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Seasonal Variation in the Components Contribution to Total Ecological Footprints of Individuals: A Case Study of Borno State, Nigeria

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ABSTRACT
The Ecological footprints of 1099 and 1142 individuals in Borno State were computed in the wet and dry seasons respectively to determine the seasonal contributions of the Footprint components of food, mobility, shelter and goods & services to total Ecological Footprint. Food contributed an average of 0.4571± 0.00596 global hectare (gha) in wet season and 0.5217 ± 0.00617gha in the dry season; mobility contributed 0.4859 ± 0.02057 and 0.5557 ± 0.02105 in the wet and dry seasons respectively to total Footprints of people. Shelter Footprint contributed an average of 0.3551 ± 0.00705 gha in the wet and 0.3544 ± 0.00705 gha in the dry season. Goods & services contribution to total Footprints were 0.2474 ± 0.00757 gha and 0.2558 ± 0.00765 gha in the wet and dry seasons respectively. The contribution of the Ecological Footprint components to total Footprints of people varied between the wet and dry seasons. Mobility Footprint made the highest contribution to individual's total Ecological Footprint. Food was the 2nd contributor. Shelter was the 3rd contributor. Goods & services contributed the least. Low total Footprints is due to the generally high levels of poverty in Borno State. Since mobility is the highest contributor to total Footprints development efforts should be toward the provision of mass transits that will reduce the environmental impacts due to transportation.

Key words: Ecological Footprint; food, mobility, shelter Footprint, goods and services Footprints

INTRODUCTION

Achieving sustainable development remains a growing global issue and challenge 43 years after the Stockholm Conference of 1972 and the publication of Our Common future. Globally the use of resources remains unsustainable and with the impacts of climate change and the associated hazards and disasters achieving sustainable development is further being threatened. The extreme weather events being experienced in many places and terrorism all over the globe are not only a serious constraint to the achievement of sustainable development but could also negatively affect achievements made. In addition continued unsustainable consumption will increase the existing stress (overshoot) on the biosphere.

There has been a 33% decline in the earth's natural resources since the Stockholm 1972 Conference that gave birth to the global sustainable development talks (Bond, 2002; WWF 2003, 2007, 2008; Global Footprint Network, 2006). According to Wackernagel *et al*. (2006) the biosphere's regenerative capacity was exceeded since 1980. The last time humans lived within the regenerative capacity of the earth was 1976 (WWF, 2012) and at the present humans use resources at a rate that is 50% more than the earth can sustain (WWF 2007, 2008, 2010). This is to say that humans use one and half planets worth of resources in a year. In 2007 humanity's Ecological Footprints exceeded the earth's carrying capacity by 50% (WWF, 2010). Human use and demands on resources has both exceeded the biosphere's regenerative capacity and resulted in an overshoot. If the unsustainable use of resources continues at this rate, the world is headed for a catastrophic environmental collapse. The visible evidences of climate change all over the world and increasing conducive environments for both natural and man-made hazards and disasters as a consequence of misuse of the earth and its eco-communities highlights the need to study consumption of resources everywhere. Indeed human

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induced climate change is caused by the unsustainable consumption of resources (lifestyle). Natural and man-made disasters are a consequence of human misuse of the earth and its eco-communities (Swedish, 2014) and continued unsustainable use of resources will increase the existing stress on the biosphere.

Since the use of resources by humans has breached environmental limits, it is important to know the sustainability of peoples' lifestyles. This is important as human existence no matter the advancements in science and technology will always ultimately depend on what the planet can provide sustainably. Ecological Footprints is a tool that measures the sustainability or not of lifestyles. It measures the amount of renewable and non-renewable ecologically productive land and sea areas that are required to support any given consumption as well as the absorption of wastes. Ecological Footprints helps us to examine and compare lifestyles between individuals, schools, businesses, communities, and so on. It helps us to assess the sustainability of our lifestyle choices. As a tool it is not only a measure of sustainability but it clearly communicates in an easy to understand fashion both the total Footprints and the components contribution to total Footprints. Ecological Footprint has four components namely: food, mobility (travel), shelter and goods and services. This paper presents the seasonal variation in the components contribution to total Footprints of individuals in Borno State, Nigeria. The objective of the study was to compute the components of Ecological Footprints of individuals in Borno State and their seasonal variations between different settlement types.

METHODOLOGY

Data for the study were obtained through the use of questionnaire. A study population of two thousand, two hundred and four-one (2241) people were randomly selected from villages, and the headquarters of nine Local Government Areas, and Maiduguri the Borno State capital. Data on these people were generated during both the wet and dry seasons. The villages constituted rural settlements, the LGA headquarters constituted semi-urban settlements and Maiduguri constituted urban settlement. The settlement types account for the effects of settlement types/urbanization on lifestyles and the seasons account for the possible effects of seasons on the lifestyles of people. This premise is based on the *a priori* expectation that consumption (lifestyles) of individuals change with changes in resources availability to people based on their types of settlement and climatic seasons.

The questionnaire was based on the Redefining Progress Ecological Footprint calculator questionnaire. The Redefining Progress Ecological Footprint calculator is available online for the computation of individuals Footprint. The questionnaire is specially designed for generating data for application on the calculator. The data generated formed the input information on the calculator to compute Footprints of each individual studied. They are analysed using paired samples correlation to show for variation between the seasons. Paired samples t-test for each component will reveal significant variations due to the fact that each component is a driver of Footprint since total Footprint is a summation of the four components.

Ecological Footprints are expressed in units of global hectares (gha). A global hectare is a measurement of biological capacity(bio-capacity) of the earth and represents the average yield of biologically productive areas on earth. Biological capacity refers to the capacity of ecosystems to produce biological materials and absorb waste materials generated. Footprintmeasures the demand by humans on this area. The use of global hectares allows for a meaningful comparison of Footprints. Footprint results are expressed in global hectares per person and are compared to the available biocapacity per capita. It is generally accepted that the available supply of biologically productive land and sea on earth that is fairly available for each person is 1.8 global hectares (Wackernagel and Rees, 1996; Global Footprint Network, 2003-2009; Mcmanus and Haughton, 2006; Tinsley and George, 2006; *Wackernagel et al*., 2006; Redefining Progress, 2007; Ohl*et al.,* 2008; Wackernagel, 2008; Wiedmann*et al.*, 2008; WWF Living Planet Reports 2008, 2010). The 1.8gha is the fair average share of the world's resources available to each person i.e. per capita and can be seen as a threshold value available for each person if the biosphere is to remain within its biocapacity with no overshoot.

RESULTS AND DISCUSSION

The detailed findings on the components Footprints for all individuals are presented on Tables 1, 4, 7 and 10. The components of food, mobility, shelter and goods & services contributed differently to the total Footprints of individuals. Mobility was the highest contributor to Footprints. The components Footprints based on the types of settlement is presented on Table 10

Food footprint

Each person has a food Footprint. Food was the 2nd highest contributor to total Footprint in both the wet and dry seasons. The detailed food Footprints of individuals are presented on Table 1. The lowest was 0.1 gha and the highest was 1.1 gha in both the wet and dry seasons. In the wet season 48.6% of individuals had ≤ 0.4 gha food Footprint. Average food Footprints in the wet and dry seasons were 0.457 ± 0.006 gha and 0.522 ± 0.006 gha respectively.

Table 1: Food footprints of individuals in Borno state in global hectares

Foot	Wet season			Dry season			Seasons combined		
Print	No*	%*	Cumulative %	No	%	Cumulative %	No	%	Cumulative %
0.1	2	0.2	0.2	2	0.2	0.2	4	0.2	0.2
0.2	218	19.8	20.0	103	9.0	9.0	321	14.3	14.5
0.3	218	19.8	39.9	169	14.8	23.8	387	17.3	31.8
0.4	96	8.7	48.6	173	15.1	39.0	269	12.0	43.8
0.5	80	7.3	55.9	142	12.4	51.4	222	9.9	53.7
0.6	376	34.2	90.1	374	32.7	84.2	750	33.5	87.1
0.7	5	0.5	90.5	6	0.5	84.7	11	0.5	87.6
0.8	92	8.4	98.9	97	8.5	93.2	189	8.4	96.1
0.9	1	0.1	99.0	1	0.1	93.3	2	0.1	96.2
1	10	0.9	99.9	73	6.6	99.8	83	3.7	99.9
1.1	1	0.1	100.0	2	0.2	100.0	3	0.1	100.0

There was a variation in the food Footprints of individuals between the wet and dry seasons. There were increases in the percentage of people with 0.4 gha and 0.5 gha Footprints in the dry season. The percentage of people with 0.2 and 0.3 gha reduced from 39.6% in the wet to 23.8% in the dry season. Food Footprints were lower during the wet than dry season. In the dry season the percentage of people with food Footprint of 0.4 to 0.5 gha increased to 27.5% from 16% in the wet season. Individuals with high food Footprints of 1+ gha also increased from 1% to 6.8% in the dry season. Food was the second highest contributor to total Footprints during both seasons. Food contributed 29.6% and 31% to the total Footprints of individuals in the wet and dry seasons respectively (see Table 12).Paired samples correlation of food Footprint between the seasons was significant at the 0.01 level of significance (Table 2).

Table 2: Paired samples correlations

Paired Samples	Number	Correlation	Sig.
Combined seasons and food	2241	0.157	0.000

T-test results showed a significant variation at the 0.01 level of significance (see Table 3).

Table 3: Paired samples test

	Paired Differences					T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Combine- Food Footprint	1.01959	0.50989	0.01077	.99847	1.04071	94.661	2240	0.000

Food Footprints were higher in the dry season due to increase in the availability of food resources and monetary resources for the purchase of food during the dry season compared to the wet season for most rural individuals. During the wet season most of the food harvest of the previous year is depleted. Seasonal hunger has been observed in rural and urban settings. The low food Footprint is due to the low level of animal based proteins in diets. Most people in rural areas also depend on locally produced foods. Food and thus total Footprints in the study area will increase as people's ability to consume the much needed protein is enhanced.

Mobility (travel) footprints of individuals

Not everyone had mobility footprints, 157 people who constitute 14.3% of people in the wet season and 199 who constitute 17.4% during the dry season had 0 gha mobility footprints (Table 4).

Table 4: Mobility footprints of individuals in Borno State

Foot	Wet season			Dry season			Combined		
Print	No*	%*	Cumulative %	No	%	Cumulative %	No	%	Cumulative %
0	157	14.3	14.3	199	17.4	17.4	356	15.9	15.9
0.1	196	17.8	32.1	187	16.4	33.8	383	17.1	33.0
0.2	157	14.3	46.4	142	12.4	46.2	299	13.3	46.3
0.3	139	12.6	59.1	54	4.7	51.0	193	8.6	54.9
0.4	175	15.9	75.0	95	8.3	59.3	270	12.0	67.0
0.5	67	6.1	81.1	85	7.4	66.7	152	6.8	73.8
0.6	31	2.8	83.9	87	7.6	74.3	118	5.3	79.1
0.7	5	0.5	84.3	13	1.1	75.4	18	0.8	79.8
0.8	9	0.8	85.2	25	2.2	77.6	34	1.5	81.3
0.9	6	0.5	85.7	34	3.0	80.6	40	1.8	83.1
1	5	0.4	86.1	26	2.3	82.8	31	1.3	84.4
1.1	3	0.3	86.4	6	0.5	83.4	9	0.4	84.8
1.2	15	1.4	87.7	36	3.2	86.5	51	2.3	87.1
1.3	25	2.3	90.0	31	2.7	89.2	56	2.5	89.6
1.4	26	2.4	92.4	36	3.2	92.4	62	2.8	92.4
1.5	3	0.3	92.6	10	0.9	93.3	13	0.6	92.9
1.6	5	0.5	93.1	6	0.5	93.8	11	0.5	93.4
1.7	3	0.3	93.4	1	0.1	93.9	4	0.2	93.6
1.8	14	1.3	94.6	10	0.9	94.7	24	1.1	94.7
1.9	3	0.3	94.9	3	0.3	95.0	6	0.3	95.0
2	6	0.5	95.4	6	0.5	95.5	12	0.5	95.5
2.1	6	0.5	96.9	2	0.2	95.7	8	0.4	95.9
2.2	0	0	96.9	4	0.4	96.1	4	0.2	96.1
2.3	1	0.1	96.0	7	0.6	96.7	8	0.4	96.4
2.4	2	0.2	96.2	2	0.2	96.8	4	0.2	96.6
2.5	0	0	96.4	2	0.2	97.0	2	0.1	96.7
2.6	0	0	96.4	1	0.1	97.1	1	0.0	96.7
3	14	1.3	97.7	14	1.2	98.3	28	1.2	98.0
3.1	6	0.5	98.2	10	0.9	99.2	16	0.7	98.7
3.2	5	0.5	98.7	1	0.1	99.3	6	0.3	99.0
3.3	11	1.0	99.7	2	0.2	99.5	13	0.6	99.6
3.4	2	0.2	99.9	1	0.1	99.6	3	0.1	99.7
3.5	2	0.2	100.0	1	0.1	99.6	3	0.1	99.8
3.7	-			1	0.1	99.7	1	0.0	99.9
4	-			1	0.1	99.8	1	0.0	99.9
4.1	-			1	0.1	100.0	1	0.0	100.0

The lowest mobility Footprint was 0.4 gha and the highest was 4.1 gha. The detailed mobility Footprints of individuals are presented on Table 4.Mobility made the highest contribution to Footprints in Borno State. It contributed 0.49 ± 0.021 gha and 0.56 ± 0.21 in the wet and dry seasons respectively. The contribution by transportation varied between individuals and between the wet and dry seasons. As many as 834 people who constituted 84% of the study population had mobility Footprints 0-0.4 gha during the wet season.

There was a seasonal variation in the contribution to total Footprints by mobility between the seasons. During the dry season the percentage of individuals with 0 - 0.4 ghamobility Footprints reduced to 51% from 59.1% in the wet season. The increases in mobility Footprints in the wet season were in individuals with mobility Footprint of0.5 to 1.5 gha and 2.2 to 4.1 gha. Although the absolute increases in percentages may appear somehow low, the increase in mobility contribution to total Footprint was high. It should be noted that the percentage of people with zero (0) to 0.4 gha decreased from 75% in the wet to 59.3 % in the dry season. Mobility was the highest contributor to total Footprints during both seasons, it contributed 31.4% and 33% of total Footprints during the wet and dry seasons respectively (see Table 12).There was a significant variation in the contribution to mobility to average total footprints between the wet and dry seasons at the 0.01 level of significance for both paired samples correlation and paired samples t-test (see Tables 5 and 6 respectively).

Table 5: Paired samples correlation

Paired Samples	**Number**	**Correlation**	**Sig.**
Combined seasons and mobility	2241	.050	.018

Table 6: Paired samples test

	Paired Differences					T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Combine- Mobility Footprint	0.9881	0.8379	0.0177	0.9534	1.0228	55.824	2240	.000

There were increases in motorised travel in the dry season. During the wet season the exigencies of farm related activities and restrictions presented by difficulties in motorised travel and the fact of general lack of monetary resources brought about lower movements and consequently Footprints due to mobility. During the dry season people are more mobile not only due to availability of monetary resources and less farm work but also a host of other reasons. At the time of the study, all the Muslim festivities took place during the dry seasons. Christmas and Easter are dry season Christian celebrations in Borno State. Travels to attend weddings are also more during the dry season.

Shelter footprint

Shelter Footprints of individuals are presented on Table 5. Shelter was the 3rd contributor to total Footprints. Shelter Footprints were generally low. During the wet season 89.7% of the population had shelter Footprints 0.1-0.4 gha and during the dry season 91.7% had 0.1-0.4 gha shelter Footprints. During both seasons combined together less than 10% of the population had shelter Footprints over 0.4 gha (see Table 7).

Table 7: Shelter footprints of individuals in Borno state

Foot	Wet season			Dry season			Combined		
print	No*	%*	Cumulative %	No	%	Cumulative %	No	%	Cumulative %
0.1	2	0.2	0.2	6	0.5	0.5	8	0.4	0.4
0.2	60	5.5	5.6	71	6.2	6.7	133	5.9	6.3
0.3	726	66.1	71.7	811	71.0	77.8	1535	68.5	74.8
0.4	198	18.0	89.7	159	13.9	91.7	357	15.9	90.7
0.5	32	2.9	92.6	34	3.0	94.4	66	2.9	93.7
0.6	51	4.6	97.3	17	1.5	96.1	68	3.0	96.7
0.7	9	0.8	98.1	11	1.0	97.1	20	0.9	97.6
0.8	5	0.5	98.5	7	0.6	97.7	12	0.5	98.1
0.9	4	0.4	98.9	2	0.2	97.9	6	0.3	98.4
1	2	0.2	99.1	1	0.1	98.0	3	0.1	98.5
1.1	1	0.1	99.2	5	0.4	98.4	6	0.3	98.8
1.2	1	0.1	99.3	1	0.1	98.5	2	0.1	98.9
1.3	1	0.1	99.4	1	0.1	98.6	2	0.1	99.0
1.4	0	0	0	2	0.2	98.8	2	0.1	99.1
1.5	3	0.3	99.6	3	0.3	99.0	6	0.3	99.3
1.6	1	0.1	99.7	2	0.2	99.2	3	0.1	99.5
1.7	0	0	0	2	0.2	99.4	2	0.1	99.6
1.8	0	0	0	2	0.2	99.6	2	0.1	99.6
2	0	0	0	1	0.1	99.6	1	0.0	99.7
2.1	1	0.1	99.8	0	0	0	1	0.0	99.7
2.5	0	0	0	1	0.1	99.7	1	0.0	99.8
2.8	1	0.1	99.9	1	0.1	99.8	2	0.1	99.9
2.9	0	0	0	1	0.1	99.9	1	0.0	99.9
3.9	1	0.1	100.0	0	0	0	1	0.0	100.0
4				1	0.1	100.0	1	0.0	100.0

Shelter Footprints did not vary much between the seasons in contributing to total Footprints of individuals. Shelter contributed 23% and 21% to total Footprints in the wet and dry seasons respectively. Paired samples correlation was not significant at the 0.01 level of significance (Table 8).Paired sample test result showed significant variation at the 0.01 level of significance (Table 6); however the significance is due to the fact that each component is a driver of Footprints.

Table 8: Paired samples correlation

Paired Samples	Number	Correlation	Sig.
Combined seasons and shelter	2241	-.002	.942

Table 9: Paired Samples Test

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Combine- Shelter	1.1549	0.5456	0.0115	1.1323	1.1775	100.207	.2240	.000

Goods and services footprints

Goods and services Footprints were low and made least contribution to the total Footprints of individuals in Borno state. 86.4% of the people studied had goods and services Footprint of 0-0.4gha during the wet season, 85.73% had 0-0.4 gha during the wet season and for both seasons combined 86% had 0-0.4 gha shelter Footprints. The detailed goods and services Footprints are presented on Table 10.

Table 10: Goods and services footprints of individuals

Foot	Wet season			Dry season			Combined		
Print	No*	%*	Cumulative %	No	%	Cumulative %	No	%	Cumulative %
0	3	0.3	0.3	4	0.4	0.4	7	0.3	0.3
0.1	530	48.2	48.5	490	42.9	43.3	1020	45.5	45.8
0.2	259	23.6	72.1	266	23.3	66.5	525	23.4	69.3
0.3	85	7.7	79.8	137	12.0	78.5	222	9.9	79.2
0.4	72	6.6	86.4	82	7.2	85.7	154	6.9	86.0
0.5	58	5.3	91.6	58	5.1	90.8	116	5.2	91.2
0.6	20	1.8	93.4	21	1.8	92.6	41	1.8	93.0
0.7	18	1.6	95.1	24	2.1	94.7	42	1.9	94.9
0.8	9	0.8	95.9	22	1.9	96.7	31	1.4	96.3
0.9	6	0.5	96.5	11	1.0	97.6	17	0.8	97.1
1	13	1.2	97.6	11	1.0	98.6	24	1.1	98.1
1.1	16	1.5	99.1	12	1.1	99.6	28	1.2	99.4
1.2	2	0.2	99.3	0	0	99.6	2	0.1	99.5
1.3	1	0.1	99.4	3	0.3	99.9	4	0.2	99.6
1.4	4	0.4	99.7	0	0	99.9	4	0.2	99.8
1.5	1	0.1	99.8	0	0	99.9	1	0.0	99.9
2	0	0	99.8	1	0.1	100.0	1	0.0	99.9
2.6	2	0.2	100.0				2	0.1	100.0

There was a little seasonal difference in the contributions by goods and services to the total Footprints of individuals in Borno State by goods and services. Goods & services contributed 16% and 15% to total Footprints during the wet and dry season respectively. Paired Samples correlation did not show significant variation in the contribution to total Footprints at the 0.01 level of significance by goods & services (Table 11), but paired samples t-test was significant at the 0.01 level of significance. Although paired samples test showed a significant variation at 0.01 level of significance, this is due to the fact that all the components of Footprints are drivers of Footprint since the total Footprints (and thus average total Footprint anywhere) is a summation of the components Footprint.

Table 11: Paired samples correlation

Paired Samples	Number	Correlation	Sig.
Combined seasons and goods and services	2241	.081	.405

Table 12: Paired Samples test

	Paired Differences					T	df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Combine- Goods & Service	1.2579	0.5500	0.0116	1.2351	1.2081	108.269	2240	.000

The contributions by all the components to total Footprints are summarised and presented on Table 13.

Table 13: Components contribution to total ecological footprints in global hectares (gha)

Ecological Footprint component	Average Ecological footprint		
	Wet season	Dry season	Combined season
Food (%)	0.457±.006(29.6)	0.522±.006 (31)	0.496±.004 (30.77)
Mobility (%)	0.486±.021 (31.4)	0.556±.021 (33)	0.522±.015 (32.38)
Shelter (%)	0.355±.006 (23.0)	0.354±.007 (21)	0.355±.005(22.02)
Goods and Services (%)	0.247±.008 (16.0)	0.256±.007 (15)	0.252±.005 (15.53)
Total Footprint	1.543±0.030	1.678±0.029	1.612±0.021

Components contribution to total footprints based on settlement types

The findings on the components Footprints based on settlement types is presented on Table 14. Components Footprints differed based on the types of settlements. Maiduguri which represents the urban settlement had higher average Footprints for all the components with the exception of food during the wet seasons. The fact of urbanity and consequent higher availability of resources is the major factor. Mobility Footprints was much higher in the urban than the rural and semi-urban settlements.

Table 14: Components contribution to total footprints based on settlement types and seasons

Settlement types	Component	Component average footprint	
		Dry season	Wet season
Rural	Food	0.4535 ± 0.0066	0.5040 ± 0.0073
	Mobility	0.4523 ± 0.0234	0.5162 ± 0.0207
	Shelter	0.3311 ± 0.0040	0.3197 ± 0.0038
	Goods & services	0.2246 ± 0.0077	0.2242 ± 0.0058
Semi-urban	Food	0.4738 ± 0.0163	0.5362 ± 0.1433
	Mobility	0.4917 ± 0.0539	0.4092 ± 0.0543
	Shelter	0.3494 ± 0.0091	0.3937 ± 0.0263
	Goods & services	0.2458 ± 0.0222	0.2454 ± 0.0175
Urban	Food	0.4576 ± 0.0212	0.5916 ± 0.0173
	Mobility	0.7093 ± 0.0662	0.8976 ± 0.0823
	Shelter	0.5280 ± 0.0418	0.4796 ± 0.0333
	Goods & services	0.4068 ± 0.0302	0.4180 ± 0.0279

CONCLUSION AND SUGGESTIONS

Each component of food, mobility, shelter, goods and services contributed to the total Footprint of individuals in Borno state, since total Footprint is a summation of the various components Footprints. Each component is a driver of Footprints but the magnitude of their contribution differed. The contribution of each component to total Footprints varied between the dry and wet season. There was a significant variation in the Footprints of people between the seasons and between the components contribution between the wet and dry seasons. Variation is mainly due to changes in mobility and food lifestyles.

Ecological Footprints are generally low. The low Footprint of the population is due to the general low standards of living and wide spread poverty among people in Nigeria. While the Ecological Footprints of individuals on the average are sustainable, Footprints are likely to increase in the future. Increases will happen when poverty alleviation becomes a reality. Developmental thrusts of government are expected to in the long run increase people's consumption due to increase in the much needed standards of living. Policy should therefore aim at providing good transportation network based on mass transits such as trains and buses so as to curtail further increases in mobility Footprints in the future. The common goal of governments should focus on improvements in health care and education delivery, agriculture, transport and electricity. This should enhance in the long run the standards of living of its people in the areas of food, housing and electricity. These increases will not bring about unsustainable consumption as the Footprints of the population are far lower than the globally available fair share biocapacity per capita of 1.8 gha. The provision of food should be from local sources so as to curtail increases in food Footprints due to food imports from distant places.

The implications of the findings is that while policy and developmental thrusts in Borno State by leaders should be the improvements of the standards of living and the provision of security for the generality of its people; improvements of standards of living which is one of the key purposes of democratic governments should be achieved within the carrying capacity of the earth. With climate change and its uncertain impacts it is important that peoples lifestyles should be improved with a sustainable goal on mind. Humans have only one planet to live on and this can be sustainably or unsustainably. Bequeathing a healthy sustainable environment for our children can be reality.

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