THE ROLE OF ADEQUATE RAINFALL IN THE DEVELOPMENT OF ENVIRONMENTAL RESOURCES AND ENHANCEMENT OF TOURISM POTENTIAL IN UGBO TOWN OF ENUGU STATE, NIGERIA

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ABSTRACT

The position of adequate rainfall in the development of environmental resources is a worthwhile research area in the concept of tourism enhancement and sustainable resource exploitation. The study became indispensable due to the significance of biodiversity, forests, wildlife and other environmental features in development of tourism industry in Nigeria. Photographs of crucial tourism potentials and analysis of rainfall pattern with charts were employed to ascertain the position and discuss the role of tourism potentials in the development of environmental resources in the area. It was observed that tourism potentials which exist in the area include landforms, wetlands, biodiversity, forests and wildlife. These are highly influenced by the condition of rainfall in the area. These tourism potentials were mostly conserved through groves and deity shrines. The paper maintain that the tourism potentials are capable of yielding huge sums of revenue yearly to the state government once developed into tourism centers. Encouragement of public and private partnership in the developing tourist sites everywhere in Nigeria was recommended among others.
Keywords: *Tourism, Forests, Wildlife, Biodiversity, Environmental resources*

INTRODUCTION

Tourism and recreation are often inter-twined especially when the tourist is on holidays. The tourist visits various places mainly for amusement, entertainment and relaxation. The recreational centres and events may include game reserves, zoos, parks, social and cultural events such as chieftaincy ceremonies, masquerade festivals, natural features, landscapes and places of historical interest (Okafor,1989). Tourism is a world-wide concept that unites people and integrates them to new environments. The culture of the people, norms, values, ethics, physical environments and biodiversities contributes so much in tourism development (Cardinale, Nelson, Palmer 2000). In Ugbo town, Awgu L.G.A.of Nigeria, the environment has natural endowment such that so many tourism potentials exist. The tourism potentials includes biodiversities, forest reserves, varieties of wild life, streams with abundant fish, topography, village squares, cultural events, soil fauna and flora among others. These tourism potentials are capable of yielding huge sums of revenue yearly to the state government if expanded.

The contemporary activities of environmental managers are fundamentally sustainable development and management of the environmental resources for tourism

development, biodiversity conservation, improvement of environmental quality such as flood and erosion control (Ogbuene 2010, Nwafor 2006). Anyadike (2009) opines that Biodiversity depends on rainfall for their continued existence. Southeastern Nigerian environment receive extremely high quantity of rainfall annually, which help to sustain multiple biodiversity. In recent years, indiscriminate cutting down of trees, bush burning, over use of environmental resources, gas flaring, pollution, climate change among others, have resulted into rainfall disparities. This has a severe impact on biodiversity and natural environment in the area (Bhalme, 1999).

The natural environment is a very important resource if conserved and utilized sustainably. Natural environment depends on rainfall to flourish. Duffy (2002) opines that within the tropical rain forest, most people, who live entirely in and off the forest, are the only ones who have mastered the art of exploiting the rain forests on a really sustained basis. They know everything about food plants, medicinal species, edible insects and their larvae, and the collection of wild honey. With bows and arrows or blowpipes they hunt the scarce animals of the rainforest to obtain protein.

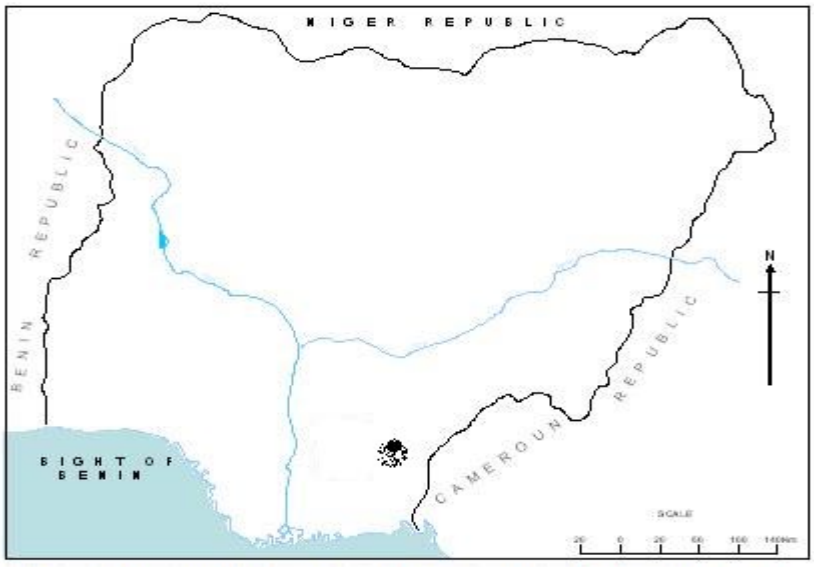
However, inadvertent human activities such as lumbering, gas flaring, bush burning, industrialization, development of infrastructure, urbanization, constructions, improvement in agricultural practice, oil and mineral resources exploration among others, cause rainfall and temperature variability which influence the natural environment. The consequences are environmental hazard and rainfall disparities. The natural vegetation, wild lives, rivers, air, soil fauna and flora has been degraded/ deteriorated. Urban heat island is on the increase, chlorofluorocarbons (CFCs), methane gas and ozone depleting substances keep on accumulating in the environment. These destroy rainfall formation mechanisms. The natural environment for tourism and recreational development has been destroyed completely. Recently, the Enugu zoo, market garden and the vegetation along Okpara square have been destroyed. The miliken hill natural vegetation is rapidly disappearing (Ogbuene 2007, Ojo 1982). Most cities in Nigeria cannot boast of good vegetation for natural tourism centre. This is as a result of the changes in rainfall pattern, amount and intensity. It is on these bases that the study investigates the role of tourism potentials in the development of environmental resources in rural area with reference to Ugbo town, Awgu LGA, Nigeria.

METHODOLOGY

This study was conducted at Ugbo town in Awgu Local Government Area of Enugu State. The town is situated in the North Central area of Awgu. It falls within the Guinea savanna vegetation zone, which lies between the semi-arid north and wet southern part of Nigeria (see fig 1). The following towns have common boundary with Ugbo: Owelle court, Ogugu, Mmaku, Obeagu, Achi and Amoli. Among these towns, Ugbo is established on an elevated land and it is made up of three villages: Ugbo-Okpala, Ugbo-Nabo and Ngene Ugbo. Rainfall and temperature in the zone is largely seasonal and varies highly from year to year. The area records annual rainfall

ranging from 937.2mm to 2243.3mm, while mean temperature range is usually between 26.8 0C to 32.5^{0}C over the year. Two distinct seasons are observed: dry and wet. The dry season extends over a period of about 6 to 7 months, from October to March or April while the wet season extends over a period of about 5 to 6 months, from May to September. However, these meteorological conditions vary wildly and this is a factor of the present global climate change which results into biodiversity loss and degradation of tourism potentials. This, then awakens the interest of this study.

Statistical package for social sciences (SPSS) was applied to plot time series analysis of rainfall 1917-2004. This established clearly the sequence of rainfall over the year in graphical form. It is important to note that rainfall and temperature are the dominant meteorological parameter within the tropical environment (Bhalme, 1999 and Ogbuene 2007). This enables the study to determine how changes in rainfall pattern each year affect environmental resources over the years of analyses. Adequate rainfall is the basis for tourism development in the area. The study also establishes typical rainfall values for each decade. Multiple bar chart, component bar chart and multiple line graph were applied to clarify rainfall patter over the years of analysis. In addition, descriptive approach was utilized to highlight issues in this study. Tourism potentials in the area were examined in detail. The study involved illustration of impact of rainfall on biodiversity, forests and wildlife as the major tourism potential in the study area. Photographs of the tourism potentials were taken to establish insight into the study.



Map of Nigeria Showing the Location of the Study Area (Ugbo-Town .)

RESULTS AND DISCUSSION

Rainfall Analysis in Enugu Environment (1917-2004)

Time series analysis of rainfall below disclosed pattern of rainfall from 1917-2004. Rainfall amount, pattern, duration each year, have a serious impact on the condition of biodiversity, forest and wildlife in the study area. The typical rainfall data were obtained from each decade. Typical rainfall is known as the media rainfall values of each decade. They have the characteristics of all the rainfall within a given decade in the area. Rainfall data on table 1 represents the typical rainfall which is utilized in the plotting of the bar chart of typical rainfall in fig 3 below.

Table 1: Two year's typical rainfall value in each decade

Decade 1	Decade 2	Decade 3	Decade 4	Decade 5	Decade 6	Decade 7	Decade 8
1917-1927	1928-1937	1938-1947	1948-1957	1958-1969	1971-1980	1981-1990	1991-2000
1593.5mm	2044.3mm	1616.5mm	1615.1mm	2005.4mm	1829.4mm	1450.6mm	1830.6mm
1699.6mm	2064.2mm	2042.3mm	1793.8mm	1563.3mm	1545.8mm	1451.6mm	2173.6mm

Source: NIMET, Lagos, 2008

In addition, total and average rainfall values for each decade were shown on table 2. These were utilized to plot line graph in fig 4. These reveal that rainfall over the years has been fluctuating in each decade, thus influencing the condition of forests and wild life in the environment which are the major tourism potentials resources in the area. Data on table 3 displayed monthly rainfall for each decade. The monthly rainfall distributions for each decade were clearly plotted in fig 5. The rainfall season is from April to September. Rainfall in September is usually excessive, thus exposing the area to flood and other environmental hazards. While rainfall in November to March is inadequate, thereby rendering the area to drought and associated environmental consequences. Double rainfall maxima which mark the peak of rainfall were recorded in each decade within June-July and rainfall gradually reduces in August (giving way to August break). The quantity of rainfall in each decade shown in various tables and charts influence the condition of biodiversity, forest, and wildlife which are the major tourism potentials in the area.

Evaluation of tourism potential and method of conservation in the area

The analyses of rainfall over the years in the area disclosed that adequate rainfall has supported environmental resources which form the bases for tourism development. However, it was discovered that in recent years, deforestation constitutes a serious disaster to environmental resources development in the area. Landforms, forest, animals and wild life of diverse categories are the major tourism potentials in the study area. They are thus, conserved through groves system and deity shrines. This makes it possible for the area to have virgin forests that house a wide variety of trees, climbers, animals, and soil micro-organism species. However, conservation of wild life can be grouped into the following:

In situ conservation: This involves conserving wild life inside their natural environment. It also involves the maintenance of plant and animal genetic material in

the wild environment. In situ conservation maintains not only a variety's genetic diversity but also the evolutionary interactions that allow it to adapt continually to shifting environmental conditions, such as changes in pest populations or climate. (Tilman, 1999).

Ex-situ conservation: This involves conserving wild life outside their natural environment such as zoos, aquaria, botanic gardens, and germ plasma banks. It is the conservation of biodiversity outside of the original habitat. There are roughly 500,000 mammals, birds, reptiles, and amphibians in captivity in zoos throughout the world. Zoos contribute in many ways to the conservation of biodiversity. They propagate and reintroduce endangered species, they serve as centers for research to improve management of captive and wild populations, and they raise public awareness of biotic impoverishment (Fridley, 2001)

Genetic bank: This is used to store/conserve genes of different species.

Groves system: This is a process of conserving biodiversity in evil forest and deity shrines. This method is more abundant in Enugu and its environs. In the study area, forest and wild life are conserved through this system. In such places, cutting down of trees, or hunting are prohibited by the custom and law of the people. This makes it possible for virgin forest, variety of plants and wildlife to be conserved in the area.(Okafor 1989; Wilson 1992; Adinna 2001; Ogbuene 2007). Conservation of forest and wildlife for tourism development in the area is of paramount importance in environmental management and income generation. There is need for the creation of awareness on the importance of conservation and benefit that are associated with forest and wild life reserve in the area.

Need for Conservation of Forest and Wild Life as major Tourism Potentials

Okafor (1975) opines that conservation may be defined as preservation from harm, decay, loss, or the rational use of the environment and associated resources to provide a high quality of living for mankind involving the planning and control of man's use of his environment. It helps to maintain essential ecological processes and life supporting system such as soil regeneration and protection, the recycling of nutrients and the cleansing of water in which human survival and development depends. It also helps to preserve biodiversity and genetic diversity. It includes the range of biotic organism and genetic materials found in forest and wild life.This helps in the enhancement of natural processes necessary for the protection and improvement of cultivated plants and domesticated animals, as well as scientific advancement, technical innovation and security of many industries that use living resources. To ensure the sustainable utilization of special ecosystems (notably forest, grazing lands, fish and other wild life) which support millions of rural communities as well as major industries.

Constituents of natural environment as tourism potentials in the study area

Forest and wild life environment in Ugbo town (study area) includes Onu-ajanu, Ofia-umuaniegbera, Mgboko-ogba natural stone features, Nwa-ogbo water fall, Ukpoku-uhuogba-obeagu wet land and Oshisi-okpo stream. The constituents of

these tourism potentials include: a variety of categories of ancient and tall trees, climbers, diverse wild life such as animals, birds, mushrooms, micro-organisms, soil flora and fauna among others. These environmental resources are vital in tourism/ recreational development. The natural environment is really of aestatic value, cool, pleasant and a wonderful tourism/recreation centre. Within the forest environment, trees are formed in canopy layers, flowers, birds, squirrels and monkeys make the environment more absorbing. The sung of the birds and squirrels are so amusing that it soothes the nerves from stress in the natural environment. The environment is a good site for study of environmental features, biodiversity and plant taxonomy. A visit to Ugbo tourism centre will always convince the visitors/Tourists of what paradise looks like.

Economic importance of forest and wild life in the area

It was observed that Onu-ajanu and Onu-ajanuokwe forest environment are centres for preservation of coco-yam which is the major crop grown in the area. The falling leaf in the forest is used as manure in their various farms. The farmers collect and apply them to their farms. This process help to keep the forest environment clean for tourism.

Local herbs for medicinal purpose: Morida lucida is a good example of plant that exists in the area which can be used as medicine.

Source of local fuel: almost every body in the village makes use of firewood in cooking their food.

Source of income: it is obvious that firewood, nuts, fruits, leaves among others are the product of forest which is sold in the market for money.

Source of food: vegetables and animals which are the product of the forest in the area, serve as food.

Centre for Biodiversity conservation: forbidden forest in the area houses and conserves multiple variety of biodiversity.

Tourism Development Strategies

The developmental strategies to be adopted include the following:

i Infrastructural development: there is need for Enugu state government to develop roads, construct bridges and culverts in the area. This will help to improve the area and attract tourists in the area.

ii Establishment of hotels, restaurants and guest house in the area: This will enable the visitors (tourists) to relax and study for some couple of days in the area. Food, water and other things they need will be provided by the hoteliers and guest house attendants.

iii Improved security in the area: there is need to establish police station and deploy law enforcement agency in the area. This will help improve security condition in the area.

iv The government should make laws prohibiting the people from hunting or cutting down trees in the core area.

v Empowerment of the people: The government and international agency should provide soft loan facilities to the people that depend on the forest as their source of livelihood.

vi Local participation initiative: The people should be educated on every stage of the project development that will be introduced in the area.

CONCLUSION AND RECOMMENDATIONS

The major tourism and recreational potential that exist in Ugbo town is environmental features, forests and wildlife. The various categories of biodiversity such as trees, wild life, micro-organism, soil fauna and flora among others, are vital environmental resource potentials for the development of tourism and recreational activities in the area. Presently, the entire wild life environment in the area is under a serious threat. Deforestation resulting from bush burning and lumbering activities has resulted into serious biodiversity loss. The environmental consequences include species extinction, climate change, temperature increase and general environmental deterioration/degradation. The need to develop the area into tourist and recreational centre becomes more imperative to avoid extinction of species. Finally, considering the huge amount of money that will be realized from tourists and the role it will play in local climatic control, maintaining ecological processes, biodiversity conservation and sustainable environmental management, it becomes very important to develop the tourism and recreational potential in Ugbo town. It is expected that the following recommendations will help safeguard the natural environment:

i Environmental impact assessment (EIA) should be made compulsory to any type of development in the study area and state in general.

ii Restoration and regulation activities to ensure sustainable exploitation of environmental resources.

iii Tourism development should be a must to each state and local government in Nigeria.

iv Encouragement of public and private partnership in the developing tourist sites everywhere in Nigeria.

v Adaptation strategies become very significant due to secret hunting of wild life, cutting down of trees, variation in rainfall, water discharge regimes and temperature as observed in the study. Broadly, these adaptations include refinement of early warning system to enable timely remedial measure, effective water-use-strategies, adequate basin management and intensive research into evaporation, rain formation mechanism, erosivity and erodibility of the study area. A central element of adaptation approach therefore should be ecosystem management restoration activities such as afforestation, watershed rehabilitation, and management, effective water harvesting and conservation, promoting best practices that are climate change resilient within the natural environment.

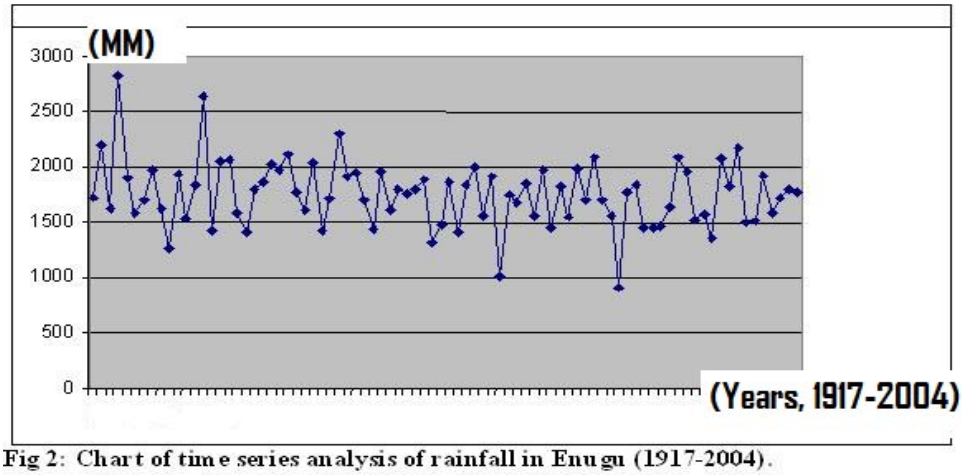


Fig 2: Chart of time series analysis of rainfall in Enugu (1917-2004).
(Source of Raw data: NIMET, Lagos, 2008)

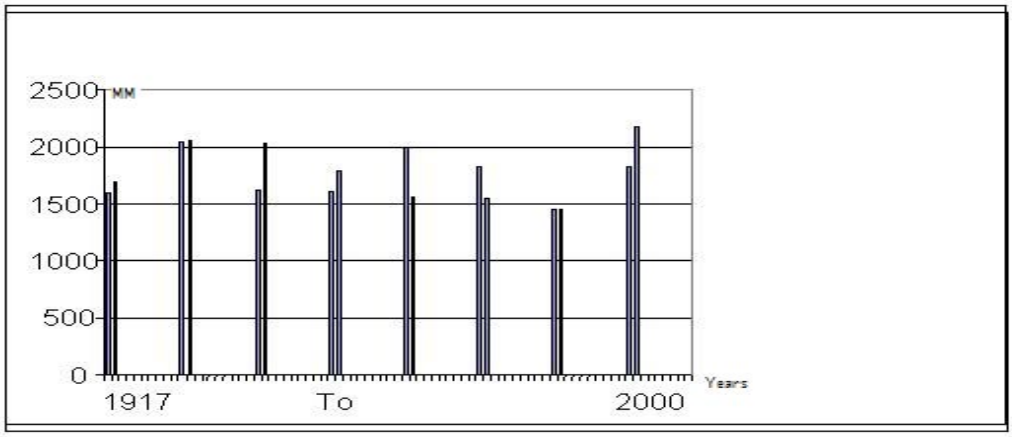


Fig 3: Bar chart of typical rainfall in Enugu (1917-2004).
(Source of Raw data: NIMET, Lagos, 2008)

Table 2: Total and average rainfall for each decade

Decade	Total rainfall (mm)	Average rainfall (mm)
1917-1927	18647.1	1864.71
1928-1937	18202.9	1820.29
1938-1947	18900.9	1890.09
1948-1957	17220.1	1722.01
1958-1969	16510.8	1651.08
1971-1980	17700.5	1770.05
1981-1990	16152.7	1615.27
1991-2000	17079.7	1707.93

(Source of Raw data: NIMET, Lagos, 2008)

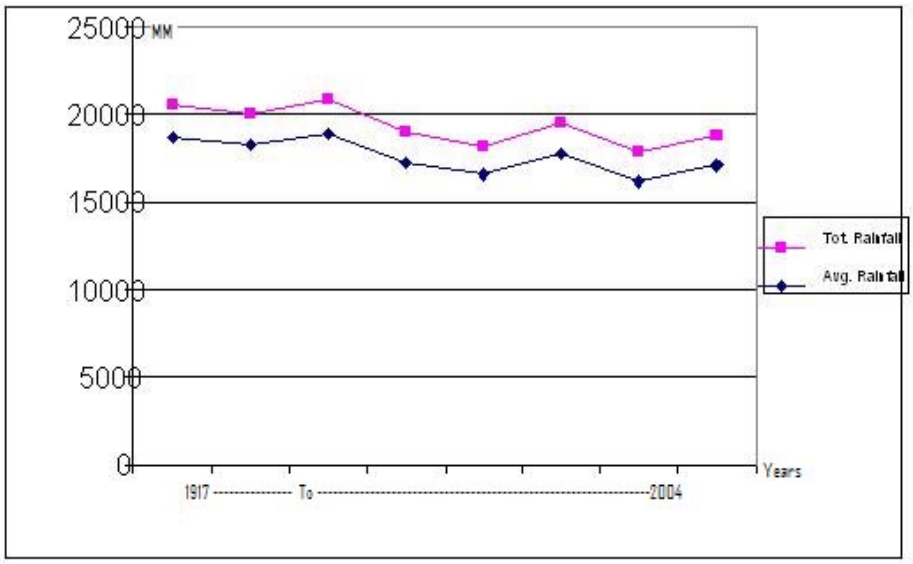


Fig 4: Line graph of total and average rainfall for each decades in Enugu Environment (1917-2004).

(Source of Raw data: NIMET, Lagos, 2008)

Table 3: Monthly rainfall distributions for each decade (MM)

Jan	Feb	March	April	May	June	July	Augt	Sept	Oct	Nov	Dec
2	0	35.8	212.3	405.4	609.3	238.8	353.8	514.9	345.2	109.7	0
0	15	54.9	115.8	389.4	210.8	208.3	66	326.1	364.7	50	35.1
52.3	33	31.5	79.2	180.3	445	337.1	281.4	271.5	190.5	75.4	0
27.7	11.7	58.9	189.7	341.6	264.9	222.5	45.5	228.6	249.7	61	0
60.7	0	17.5	315.7	222.8	173.5	220.5	322.6	273.6	217.2	36.1	6.4
0	21.3	92.2	136.1	101.7	260.8	350.4	192.5	564.4	138.4	-88.8	-88.8
0	24.2	56.7	76	314.1	228.7	228.6	316.7	594.6	176.8	74.4	0
0.5	0.5	0	181.5	89.7	279.4	508.3	359.1	317.5	318.8	2.3	25.8
32.4	0	32.3	202	357.5	206.1	289.5	331.8	339.7	226.5	-88.8	0

(Source of Raw data: NIMET, Lagos, 2008)

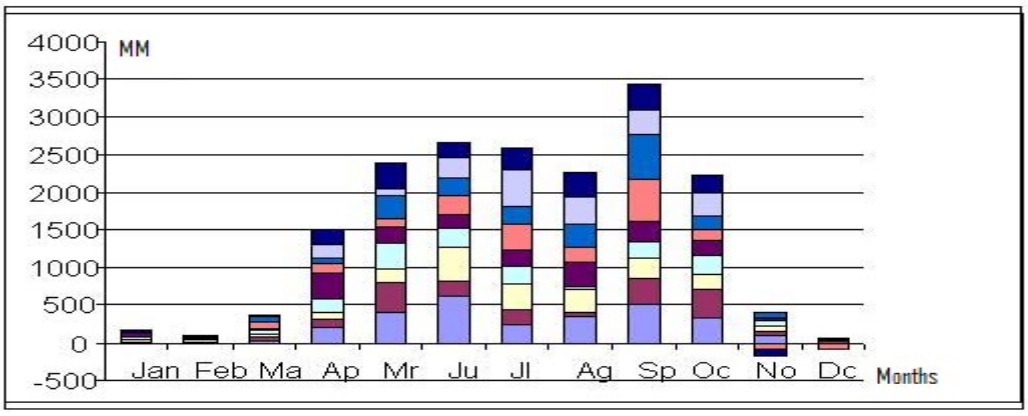


Fig 5: Component bar Graph of Monthly Rainfall Distribution in Enugu Environment (1917-2004)
(Source of Raw Data: NIMET, Lagos, 2008)

Plate 1: Wild life environment in Ugbo Town

Plate 2: Wild life environment of Onu-Ajanu okwe in Ugbo Town

(Source: Authors Field Work, 2009)

Plate 3: Natural Land Feature environment in Ugbo Town

(Source: Authors Field Work, 2009)

Plate 4: Nwogba Water fall environment in Ugbo Town

(Source: Authors Field Work, 2009)

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