakeholders from the farm to the table and everyone in between. Agroecology is action-oriented because it confronts the economic and political power structures of the current industrial food system with alternative social structures and policy action. The approach is grounded in ecological thinking where a holistic, systems-level understanding of food system sustainability is required.” (p. 599). On a much simpler term, Pereira et al. (2018) opined that agroecology has grown in popularity over the last 50 years, but its practices "are as old as agriculture itself." Agroecology is described as a science, a movement, and a set of agricultural practices, but at its heart is the application of ecological concepts and principles to the design and management of sustainable agricultural systems[5]. Agroecology integrates the study of the entire food system, including ecological, economic, and social dimensions, and encourages practitioners to recognize system connectivity while emphasizing unique, appropriate, and context-specific solutions. Most small-scale farmers around the world practice agroecology, and they are also among the poorest in the population.

Altieri and Nicholls (2012) argued that alternative agricultural systems should be based on the diverse ecologically based agricultural approaches developed and practised by at least 75% of the world's 1.5 billion smallholders, family farmers, and indigenous peoples. These alternative farming systems, which are broadly classified as agroecology, are distinguished by the use of ecologically sound technologies, a focus on family farming and local production, low levels of external inputs, and a diverse nature. Thus, making this study significant in the context of agroecology and organic fertilizer practices. Furthermore, this study is significant for The Gambia as a developing country with 47.52 (% of total employment)[9] people deriving their employment from the agriculture sector. Thus, agroecology presents important opportunities for showcasing alternative agricultural development pathways that are contained within planetary boundaries and that demonstrate innovations that are societally desirable and ethically responsible. Moreover, Pereira et al. (2018) suggested developing countries (such as The Gambia) are uniquely positioned to establish alternative agricultural pathways that maximize livelihood creation and sustainable food production as agroecology is a more appropriate agricultural development paradigm for inclusive innovation in which the poorest and most marginalized participate and benefit from associated innovation processes[10].

Additionally, this study is significant because agroecology goes beyond the science and practice of agriculture. It is also a social movement founded on the principles of food sovereignty, ecology, sustainability, gender, justice, farmer networks, land access, resilience, and resistance[11,12]. When viewed in direct opposition to the negative effects of capital-intensive practices introduced during the so-called "Green Revolution," agroecology has grown as a social movement [5]. Agroecological practices' innovations are gaining recognition as they are guided by local knowledge and implemented through participatory methods and community engagement [13].

This study is critically important as organic fertilizer practices have received much attention in the literature. Organic amendments' impact on crop yield and soil fertility has been studied extensively around the world, and it has been identified as critical for sustainable agroecosystem management[4]. For example, Kwesiga et al. (2020) investigated the effects of repeated applications of green and farmyard manures on rain-fed rice performance in East African rural floodplain environments and discovered that both amendments resulted in a significant increase in grain yield (18-62%), with a positive residual effect on non-amended rice yield in the third year, as well as increased soil fertility. Thus, there is enough evidence available even though researchers have paid little attention to these systems – to suggest that agroecological technologies promise to contribute to food security on many levels[7]. This is particularly important for The Gambia as an agriculture-based economy. The use of organic manure and compost has been shown to improve the soil organic matter content, water infiltration and retention, and the available water content of soils by 58–86%[15].

Organic fertilizers are materials with specific chemical composition and high nutritional value that can provide sufficient nutrients for plant growth[16,17]. Organic fertilizers were primarily created by composting animal manure, human excrement, or plant matter (such as straw and garden waste) with microorganisms that fermented at high temperatures[18]. Organic fertilizers improve soil structure, provide a variety of plant nutrients, and introduce beneficial microorganisms into the

soil. Organic fertilizers are widely used in agriculture due to their benefits for soil structure and crop yield[19]. Thus, providing significance for this study. Organic fertilization practices can increase crop yields and soil quality, and combining organic and inorganic fertilizers was thought to be an effective solution for crop ecosystem sustainability.[20] Organic fertilizers can improve soil structure and fertility while also increasing soil organic carbon and other nutrients[21]. Many studies have shown that applying organic fertilizers to the soil surface can provide a rich food source for microorganisms while significantly increasing microbial community composition and diversity when compared to no application[22].

Furthermore, using organic fertilizers altercation exchange capacity (CEC) and increases soil moisture content, resulting in changes in soil fauna community structure and composition in acidic soils [23]. Organic fertilizers promote the formation and stability of earthworm communities due to the more stable nutrients in organic manure after aerobic fermentation[24]. Conversely, others have discovered that long-term use of chemical fertilizers can reduce soil organic matter content and change the activity of soil biota, resulting in changes in soil microbial composition and decreased soil invertebrate abundance and diversity due to environmental constraints and pH reductions [25]. The use of organic fertilizers, with a focus on renewable local or farm resources is advantageous in that it is inexpensive, improves soil arrangement, texture, and airing, increases the soil's water retention capabilities, and stimulates healthy root development[26]. In the developing world, such as The Gambia, many farmers use traditional methods that are comparable to organic farming, but are not certified. Thus, providing significance for a greater understanding of the use and application of organic fertilizer by farmers in the geographic context of this study. Hence, given the dynamic and growth trajectory of agroecological practices, this study aims to assess the current practices of the smallholder farmers in the Gambia, particularly in NBR, CRR North and South regions. Furthermore, this study aims to identify areas of improvement for agroecological practices in the study areas and by default the Gambia as a whole.

1.1 Definition

Agroecology: In this study, agroecology is defined as agroecology is the integration of research, education, action, and change that brings sustainability to all parts of the food system: ecological, economic, and social.

Organic fertilizer: In this study, organic fertilizer is defined as materials primarily created by composting animal manure, or plant matter (such as straw and garden waste) with microorganisms that fermented at high temperatures with a specific chemical composition and high nutritional value that can provide sufficient nutrients for plant growth.

1.2 Study Objectives

The overall objection of the project is to strengthen the capacities of Civil Society Organizations (CSOs) in The Gambia to engage in policy dialogue at the national and regional levels, as well as in dialogue, implementation, and monitoring of the European Union (EU) and national development plans and programs.

The specific objectives of the project are to strengthen the research, promotion, production, marketing, vulgarisation/extension, and the use of organic fertilizers in the Gambia are

strengthened and to promote the consumption of diversified food items produced using organic fertilizers. Thus, the study is significant to agroecology and the use of organic fertilizer.

The present study measured or evaluated the specific objectives by using mixed method metrics (measurement tools) of research (quantitative method) such as content content-specific reliable questionnaires (see Appendix D). Furthermore, interviews and Focus Group Discussions (FDG) (qualitative qualitative) were utilized to measure/evaluate the level of use of adoption and use of organic fertilizer. This is furthermore explained in section 2.0

1.3 Study Area

As a low-income developing country, The Gambia has poverty and unemployment rates of more than 45% and 35%, respectively. The national per capita income in 2019 was $778[27]. Access to quality education and primary healthcare remains limited across the country, though it is slightly better in cities[28,29]. According to Beyers and Wackernage (2019)[30], The Gambia has a total productive land area of 1.5 million, defined as its biocapacity with an ecological footprint of 2 million, both measured in global hectares (gha) by the Global Footprint Network" (p. 3). Furthermore, the ecological footprint measures people's demand or dependence on nature/natural capital assets and flows[30]. "A country is declared ecologically deficit when its footprint exceeds its biocapacity" (Dampha, 2021a p. 3). The Gambia was declared ecological bankruptcy in 2002, and as of 2016, the country had an ecological deficit of 547,341gha. In 2016, an average Gambian had a per capita biocapacity of 0.7gha, compared to 4gha in 1961, and an ecological or environmental footprint of 1gha [31]. Agriculture and natural resources provide a living for more than 75% of the population in The Gambia. With an increasing reliance on natural capital for consumption, income generation, and wealth accumulation, the average Gambian ecological footprint will more than double by 2050 (urban dwellers more so than rural settlers) [31]. Similarly, as the population grows, the biocapacity deficit expands exponentially. As a result, The Gambia will continue to be not only an economically indebted developing country but also an ecological debtor (importing biocapacity) from countries with natural capital reserves, known as ecological creditors[31].

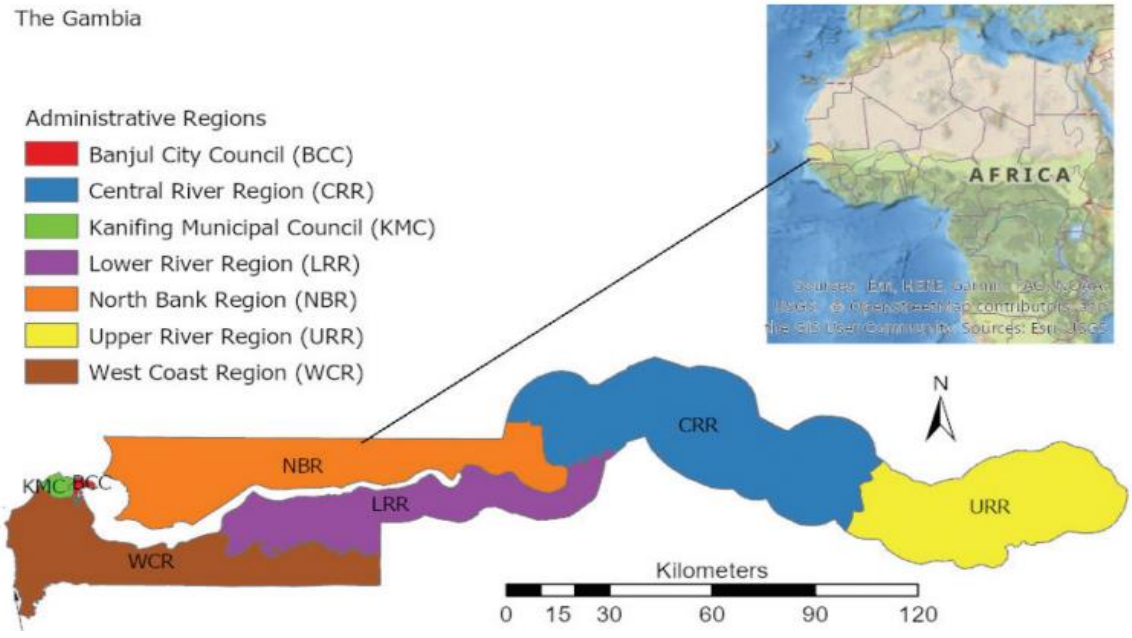
The study areas for both the baseline and diagnostic were limited to The Gambia: North Bank Region (NBR) specifically Nuimi and Central River Region (CRR) North and South., Lower Fullado and Upper/Lower Saloum respectively, LRR and URR. The Gambia is the smallest country in mainland Africa, covering approximately 11,000 square kilometers and bordered by Senegal on all sides except the Atlantic coast. Administratively, the country is divided into five regions (West Coast, North Bank, Central River, Lower River, and Upper River) and two municipalities (Banjul and Kanifing) [32]. The Gambia is a low-income West African country where agriculture is practised by two-thirds of the population. Peanuts are the primary export crop, while rice, millet, and sorghum are traditionally grown for food. Over the second half of the twentieth century, The Gambia became increasingly reliant on rice as a dietary staple, but the country's farmers were unable to increase their market share of the burgeoning urban rice demand[33]. Socioeconomically, the regions of The Gambia are not dissimilar. Thus, there are shared geographical and socio-economic characteristics among regions of The Gambia except for the West Coast Region (WCR) which is closer to the Atlantic Ocean and therefore has a different

typological weather indicative of coastal regions. Generally, CRR is further east of the Gambia often referred to as rural Gambia. Similarly, the NBR region is in the north of the Gambia. The CRR is made up of ten local administrative districts, each headed by a District Chief named Seyfo. According to the 2013 census, The Gambia's Central River Region has 226,018 inhabitants (Gambia Bureau of Statistics (Gbos), 2013). The area has good soil structure and fertility, as well as some vegetative cover when compared to the rest of the country, particularly in the north [35]. Almost all CRR residents rely on agriculture, either directly or indirectly, and poor or failed harvests pose a serious threat to the region's food security. Because of region has approximately 105 horticultural marketing federations, the region was chosen as the subject of this study. As previously stated, NBR is not dissimilar to CRR. Thus, NBR has 68 marketing federations chosen to participate in this study. (See Table 1 below study area for the baseline study).

Table 1: Study Areas

NO.	Area	# of Federation	Population
1	NBR	68	10463
2	CRR-South	41	6308 estimated
3	CRR-North	64	9847 estimated
	Total		**26618**

Source: Field data (2024). See below in section 3.1.2 Sampling



Source: Dampha (2021) [36] Figure 1

2.0 METHODOLOGY

2.1Study Design:

The present baseline study adopted a mixed-methods approach, combining both quantitative and qualitative methods to gather a holistic understanding of agroecology and organic fertilizer practices in The Gambia, and drawing data from horticultural marketing federations in NBR and CRR (North and South). Studies of farming systems with similar objectives to the current study used typological analysis to classify prevailing practices among farmers and identify farmer characteristics that determine their proclivity to engage in those sets of practices[37]. Such analyses typically use multivariate statistical approaches with a variety of techniques[38]. The most commonly used techniques in this regard are factor analysis (FA), principal component analysis, and cluster analysis[39]. The usefulness of each of these techniques is situation-dependent. In the present study, we defined organic fertilizer descriptively as a set of related decisions/actions that a farmer takes at the household level to obtain the input for use/practice. From the literature, we identified a universal set of observable organic fertilizer use decisions to support possible sub-sets of decisions by farmers in the study area. Since there is no prior information about how farmers make organic fertilizer decisions, we could not assume any number or nature of expected factors. Hence, the present study applied exploratory factor analysis on observed decisions/actions of farmers to identify common factors such as agroecological and organic fertilizer practices. Thus, based on the objectives of the study, the nature of the study was exploratory. Hence the study adopted an exploratory research design using a micro survey (questionnaire and focus group discussions). The study was conducted in three main phases: preparatory phase (1), data collection phase (2), and data analysis phase.

2.2 Sampling

The present study collected data from members of horticultural marketing federations in NBR and CRR (North and South). From reliable sources, NBR has 68 horticultural marketing federations in various districts of the region with a total membership of 10,463. CRR-North has 64 horticultural marketing federations with an unknown membership count. Similarly, CRR-South has 41 marketing federations with an unknown membership count. Thus, the use of a conventionally approved sampling method would require knowing the total population of the marketing federations in the study area. For convenience, this study estimated the membership for CRR-North and CRR-South. As such the count of NBR federations with 10,463 was used as a baseline to determine the count for CRR-North and CRR-South. Thus: The formula used was percent (%) to calculate and determine the estimated membership count for CRR-North and CRR-South (See below)

64 is 94.1176% of 68= 94.117% of 10463=9847 (CRR-North)

41 is 60.29% of 68=60.29% of 10463= 6308 (CRR-South)

Based on the percent calculations, the total count for the study population equals:

NBR= 10,463

CRR-North= 9847

CRR-South= 6308

Total: 26618 (See Table 1 above)

Table 3: Proportionate distribution of respondents

Region	Share	Percentage Share (%)
NBR	10,463	39.
CRR-North	9847	37.
CRR-South	6308	24
Total	**26618**	**100**

Source: Author's Computation from Field data (2024)

However, because of the anticipated difficulty in mobilizing and reaching members of the horticultural marketing federations in remote and hard-to-access places in NBR and CRR coupled with limited resources and time, the present study was supplied with a list of representatives of the horticultural marketing federations in NBR and CRR-North and South with a count of 173 representatives (See Appendix C).

Table 4: Number of Representatives per region

NO.	Region	No. Representatives
1	NBR	68
2	CRR-North	64
3	CRR-South	41
	Total	**173**

Source: Field data (2024)

2.3 Sampling Frame

The present study was only able to access the list of horticultural marketing federation representatives in NBR and CRR-North and South (See Appendix C). Thus, the present study accessed 173 members of the horticultural marketing federations thus representing the sample size of the study. Sample distribution was calculated based on the proportionate-to-size method: (sample size/population size x federation size). The membership of each of the horticultural marketing federations was calculated based on the number of representatives on the list provided. Table 5 depicts the number of questionnaires that were sent to each horticultural marketing federation; 68 copies of questionnaire were distributed among NBR marketing horticultural federation representatives; 64 copies of questionnaire were distributed among CRR-North horticultural marketing federation representatives, and 41 copies of questionnaire were distributed among the representatives of CRR-South horticultural marketing federation; making a total

number of 171 copies of questionnaire, which represented the horticultural marketing federations in The Gambia.

The present study's unique circumstances warranted the use of convenience sampling for the ease of access to the selected participants of the marketing federation members of NBR, CRR-North, and South. Given the characteristics nature of small-scale farmers and horticulturists and the shared geographical locations and practices in the Gambia, the present participants are undoubtedly quite representatives of the Gambia population. Thus, the selected sample for the present study is appropriate for the general representation of the Gambian population and for achieving the objectives of the study.

Table 5: Number of Questionnaires Proportioned by Representatives

Region	Percentage Share (%)	No of Questionnaires
NBR	39	68
CRR-North	37	64
CRR-South	24	41
Total	**100**	**173**

Source: Author's Computation from Field data (2024)

3.0 BASELINE SURVEY FINDINGS ON KEY PERFORMANCE INDICATORS (KPIs)

This sub-section reveals key insights from the baseline survey findings. It reports on the initial indicators of the project. The report focused on a set of seven (7) key indicators derived from the project log frame and documents. Below is a list of the main KPIs:

i. Attainment of the objectives of key national policies (i.e., NDP (2023 - 2027), and the
ii. ANR Policy (2017 - 2026).
iii. Number of women and youth producing and using organic fertilizers.
iv. Number of women and youth CSOs engaged in advocacy and policy dialogues about agroecology and organic fertilizers.
v. Number of youth, extension workers, disabled and CSOs trained in circular economy (waste to cash), agroecology and organic fertilizer marketing and use (disaggregated by region and gender).
vi. Number of farmer-to-farmer study tours and exchange visits conducted, and profile of study tour participants.
vii. Number of women's gardens using inputs provided by the action (e.g. quality seeds and organic fertilizers), infrastructure (fencing, boreholes, and solar irrigation systems), and tools (e.g., watering cans, rakes, shovels and mobility).

4.1 THE DIAGNOSTIC STUDY

4.1.1 Study Design

The present diagnostic study adopted a mixed-methods approach, combining both quantitative and qualitative methods to gather a holistic understanding of agroecology and organic fertilizer practices in The Gambia, and drawing data from horticultural marketing federations in NBR and CRR (North and South).

The population of the present diagnostic study represents the households in the respective districts of the 5 rural regions in the Gambia (NBR, CRR-North &South, LRR, and URR); the largely farming communities in the Gambia. Therefore, the study targeted households in the farming communities in the districts of the regions mentioned above. The population (No. of households) for the study consists of 31 districts with 99549 households. See Table 6 for the number of districts and households in the study area.

Table 1: No. of Households in the Regions of the Gambia (Study Area)

No.	Regions	District	No. of Household (Population)
1	NBR	7	27479
2	CRR-SOUTH	6	14465
3	CRR-NORTH	5	10963
4	LRR	6	11984
5	URR	7	34659
	TOTAL	31	**99549**

Source: [64]

4.1.2 Sampling

The sampling for the present research was based on probability sampling. In the probability sampling category, the simple random sampling method is the common method used in most research. In such a case, the opportunity is independent and on an equal basis for every respondent to be chosen as a part of the sample (Sekaran, 2003)[72]. Thus, this diagnostic study was conducted using stratified sampling. According to Cohen et al. (2007)[73], stratified sampling includes the division of the total sample into homogenous groups, where every group has subjects with common characteristics. For instance, category A for males and B for females. To get the sample representative of the total population of both genders, there should be a random selection from both groups A and B. The right proportion of A (males) to B (females) in the total population can be reflected in the sample. Furthermore, such research will have to identify all those qualities and

characteristics of a large population that must be included in the sample, i.e. to identify and explore the parameters of the large population[73].

4.1.3 Sampling Frame

The population of this study was stratified first by regional population, followed by farming districts, followed by farming households, and finally active farmers male or female. The respondents were randomly selected in their respective districts (See Figure 1 below). Stratification of the population was necessary to achieve the aim of the study's participant representation. Farming communities are found in all five regions of the Gambia. However, this diagnostic study requires that participants be sourced from specific farming communities. Thus, stratification of the population started with: strata (1) identifying the communities of interest regionally; strata (2) as per the scope of the study; regions LRR, CRR-North & South, and URR were selected; strata (3) identifying farming districts in the selected regions; strata (4) identifying farming households in the community, and lastly, strata (5) identified farmers (Male and Female) for participation in the study.

Furthermore, the difficulty in accessing all rural households of the regions warranted the use of stratified sampling. Therefore, stratified sampling was appropriately used to ensure that the study obtained an accurate representation of the Gambian population of which a significant number (approximately 70% of the population earn their living through agricultural engagement). Moreover, samples obtained from the sample stratification of the farming regions are sufficiently representative of the farming households in the specific geographical locations (scope). Moreover, the stratified sampling approach was the most appropriate for the present diagnostic study because of the availability of information (list of households in the regions/districts provided by Gambia Bureau of Statistics(GBoS)[40].

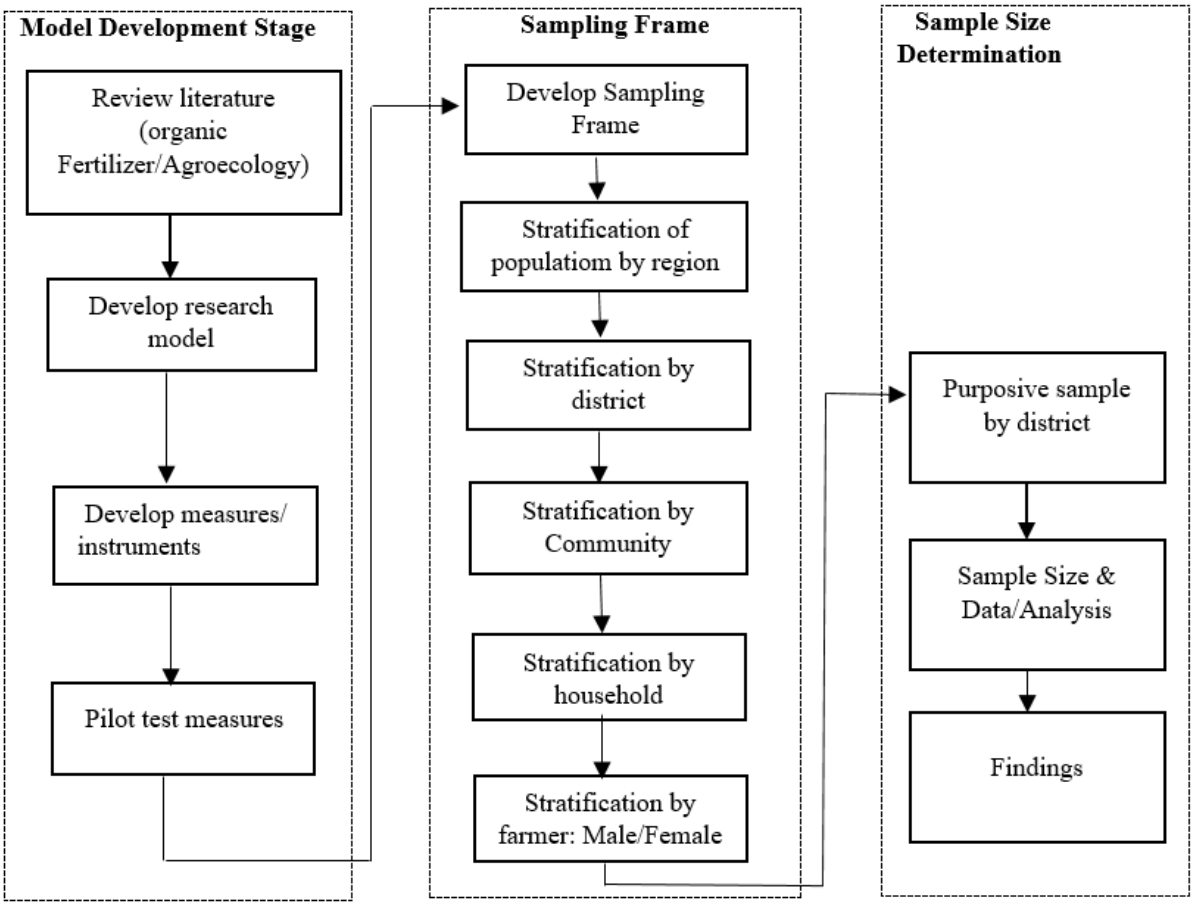


Figure 1: Study Model

The present study was only able to access the list of farming households in the Gambia using GboS data. Thus, the present study determined 50110 farming households (krejcie and Morgan formula was used to determine the sample size of the study-1713). Questionnaire distribution by district in a region was calculated based on the proportionate-to-size method: (district household size/region household size x sample size)

Following the initial sampling method, there arose a need to expand the sampling framework. This resulted in the adoption of the convenient and random sampling method. Convenient sampling and randomly selecting three districts in each region was deemed necessary for determining the number of questionnaires for the selected districts of each region.

Because of a coincidence, this diagnostic study was conducted in the rainy season of August in the Gambia. During this period (August) access to certain identified districts in each region was practically insurmountable. Some of the districts were marred by inaccessible rural roads practically prohibiting access to study participants in some parts of the country; rural Gambia. Convenient sampling was appropriately used in exploratory research such as the present study where the researcher is interested in getting access with less difficulty in collecting data. Thus, three accessible districts were randomly identified and prudently selected for participants of the

study: NBR, CRR-North & South, LRR, and URR. Thus, the randomly selected districts in each region. Based on the three districts selected in each region, the sample size for the study was therefore, determined as follows (see Table 1 below):

Table 1 Sample size determination per region/by district

NO.	Regions	District	Household No.	Sample Size (Krejcie & Morgan)
1	NBR	3	14813	306
2	CRR-South	3	4173	351
3	CRR-North	3	5062	357
4	LRR	3	7317	382
5	URR	3	18745	317
Total		**15**	**50110**	**1713**

Sample size per region (3 regions selected by region)

1) **NBR-306**
2) **CRR-Sout-351**
3) **CRR-North-357**
4) **LRR-382**
5) **URR-317**

Total Sample Size: 1713

5.1 SELECTED FINDINGS

A. Engagement in Agroecology and Organic Fertilizer Production

1. Insights into male engagement in agroecology across various Regions.

Overall Summary:

- **High Engagement** averages 30%, while **Moderate Engagement** is close at 29%.
- **Low Engagement** stands at 19%, and **Very High Engagement** is 18%.
- Only 4% fall under **Very Low Engagement**.

LGA Highlights:

- **CRR North**: Strongest male engagement, with **46% Very High Engagement**.
- **CRR South**: Highest **High Engagement** (44%), though **Very High** drops to 11%.

- **LRR**: Balanced with **38% High Engagement**, but **Moderate** and **Low** levels are equal at 20%.
- **NBR**: Dominated by **Moderate Engagement** (42%), with minimal Very High or Very Low participation.
- **URR**: Balanced distribution, with **Moderate Engagement** (32%) leading.

Conclusion:

CRR North and NBR show the strongest **High** and **Very High Engagement**, while CRR South and URR have more balanced participation. LRR exhibits both high and low extremes in female engagement.

5.1.1 Engage in Organic Fertilizer Production

The results reveal that the highest percentage of the respondents who practice organic fertilizer production were found in CRRN (87%) followed by URR (76%), CRRS (75%) and LRR (50%).

Intervention initiatives are highly recommended for the NBR because the lowest (29%) engagement by respondents was in NBR. Recommendations for initiatives will address the gap in engagement in implementing agroecology practices and the production of organic fertilizers in NBR. Similarly, because in LRR the findings showed that (50%), one-half of respondents are engaged in organic fertilizer production, it is also recommended that initiatives be considered for increasing the number of persons engaged in organic fertilizer production. One-half (50%) is cause for concern where this engagement may slide backward if intervention efforts are not directed at these regions. Thus, all efforts of intervention actions such as sensitization, education, and facilitation and creation of sample farms would help to increase the engagement in both NRB and LRR.

5.1.2 Challenges of organic fertilizer raw material (overall)

Results on the comparative analysis of the challenges of organic fertilizer raw materials for the production of organic fertilizer greatly differ among the regions. Most of the respondents in all the regions indicated scarcity of raw materials as their major challenge in the production of organic fertility except LRR and URR where most of the respondents stated high cost and transportation issues of raw materials, respectively. The NBR had the highest percentage (48%) of respondents who mentioned scarcity of raw materials availability followed by CRRS (45%) and CRRN (44%). All the regions indicated a very low percentage (not more than 10%) of respondents with poor quality raw materials for the production of organic fertilizer.

Based on the findings, it is highly recommended that intervention efforts be directed at NBR and CRR-North and South that would ameliorate the challenge of sourcing raw materials for the production of organic fertilizers. This effort may be provided in the form of educating the farmers on green innovations that involve green products (fertilizer) and green systems (methods) of production. This would educate on identifying the proper material as the most suitable raw material

that can be sourced and used for the production of organic fertilizers. The proper experts with pertinent knowledge in this area should be the in mix of solutions in addressing finding and using raw materials for the production and use of organic fertilizers.

On the other hand, URR recorded the highest percentage (52%) of the respondents with transportation issues of production of organic fertilizer followed by LRR (30%) and CRRS (26%). Thus, it is highly recommended that intervention efforts to address transportation issues include the provision of affordable transportation. Because many of these farmers are of low means, simple and affordable means of transportation would address the challenges with limited or low-cost means. Thus, it is recommended farmers are helped to access funds for the purchase of simple, low-cost modes of transport in the form of donkeys and carts that may be offered as grants or soft loans.

5.1.3 Funding Situation for organic Fertilizer Production (overall)

The comparative analysis reveals significant regional variations in the funding challenges for organic fertilizer production. In most regions, respondents predominantly rated the funding situation as either poor or very poor. The URR reported the highest dissatisfaction, with 45% of respondents rating funding as poor and 20% as very poor. Similarly, CRR-North recorded 38% in both the poor and very poor categories.

In contrast, the NBR stood out with 45% of respondents describing the funding situation as good. The LRR and CRR South exhibited a more balanced distribution between positive and negative assessments, reflecting a moderate perception of the funding landscape for organic fertilizer production.

Based on the findings, it is highly recommended for intervention efforts to address matters of the funding gap in URR and CRR-North; the regions with critical situations of funding gaps in the production and use of organic fertilizer. The same recommendation may be suitable for NBR and LRR. Funding may be provided in the form of a low-interest loan or as a form of agricultural subsidy. An agricultural cooperative may also be created to among other things assist in facilitating funding schemes to increase the accessibility of funds towards agroecological practices and for the production and use of organic fertilizers.

5.1.4 Structures for the production of organic fertilizers (overall)

The findings showed that most respondents in all the regions stated the use of no structures for the production of organic fertilizers. The CRR-N had the highest percentage (88%) of respondents who mentioned the use of no structures for the production of organic fertilizers followed by URR (78%) and CRR-S (68%).

On the other hand, NBR recorded the highest percentage (37%) of the respondents with the use of compose pit as their structures for the production of organic fertilizers followed by LRR (35%) and CRR-S (26%).

All the regions indicated a very low percentage (not more than 5%) of respondents with the use of biogas plants. The use of drums for organic fish fertilizer production was only observed in NBR (5%) and not practiced in other regions. Thus, it is highly recommended intervention efforts are directed at CRR-North and South, and URR, to address the challenge. It is recommended that these regions receive expert training to understand how to use the various forms of structures for the production and use of organic fertilizer. While NBR, LRR, and CRR-S showed some form of understanding for the use of one form or other structure in the production of organic fertilizer, it may similarly be recommended for continuous improvement that these regions continue to receive training on the structures they are knowledgeable about. An added understanding of other forms of structure will add value to the farmers. Thus it is recommended for these regions to receive training on the structure they are not knowledgeable about and may want to diversify their structure.

5.1.5 Challenges in accessing tools and equipment for organic fertilizer production (overall)

The findings showed The CRR-N had the highest percentage (54%) of respondents who mentioned a lack of training in accessing organic fertilizer production tools and equipment followed by CRR-S (38%) and NBR & URR (26%).

On the other hand, NBR recorded the highest percentage (47%) of the respondents with limited availability of tools and equipment for the production of organic fertilizer followed by URR (35%) and CRR-S (32%).

Most of the respondents in LRR (40%) complained of the high cost of organic fertilizer production tools and equipment as their major limitation.

All the regions indicated a very low percentage (not more than 15%) of respondents with poor quality of tools and equipment for the production of organic fertilizer.

Based on the findings, it is recommended that intervention efforts for URR, CRR-S, and NBR to remedy the challenges for training issues and tools issues be specific in the formulation of training modules that directly address and helps farmers understand and be at least moderately knowledgeable about agroecology, the production and use of organic fertilizer. The recommended training effort should be tailored to be one of continuous development and progressive nature. Thus, training modules should be communicated in simple language all native languages for ease of understanding the key messages of the content.

Special intervention for access to tools and types of equipment for the production of organic fertilizer is further recommended to be directed at NBR, CRR-S, and URR. Access to tools and equipment may be provided through grants or special farmer programs of low-interest loans, soft loans that may be had through cooperatives to facilitate access to tools and equipment.

5.1.6 Challenges to accessing information and data on the production of organic Usage

Most of the respondents in all the regions indicated a lack of sources of information and data on the production and usage of organic fertilizer in all the regions. The CRR had the highest percentage (82%) of respondents who mentioned a lack of sources of information followed by LRR (58%) and NBR (55%). The CRR-S recorded the lowest percentage of respondents (39%) as compared to other regions who stated lack of source as their major constraint in accessing information and data on the production and usage of organic. Similarly, the high cost of data access was indicated by the respondents in the region as one of their constraints. The LRR was found to be highly affected (25%) by the high cost of data than all the other regions followed by CRR (23%), NBR (22%), and URR (18%). The limited internet connectivity was observed as the least (not more than 15%) affected constraint in all the regions.

Based on the findings above, it is highly recommended that intervention efforts to address this challenge are not limited to any specific region. It is recommended that intervention efforts such as media production, and research information about agroecology, and the production and use of organic fertilizer are directed at all the regions; NBR, CRR-N &CRR-S, LRR, and URR. It is recommended that media campaigns especially tailored news items should be incorporated in the media campaigns to be distributed in these regions through mobile film caravans and other innovative ways and devices for dissemination of information. It is also recommended that information on recommended standards for the production of organic fertilizers be developed and disseminated across all regions. Recommended standards for the production and use of organic fertilizer may be developed with the help of experts in the field (within the Gambia or externally). These experts may be sourced, if necessary from across the world.

5.1.7 Challenges to Access organic fertilizers from agricultural markets

The result shows that the markets for access to agroecological products in all the survey regions are not adequate. The majority of respondents in CRR-N (82%), LRR (64%), CRRS (49%), and URR (44%) stated that the markets for accessing the agricultural market to procure organic fertilizer are very difficult in their communities. While 26% of them in NBR indicated that the markets for accessing the agricultural market to procure organic fertilizer are very difficult in the region. However, a significant percentage of respondents in CRRS (10%) and NBR (9%) mentioned that the markets for accessing the agricultural market to procure organic fertilizer are easy compared to other regions. Similarly, only CRR-N (2%) and LRR (1%) indicated the markets for accessing the agricultural market to procure organic fertilizer is very easy in their communities.

Based on the findings above, it is highly recommended that intervention efforts to address this challenge are not limited to any specific region. It is recommended that intervention efforts such as the creation of markets for organic fertilizer are directed at all the regions; NBR, CRR-N &CRR-S, LRR, and URR. It is recommended that markets and distribution channels/points are created for marketing and distribution of organic fertilizer. The creation of these markets requires the

involvement of the Ministry of Agriculture in collaboration with NGOs who may be keen on addressing the issues of marketing for organic fertilizers.

5.1.8 Challenges in receiving support and supplies for organic fertilizer production

The various constraints outlined by the respondents were financial constraints, lack of technical support, supply chain issues, and policy and regulatory barriers. The majority of the respondents in all the regions except CRR-S indicated financial constraint as their main challenge in the production of organic.

The highest percentage of the respondents (51%) who stated financial constraints as their major challenge was recorded in CRR-N followed by LRR (48%), NBR (39%), and URR (37%). For CRR-S, most of the respondents mentioned a lack of technical support as their main constraint in the production of organic fertilizer.

The supply chain issues were stated as the third major constraint and this was mostly highlighted in CRR-S (32%) than all the other regions followed by NBR and URR (22%), CRR-N (21%), and LRR (19%). The policy and regulatory barriers were indicated as the least constraint affecting the production of organic fertilizers in the regions.

Based on the findings above, it is highly recommended that intervention efforts to address this challenge are not limited to any specific region. It is recommended that intervention efforts such as grants and loan programs should be created to facilitate the production of organic fertilizer and that these finance schemes be directed at all the regions especially; NBR, CRR-N & LRR, and URR. It is further recommended that the supply chain for access to organic fertilizer be developed through a specially formulated program overseen by an NGO in collaboration with the Ministry of Agriculture,

5.1.9 An increase in the cost of chemical fertilizers led to higher production and usage

The majority of the respondents in CRR-N (71%), LRR (75%), and NBR (55%) strongly agreed that an increase in the cost of chemical fertilizer led to a higher level of usage and production of crops.

Also, most of the respondents in CRRS (44%) followed by NBR (43%) URR (21%) LRR (20%) and CRR-N (15%) agreed that an increase in the cost of chemical fertilizers led to higher usage and level of production of crops.

However, in URR most of the respondents (35%) disagreed that an increase in the cost of chemical fertilizers did not have any influence on the level of usage and production of crops. Similarly, there are small percentage of the respondents in the regions who strongly disagree that an increase in the cost of chemical fertilizer led to a higher level of usage and crop production with the highest recorded in CRRN (10%) followed by CRRS (5%) and URR

Based on the findings, it is recommended that consideration for the production and use of organic fertilizers are at the forefront of efforts for popularizing organic fertilizers. Given the cost factor of chemical fertilizer, it is recommended that intervention efforts be directed at initiatives to increase the popularity of the usefulness of pivoting toward the use of organic fertilizers. Thus, the initiative of creating affordability of organic fertilizers should be focused on all the regions; CRR-S, CRR-N, LRR, NBR, and URR.

6.1 Conclusion And Recommendations

Conclusion

The diagnostic study on agroecology and organic fertilizer production across key farming regions in The Gambia highlights several critical challenges and opportunities. There is a strong community engagement in agroecology, particularly among youth and women, but their efforts are hindered by a lack of resources, such as access to tools, raw materials, and necessary infrastructure. The study reveals that despite their willingness to adopt sustainable farming practices, many farmers lack the requisite skills and support, limiting the scalability of agroecological initiatives.

Climate change has significantly impacted agricultural productivity in these regions. Challenges such as flooding, rising temperatures, soil degradation, and increased pest and disease outbreaks have affected both agroecology and organic fertilizer production. In regions like CRR North and URR, the absence of adequate infrastructure and tools has further compounded these challenges, making it difficult for communities to cope with the effects of climate change.

On the other hand, opportunities exist for improving organic fertilizer production and agroecology practices. The potential for cost-effective organic fertilizer production as a substitute for expensive chemical fertilizers presents an economic advantage, especially for smallholder farmers. With better support, including access to modern tools, land, and training, organic fertilizer production can be scaled to meet local and regional market demands.

The study also found that despite efforts to promote agroecology, there is a significant gap in market access, which discourages farmers from fully engaging in sustainable farming practices. Addressing these barriers, particularly by creating better market linkages and improving infrastructure, will be critical for the successful implementation of agroecology.

Recommendations

1. **Governance Structure:**

   Establish regional multi-sectoral platform on agroecology with a governance structure and organise a competition between the regions and certificate them to instill a sense of ownership.

2. **Enhance Training and Capacity Building**:

   - Provide comprehensive training to farmers on agroecology and organic fertilizer production, with follow-up support to ensure long-term adoption of these practices.

Training should include practical demonstrations on composting, crop rotation, and pest control.

- Incorporate inclusive training programs that involve women, youth, and persons with disabilities to ensure that all groups benefit from agro-ecological interventions.

3. **Improve Access to Tools and Resources**:
    - Increase access to essential tools and equipment, particularly in regions like CRR North and URR, where there is a significant shortage. Donor agencies and the government should focus on providing tools such as wheelbarrows, compost pits, and organic fertilizer production equipment.
    - Facilitate better access to raw materials for organic fertilizer production in regions where availability is limited.
4. **Develop Infrastructure**:
    - Invest in infrastructure development for organic fertilizer production, including compost chambers and storage facilities. Priority should be given to regions such as URR and CRR North, which face severe infrastructure challenges.
    - Improve access to water for irrigation to support year-round agro-ecological practices, especially in areas prone to drought.
5. **Address Climate Change Challenges**:
    - Implement strategies to mitigate the impacts of climate change, such as introducing drought-resistant crops and developing early warning systems for flooding.
    - Encourage the use of organic pesticides and promote integrated pest management techniques to reduce dependency on chemical pesticides, which harm soil health.
6. **Address Other Challenges**
    - The government should reduce the importation of chemical fertilizer and redirect funds to support and promote organic fertilizers.
    - Conduct an inventory and create a directory of farmers who advocate for agroecology and produce or use organic fertilizers. Additionally, the Government should promote locally produced food for a healthier diet, as people need to be informed about the nutritional content of these foods.
    - The Government should establishing agro-ecological cooperatives.
    - Subsidies are needed for farmers to access organic fertilizers or products. The Government and non-state actors including NGOs should provide subsidies to farmers so they can afford organic fertilizers, similar to how inorganic fertilizers are subsidized.
    - Discourage community farmers from relying upon inorganic fertilizers without understanding their impacts.
    - Promote and preserve the local indigenous seeds.

7. **Increase Market Access**:
    - Establish local and regional markets for agro-ecological products, including organic fertilizers. This will incentivize farmers to adopt sustainable practices by ensuring they have a stable market for their produce.
    - Those farmers who are using or producing organic fertilizers can use the existing platforms to market their products. Also, establish rural agro-ecology markets and award the best agro-ecology markets.
    - Promote organic products by inviting farmers to specific places, conferences and seminars. Organize annual agro-ecology day for farmers to sell or showcase their products.
    - Assist organic fertilizer producers to have access to high-quality packaging materials. This will enable them to present their products effectively in various markets.
    - Collaborate with government and private sector partners to create supply chains for organic fertilizers, ensuring that farmers can easily access and distribute these products.
8. **Empower Women and Youth**:
    - Strengthen policies and initiatives that empower women and youth in agroecology, ensuring they have access to land, resources, and decision-making processes. Women, in particular, should be given leadership roles in local agricultural cooperatives to increase their engagement.
    - Develop programs that provide financial and material support to youth-led agricultural initiatives, helping them overcome barriers to entry in agroecology.

9. **Develop a Strategy on Agroecology and Communication Strategy:**
    - Action Aid International should develop a strategy on agroecology and communication strategy for agro-ecology for the dissemination of information on agro-ecology. The Ministry of Agriculture should formulate an Action Plan on agroecology and organic fertilizers.
    - The Government of The Gambia should develop a specific agroecology policy. Current agricultural policies often support conventional practices, but do not focus on solely on agroecology.
10. **Conduct Advocacy Programs on Agroecology and Organic Fertilizers**
    - The Ministry of Agriculture and non-state actors need to advocate for and emphasize the importance of producing and using organic fertilizers and to properly engage with farmers. Extension workers should receive adequate training and resources to help educate farmers about the organic fertilizers.
11. **Increase Pay package:**
    - Provide adequate remuneration for extension workers. This is because the existing pay, allowances and incentives for extension workers are poor.

12. Create Awareness:

- Create awareness among farmers, extension workers, and journalists about agro-ecology and the production and use of organic fertilizers. Raise awareness on organic fertilizers among farmers and help them understand that what they are producing can lead to greater opportunities and benefits for many people in the future.

13. **Leverage Donor Support**:

- Donor agencies should continue to play an active role in supporting agroecology initiatives by providing funding, technical expertise, and tools. Emphasis should be placed on long-term sustainability by fostering partnerships between local organizations and international donors.
- Governments should also work closely with donor agencies to implement policies that support organic fertilizer production and agroecology as part of national agricultural development strategies.

By addressing these challenges and leveraging the opportunities identified in the study, there is significant potential to scale agroecology and organic fertilizer production in The Gambia. This will not only improve food security but also enhance the socio-economic well-being of farming communities across the country

Limitations

The study faced logistical constraints, including challenges in reaching remote areas, which may have limited the breadth of data collection and potentially led to underrepresentation of certain regions. Additionally, the data collectors did not engage in detailed probing during Focus Group Discussions (FGDs), which limited the depth of qualitative insights into the underlying reasons behind engagement levels in agroecology and organic fertilizer production. This lack of in-depth exploration may have affected the richness of the data and the ability to fully understand participants' motivations and barriers.

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