Status of Climate-Smart Agriculture in Southeast Nigeria

By

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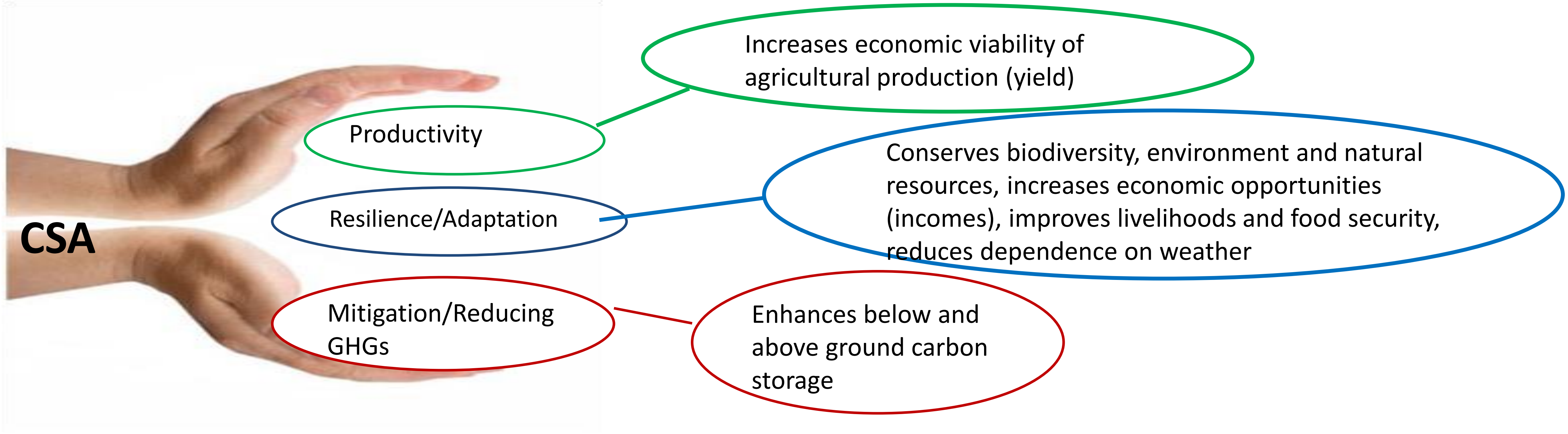
INTRODUCTION

- Impact of climate change on food and nutritional security and environmental sustainability is continuously gaining attention, particularly in Southeast Nigeria.
- Southeast Nigeria depends heavily on rain-fed agriculture making rural livelihoods and food security highly vulnerable to CC.
- Existing technologies and current institutional structures seem inadequate to achieve the mitigation needed to adequately slow CC effects, while also meeting needed food security, livelihood and sustainability goals.
- Southeast Nigeria needs to identify actions that are science-based, utilize knowledge systems in new ways, and provide resilience for food systems and ecosystem services in agricultural landscapes despite the future uncertainty of CC.
- Innovative approaches to increase productivity, enhance resilience of agricultural systems, and increase above ground and below ground carbon storage is therefore needed.

INTRODUCTION

- Climate-smart agriculture (CSA) a new concept by FAO at the Hague Conference on Agriculture, Food Security and Climate Change in 2010 is one such approaches.
- CSA practices increase agricultural productivity, improve resilience to climate change, and contribute to long-term reductions in dangerous carbon emissions



Research Problem

- No published research covering the knowledge and practice of climate-smart agriculture by farmers in southeast Nigeria based on detailed and consistent field data.
- Inadequate research in the area of climate-smart agriculture is listed as a constraint in the newly adopted Nigeria's Agriculture Promotion Policy of 2016 to 2020.

Objectives

- Identify existing practices in southeast Nigeria relevant to CSA;
- Describe the synergies between productivity, resilience, and greenhouse gas mitigation of the CSA practices;
- Determinants of the CSA practices.

METHODOLOGY

Study Area

- **This study was conducted in southeast Nigeria.**

Sampling Technique

- **Cluster and multistage random sampling techniques were adopted for this study (5 States, 10 LGAs, 20 communities, 160 farmers).**

Method of Data Collection

- **Primary data. Questionnaire and FGD.** Focus groups were used to develop lists of specific technologies relevant to CSA before data collection from the farmers using questionnaire.

Method of Data Analysis

- **Data collected analysed using descriptive statistics and logit regression.**

FINDINGS

Practice reported	Productivity impacts (incremental yield; return to labour, capital)	Climate Change Adaptation and Resilience implications (increase in incomes, decreasing dependence on weather)	Mitigation impacts (Reduction in greenhouse gases' emission)
1. Adjusting production systems			
High yielding crop varieties like cassava	Increased crop yield and productivity	Increased resilience against climate change, particularly by reducing yield variability	
Improved livestock breeds and species	Increased productivity per animal for the resources available	Better suited to changing climatic conditions	Positive mitigation
Adjusting planting dates	Reduced tendency of crop failure	Production under changing rainfall patterns is maintained,	
Crop rotation	Increased soil fertility and yields	Improved soil fertility increases resilience to climate change, crop rotation that includes forages reduces soil loss by water erosion and, slow the build-up of insects and disease	Mitigation potential, especially with legumes
Mixed cropping	Increased yields	Increases resilience especially cropped with legumes	Mitigation potential, particularly cropped with legumes
Strip cropping	Increased yield	Protection from erosion both by rain and surface flow	Alternate strips of different species of crops reduce soil carbon
Shifting cultivation	Increase nutrient reserves, and improve productivity	Improved soil fertility increases resilience to climate change	The forest before clearing can serve as carbon dioxide sink
Fallowing	Increase nutrient reserves, and improve productivity	Improved soil fertility increases resilience to climate change	The forest before clearing can serve as carbon dioxide sink
Cover cropping	Prevents rain drops from detaching soil particles, and this keeps soil loss to tolerable limits, conserves the soil and improves soil fertility and productivity	Improved soil fertility and water holding capacity increases resilience to climate change	Mitigation potential through increased soil carbon storage
Application of manure	Higher yields	Improved soil fertility increases resilience to climate change	
Mulching	Reduce splash effect of rain, decrease the velocity of runoff, reduction of soil loss and improving soil fertility and agricultural productivity	Improved soil fertility and water-holding capacity increases resilience to climate change	Increased soil carbon storage
Reduced or zero tillage	Increased yields, preventing runoff in erosion sensitive surfaces and promoting easy entrance of water into the soil as well as penetration of plant roots	Improved soil fertility and water-holding capacity increases resilience to climate change, reduces erosion	Increased soil carbon storage
Agroforestry	Greater yields, increase nutrient inputs to the soil, enhance internal cycling, and decrease nutrient losses from the soil, biofuel and bioenergy production	Fix nitrogen and thus make it available to other plants and increase resilience, soil protection, supply food in the form of fruit, nuts, or leaves used as a vegetable, supply firewood, biodiversity conservation	Mitigation potential as trees on farms are sink for CO_2 and biofuel and bioenergy production
Irrigation	Improved crop production and productivity	Reduced yield variability and greater climate resilience	Mitigation potential due energy efficiency
Water harvesting	Higher yields	Reduced production variability and greater climate resilience	Mitigation potentials due soil water conservation

1. Mobility and Social Network			
Migration	Increased investment in farm from remittances which could lead to increased production	Increased income	
Membership to development associations	Benefits from rotational savings and labour from fellow members. Increased productivity	Increased income	
Membership to cooperative societies	Benefits from rotational savings and labour from fellow members. Increased productivity	Increased income	
1. Farm financial management			
Reduce investment in the farm by reducing land area cultivated	Productivity gains from scale of production, and reduced likelihood of crop failure	Maintained production under changing climatic patterns, such as changes in the timing of rains or erratic rainfall patterns	
Insurance	Insurance for crop failure, and reduced risk	Guaranteed income	
1. Diversification on and beyond the Farm			
Mixed farming	Higher crop yields due to manure from livestock wastes	Reduced yield variability under climate change due to better soil quality; benefits in terms of livelihood diversification	
Shifting from crop to livestock production	Benefits in terms of livelihood diversification; potential short-term trade-off in terms of numbers of livestock supported	Less dependence on weather	
Non-agricultural employment	Benefits in terms of livelihood diversification	Less dependence on weather and increased income	
1. Knowledge Management and Regulations			
Forest protection measures	Conservation and preservation of forest resources	Increased resilience to climate change due to improved soil conditions and water management; benefits in terms of livelihood diversification	Mitigation potential through increased soil carbon sequestration
Regulations on flood catchment	Increased yields due to drainage of agricultural lands in areas where flooding is problematic	Reduced yield variability under heavy rainfall conditions due to improved water management	Positive mitigation benefits through improved productivity and hence increased soil carbon
Use of local pesticides	Increased yields	Increased resilience against climate change	Mitigation potential as a result of less dependence on chemical pesticides which contributes to greenhouse gas emissions

FINDINGS

Climate-smart Agriculture Practice	Frequency	Percentage
Adjusting production systems		
High yielding crop varieties like cassava	118	73.75
Improved livestock breeds and species	20	12.50
Adjusting planting dates	91	56.88
Crop rotation	94	58.75
Mixed cropping	120	75.00
Strip cropping	60	37.50
Shifting cultivation	75	46.88
Fallowing	72	45.00
Cover cropping	102	63.75
Application of manure	88	55.00
Mulching	115	71.88
Reduced or zero tillage	111	69.38
Agroforestry	118	73.75
Irrigation	16	10.00
Water harvesting	24	15.00
Terraces	48	30.00
Mounds	42	26.25
Diversion of ditches and drainages	24	15.00
Contour bunds	36	22.50
Mobility and Social Networks		
Membership to development associations	72	45.00
Membership to cooperative societies	60	37.50
Migration	44	27.50
Farm financial management		
Reduce investment in the farm by reducing area cultivated	77	48.13
Insurance	12	7.50
Diversification on and beyond the Farm		
Mixed farming	126	78.75
Shifting from crop to livestock production	78	48.75
Diversifying from farm to non-farm activities	80	50.00
Knowledge Management and Regulations		
Forest protection measures	36	22.50
Regulations on flood catchment	12	7.50
Use of local pesticides	40	25.00

Variable	Improved agricultural systems	Mobility and social networks	Farm financial management	Diversification on and beyond the farm	Knowledge management and regulations
Education	0.003 (1.77)*	0.007 (2.53)**	0.017 (2.55)**	0.015 (2.31)**	0.005 (3.70)***
Income	0.003 (3.45)***	0.002 (2.25)**	0.0029 (2.48)**	0.007 (1.78)*	0.0043 (3.59)***
Credit	0.007 (2.57)**	0.006 (2.13)**	0.0042 (3.08)***	0.0022 (3.51)***	0.0015 (2.17)**
Extension contact	0.003 (2.36)**	0.008 (3.32)***	0.0017 (3.95)***	0.0014 (3.71)***	0.008 (2.77)***
Household size	0.044 (1.84)*	0.019 (1.69)*	0.058 (2.15)**	0.061 (2.47)**	-0.024 (-1.28)
Farming experience	0.002 (1.93)*	0.014 (3.42)***	0.018 (3.23)***	0.022 (3.84)***	0.007 (2.44)**
Farm size	0.197 (2.10)**	2.45e-07 (0.35)	9.42e-07 (0.93)	6.61e-07 (0.83)	1.24e-06 (1.13)
Exposure to mass media	0.00737 (2.04)**	0.003 (2.37)**	0.005 (2.19)**	-0.003 (-1.22)	0.003 (2.38)**
Distance to market	-0.021 (-4.74)***	-0.013 (-2.51)**	-0.005 (-1.70)*	0.004 (1.27)	-0.003 (-2.02)**
Livestock ownership	0.003 (2.32)**	0.002 (1.40)	0.003 (1.76)*	0.002 (2.37)**	-0.003 (-1.49)
Leadership position	0.113 (1.83)*	0.042 (0.54)	0.088 (0.88)	0.100 (2.09)**	0.183 (1.73)*
Gender	-0.093 (-1.68)*	-0.111 (-1.42)	-0.088 (-0.85)	-0.153 (-1.56)	-0.119 (-1.13)
Land ownership	0.02 (3.37)***	0.003 (1.49)	-0.0001 (-0.13)	-0.001 (-1.28)	0.003 (1.27)
Risk orientation	0.010 (3.09)***	0.183 (1.73)*	0.226 (3.24)***	0.241 (2.28)**	0.018 (2.52)**
Distance to water sources	-0.153 (-2.56)**	-0.119 (-1.13)	-0.029 (-0.50)	-0.169 (-2.51)**	-0.053 (-1.02)
Likelihood Chi square	94.60***	59.65***	77.92***	84.23***	67.82***
Number of observations	160	160	160	160	160

Conclusion

- Paper emphasizes the practices that are on ground and familiar with farmers that could enhance and reposition climate-smart agriculture in southeast Nigeria, which could be applied in other parts of Nigeria.
- This study provides the evidence on which basis the federal government, State governments and support-institutions can design appropriate CSA policies, programs and performance monitoring.
- It forms the foundation upon which interventions can be based.

THANK YOU FOR YOUR ATTENTION