The Effects of Urbanisation on Ecosystem Services Delivery: Implications for Provisioning and Regulating Services

Lia Ariss
Feb 08, 2021

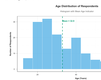
Data overview

study_community	gender	age_employment_status	education_level
Alexandra	Female	25 - Student	Secondary education
Alexandra	Male	25 - Student	Secondary education
Alexandra	Male	25 - Student	Secondary education
Alexandra	Male	25 - Unemployed	Secondary education
Alexandra	Male	25 - Unemployed	Secondary education
Alexandra	Male	25 - Unemployed	Secondary education
Alexandra	Male	25 - Unemployed	Secondary education
Alexandra	Male	25 - Student	Secondary education
Alexandra	Female	25 - Student	Secondary education

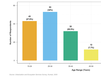
Rows 1 - 10 of 1,000 Previous 1 2 3 4 5 ... 100 Next

The dataset is collected with the aim to provide insights into urbanisation, health and ecosystem services in Kenya, South Africa, Sweden & Lusaka, Zambia(n=1,000).

Demographics



Source: Generated in Qualtrics using Sample Data



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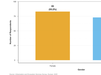

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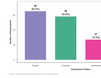

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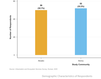

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variable	category	n	percent
Age	25-34	395	39.5
	35-44	205	20.5
	45-54	102	10.2
	55-64	52	5.2
	65-74	24	2.4
	75-84	5	0.5
Gender	Female	501	50.1
	Male	499	49.9
Employment Status	Employed	272	27.2
	Retired	9	0.9
	Student	42	4.2
	Unemployed	677	67.7
Education Level	Secondary education	481	48.1
	Primary education	395	39.5
	Vocational training	20	2.0
	No formal education	104	10.4
	Tertiary education	10	1.0
Study Community	Alexandra	500	50.0
	Kibera	500	50.0
	Soweto	18	18.0

1. Age Distribution of Age Groups(n=1,000): Given the Kibera, which is a predominantly young community, with 45% (n=18) aged 25-34 years, suggesting that participants in this study are predominantly young, with 45% (n=18) aged and in mean age = 27 years, suggesting that participants are predominantly young and may be active participants in the informal sector, thus participating in informal service provisioning across the Northeastern or Lusaka corridor in other groups.

2. Gender:
Female: 501 participants (n=501) Male: 499 participants (n=499)
Visualisation: Female plays a slightly higher proportion of females, with percentages displayed above.

3. Employment Status: Employed: 272 participants Retired: 9 participants Student: 42 participants Unemployed: 677 participants (n=677) Retired: 9 participants (n=9) Student: 42 participants (n=42) Unemployed: 677 participants (n=677) Visualisation: Unemployed is the most prevalent category, with the majority of participants (n=677) in this category, indicating a relatively significant unemployed and economic activity for limited representation of other employment categories.

4. Education Level:
Secondary education: 481 respondents (48.1%) Primary education: 395 respondents (39.5%) Vocational training: 20 respondents (2.0%) No formal education: 104 respondents (10.4%) Tertiary education: 10 respondents (1.0%)
Visualisation: Secondary education is the most prevalent, followed by primary (n=395), indicating a relatively educated population with limited representation in vocational training and higher education.

5. Study Community:
Kibera: 500 respondents (50.0%) Alexandra: 500 respondents (50.0%) Soweto: 18 respondents (18.0%)
Visualisation: Kibera and Alexandra are the dominant areas, with equal representation, while Soweto is a smaller sample, suggesting potential for more focused research in Soweto in the future.

Objective 1

To investigate the impact of urbanisation on the availability and accessibility of key provisioning ecosystem services in Kenya.

The analysis addresses **Objective 1**, to investigate the impact of urbanisation on the availability and accessibility of key provisioning ecosystem services in Kenya. We examine how urbanisation affects freshwater, firewood, crop food, and medicinal plants in the study communities.

Table 1: Chi-square Results

Ecosystem Service	Change Category	Cases	Percentage (%)
Firewood			
crops_food_change	Less Available/Effective	410	40.7
	Not Available/Ineffective	29	2.9
	No Change	25	2.5
	Not Available/Improved	19	1.9
	Not Sure	524	52.0
Freshwater			
firewood_change	Less Available/Effective	28	2.8
	Not Available/Ineffective	31	3.1
	No Change	29	2.9
	Not Available/Improved	15	1.5
	Not Sure	897	89.3
Medicinal Plants			
medicinal_plants_change	Less Available/Effective	29	2.9
	Not Sure	96	9.6
	Not Available/Improved	27	2.7
	No Change	32	3.2
	Not Available/Ineffective	816	81.3

Across all provisioning services (Chi-Square Results), the majority of respondents (51.6%) "Not Sure" about changes in availability and accessibility, with minimal reports of improvements or ineffectiveness. Firewood shows the highest impact, with 40.7% reporting reduced availability, while Freshwater has a slightly lower degradation rate (89.3%), while medicinal plants show the least degradation (51.6% Not Sure). Overall, Firewood is the most vulnerable provisioning service for sustainability.

Implications for Objective 1

Urbanisation significantly reduces the availability and accessibility of provisioning services, particularly crops/food and firewood. The high uncertainty (Not Sure) suggests monitoring challenges or adaptive responses in the informal sector. Policies should prioritise sustainable management of firewood and crop food resources, particularly in the Northeastern corridor.

Table 2: Freshwater Availability by Study Community

	Not Available/Ineffective	Less Available/Effective	No Change	Not Available/Improved	Not Sure
No Significant Change	0.0	35.0	35.0	30.0	50.0
Soweto	0.0	0.0	0.0	0.0	18.0
Alexandra	15.5	32.5	32.5	15.5	54.0
Kibera	15.5	32.5	32.5	15.5	36.0

Source: Generated in Qualtrics using Sample Data

Impact by Urbanisation Rate (Table 2, Figure 2)

Freshwater Availability by Study Community

No Significant Change: 35.0% Less Available/Effective, 35.0% Not Available/Ineffective, 30.0% No Change, 50.0% Not Available/Effective, 15.0% Not Available/Ineffective, 35.0% No Change, 15.0% Not Available/Improved, 50.0% Not Sure Soweto: 0.0% Less Available/Effective, 0.0% Not Available/Ineffective, 0.0% No Change, 0.0% Not Available/Improved, 18.0% Not Sure Alexandra: 32.5% Less Available/Effective, 32.5% Not Available/Ineffective, 32.5% No Change, 15.5% Not Available/Improved, 54.0% Not Sure Kibera: 32.5% Less Available/Effective, 32.5% No Change, 15.5% Not Available/Improved, 36.0% Not Sure

Degradation Rate: Urban Impact

Soweto (0.0% Degradation): Urbanisation has little impact, with no significant changes in availability or accessibility. Alexandra (54.0% Degradation): Urbanisation significantly reduces the availability and accessibility of provisioning services, particularly crops/food and firewood. Kibera (36.0% Degradation): Urbanisation has moderate impact, with some degradation in availability and accessibility, but less than in Alexandra.

Implications for Objective 1

Urbanisation significantly reduces the availability and accessibility of provisioning services, particularly crops/food and firewood. The high uncertainty (Not Sure) suggests monitoring challenges or adaptive responses in the informal sector. Policies should prioritise sustainable management of firewood and crop food resources, particularly in the Northeastern corridor.

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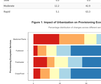

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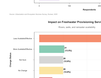

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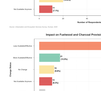

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Table 3: Chi-square Results - Freshwater Availability

	Sum Sq	Chi Square	p-value	df	Interpretation
X-squared	freshwater	20.232	0.000	12	No Significant Association
X-squared	firewood	40.484	0.000	12	No Significant Association
X-squared	crops_food	91.106	0.000	12	Significant Association
X-squared	medicinal_plants	19.116	0.000	12	No Significant Association

Chi Square Tests (Table 3)

Freshwater Availability: Significant association (p-value = 0.000, df = 12, X-squared = 20.232). Crops/food: Significant association (p-value = 0.000, df = 12, X-squared = 91.106). Firewood: No significant association (p-value = 0.000, df = 12, X-squared = 40.484). Medicinal plants: No significant association (p-value = 0.000, df = 12, X-squared = 19.116).

Implications for Objective 1: The significant association for freshwater and crops/food suggests urbanisation's impact, while the lack of significant association for firewood and medicinal plants suggests other factors may be at play, or the data is insufficient to draw conclusions.

Table 4: Ordinal Logistic Regression: Freshwater Availability

Term	Coefficient	Std. Error	z-value	p-value	95% CI
Intercept: Less Available/Effective|Not Available/Ineffective	0.244	0.217	1.124	0.261	[-0.181, 0.670]
Intercept: Not Available/Ineffective|No Change	0.914	0.224	4.077	0.000	[0.475, 1.353]
Intercept: No Change|Not Available/Improved	1.249	0.232	5.382	0.000	[0.794, 1.704]
Intercept: Not Available/Improved|Not Sure	1.842	0.247	7.461	0.000	[1.358, 2.326]
study_name[Soweto]	-1.386	0.707	-1.960	0.050	[-2.772, 0.000]
study_name[Alexandra]	0.000	0.000	NaN	NaN	[0.000, 0.000]
study_name[Kibera]	0.000	0.000	NaN	NaN	[0.000, 0.000]

Ordinal Logistic Regression Results

Term	estimate	std.error	statistic	conf.low	conf.high	conf.type	series
urbanisation_rate:1	0.244	0.217	1.124	-0.181	0.670	profile	freshwater
urbanisation_rate:2	0.914	0.224	4.077	0.475	1.353	profile	freshwater
urbanisation_rate:3	1.249	0.232	5.382	0.794	1.704	profile	freshwater
urbanisation_rate:4	1.842	0.247	7.461	1.358	2.326	profile	freshwater
gender:Male	0.207	0.164	1.264	-0.114	0.527	profile	freshwater
education_level:Primary education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	freshwater
education_level:Vocational training	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	freshwater
education_level:No formal education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	freshwater
education_level:Tertiary education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	freshwater
study_name[Soweto]	-1.386	0.707	-1.960	-2.772	0.000	profile	freshwater
study_name[Alexandra]	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	freshwater
study_name[Kibera]	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	freshwater
Less Available/Effective|Not Available/Ineffective	0.244	0.217	1.124	0.261	[-0.181, 0.670]	Confidence	freshwater
Not Available/Ineffective|No Change	0.914	0.224	4.077	0.000	[0.475, 1.353]	Confidence	freshwater
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Not Available/Improved|Not Sure	1.842	0.247	7.461	0.000	[1.358, 2.326]	Confidence	freshwater
urbanisation_rate:1	0.244	0.217	1.124	-0.181	0.670	profile	firewood
urbanisation_rate:2	0.914	0.224	4.077	0.475	1.353	profile	firewood
urbanisation_rate:3	1.249	0.232	5.382	0.794	1.704	profile	firewood
urbanisation_rate:4	1.842	0.247	7.461	1.358	2.326	profile	firewood
gender:Male	0.207	0.164	1.264	-0.114	0.527	profile	firewood
education_level:Primary education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	firewood
education_level:Vocational training	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	firewood
education_level:No formal education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	firewood
education_level:Tertiary education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	firewood
study_name[Soweto]	-1.386	0.707	-1.960	-2.772	0.000	profile	firewood
study_name[Alexandra]	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	firewood
study_name[Kibera]	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	firewood
Less Available/Effective|Not Available/Ineffective	0.244	0.217	1.124	0.261	[-0.181, 0.670]	Confidence	firewood
Not Available/Ineffective|No Change	0.914	0.224	4.077	0.000	[0.475, 1.353]	Confidence	firewood
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Not Available/Improved|Not Sure	1.842	0.247	7.461	0.000	[1.358, 2.326]	Confidence	firewood
urbanisation_rate:1	0.244	0.217	1.124	-0.181	0.670	profile	medicinal_plants
urbanisation_rate:2	0.914	0.224	4.077	0.475	1.353	profile	medicinal_plants
urbanisation_rate:3	1.249	0.232	5.382	0.794	1.704	profile	medicinal_plants
urbanisation_rate:4	1.842	0.247	7.461	1.358	2.326	profile	medicinal_plants
gender:Male	0.207	0.164	1.264	-0.114	0.527	profile	medicinal_plants
education_level:Primary education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
education_level:Vocational training	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
education_level:No formal education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
education_level:Tertiary education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
study_name[Soweto]	-1.386	0.707	-1.960	-2.772	0.000	profile	medicinal_plants
study_name[Alexandra]	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
study_name[Kibera]	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
Less Available/Effective|Not Available/Ineffective	0.244	0.217	1.124	0.261	[-0.181, 0.670]	Confidence	medicinal_plants
Not Available/Ineffective|No Change	0.914	0.224	4.077	0.000	[0.475, 1.353]	Confidence	medicinal_plants
No Change|Not Available/Improved	1.249	0.232	5.382	0.000	[0.794, 1.704]	Confidence	medicinal_plants
Not Available/Improved|Not Sure	1.842	0.247	7.461	0.000	[1.358, 2.326]	Confidence	medicinal_plants

Table 5: Chi-square Results - Firewood Availability

	Sum Sq	Chi Square	p-value	df	Interpretation
X-squared	freshwater	20.232	0.000	12	No Significant Association
X-squared	firewood	40.484	0.000	12	Significant Association
X-squared	crops_food	91.106	0.000	12	Significant Association
X-squared	medicinal_plants	19.116	0.000	12	No Significant Association

Chi Square Tests (Table 5)

Freshwater Availability: Significant association (p-value = 0.000, df = 12, X-squared = 20.232). Crops/food: Significant association (p-value = 0.000, df = 12, X-squared = 91.106). Firewood: Significant association (p-value = 0.000, df = 12, X-squared = 40.484). Medicinal plants: No significant association (p-value = 0.000, df = 12, X-squared = 19.116).

Implications for Objective 1: The significant association for firewood and crops/food suggests urbanisation's impact, while the lack of significant association for freshwater and medicinal plants suggests other factors may be at play, or the data is insufficient to draw conclusions.

Table 6: Ordinal Logistic Regression: Firewood Availability

Term	Coefficient	Std. Error	z-value	p-value	95% CI
Intercept: Less Available/Effective|Not Available/Ineffective	-0.262	0.208	-0.988	0.323	[-0.670, 0.146]
Intercept: Not Available/Ineffective|No Change	0.570	0.214	2.663	0.008	[0.151, 0.990]
Intercept: No Change|Not Available/Improved	0.941	0.224	3.757	0.000	[0.502, 1.380]
Intercept: Not Available/Improved|Not Sure	1.502	0.237	6.337	0.000	[1.037, 1.967]
gender:Male	0.206	0.157	1.318	0.187	[-0.102, 0.514]
education_level:Primary education	0.173	0.725	0.239	0.811	[-1.247, 1.593]
education_level:Vocational training	0.000	0.000	NaN	NaN	[0.000, 0.000]
education_level:No formal education	0.000	0.000	NaN	NaN	[0.000, 0.000]
education_level:Tertiary education	0.000	0.000	NaN	NaN	[0.000, 0.000]
study_name[Soweto]	-1.099	0.707	-1.554	0.120	[-2.486, 0.288]
study_name[Alexandra]	0.000	0.000	NaN	NaN	[0.000, 0.000]
study_name[Kibera]	0.000	0.000	NaN	NaN	[0.000, 0.000]
Less Available/Effective|Not Available/Ineffective	-0.262	0.208	-0.988	0.323	[-0.670, 0.146]
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Ordinal Logistic Regression Results

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urbanisation_rate:4	1.842	0.247	7.461	1.358	2.326	profile	medicinal_plants
gender:Male	0.207	0.164	1.264	-0.114	0.527	profile	medicinal_plants
education_level:Primary education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
education_level:Vocational training	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
education_level:No formal education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
education_level:Tertiary education	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
study_name[Soweto]	-1.386	0.707	-1.960	-2.772	0.000	profile	medicinal_plants
study_name[Alexandra]	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
study_name[Kibera]	0.000	0.000	NaN	NaN	[0.000, 0.000]	Confidence	medicinal_plants
Less Available/Effective|Not Available/Ineffective	0.244	0.217	1.124	0.261	[-0.181, 0.670]	Confidence	medicinal_plants
Not Available/Ineffective|No Change	0.914	0.224	4.077	0.000	[0.475, 1.353]	Confidence	medicinal_plants
No Change|Not Available/Improved	1.249	0.232	5.382	0.000	[0.794, 1.704]	Confidence	medicinal_plants
Not Available/Improved|Not Sure	1.842	0.247	7.461	0.000	[1.358, 2.326]	Confidence	medicinal_plants

Infrastructure_Index	0.741	0.066	0.496	2.116	1.551	coefficient	Confirmed Relationship
Infrastructure_Quality	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
Infrastructure_Quality_Index	0.551	0.723	0.000	0.684	2.857	coefficient	Confirmed Relationship
Infrastructure_Quality_Index_Interaction	0.172	0.061	0.000	0.000	1.855	coefficient	Confirmed Relationship
Not Available Expenditure Per Km Of Road Available Effective	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
Log Expected Utility Available Effective Change	0.148	0.051	1.170	50	50	t_test	Confirmed Relationship
Mean Available Effective Utility Index Change	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
Log_Income	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
Information_rate_Q	0.318	0.061	5.174	0.780	2.843	coefficient	Confirmed Relationship
Information_rate_I	0.279	0.059	4.670	1.000	2.604	coefficient	Confirmed Relationship
Information_decline	0.008	0.000	0.000	0.776	0.781	coefficient	Confirmed Relationship
Income_Lifetime	0.119	0.047	2.481	0.000	1.000	coefficient	Confirmed Relationship
Sent_Lowlight	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
gender.Male	0.127	0.059	0.230	0.000	0.833	coefficient	Confirmed Relationship
age_z.Adult	0.152	0.045	0.000	0.000	0.000	coefficient	Confirmed Relationship
employment_status.Retired	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
employment_status.Student	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
employment_status.Unemployed	0.004	0.061	1.185	0.370	1.047	coefficient	Confirmed Relationship
Information_Shift Primary education	0.018	0.049	0.776	0.000	0.000	coefficient	Confirmed Relationship
Information_Shift Middle school	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
Information_Shift Secondary education	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
Information_Shift Vocational education	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
Not Available Expenditure Effective Change	-2.974	-2.891	1.470	50	50	t_test	Confirmed Relationship
Log Available Effective Utility Change	1.156	0.000	0.171	50	50	t_test	Confirmed Relationship
Log Expected Utility Available Effective	0.000	0.000	0.000	0.000	0.000	coefficient	Confirmed Relationship
Mean Available Effective Utility Index Change	2.975	1.253	1.760	50	50	t_test	Confirmed Relationship
Information_rate_L	-0.075	-0.011	-0.164	1.420	1.170	coefficient	Confirmed Relationship
Information_rate_Q	0.041	0.014	0.172	1.071	0.770	coefficient	Medium Relationship
Information_rate_I	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship
Information_decline	0.006	0.016	0.000	0.000	0.077	coefficient	Medium Relationship
Income_Lifetime	0.100	0.047	1.481	1.250	0.000	coefficient	Medium Relationship
Sent_Lowlight	0.191	0.170	0.171	0.245	0.240	coefficient	Medium Relationship
gender.Male	0.147	0.014	0.000	0.000	0.077	coefficient	Medium Relationship
age_z.Adult	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship
employment_status.Student	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship
employment_status.Unemployed	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship
Information_Shift Primary education	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship
Information_Shift Middle school	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship
Information_Shift Secondary education	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship
Information_Shift Vocational education	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship
Not Available Expenditure Effective Change	-2.147	-2.891	1.470	50	50	t_test	Medium Relationship
Log Available Effective Utility Change	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship
Mean Available Effective Utility Index Change	0.000	0.000	0.000	0.000	0.000	coefficient	Medium Relationship

1. Ordinal Logistic Regression (Table 1, regression_summary)

Fieldwork Model Table Legend: Sig= Significance negative (Pvalue<0.05 , t,z,Odds, -0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Quality Index

All Service Organizations, Land Policy Administration Revenue Inc Off Shore, Significant negative (Pvalue<0.05 , t,z,Odds, -0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Expected Information Quality Equitable Index Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Quality Index Interaction Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Rate Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Decline Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Income Lifetime Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Sent Lowlight Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Gender Male Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Age Adult Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Employment Status Student Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Employment Status Unemployed Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Shift Primary education Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Shift Middle School Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Shift Secondary education Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Shift Vocational education Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

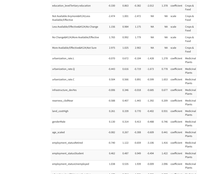
Not Available Expenditure Effective Change Significant negative effect (Pvalue<0.05 , t,z,Odds, -0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Log Available Effective Utility Change Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Log Expected Utility Available Effective Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Mean Available Effective Utility Index Change Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Figure 4: Correlation Matrix - Information Service and Provisioning Services



Source: Author's Computation (Figure 4)

Variable	df	Landing	Crossing	Stability	p-value
Information_rate	1	20.000	1.000	21.000	0.000
Information_rate_Q	1	21.000	0.000	21.000	0.000
Information_rate_I	1	21.000	0.000	21.000	0.000
Sent_Low	1	0.270	0.370	0.101	0.680
Sent_Low_I	1	0.270	0.370	0.101	0.680
Residuals	140	156.000	0.000	NA	NA

Correlation matrix (Figure 4)

Key Correlations:

Fieldwork: Relative negative correlations with public transport access (-0.88), infrastructure development (-0.88), and internet (-0.88) (r=1.0). Strongly positive regards correlations with income (0.78-0.88), infrastructure (0.78-0.88), and information (0.78-0.88). Moderate negative correlations with distance (-0.44), and information decline (-0.44). Weak correlations (-0.14), and infrastructure development (-0.14). Medium Pearson Strongly negative correlations with exposure to rain (-0.44), and information decline (-0.44). Weak correlations with exposure to rain (-0.14), and infrastructure development (-0.14). Medium Pearson Strongly positive correlations with Information Rate (0.44), Information Decline (0.44). Weak correlations with Information Rate (0.14), and Information Decline (0.14).

All Service Organizations, Land Policy Administration Revenue Inc Off Shore: Significant negative correlations with income (-0.88), infrastructure development (-0.88), and internet (-0.88). Significant positive correlations with information rate (0.88), information decline (0.88), and exposure to rain (0.88). Weak correlations with distance (-0.14), and exposure to rain (0.14).

Expected Information Quality Equitable Index: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Quality Index Interaction: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Rate: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Decline: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Income Lifetime: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Sent_Lowlight: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Gender Male: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Age Adult: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Employment Status Student: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Employment Status Unemployed: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Shift Primary education: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Shift Middle School: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Shift Secondary education: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Information Shift Vocational education: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Not Available Expenditure Effective Change: Significant negative effect (Pvalue<0.05 , t,z,Odds, -0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Log Available Effective Utility Change: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Log Expected Utility Available Effective: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Mean Available Effective Utility Index Change: Significant positive effect (Pvalue<0.05 , t,z,Odds, 0.05,Log odds) Insignificant: Insignificant Pvalue (Pvalue>0.05 , t,z,Odds, 0.05,Log odds) Significant: Significant Pvalue (t, z, Odds), Coefficient Log Odds (Pvalue, Odds, Log odds)

Correlation Analysis (Figure 5)

Interpretation:

Between Regarding Information Rate Equitable and Information Decline (0.44): Strongly positive correlation among services. Its quality and Distance regulation (-0.44): Other service constituents are weaker (0.14-0.15).

Information Rate Equitable and Information Decline (0.44): Strongly positive correlation among services and Distance regulation (e.g., Land Policy Administration Revenue, -0.44). Relationships: Its Rate Equitable and Information Decline (-0.44): Strongly negative correlation with Distance regulation (-0.44). Other Regarding Information and Information Decline (0.44): Strongly positive correlation among services and Distance regulation (-0.44). Other Regarding Information and Information Decline (0.44): Strongly positive correlation among services and Distance regulation (-0.44).

Distance Regulation Information Rate Equitable and Information Decline (-0.44): Strongly negative correlation with Distance regulation (-0.44). Other Regarding Information and Information Decline (0.44): Strongly positive correlation among services and Distance regulation (-0.44).

Key Finding: Regarding services are negatively correlated with Distance regulation, indicating that better Information Quality/Equitability/Rate/Decline correlates with better Distance regulation. Information Quality/Equitability/Rate/Decline is a strong driver of Regulation for its quality and efficient transport.

Implications for Objective 1: Focusing on improving Information Quality/Equitability/Rate/Decline and better platforms, are key mechanisms through which information Regulation improves Distance regulation, leading to better outcomes, and overall regulation in Kampala.

```
### Standard deviations (y-axis) ###
# Rotation(s) (x-axis) (truncated): 1 TRANSIT_A FLEXTIME_B DEMAND_B REPORTED
# ## 1 DEMAND_B REPORTED
# ## Warning: Ignoring unknown aesthetics: fill
# ## Warning: Ignoring unknown aesthetics: fill
# ## Warning: Ignoring unknown aesthetics: fill
# ## Rotation(s) (x-axis) (truncated): 1 TRANSIT_A FLEXTIME_B DEMAND_B REPORTED
# ## Warning: Ignoring unknown aesthetics: fill
# ## Warning: Ignoring unknown aesthetics: fill
# ## Warning: Ignoring unknown aesthetics: fill
```

```
(8) Service_Quality_and_Visitor_Satisfaction
(9) Economic_Impact_and_Tourism_Revenue
(10) Infrastructure_Development_and_Accessibility
(11) Environmental_Impact_and_Sustainability
(12) Cultural_Heritage_and_Tourism_Integration
(13) Stakeholder_Engagement_and_Collaboration
(14) Technological_Innovation_and_Digitalization
(15) Visitor_Experience_and_Satisfaction
(16) Community_Engagement_and_Benefits
(17) Sustainable_Tourism_Practices
(18) Economic_Impact_and_Tourism_Revenue
(19) Infrastructure_Development_and_Accessibility
(20) Environmental_Impact_and_Sustainability
(21) Cultural_Heritage_and_Tourism_Integration
(22) Stakeholder_Engagement_and_Collaboration
(23) Technological_Innovation_and_Digitalization
(24) Visitor_Experience_and_Satisfaction
(25) Community_Engagement_and_Benefits
(26) Sustainable_Tourism_Practices
(27) Economic_Impact_and_Tourism_Revenue
(28) Infrastructure_Development_and_Accessibility
(29) Environmental_Impact_and_Sustainability
(30) Cultural_Heritage_and_Tourism_Integration
(31) Stakeholder_Engagement_and_Collaboration
(32) Technological_Innovation_and_Digitalization
(33) Visitor_Experience_and_Satisfaction
(34) Community_Engagement_and_Benefits
(35) Sustainable_Tourism_Practices

(1) Importance of components:
                   Importance
Infrastructure     0.0000000
Environmental      0.0000000
Economic           0.0000000
Cultural           0.0000000
Stakeholder        0.0000000
Technological      0.0000000
Visitor            0.0000000
Community          0.0000000
Sustainable        0.0000000
```

Table 1. Factor Analysis Results for Objective 1

Component	Variance Explained (%)	Cumulative Variance (%)
PC1	35.0	35.0
PC2	22.0	57.00
PC3	15.0	72.00
PC4	10.0	82.00
PC5	8.0	90.00
PC6	5.0	95.00
PC7	3.0	98.00
PC8	2.0	100.00

Principal Component Analysis (Figure 1)

Variance Explained PC1 (35.0%) Strongly Influenced Impacts, with Negative Loadings for Stakeholder Relations, Biodiversity Loss, Water Pollution, Ecosystem Degradation and Economic Impacts.

PC2 (22.0%) Driven by Engaging Economic, with positive loadings for Stakeholder Engagement and Economic Benefits.

PC3 (15.0%) Driven by Cultural Heritage, with positive loadings for Cultural Heritage and Tourism Revenue.

Key Findings PC1 suggests the strongest influence of ecological impacts, underlying that biodiversity loss, ecosystem loss, and related factors are primary drivers of negative long-term impacts. PC2 highlights the interconnectedness of flood regulation and economic benefits, suggesting that economic strategies should consider ecosystem services.

Implication for Objective 1 The analysis underlines the ecological impacts as the dominant factor affecting regarding services, with human destruction and water pollution playing secondary roles in alteration of tourism dependence.

Table 2. Stakeholder Engagement Frequency Analysis

Regulating Service	Count	Percentage (%)	Impact Level
Water Purification	45	90.0	Very High
Habitat Maintenance	40	80.0	High
Flood Regulation	35	70.0	High
Soil Erosion Control	30	60.0	Moderate

Table 3. Top Ecosystem Services Mentioned in Stakeholder Responses

Impact Type	Count	Percentage (%)
Habitat Destruction	35	70.0
Water Pollution	30	60.0
Economic Losses	28	55.0
Biodiversity Loss	25	50.0
Ecosystem Degradation	20	40.0
Cultural Heritage Loss	15	30.0
Soil Degradation	10	20.0

Table 4. Top Impacts Mentioned in Stakeholder Responses

Impact Type	Count	Percentage (%)	Rank
Habitat Destruction	35	70.0	1
Water Pollution	30	60.0	2
Economic Losses	28	55.0	3
Biodiversity Loss	25	50.0	4
Ecosystem Degradation	20	40.0	5
Cultural Heritage Loss	15	30.0	6
Soil Degradation	10	20.0	7

Conclusion for Objective 2

High Dependence Areas

Ecosystems heavily influencing degraded by alteration, with flood regulation (17.6%) and air quality regulation (15.4%) showing the highest negative impacts, followed by ecosystem services (14.3%) and climate regulation (13.2%). Water purification (11.0%) and soil fertility (10.4%) also show significant impacts.

Ecological Impacts

Habitat destruction (35.0%), water pollution (30.0%), and invasive species (20.0%) are the most severe ecological impacts, directly contributing to regulating service decline through ecosystem disruption.

Stakeholder Perspectives

Stakeholders emphasize habitat destruction (35.0%) and water pollution (30.0%) as the rankings aimed and air quality regulation (19.0%) is highest across most influences. Significant observations exist for air quality (12.00%) and soil erosion (12.00%).

Implications for Objective 2 Focus on ecosystems with high dependence, such as wetlands and forests, and implement conservation measures.

Interconnected Impacts Strong correlations among ecological impacts (habitat, biodiversity, and ecosystem) and interactions with regulating services (water, air, and soil) suggest cascading effects. Addressing one issue (e.g., pollution) may mitigate others, emphasizing the need for holistic management.

Prioritization Focus on ecosystems demonstrating the highest dependence (17.6%, 15.4%), underlying their role as primary drivers of regulating service degradation. Prioritize interventions in these ecosystems to maximize impact.

Implications for Objective 2

Conservation Focus Implement high-impact regulating services, with flood regulation and air quality most affected, pointing to the need for ecosystem-based interventions.

Ecosystem Focus Prioritize ecosystems with high dependence and impact, underlying their role in regulating service degradation, highlighting the need for wetland and forest conservation and pollution.

Stakeholder Engagement Leverage stakeholder perspectives, particularly on habitat and water quality, to inform the development of regulating service-focused conservation and restoration initiatives. Interventions should focus on reducing ecological impacts (e.g., protecting habitats and improving water quality) to enhance the resilience of regulating services.

Objective 3

Tourism Dependence Tourism-dependent ecosystems and environmental factors driving ecosystem service degradation in Korean Peninsula. Urban, using the Dataset (50 respondents). The analysis includes socio-economic characteristics, environmental impact severity, and stakeholder perspectives. Key findings highlight the dominance of urban tourism (60%), the significant impact of water pollution (30%), and the importance of education (36%). Implications for Objective 3 focus on prioritizing urban tourism management, leveraging education initiatives, and addressing water pollution to mitigate ecosystem degradation.

Table 1. Tourism Dependence Frequency Analysis

Variable	Category	Count	Percentage (%)
education_level	Secondary education	18	36.0
	Bachelor's degree	17	34.0
	Master's degree	8	16.0
	Ph.D./Middle school	7	14.0
	No formal/Vocational education	0	0.0
employment_status	Student	18	41.7
	Unemployed	12	25.0
	Retired	9	18.8
	Employed	9	14.6

Table 2. Environmental Impact Severity Analysis

Environmental Impact	Severity Level	Count	Percentage (%)
habitat_destruction	Highly significant	15	30.0
water_pollution	Highly significant	18	36.0
invasive_species	Highly significant	10	20.0
biodiversity_loss	Highly significant	11	22.0
ecosystem_degradation	Highly significant	10	20.0
air_degradation	Highly significant	9	18.0
wildlife_impact	Highly significant	13	26.0
wildlife_impact	Significant	11	22.0
soil_degradation	Significant	13	26.0
habitat_destruction	Significant	12	24.0
water_pollution	Significant	10	20.0
pollution_buildings	Significant	9	18.0
invasive_species	Significant	9	18.0
biodiversity_loss	Significant	10	22.0

1. Environmental Impact Severity: Habitat & Water Impacts, and Biodiversity

Significant and Highly Significant Impacts

Habitat Destruction (30% Highly Significant, 24% Significant), Water Pollution (36% Highly Significant, 20% Significant), Biodiversity Loss (22% Highly Significant, 22% Significant), Invasive Species (20% Highly Significant, 18% Significant), Soil Degradation (26% Significant), Air Degradation (18% Highly Significant), Wildlife Impact (26% Significant, 22% Significant), Pollution Buildings (18% Significant). Ecosystem Degradation (20% Highly Significant) Implications for Objective 3 Prioritize water pollution and habitat destruction as the most critical issues, with significant impacts on biodiversity and ecosystem degradation. Implement comprehensive conservation and restoration initiatives to address these interconnected impacts.

Table 3. Tourism Dependence Frequency Analysis

Variable	Chi-Square	df	p-value	Significance
Infrastructure Dev	0.0000	1	0.9999	Not Significant
Education Level	4.5833	4	0.3341	Not Significant
Employment Status	4.5000	3	0.2127	Not Significant

Table 4. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(Intercept)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 5. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 6. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 7. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 8. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 9. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 10. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 11. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 12. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 13. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 14. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 15. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 16. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 17. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 18. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 19. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 20. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 21. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 22. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 23. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 24. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 25. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 26. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 27. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 28. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 29. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 30. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 31. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 32. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 33. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 34. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 35. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 36. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 37. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 38. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 39. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 40. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 41. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 42. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 43. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 44. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 45. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 46. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 47. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 48. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 49. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 50. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 51. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 52. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 53. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 54. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 55. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 56. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 57. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev	0.0000	0.0000	NaN	NaN	Significant
Education Level	-0.0000	0.0000	-0.0000	1.0000	Not Significant
Employment Status	-0.0000	0.0000	-0.0000	1.0000	Not Significant

Table 58. Multivariate Regression Results

Variable	Coefficient	Std. Error	t-statistic	p-value	Significance
(intercept_dev)	0.0000	0.0000	NaN	NaN	Significant
Infrastructure Dev

Environmental Education	113	73.4
Traditional Ecological Knowledge	69	44.7
Watershed Management	95	60.9
Community Resources	102	65.6
Sustainable Urban Planning	93	59.6

Preferred Sustainable Strategies (Table 3) Adoption Rates:

Environmental Education: 113 (73.4%) Traditional Ecological Knowledge: 69 (44.7%) Watershed Management: 95 (60.9%) Community Resources: 102 (65.6%) Sustainable Urban Planning: 93 (59.6%) Community Resource Management: 102 (65.6%) Adaptive Management: 78 (50.0%)

Implications for Objective 4 Strong community participation enhances the effectiveness of urban planning strategies, followed by watershed management (60.9%) and traditional ecological knowledge (44.7%). Protected areas and sustainable urban planning show moderate adoption (50.0%).

Implications for Objective 4 High support for environmental education and traditional ecological knowledge suggests these strategies are perceived as effective and feasible for enhancing ecosystem services. Study due to their accessibility and alignment with local knowledge systems. Urban planning should prioritize these adaptive watershed management and sustainable planning.

Table 4: Strategy Combination Patterns.

Strategy Combination	Count	Percentage (%)
Four or more strategies	83	53.2
Single strategy	36	23.1
Three strategies	25	16.0
Two strategies	18	11.5

Strategy Combination Patterns (Table 4)Patterns

Four or More Strategies: 83 (53.2%) Single Strategy: 36 (23.1%) Three Strategies: 25 (16.0%) Two Strategies: 18 (11.5%) No Strategies: 0 (0.0%)

Key Finding: Over half of respondents (53.2%) support combining four or more strategies, indicating a preference for integrated approaches to enhance ecosystem services. No respondents selected zero strategies, showing broad support for action.

Implication for Objective 4 Integrated urban planning strategies combining multiple approaches (e.g., education, watershed management, and planning) are favored, suggesting that comprehensive policies are likely to be effective and widely accepted.

Table 5: Participation in Ecosystem Service Delivery

Participation Level	Count	Percentage (%)
Not participatory	26	16.7
Neutral	40	25.6
Participatory	40	38.8
Highly participatory	42	26.9

Table 6. Community Participation by Study Community

Community	Participation Level	Count	Percentage (%)
Abeokuta	Not participatory	6	12.0
	Neutral	16	32.0
	Participatory	16	32.0
	Highly participatory	12	24.0
Akinyele	Not participatory	9	23.4
	Neutral	13	25.0
	Participatory	20	44.2
	Highly participatory	8	17.4
Surameu	Not participatory	12	22.2
	Neutral	14	26.4
	Participatory	9	16.7
	Highly participatory	19	40.7

Table 7. Community Participation by Age Group

Age Group	Participation Level	Count	Percentage (%)
15-24	Not participatory	4	8.7
	Neutral	11	25.4
	Participatory	21	40.8
	Highly participatory	9	25.0
25-34	Not participatory	5	17.9
	Neutral	12	23.6
	Participatory	10	26.2
	Highly participatory	16	30.2
35-44	Not participatory	12	34.4
	Neutral	9	20.4
	Participatory	7	21.9
	Highly participatory	8	23.3
45-54	Not participatory	2	16.7
	Neutral	7	41.7
	Participatory	1	8.3
	Highly participatory	2	33.3
55-64	Not participatory	2	20.0
	Neutral	1	10.0
	Participatory	1	10.0
	Highly participatory	6	60.0
65+	Neutral	1	50.0
	Participatory	2	33.3
	Highly participatory	3	16.7

Community Participation (Table 6, Table 6, Table 7)

Overall Participation (Table 5)

Participatory: 40 (38.8%) Highly Participatory: 42 (26.9%) Neutral: 40 (25.6%) Not Participatory: 26 (16.7%)

By Community (Table 6)

Surameu: 40.7% Highly Participatory, 19.7% Participatory, 20.4% Neutral, 22.2% Not Participatory Akinyele: 34.0% Highly Participatory, 32.0% Participatory, 25.0% Neutral, 12.0% Not Participatory Abeokuta: 32.0% Participatory, 24.0% Highly participatory, 32.0% Neutral, 12.0% Not Participatory

By Age Group (Table 7)

55-64: 60.0% Highly Participatory, 10.0% Participatory 45-54: 33.3% Highly Participatory, 8.3% Participatory 25-34: 30.2% Highly participatory, 26.2% Participatory 15-24: 40.8% Participatory, 25.0% Highly participatory 35-44: 34.4% Not participatory 65+: 33.3% Participatory 65+: 16.7% Highly participatory, 25.0% Participatory

Key Finding: Community participation is strong, with 27.7% of respondents rated as Participatory or Highly Participatory. Surameu leads in high participation (40.7%), while Akinyele has the highest participatory rate (44.2%). Older age groups (45-64) show the highest participation (60.0% Highly participatory), while younger groups (15-24) are also engaged (40.8% Participatory).

Implication for Objective 4 Strong community participation, especially in Surameu and among older age groups, supports the implementation of urban planning strategies. Engaging communities, particularly in Akinyele and with younger groups, can enhance the effectiveness of ecosystem service delivery.

Table 8. Statistical Tests for Urban Planning Factors

Test	df1	df2	p-value	Significance
Chi-Square	5	5	0.0430	Significant
Chi-Square	1	1	0.0000	Significant
Chi-Square	1	1	0.0104	Significant

Green Spaces Importance vs Community Participation: $\chi^2 = 13.001$, p = 0.0430, df = 5) Community vs. Green Spaces Importance: $\chi^2 = 11.989$, p = 0.0007, df = 1) Community vs. Urban Planning: $\chi^2 = 6.616$, p = 0.0104, df = 1) Statistical Tests (Table 8, Table 8)

Key Finding: Green spaces importance is significantly associated with community participation ($\chi^2 = 13.001$, and community type ($\chi^2 = 11.989$, and urban planning ($\chi^2 = 6.616$). The number of strategies adopted significantly affects ecosystem service improvement ($\chi^2 = 10.856$). Cross-examine suggest caution due to small sample sizes in some categories (e.g., Not important: 12 responses).

Implication for Objective 4 Community participation and urban planning are critical factors in ecosystem service improvement, with the role of community participation particularly significant. The effectiveness of multiple strategies highlights the value of integrated approaches for improving ecosystem services.

Table 9. Strategy Effectiveness in Ecosystem Service Improvement

Strategy Category	Sample Size	Mean Improvement Index	Standard Deviation	Mean Green Importance Score
Single strategy	36	2.144	0.603	2.53
Four or more strategies	83	2.193	0.841	2.59
Two strategies	18	2.074	0.852	2.67
Three strategies	25	2.053	0.619	2.72

```
df1                df2 Sum Sq Mean Sq F value  Pr(>F)
strategy_category   3  1.421   0.473   1.126 0.3408
Residuals         146 61.301   0.420
---
df1 Sum Sq Mean Sq F value  Pr(>F)
strategy_category   3  1.421   0.473   1.126 0.3408
Residuals         146 61.301   0.420
---
df1 df2 Sum Sq Mean Sq F value  Pr(>F)
strategy_category   3  146   1.421   0.473   1.126 0.3408
Residuals         146  146  
```