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**Role of Environmental Governance Policies on Sustainability of  
Agricultural Provisioning Ecosystem Services in North Nyakach,  
Kenya**



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## Role of Environmental Governance Policies on Sustainability of Agricultural Provisioning Ecosystem Services in North Nyakach, Kenya

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### Abstract

**Purpose:** The purpose of the study was to assess the role of environmental governance policies on sustainability of agricultural provisioning ecosystem services in North Nyakach, Kenya.

**Methodology:** The study adopted a descriptive research design. The target population for the study was 7553 smallholder farmers for collecting data using questionnaires. The sample size was 63 selected using random sampling techniques for questionnaire sample. Primary data was collected using both questionnaires. Quantitative data was analysed using descriptive statistics such as mean and standard deviations. The correlation analysis was also used to establish the relationship between the variables.

**Findings:** The study established there is a positive and significant relationship between environmental governance policies and sustainability of agricultural provisioning ecosystem services ( $r=0.748$ ;  $p=0.00<0.01$ ). The study concluded that environmental governance policies play a significant role in sustaining agricultural provisioning ecosystem services in North Nyakach, Kenya. The study recommends that there is need for government in collaboration county government of Kisumu should come with strategies for strengthening enforcement of environmental governance policies among the farmers

**Unique Contribution to Theory, Policy and Practice:** The study uniquely contributes to theory by clarifying how environmental governance mechanisms directly shape the sustainability of agricultural provisioning ecosystem services in North Nyakach. It informs policy as it highlights the need for stronger, community-aligned regulatory frameworks and guides practice through demonstration of actionable governance strategies that can enhance resource management and long-term agricultural productivity in North Nyakach.

**Keywords:** *Sustainability, Environmental Governance Policies, Agricultural Food Provisioning Ecosystem Services, Livelihood Indicators*

## Introduction

Agricultural food provisioning ecosystem services refer to the capacity of ecosystems to offer food resources like crops and livestock forage. The sustainability of these services guarantees that there is adequate food for human survival (Li, *et al.*, 2017). Agricultural food provisioning ecosystem services heavily relies on ecological health, land use practices and climatic stability (Shi, *et al.*, 2020). However, its sustainability has been threatened by rapid environmental degradation caused by deforestation, overexploitation of natural resources and unsustainable agricultural practices (Rehman, *et al.*, 2022). To address this, environmental governance policies have emerged as a strategic tool for ensuring that ecosystems continue supporting food production sustainably (Evans & Thomas, 2023).

According to Mehta, *et al.* (2025), environmental governance policy refers to the legal and institutional frameworks guiding the interaction between humans and environment. The policies include legal frameworks, institutional mechanisms, stakeholder participation and regulatory measures (Ogunkan, 2022). These policies aim to ensure effective mitigation of environmental harm and harmonization of human activities with environmental conservations (Awewomom, *et al.*, 2024). Isomova (2024) noted that environmental governance policies influence land use practices, water resource management, pollution control and biodiversity conservation.

Globally, environmental governance policies have had different impacts on the sustainability of food provisioning ecosystem services. In USA, environmental governance entails legislation such as the Clean Water Act and the Farm Bill which ensures balanced agricultural production with environmental sustainability (Isomova, 2024). In Australia, Pollino, *et al.* (2021) noted that Murray-Darling Basin Plan aims to balance food production with ecosystem conservation. In Brazil, the Forest Code mandates the preservation of natural vegetation with an aim of sustaining ecological functions essential for agriculture (Brock, *et al.*, 2021).

In Africa, environmental governance has increasingly become a crucial tool for management of natural resources and promotion of sustainable agricultural practices (Yang & Solangi, 2024). In Ethiopia, the land restoration through the Green Legacy Initiative have assisted in restoring degraded lands and improved rainfall patterns for subsistence farming (Beyene & Shumetie, 2023). In Nigeria, the National Environmental Policy have been regulating land use and promoting environmental sustainability which sustains food provisioning ecosystem services (Orubebe, 2020).

In Kenya, environmental governance framework includes the Environmental Management and Coordination Act (EMCA) and different sectoral policies addressing water, land use and forestry (Muigua, 2023). These laws and policies aim at ensuring sustainability of food provisioning ecosystem services. In areas like North Nyakach, environmental governance policies could

enhance ecosystem resilience and ensure long-term sustainability of food provisioning ecosystem services.

Further, weak enforcement of environmental policies, poor land use practices and limited community involvement have led to ecosystem degradation (Adhikari & Baral, 2018). In addition, the existing studies (Barrett, 2021; Maithya, *et al.*, 2022; Cardoso & Domingos, 2023; Muigua, 2023) have failed to comprehensively establish how various aspects of environmental governance policies affect sustainability of agricultural provisioning ecosystem services in North Nyakach, Kenya. Hence, it's important to establish its influence on sustainability of agricultural provisioning ecosystem services in North Nyakach, Kenya.

### **Research Objectives**

The main objective was to assess the role of environmental governance policies on sustainability of agricultural provisioning ecosystem services in North Nyakach, Kenya. Specifically, the study was guided by the following specific objectives:

- i. To assess the current status of agricultural food provisioning ecosystem services on North Nyakach based on livelihood indicators
- ii. To examine the relationship between environmental governance policies and the sustainability of agricultural provisioning ecosystem services in North Nyakach, Kenya.

### **Literature Review**

#### **Status of Agricultural Food Provisioning Ecosystem Services**

Status of agricultural food provisioning ecosystem services reflects both progress and challenges faced in the process of sustaining food systems (Rehman, Farooq, Lee & Siddique, 2022). As argued by Shi, Shi, Wu and Fang (2020), agricultural food provisioning services is the capability of the ecosystems to produce crops and livestock among other food products. This is very crucial for the survival of humans and they continue to expand substantially because of technological innovations and improved farming practices. Sustainable growth of ecosystem services guarantees increased food availability and reductions in hunger across the globe (McCulley, Roh & Gunaratna, 2020). The status of agricultural food provisioning ecosystem services is determined by its sustainability. Ekka, Patra and Saikia (2023) noted that sustainability of agricultural food provisioning ecosystem services is threatened by different issues including rapid population growth, land-use changes, soil degradation, water scarcity and climate change.

Giller (2020) argued that agricultural food provisioning services are highly vulnerable to erratic rainfall, limited access to inputs, and declining soil fertility in sub-Saharan Africa. Agriculture continues to provide essential food supplies across the globe through its ecological sustainability and resilience face increasing risks (Khatri, *et al.* 2024). Research by Propper, *et al.* (2024) focused on balancing food security, vertebrate biodiversity, and healthy rice agroecosystems in Southeast



Asia. It was established that rice agricultural systems in Asia have spill-over benefits for farmers as it increases the bird activity which augments the control of pests and increases rice yields. Fezzi, *et al.* (2011) noted that variation in ecosystem inputs induced by climate change substantially influenced by the gross margins generated by farm food production in England.

In Nigeria, Adesiyun and Kehinde (2024) established that crop and livestock farming have generated steady cash incomes through most of smallholder's farmers still face various challenges like weak access to credit and inputs which limits its ability to intensify sustainably. Nega (2025) established that biodiversity including the presence of pollinators, pest predators and crop genetic diversity which improves the stability of ecosystems, pests and disease resilience as well as adaptive capacity to climate variability in Ethiopia. These studies could not be generalised to cover the case of North Nyakach as they were done outside Kenya.

Research by Mutea, Rist and Jacobi (2020) notes that farming households and small holder farmers in Kenya continue to rely on agricultural provisioning services for food and income. The study noted that any change in provisioning services affects the household food consumption and cash earnings since smallholders produce the bulk of domestic staples. Shock exposures that include drought, pests, market and price volatility continue undermining the ability of agricultural provisioning ecosystem services to sustainably guarantee adequate food for human survival (Mutea, *et al.*, 2020). The study did not focus on all the livelihood indicators for assessing the current status of agricultural food provisioning ecosystem services in North Nyakach.

### **Role of Environmental Governance Policies on Sustainability of Agricultural Provisioning Ecosystem Services**

Environmental governance policies offer institutional and regulatory frameworks for managing natural resources, guiding agricultural practices and maintaining ecological balance (Yang & Solangi, 2024). As argued by Rehman, *et al.* (2022), efficient governance policies ensure that agricultural activities do not derail the capability of ecosystems to continuous provision of food and other essential services. Governance policies protect environmental resources such as water, soil and air which are essential for long-term agricultural productivity (Chandra, 2023). Briassoulis (2019) argued that governance policies address the challenges such as land degradation as well as overexploitation of natural resources that threatens agricultural provisioning services.

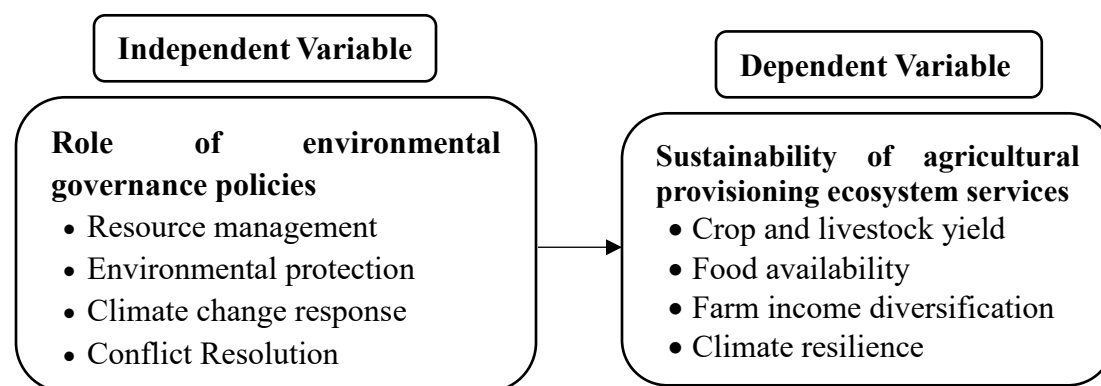
Research by Nandi, Krupnik and Kabir (2024) established that there are policies that advocate for crop diversification and climate-smart agriculture that mitigates the environmental risks and sustain food provisioning ecosystem services. The link between environmental governance and the provision of ecosystem services in Germany was explored by Bethwell, Sattler and Stachow (2022). The study adopted analytical research design and established that different governance policies had a significant relationship with provision of ecosystem services in Germany. Moreover, Costanza and Liu (2014) established that environmental governance is significantly related to

ecosystem services in China. However, the studies did not specify different kinds of provision of ecosystem services as the current study that specifically focuses on agricultural. The studies were also done in Germany and China that has different environmental governance policies than those in Kenya.

Research by Bachev (2021) explore the link between governance mechanisms and modes of ecosystem services in Bulgarian farms. The established that governance mechanisms that includes environmental policies were significantly related to different modes of ecosystem services in Bulgarian farms. Bachev also noted that governance of agricultural ecosystem services is associated with a considerable increase in production and transaction costs of participating farms. Research in Kenya by Radeny (2019) established that weak governance characterized by inadequate enforcement and corruption supported unsustainable practices such as encroachment into fragile ecosystems that threatens the long-term availability of agricultural services. The studies however did not explicitly establish how different aspects of environmental governance policies are related to sustainability of agricultural provisioning ecosystem services in North Nyakach.

### Conceptual Framework

The conceptual framework showed the relationship between the independent variable (environmental governance policies) and the dependent variable (sustainability of food provisioning ecosystem services). The conceptual framework is illustrated in Figure 1.



**Figure 1: Conceptual Framework**

### Research Methods

The study area was North Nyakach. The study adopted a descriptive research design. The design was relevant as it allows collection of both qualitative and quantitative data in North Nyakach. The targeted population for the study is 7553 smallholder farmers for collecting data using questionnaires. The sample size of 63 computed using Nassiuma formulae and selected using random sampling techniques. Primary was collected using questionnaires. The questionnaires had both open and closed ended questions based on the study objectives. Process of data collection

began with obtaining UoN letter of introduction and NACOSTI permit. The researcher used research assistants in administering the questionnaires. The researcher reviewed the completed questionnaires for completeness. Data from the questionnaires was coded to facilitate data entry into SPSS for analysis. Quantitative data was analysed using descriptive statistics such as frequency, percentages, mean and standard deviations. The correlation analysis was used to establishing the relationship between variables.

## Research Results and Discussions

### Descriptive Statistics

The study sought to assess the current status of agricultural food provisioning ecosystem services on North Nyakach based on livelihood indicators. In respects to this, the participants rated the statements based on 5point Likert scale. The findings are shown in Table 1.

**Table 1: Current Status of Agricultural Food Provisioning Ecosystem Services**

	Mean	Std. Dev.
Agricultural activities in North Nyakach consistently provide adequate food supplies for household consumption.	3.054	0.749
The current farming systems in North Nyakach are sustainable enough to support long-term food production.	2.143	0.773
Climate-related shocks such as drought and erratic rainfall significantly reduce our agricultural food production.	4.107	0.705
Soil fertility in North Nyakach is sufficient to support healthy crop yields throughout the year.	4.018	0.820
Access to essential farming inputs (seeds, fertilizers, equipment) is adequate to sustain food production.	2.268	0.963
Biodiversity such as pollinators and natural pest predators, positively contributes to crop yields in North Nyakach.	4.071	0.871
Agricultural food production in North Nyakach is resilient enough to withstand market and price fluctuations.	4.089	0.793

As per the findings in Table 1, the respondents agreed that climate-related shocks such as drought and erratic rainfall significantly reduce our agricultural food production (Mean=4.107) and that agricultural food production in North Nyakach is resilient enough to withstand market and price fluctuations (Mean=4.089). There was also an agreement that biodiversity such as pollinators and natural pest predators, positively contributes to crop yields in North Nyakach (Mean=4.071) and that soil fertility in North Nyakach is sufficient to support healthy crop yields throughout the year (Mean=4.018). The findings are in line with Shi, et al. (2020) who noted that agricultural food provisioning services is the capability of the ecosystems to produce crops and livestock among

other food products. This is very crucial for the survival of humans and they continue to expand substantially because of technological innovations and improved farming practices. Fezzi, *et al.* (2011) noted that variation in ecosystem inputs induced by climate change substantially influenced by the gross margins generated by farm food production in England.

The respondents were neutral that agricultural activities in North Nyakach consistently provide adequate food supplies for household consumption (Mean=3.054). However, the respondents disagreed that access to essential farming inputs (seeds, fertilizers, equipment) is adequate to sustain food production (Mean=2.268) and that the current farming systems in North Nyakach are sustainable enough to support long-term food production (Mean=2.143). The findings disagree with Giller (2020) who argued that agricultural food provisioning services are highly vulnerable to erratic rainfall, limited access to inputs, and declining soil fertility in sub-Saharan Africa. In addition, Adesiyan and Kehinde (2024) established that crop and livestock farming have generated steady cash incomes through most of smallholder's farmers still face various challenges like weak access to credit and inputs which limits its ability to intensify sustainably.

Further, the study sought to establish the role of environmental governance policies on sustainability of agricultural provisioning ecosystem services in North Nyakach, Kenya. In respects to this, the participants rated the statements based on 5-point Likert scale. The findings are shown in Table 2.

**Table 2: Role of Environmental Governance Policies**

	Mean	Std. Dev.
Environmental governance policies provide clear guidelines that promote sustainable agricultural production in my area.	4.107	0.652
Government regulations on land use help to protect soil fertility and long-term agricultural productivity.	2.214	0.889
Environmental policies have improved farmers' access to clean and reliable water sources for agricultural use.	4.143	0.520
Existing governance frameworks effectively control harmful farming practices that degrade the ecosystem.	4.036	0.738
Environmental enforcement agencies consistently monitor agricultural activities to ensure compliance with sustainability standards.	3.911	0.940
Policy interventions on conservation (soil conservation, water management, afforestation) contribute to increased agricultural yields.	4.018	0.700
There are training and outreach programs linked to environmental governance for helping farmers adopt environmentally friendly farming techniques.	2.375	0.983
Environmental governance policies support the long-term availability of natural resources that farmers depend on for food production.	2.161	0.949



From the results in Table 2, the respondents noted that environmental policies have improved farmers' access to clean and reliable water sources for agricultural use (Mean=4.143) and that environmental governance policies provide clear guidelines that promote sustainable agricultural production (Mean=4.107). Moreover, the respondents agreed that existing governance frameworks effectively control harmful farming practices that degrade the ecosystem (Mean=4.036) and that policy interventions on conservation (soil conservation, water management, afforestation) contribute to increased agricultural yields (Mean=4.018). The results concur with Briassoulis (2019) who argued that governance policies address the challenges such as land degradation as well as overexploitation of natural resources that threatens agricultural provisioning services. Rehman, *et al.* (2022) who noted that efficient governance policies ensure that agricultural activities do not derail the capability of ecosystems to continuous provision of food and other essential services

Further, the respondents agreed that environmental enforcement agencies consistently monitor agricultural activities to ensure compliance with sustainability standards (Mean=3.911). However, the respondents disagreed that there are training and outreach programs linked to environmental governance for helping farmers adopt environmentally friendly farming techniques (Mean=2.375). In addition, the respondents disagreed that government regulations on land use help to protect soil fertility and long-term agricultural productivity (Mean=2.214) and that environmental governance policies support the long-term availability of natural resources that farmers depend on for food production (Mean=2.161). The findings are contrary to Nandi, *et al.* (2024) who established that there are policies that advocate for crop diversification and climate-smart agriculture that mitigates the environmental risks and sustain food provisioning ecosystem services. Bachev (2021) established that governance mechanisms that includes environmental policies were significantly related to different modes of ecosystem services in Bulgarian farms.

### **Inferential Statistics**

The study conducted correlation analysis to establish the relationship between environmental governance policies and sustainability of agricultural provisioning ecosystem services in North Nyakach, Kenya. The findings are shown Table 3.

**Table 3: Correlation Analysis Results**

		<b>Environmental governance policies</b>	<b>Sustainability of agricultural provisioning ecosystem services</b>
Environmental governance policies	R	1	.748**
	Sig.	-	.000
	N	56	56
Sustainability of agricultural provisioning ecosystem services	R	.748**	1
	Sig.	.000	-
	N	56	56

\*\* . Correlation is significant at the 0.01 level (2-tailed).

As per the results in Table 3, the study established there is a positive and significant relationship between environmental governance policies and sustainability of agricultural provisioning ecosystem services in North Nyakach, Kenya ( $r=0.748$ ;  $p=0.00<0.01$ ). This implies that environmental governance policies could play a significant role in sustaining agricultural provisioning ecosystem services in North Nyakach, Kenya. The findings agree with Costanza and Liu (2014) who established that environmental governance is significantly related to ecosystem services in China. Bachev (2021) noted that governance mechanisms that includes environmental policies were significantly related to different modes of ecosystem services in Bulgarian farms

## Conclusion

The study concluded that environmental governance policies play a significant role in sustaining agricultural provisioning ecosystem services in North Nyakach, Kenya. This could be attributed to the fact that environmental policies have improved farmers' access to clean and reliable water sources for agricultural use and provide clear guidelines that promote sustainable agricultural production. Existing governance frameworks effectively control harmful farming practices that degrade the ecosystem. In addition, policy interventions on soil, water and forest conservation contribute to increased agricultural yields.

## Recommendations

The study recommends that there is need for government in collaboration county government of Kisumu should come with strategies for strengthening enforcement of environmental governance policies among the farmers. Enforcing regulations on soil conservation, watershed protection and land-use planning would reduce ecosystem degradation and ensure long-term agricultural productivity in North Nyakach.

There is also need for ministry of environment to review and reinforce existing land-use regulations to ensure they effectively safeguard soil fertility and long-term agricultural productivity. Further, the Kenyan government through the ministry of agriculture need to develop

and strengthen training programs for farmers to equip them with practical skills on environmentally friendly farming techniques.

The study recommends that there is need for local farmers and community groups to be sensitized on the importance of environmental governance policies and active involvement in the process of making decisions. This would improve compliance, promote ownership of environmental initiatives and support sustainable management of agricultural ecosystem services.

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