

**IMPACT OF CLIMATE CHANGE ON SUSTAINABLE TOURISM MANAGEMENT IN
PLATEAU STATE, NIGERIA**

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ABSTRACT

Climate change has deleterious impact on many sectors but the extent of its adversity on tourism is unknown. The work therefore overviews the impact of climate change on sustainable tourism management in Plateau State, Nigeria, using reconnaissance survey, in depth interview and focus group discussion. Data obtained were presented in form of chart and table. Results revealed that climate change can destabilize ecosystems; reduce tourism patronage; cause shift in tourist destinations, death and migration of wildlife species, flooding of ecodestinations and significant increase in cost of running of tourism in different ecodestinations. It makes tourism time table ineffective by adversely affecting time for sighting games and fixed dates for cultural events. Climate change tends to pose more economic, environmental and cultural challenges to tourism management.

Keywords: Sustainable tourism management, Climate change, biodiversity conservation, Plateau State.

INTRODUCTION

Functionally, the earth is a system with characterised properties and behaviour. Man as the most superior species and manager of all species (Ijeomah, 2007) is a significant force in the earth's system, altering key process rates and absorbing the resultant impacts of global environmental change. Climate change is one of many changes that are occurring around man referred to as global change. Climate change is the permanent departure of climate patterns from mean values of observed climate indices (Obioh, 2002).

Simply put, climate change is a change in the collective pattern of expression of weather elements over time. This implies that a change in pattern of expression of only one element of weather is not climate change. The main elements of weather include temperature, rainfall, dew, humidity, wind, sunshine, mist and cloud.

There is nothing unusual about change in climate as such because climate is dynamic and variability in climate is a common experience-Rarely is any year the same as another in climate averages. Even over the millennia, the earth has experienced climate changes over varying time scales ranging from decades to millions of years. However, current climate change which is marked by global warming is of concern for three main reasons:

- (1) Temperatures are rising more rapidly than they have done for 10,000 years (as have been known to be associated with natural climate change)
- (2) There is a strong correlation between current global warming and increases in the atmospheric concentration of green house gases
- (3) The uncomfortable realization that climate change is human-induced.

Some evidences of climate change in our local environment as listed by the Nigerian Environmental Study/Action Team (NEST) / Global Strategies International (GCSI) (2004) are: delay in arrival of rains, unusual rainfall patterns, increasing floods, unusually warm periods even at high altitudes, and the harmattan in some years being hardly noticed while in others so prolonged and persistent as to be intensely felt even in coastal regions.

At the global level, the International Federation of Redcross and Red Crescent Societies (2001) report on world disaster for 1991-2001 revealed that the number of weather related disasters more than doubled

between 1991 and 2000; over 90 percent of those killed in natural disasters died from weather-related events. The year 2000 was the worst in the decade, with 256 million people being killed or affected by natural disaster that year as against an average of 211 million per year for the decade.

Every part of the earth including all human and natural systems will be affected by climate change, but the degree to which such impact will produce damage will differ, depending on geographical circumstances, the capacity to withstand the impact and the nature of the economy. Though developing countries contribute the least to cause the problem, they are the most vulnerable to its impacts. Developing countries such as Nigeria are likely to suffer the heaviest degree of damage from climate change because they are the least endowed with resources to combat the problem and their economies are based largely on natural resources dependent sectors that are climate –sensitive (TAR, 2001). Besides, most developing countries (like Nigeria) have little capacity to adapt to climate change due to low level of awareness, human and financial resources, and institutional and technological capability (Okali and Ewah, 2004).

The IPCC'S Third Assessment Report (2001) as cited by Okali and Ewah (2004) on vulnerability to climate change indicated that some unique and threatened systems may be irreversibly harmed by changes in climate beyond certain thresholds as every species has its threshold level to operate. Indicators of Nigeria's vulnerability as outlined by Okali and Ewah (2004): Many species of plants and animals are rapidly becoming extinct, tree density and floristic richness are decreasing, new species of plants and animals rarely showing up in the ecosystem, the disruption and reduction of the fruiting intensity of some trees, aberration in animal matings, changes in bird and animal migratory pattern (due to the need for new habitats or new food sources) and changes in fish spawning patterns, species of plants and animals. All these point to the fact that climate change will lead to failure of many systems including the tourism sector (particularly environmental tourism) which may jeopardize tourism-dependent-economies. Tourism managers, therefore need to be well informed to enable them to either take precautionary measures against the destructive effects or combat the effects by devising adaptive measures.

The study therefore unveils the impacts of climate change on sustainable tourism development in Plateau, a state with various tourism potentials packaged into products; and one of the most successful tourism states in Nigeria (Ijeomah, 2007).

LITERATURE REVIEW

Tourism and Sustainability

Humankind has a responsibility to have a world rich in biodiversity, filled with the plants, the animals and ecosystem processes on which all living things depend. However, for that to happen, man must take seriously the responsibilities to conserve earth's biodiversity, recognizing the complexities of present needs and carefully balancing those with the needs of future generation (Mellow, 2002). Be as it may, resources are prone to be used. Resources are of immense important particularly to the local people whose lives directly or indirectly depend. It was on this basis that Mellow (2002) and other advocates of local community involvement in natural resources management (such as Western and Wright, 1994; McNeely,19995) emphasized that local communities have a clearer and stronger conviction regarding the importance of protecting resources for the future, as compared to less connected and more economic driven population. Many Namibian communities have said that the cultural and aesthetic value of wildlife is a prime motivation for developing community – based wildlife management including tourism (Ashley, 2000). Specifically, several of those involved in setting up conservancies have said that they 'want their children to see wildlife' (e.g. at Salambala Conservancy in Caprivi (Mosimane, 1996), and Uukwaluudi Conservancy in northern Namibia (Uukwaluudi Management Committee, 1997).

The major way these resources can be conserved, whether in low or high population density area is through protected area management. People can willingly and happily allow their farmlands, forests, unusual landscapes, sacred forests and water bodies be gazzetted as protected area only if they will derive substantial benefits that balances or outweighs those previously generated from farming. In Europe, people could be commensurately compensated when their resources are taken over by the government for protection unlike in Africa where communities hosting protected areas are hardly compensated. In Nigeria, the 1979 land use Act made the government owner of every land in the country. Locals can only be given meager amount (peanut) in form of compensation for properties on the land of their land owner (the government).As a result of economic pressure and anger of their land

forcefully acquired for conservation, encroachment in the form of poaching as in the Indian Tiger Reserve is inevitable.(Kemf,1993). This is aggravated by the fact that national parks and game reserves are mostly understaffed and underfunded (NEST, 1991). Tourism was therefore introduced for generation of money that will enable management of parks while benefiting local communities. For tourism to be sustained in protected areas it has to be free from pressures: pressure from the local community and pressure from the tourists through energized effective management and monitoring. In order to reduce pressure from the community, the tourism should be designed to bring about economic growth; poverty reduction; biodiversity conservation; preservation of local culture; and improvement in health, governance of locals, education, employment of women and youths.

Pressure from the tourists could be reduced through tourists' monitoring and number control, and off course, satisfaction. Pressure from the officials are reduced through prompt payment and good working condition, including motivation with adequate staffing to prevent unethical practices (Ijeomah, et al., 2007). If these benefits become consistent, the local people will support the protection of the biodiversity and tourism facilities therein to ensure that their source of benefit does not stop – as their communities would have been opened up and have been energized through tourism – driven influx of people.

Management officials endeavour to educate, monitor and satisfy the tourists to ensure that the fragile ecosystem on which tourism thrives is not destroyed (Yunis, 2003). If it does, tourism will stop to function, conservation becomes difficult to fund, and workers lose their jobs – their livelihood. The tourists, having been satisfied will imbibe the conservation lectures they were taught (to ensure they meet the same situation and have similar experience when next they come alone or with their invited associates). Non satisfaction of tourists leads to complains and arsonic destruction of valuables (biodiversity and facilities) due to wide difference between expectation and reality. And the ecotourism destination might gradually begin to lose popularity despite the level of awareness.

Sustainable Tourism

Tourism comprises the activities of persons traveling to and staying in places outside their usual environment for not more than one consecutive year for the purpose of leisure, business and other purposes. As such, it includes all reasons for travel – business trips, visits to relatives and vacations –

and domestic as well as international tourism (USAID, 2005; Ayodele, 2002; Ayodele *et al.*, 1999; Ayodele and Falade, 1993). Tourism has been widely identified as a spinner of benefits (Ayodele and Falade, 1993; Kamuaru, 1996; Bolton, 1997). Services created by tourism bring about economic empowerment in the form of job creation, revenue generation, foreign exchange earnings, investment attraction and value addition to local resources. Also, tourism encourages business growth and provision of demand – driven facilities of welfare due to increased demand caused by visitors driven by the crave for activities involving vivid experience and personal enhancement in relatively uncontaminated natural tourist sites (Lascurain, 1996).

The term sustainable means different things to different people, often according to the perspective of the individual stakeholder. USAID (2005) reported that private tourism industry views it largely in economic and marketing terms: How can the tourism market be sustained and grow in the long term? The local community may see it in terms of socio economic benefits and cultural preservation: How can tourism help sustain a community and its culture? Rather degrade them? An environmental non governmental organization (NGO) would present more of an ecological perspective: How can tourism help to sustain, rather than mar natural systems? Nevertheless, to World Tourism Organisation (WTO)(1998) ‘Sustainable tourism development meets the needs of present tourists and host regions while protecting and enhancing opportunities for the future. It is envisaged as leading to management of all resources in such a way that economic, social and aesthetic needs can be fulfilled while maintaining cultural integrity, essential ecological processes, biological diversity and life support systems’. This agrees with the view of Carney (1998) that ‘ A livelihood is sustainable when it can cope with and recover from stresses and shocks and maintains or enhances its capabilities and assets both now and in future while not undermining the natural resource base’.

At the March 2000 meeting of its committee on Sustainable Development of Tourism, WTO agreed to revise its definition to better reflect the sustainability issues in tourism that emanated from the World Summit on Sustainable Development (WSSD) held in Johannesburg in 2002 (Yunis, 2003). The new definition emphasizes the balance between environmental, social, and global aims such as poverty. As outlined by WTO, sustainable tourism should:

1. Make optimal use of environmental resources that constitute a key element in tourism development, maintaining essential ecological processes, and helping to conserve natural heritage and biodiversity.
2. Respect the socio – cultural authenticity of host communities, conserve their built and living cultural heritage and traditional values, and contribute to inter – cultural understanding and tolerance.
3. Ensure viable, long – term economic operations, providing socioeconomic benefits to all stakeholders that are fairly distributed, including stable employment and income earning opportunities and social services to host communities, and contributing to poverty alleviation.

Achieving sustainable tourism is a gradual process that requires constant monitoring of impacts, introducing the necessary preventive and/or corrective measures whenever necessary.

Sustainable tourism should also maintain a high level of tourist satisfaction and ensure a meaningful experience to the tourists, raising their awareness about sustainability and promoting sustainable tourism amongst them. The version makes some important points: Sustainability should be sought in all landscapes, whether urban or rural, in traditional or ecological camp; community acceptance, engagement and benefit are critical; and the ‘uniqueness of place’ is protected to the fullest extent feasible (USAID, 2005).

Between 2000 and 2004 USAID implemented 98 projects in 72 countries that specifically relate to the tourism sector or employed tourism as a component to achieve other broader objectives that are linked to sustainability (Table 1). Though all the projects addressed economic growth and poverty reduction issues, their emphasis were prioritized based on prevailing regional challenges.

Table 1. Number of USAID Projects with a Tourism Component by Major Development Objective, 200-2004

Region	Major Development Objective				
	Tourism Sector Specific	Natural Resources Management	Biodiversity Conservation	Economic Development	TOTAL
Sub-Saharan Africa	3	14	7	4	28
Asia and Near East	11	5	2	3	21
Europe and Eurasia	1	1	3	7	12
Latin America and Caribbean	3	9	21	4	37
TOTAL	18	29	33	18	98

In Sub – Saharan Africa, for instance, projects relating to community – based natural resources management are common. In Latin America, many projects have focused on biodiversity conservation through the creation and strengthening of national parks and reserves, while Asia and Near East have several projects that address the competitiveness aspect of the tourism sector.

Ecotourism

In the last decade, ecotourism has emerged as the fastest developing sector of the tourism industry, itself ranked as the second largest sector of the global economy after oil (Wienberg *et al*, 2002). Vigorous attempts to define, criticize, defend and improve ecotourism have led to a commensurate growth in the literature on ecotourism (Agrawal and Redford, 2006). Collectively, the studies constitute a range of perspectives on the value of ecotourism in conserving biodiversity and alleviating poverty and whether different ecotourism projects successfully combine the goals. However, defenses and critiques of ecotourism both share the assumption that it constitutes a promising route for generating benefits for those living close to tropical biodiversity without undermining its existence (Agrawal and Redford, 2006).

Although ecotourism has no definitional consensus (Campbell, 1999; Goodwin, 1996), common elements are still discernable in various definitions. Buckley (1994) calls it ‘travel that generates financial support for protection and management of natural areas, economic benefits for residents living near natural areas and support for conservation among these residents’. For Blangy and Wood (1993),

ecotourism is 'responsible tourism travel to natural areas that conserves the environment and sustains the well being of local people'. Wunder (2004 as in Agrawal and Redford, 2006) suggests that ecotourism should have minimal physical and social impacts, educate tourists ecologically, and yield economic benefits to local residents. Ecotourism's different definitions including those of Ceballos – Lascurain, 1996 and Stem *et al.* 2003 outlined two core goals. It should generate low visitor impact and help conserve biodiversity, and it should generate beneficial socio – economic outcomes for local populations to reduce poverty. It is clear that studies of ecotourism believe that it is important to conserve biodiversity, enhance local incomes and produce sustainable development. Consequently, in most ecotourism studies, the prevalent criteria for measuring success and failure are the ability to sustain biodiversity conservation and sustainability of welfare products to residents.

Summarised by Agrawal and Redford (2006) in table 2 below are studies in 12 countries that attempted to measure the success of ecotourism based on biodiversity sustainability and economic sustainability of natives.

Table 2: Prevalent Criteria for Measuring Success and Failure of Ecotourism

Author(s)	Region or Country	Biodiversity conservation indicators	Poverty alleviation indicators
Lindberg <i>et al.</i> (1996)	Belize	1. Funds for conservation 2. Level of resource use 3. Conservation ethic	1. Employment levels
Wallace and Pierce (1996)	Brazil	1. Conservation education 2. Resource conservation	1. Local income levels 2. Employment levels 3. Better infrastructure 4. Local empowerment
Stone and Wall (2006)	China	1. Funds for conservation 2. Conservation education	1. Local income levels 2. Employment levels 3. Better infrastructure
Weinberg <i>et al.</i> (2002)	Costa Rica	1. Conservation ethic 2. Recycling 3. Pollution	1. Local income levels 2. Employment levels 3. Degree of community control
Wunder (2000) (as in Agrawal and Redford, 2006)	Ecuador	1. Conservation ethic 2. Hunting/poaching levels	1. Local income levels 2. Better infrastructure 3. Local participation 4. Equality of benefits
Ross and Wall (as in Agrawal and Redford, 2006)	Indonesia	1. Conservation education 2. Resource conservation	1. Local income levels 2. Local participation
Ogotu (2002)	Kenya	1. Hunting/poaching levels 2. Increase in wildlife numbers 3. Reduction in livestock within Protected Areas	1. Local income levels 2. Employment levels 3. Better infrastructure 4. Equality of benefits 5. Education provision
Barkin (2003)	Mexico	1. Ecosystem health 2. Levels of deforestation	1. Local income levels 2. Diversified economy 3. Decentralized development
Bookbinder <i>et al.</i> (1998)	Nepal	1. Funds for conservation	1. Local income levels 2. Employment levels 3. Equality of benefits
Yu <i>et al.</i> (as in Agrawal and Redford, 2006)	Peru	1. Resource conservation	1. Local income levels 2. Employment levels 3. Better infrastructure
Archabald and Naughton-Treves (2002)	Uganda	1. Conservation ethic 2. Resource conservation	1. Local income levels 2. Employment levels 3. Better infrastructure
Gulinck <i>et al.</i> (2002)	Zimbabwe	1. Conservation education 2. Resource conservation 3. Low visitor impact	1. Employment levels 2. Degree of inequality 3. Cultural loss

Van der Duim and Caalders (2002) concluded that because of difficulties in measuring the level of impacts of ecotourism on biodiversity, that it is advisable to evaluate ecotourism intervention by focusing on their ‘legitimacy, feasibility, and effectiveness.’ Gossling (1999) suggested that to improve the effectiveness of ecotourism in resource sustainability and functions, there should be

information and education for both local residents and tourists; couple with effective planning and control, and increased fees and charges.

Tourism and sustainable economic growth in selected countries.

The cluster - based competitiveness is a concept which postulates that product quality, interactional competitiveness and hence sustainability, increase as linkages and synergies in a local economy become stronger and more dynamic. USAID used this approach in Lebanon in 1998, focusing in agriculture and tourism. Although an economic boom had been stimulated by foreign investment on the part of major hospitality firms, it was considered unlikely that the boom would continue without a broader, proactive strategy for sustainable tourism in Lebanon. Activities initiated included national marketing venture, hospitality worker training, rural tourism development initiatives such as creating a forum for tourism industry stakeholders and identifying priorities, and integrated marketing and packaging plan for the Chouf region.

The Sri Lanka competitiveness initiative is a broad – based programme working with several industry clusters including ceramics, coconut fibre, jewelry and tourism. The tourism cluster was formed in April 2000, with a primary objective to develop and implement a strategy for industry competitiveness that would increase average tourism expenditures and position. Ecotourism was introduced as a new approach for broadening the tourism market, and a self – funding, private sector- led tourism promotion authority was created. Similar competitiveness initiatives exist in Mongolia (with a portfolio of clusters relating to Cashmere and tourism.), the Dominican Republic (horticulture, traditional tourism and ecotourism), Croatia (wood products and tourism), and Bulgaria (ecotourism and traditional tourism). These initiatives are locally driven by the private sector itself through a participatory strategic planning process. Critical to the success of these initiatives is a recognition that companies need to collaborate in order to compete.

Sustainable Management of Tourism Destination

A tourism destination can be described as a place or region that provides a uniqueness of place, product, and experience. A sustainable tourism destination – the type that USAID strives to support – is a place or region that remains competitive in a global market through adequate planning,

development, packaging and delivery to the most appropriate client market, while maintaining (or preferably enhancing) the environmental integrity and community well being of the destination (USAID, 2005). The destination is a logical and close extension of the competitiveness initiative approach.

USAID funding has enabled Sri Lanka to develop tourism destination marketing. Additional destination markets, including the Red Sea and Eastern Desert regions, were given technical assistance so that Egypt can complement its traditional archaeological market in the Nile Valley to help alleviate growth pressures along that corridor. The Rila National Park in Bulgaria has established regional hotel reservations, marketing, and coordination of activities.

In Jamaica, a relatively poor area, Portland Parish, is seeking international certification through Green Globe as an environmentally responsible destination. This effort is being implemented through a local, public – private affiliation that represents all segments of the community, with full support from the Jamaica’s government. All three projects in USAID/Jamaica’s environment portfolio: the Environmental Audits for Sustainable Tourism (EAST) project, the Coastal Water Quality Improvement Project (CWIP) and the Ridge to Reef Watershed Project (R2RW) – have combined efforts to provide an overall environmental management platform for assistance in attaining destination status (USAID, 2005).

Natural Resources Management, Biodiversity Conservation and Tourism

Sustainable tourism is often used in many countries as a mechanism to promote sustainable use of natural resources in many areas: Land resources management, Wildlife resources management, Forestry and Watershed management. Several countries including Botswana, Namibia, Zambia and Zimbabwe have initiated community - based natural resources management for the purpose of rural empowerment, local governance, community income, wildlife conservation and biodiversity protection. Two – thirds of Namibia’s 1.7 million people live in impoverished rural areas and depend on natural resources for their economic well being. Severe droughts and heavy poaching in the country caused wildlife numbers to drop drastically in the 1980’s with adverse consequences for tourism enterprises and ecosystem stability. In 1993, with USAID and World Wildlife Fund assistance, newly enacted legislation allowed communities to have rights over wildlife if community

members could meet the standards to register as a conservancy (a type of community - based management institution)(Ashley,2000). Once conservancies were established, the community received assistance in adopting effective game management practices, negotiating with the private sector and benefiting from tourism revenues (Ashley and Garland, 1994). As a result, wildlife populations have increased significantly, and many communities derive income from handicraft sales, trophy hunting contracts, and game meat distributions. Some 31 communal area conservation now exist, with an additional 10 approaching registration and 40 more in the process of formation (then)(USAID, 2005).

In Kenya, conserved areas, named 'group ranches' (Ashley and Hussein, 2000) were established which substantially improved habitats previously overgrazed and badly degraded. Through ecotourism facilities within the group ranches, and women's groups engaged in related enterprises, the communities are receiving revenues to provide not only for their personal well being but also to develop community facilities such as clinics.

In Ghana, 14 ecotourism sites, encompassing wildlife sanctuaries, artisans markets, and sacred cultural sites, are developed and promoted through the Community - Based Ecotourism Project (CBEP). CBEP juxtaposes natural resources management, cultural and historic preservation, and community enhancement. Numerous community development projects have benefited from the revenue of these ecotourism sites including the construction of primary schools, academic scholarships and the international promotion of female artisans cooperatives and their handicrafts.

The Greater Limpopo Transboundary Natural Resources Management (TBNRM) Initiative straddles the borders of Mozambique, South Africa, and Zimbabwe. Its purpose is to increase collaboration among the three countries for the sustainable management of shared resources to achieve social and economic development for communities within the region. It was planned that tourism- related activities will play an important role to further sustainable resources management and community welfare.

In Jordan, tourism services and nature-based craft enterprises have been established in the Dana Nature Reserve in southern Jordan, the Azraq Oasis in the Eastern Desert, and the Mujib Reserve next to the

Dead Sea and Wadi Rum. More than 3,000 residents are receiving direct or indirect benefits. The initiative has also greatly assisted biodiversity conservation through the establishment and management of protected areas and enforcement of wildlife laws. Integrated conservation and development activities are to promote new livelihoods in Africa and Asia, including nature tourism – based employment, as alternatives to encroachment into protected national parks for hunting, logging and farming. Self sustaining tourism activities have promoted sustainability of economic and ecological resources in many areas.

Through the effort of USAID and Nature Conservancy *in situ* protection is achieved for an array of major habitats, natural communities, and species in some of the most biologically rich but threatened ‘hot spots’ in the world (USAID, 2005). Through this means conservation success has also improved in Panama’s Darien Biosphere Reserve. Moreover, in Mountain Gorilla Habitat Conservation Project in Africa, the mountain gorilla population in Rwanda, the Democratic Republic of Congo, and Uganda have increased by ten percent within a decade (from 320 to approximately 355 individuals) .Using tourism as a vehicle, regional conservation approaches with an emphasis on transboundary coordination, antipoaching, economic alternatives and habitat conservation has been sustained. Any change that brings about disturbance to the habitat, and tourism destination (whether natural or artificial) distorts tourism, thereby affects the resources that are conserved through tourism.

METHODOLOGY

Study Area

The study area, Plateau state is located in the middle belt region of Nigeria and lies between Latitude $8^{\circ}37^1$ and $10^{\circ} 30^1$ North, Longitude $7^{\circ}30^1$ and $8^{\circ}37^1$ East. The state is characterized by high lands rising between 1200 metres to a peak of 1829 metres above sea level. The climate of the state is cool due to its high altitude.

Method of Data Collection

Information for the research was gathered through reconnaissance survey and in-depth interview with people knowledgeable about tourism, conservation and the environment of Plateau State. Also, focus group discussion was conducted with persons involved in ecotourism and biodiversity management in Plateau State. Two persons were each selected from Jos National Museum and Zoo; Jos Wildlife Park; Pandam Wildlife Park; Rayfield Resort (Plateau State Ministry of Tourism and Culture); Headquarters of Plateau State Tourism Cooperation and; the Department of Forestry in the Plateau State Ministry of Environment. In all, 14 persons who have worked for a minimum of 7 years in a tourist industry were selected. Results obtained were presented in form of frequency of counts, percentages and chart.

RESULTS AND DISCUSSION

Table 3 shows that all the respondents have observed climatic changes in Plateau State, noticed strange impact of these climatic changes on the ecosystem and is aware that the impact will adversely affect ecotourism. However, among the public, exists dearth information on the effects of these changes on tourism- the current fuel of global economies. The primary, secondary and tertiary impact of these changes on the environment, and their linkages are presented in Figure 1.

Changes in pattern of Rainfall and Ecosystem Management

Changes in pattern of rainfall apart from altering production in agriculture, also affects lives of all organism that depend on either water or agricultural products for survival. Pattern of rainfall determines seasons both in agrarian environments and for migratory wildlife species. Rainfall pattern regulates when to plant and when to harvest. Seasons established by rainfall affects cultural tourism because of date of festivals that are already fixed by past generations based on their indigenous knowledge of rainfall pattern. Plateau State has about 17 festivals recognized by the Plateau State Tourism Corporation. Some of these cultural festivals have fixed dates which are honoured on annual basis (Ijeomah, 2007) with large patronage due to their dates that have become popular.

Changes in rainfall pattern brings about changes in breeding status of species and changes in migratory pattern of animals which adversely affects time for sitting games in ecodestinations (Figure 1). In Serengeti National Park in East Africa about a million and half wildebeest (*Connochaetes gnou*) together with gazelles and zebras (*Equus grevyi*) migrate for hundreds of kilometres at specific period of

the year in search of pasture and water. They return to their former pasture ground in period of October when rain sets in. This annual migration of wildlife species regulate tourists' inflow to the ecodestination because of the wonderful scene which most tourists cherish to watch. Changes in rainfall pattern regulate when migratory birds from Europe and other continents settle in Hadejia-Nguru wetland. This alteration also affects tourism. More intense precipitation leads to coastal erosion and flooding in beaches and valleys. This has been experienced many times in Lagos Bar beach. Flooding in beaches and valleys affect tourist visitation and lead to shift in tourist destination. More intense precipitation can reduce tourist inflow to Rayfield Resort of Plateau State. During rainy season, birds watching in the Pandam Lake is hampered as most of the tracks to the lake are flooded. This is the more reason off and on seasons for tourism are observed in *in-situ* conservation sites managed for ecotourism.

Impact of Reduced Rainfall on Tourist Visitation

Reduced precipitation leads to drought which adversely affects productivity in both crops and forest plants. Consequently, starvation of wildlife species and people results, leading to malnutrition and low resistance to diseases. This leads to death of wildlife species and livestock (Figure 1). Loss of biodiversity makes the ecodestinations less attractive as animal and plant species (vegetation) which form the setting of ecosystems are the tourism stocks in parks. And due to death of wildlife species there will be shift in tourist destination (Table 3). Starvation and hunger could also lead to increased poaching of wildlife species and constant encroachment of rural inhabitants on parkland for survival which possibly leads to increase in conflict between communities and tourism management thus hampering tourism as tourists do not patronize crisis-prone ecodesitination.

Table 3. Impact of Climate Change on Sustainable Tourism Management in Plateau State, Nigeria.

VARIABLES	YES (%)	NO (%)
Observed changes in climate in Plateau State?	14 (100)	0 (0)
Noticed strange impacts on ecosystem?	14 (100)	0 (0)
Will the impacts affect tourism?	14 (100)	0 (0)
Are the public aware of the effects on tourism?	2 (14.3)	12 (85.7)
Potential Impacts on Tourism		
Siltation of water bodies	9 (64.3)	5 (35.7)
Flooding in beaches and valleys	13 (92.9)	1 (7.1)
Disruption of tourism festivals by change in rainfall pattern	11 (78.6)	3 (11.4)
Drought	9 (64.3)	5 (35.7)
Change in breeding status	11 (78.6)	3 (11.4)
Adverse effects on crop productivity	14 (100)	0 (0)
Migration of animals	12 (85.7)	2 (14.3)
Starvation of wild animals	10 (71.4)	4 (28.6)
Shift in tourism destination	11 (78.6)	3 (11.4)
Displacement of human beings	14 (100)	0 (0)
Pressure to de-reserve conserved areas	12 (85.7)	2 (14.3)
Adverse effects on germination	10 (71.4)	4 (28.6)
Death of wildlife species	13 (92.9)	1 (7.1)
Site becomes less attractive	11 (78.6)	3 (11.4)

In absence of food and water, wildlife species emigrate to new habitats for better condition of living (Figure 1). In this process, the animals are faced with risks of death by accidents and poaching. Mass migration of species as in the exodus of African elephants (*Loxadonta african*) from Kainji Lake National Park to Benin Republic and migration of African elephants from Gashaka Gumti National Park to Cameroon made the tourist destinations unpopular. For instance a total of 41,647 tourists patronized

Kainji Lake National Park between 1991 and 2006 (Ijeomah and Aiyeloja, 2008) being a period of 15 years.

Drought and flood can also lead to displacement of human beings and relocation of people to farm land coupled with consistent pressure on tourism managers to de-reserve conserved areas for agriculture and human settlement (Figure 1). De-reservation of parts of a conservation area apart from reducing home range of species will definitely affect animal population as some species that dislike noise (like the African elephant) may be induced to migrate due to ecological disturbances from people living in the enclave of the conserved Area. Migration of animals affect tourist visitation. It was pressure from the Wase people of Plateau State that led to the de-reservation of parts of the Pai River Game Reserve for agriculture in 1980. Indigenes of the Quaan Pan Local Government Area have also started mounting pressure for de-reservation of part of Pandam Game Reserve (Ijeomah, 2007). The consistent pressure to de-reserve conserved areas could lead to conflict and civil unrest which will shift the attention of the government and concerned communities who then concentrate on reparation to individuals for property damage or loss (Figure 1); developmental issues such suffers neglect.

Higher Maximum Temperatures and the web of live

According to Figure 1, abnormal increase in temperature has adverse effects on productivity of forest crops and plants. Production of grain crops-maize, guinea corn, millet and rice can be depressed by a rise in temperature from global warming. Rice is particularly sensitive: a 1% rise in temperature above 32°C results in a 5% reduction in yield (Okali and Ewah 2004). Diseases like cerebrospinal meningitis (CSM) known to be associated with high temperatures and low humidity may be increased by climate change, while direct impacts in the form of heat stroke may arise with increasing incidence of heat waves. Heat alters flowering pattern of crop and forest plant species - resultant starvation leads to death and migration of wildlife species. Many species will risk their lives by expanding their home range for survival. Baboons (*Papio anubis*) in Pandam Game Reserve enter houses of people living in Pandam community (Pandam Tourism Village) in search of food. Infact it was reported by Ijeomah (2007) that Baboon (*Papio anubis*) had licked the soup of many villagers in Pandam community. In search of food, baboons leave the tourism site and cross to the other side of Shendam-Lafia road to feed on agricultural crops in times of food scarcity.

These species are the tourism attractions, their death or migration makes the ecodestination unattractive. Low productivity of crops leads to hunger which seriously affects *ex-situ* management of wildlife species. Many zoological gardens will experience an increase in running cost due to the cost of feed. Cost of buying cows to be slaughtered for carnivorous species in Jos Wildlife Park and Jos National Museum and Zoo will be increased. Cost of buying grains such as maize, soybean, ground nut and guinea corn for compounding of feed for the Antelopes and birds in Jos Wildlife Park will also be adversely affected. The cost of buying birds to feed crocodiles in the mini zoo of the College of Wildlife, New Bussa will increase. Crop failures will also affect potatoes, cucumber, banana, sugarcane and orange used for feeding the primates particularly in Jos Wildlife Park. The management of the park will be faced with severe economic and environmental challenges to sustain tourism; whereas many tourism outfits in Nigeria are yet to be financially independent.

High temperature also affects vegetation which loses much water, become dry and can easily be scorched by heat. Grazers and browsers in the park will suffer starvation which also affects breeding and the health status of species. High temperature in an environment like Jos will lead to shift in tourist destination by many tourists (Figure 1). About 90% of tourists to Jos Wildlife Park, Jos National Museum and Rayfield Resort are attracted by the cultural cold weather of Jos just as American travelers are interested in seeking the sun, probably during winter (Lascurain, 1996; Ijeomah *et al*, 2005).

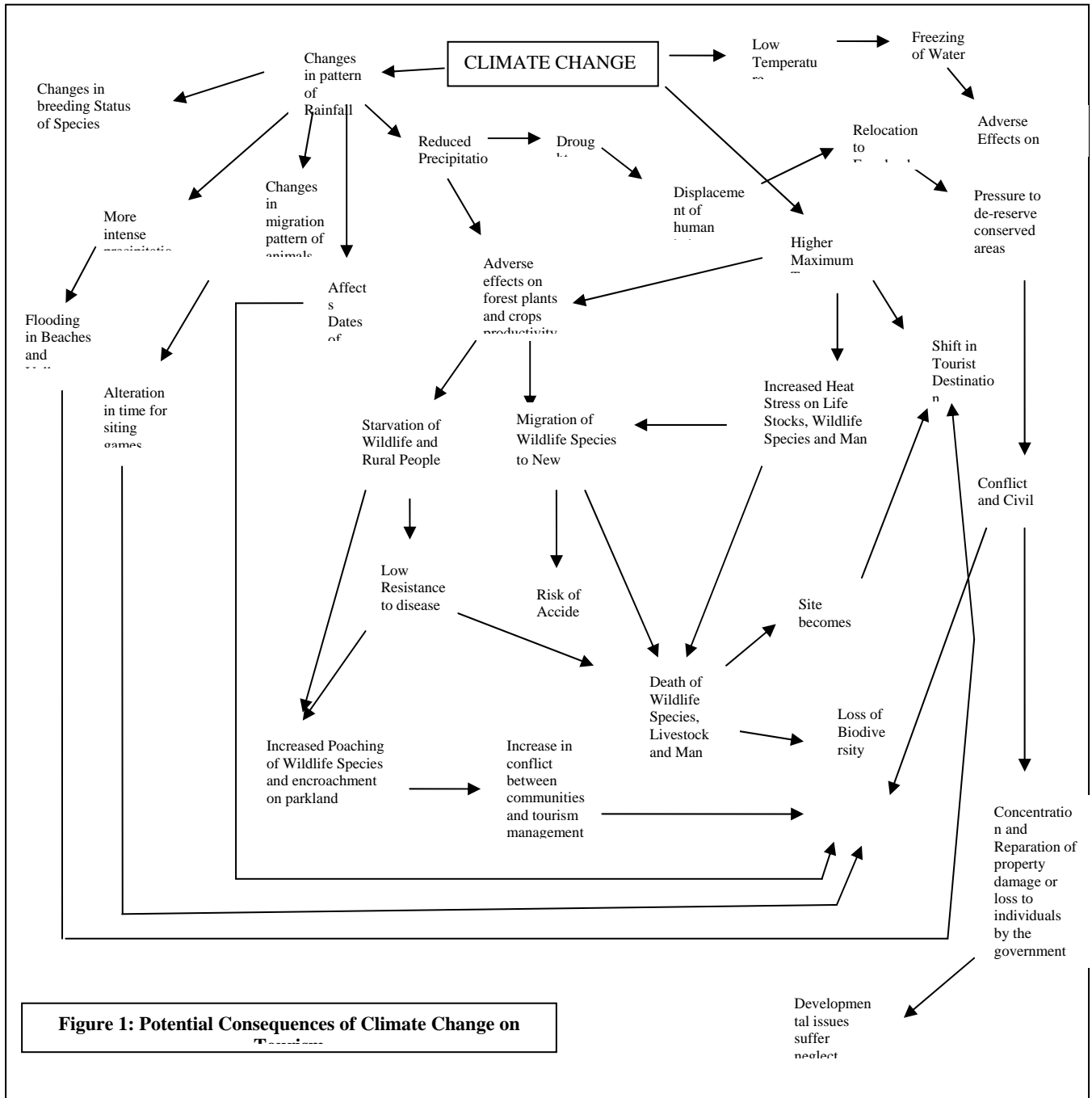


Figure 1: Potential Consequences of Climate Change on

Drought and Tourism in Wetlands

Drought decreases water level in lakes. And decreasing water level has threatened some bird species such as the marbled teal (*Marmaronetta angustiostris*) thought to be declining world wide (Mockrin and Thienne, 2001). This implies that drought can seriously destabilize tourism since it could threaten lives of water birds which are core tourist attractions. Even the Nigerian Tourism Development Corporation (NTDC) (undated) and Nason (1991) confirmed bird watching as the core attraction in wetlands particularly in Hadejia-Nguru wetland due to migratory birds from Europe, Asia, South Africa and America that arrive in thousands mainly between November and March.

Drying up of the Pandam Lake of Plateau State will hamper ecotourism, particularly bird watching; the core attraction therein (Ijeomah, 2007). Siltation and drying up of the 'hippo pool' in Jos Wildlife Park have been criticized by tourists. Drought can easily lead to forest fire and over utilization of water points in conserved areas. This is because villagers neighbouring the ecotourism site may forcefully encroach into the ecodestination in large numbers to harness water; which may lead to conflicts as Hollis *et al* (1993) posited that disagreements over water use can become volatile, sparking conflicts between neighbouring communities and conservation Areas.

Drought can hamper tourism in Plateau State by adversely affecting the water courses in Jos Wildlife Park, water level of Rayfield Lakes, Pandam Lake and the six water bodies inside Pandam Game Reserve. It was the persistent drought and desertification in the sahelian region through the 1970s that led to decreased in flows of water into the Lake Chad and consequently the lake shrank from 25,000km² surface area in the 1960s to 2500km² in recent years. The intense drought increased human pressure on the dwindling Lake Chad and the entire ecosystem of the extended Lake Chad was destabilized (Jauro, 1998); whereas as a good tourist attraction for bird watching, it has always provided a vital seasonal refuge for over one million birds particularly ducks and waders migrating between the Palearctic and Afrotropical realms (Garba –Boyi *et al* 1993; Scott and Rose, 1996; Dod *et al* 1999). And in fact more than one million individuals of most abundant wader ruff (*Philamachus pugnax*) have been observed at the lake at one time.

However, the abundance of migrant birds in both lake Chad and Hadejia –Nguru wetlands has varied in different years (since 1955 periodic census till date) with the size of the lake and wetland conditions elsewhere in Africa (Roux and Jary, 1984; Scott and Rose, 1996).

Low Minimum Temperature and Tourism Management

Figure 1 reveals that very low temperature could lead to formation of ice; which hinders germination and operation of some important soil microbes that act as decomposers. It kills many insects which birds feed on. It could lead to death of many species while others migrate to other areas with favourable temperature condition. Endemic species may be lost due to sudden changes in environmental temperature; whereas the extinction of one species may lead to chains of extinctions because of their specific roles in the ecosystem.

CONCLUSION AND RECOMMENDATIONS

Wildlife species are the principal tourist attractions in Africa, and ecotourism, the fastest growing aspect of tourism in the world. Wildlife species are only found where favourable environmental conditions that can support them exist. Whenever the habitat condition of these species becomes unfavourable, existence of the animals is threatened. Hence, they are bound to perish or migrate to another area with favourable and promising habitat condition. The death, migration, starvation or hibernation of species seriously affects tourism. Climate change with its attendant environmental expression of weather elements has adverse effects on all types of tourism. Drought affects ecotourism, disperses water birds which are core attractions for bird watchers; flooding destroys beach tourism, land slides adversely affects ecotourism, change in rain fall pattern has adverse effects on both mountaineering and cultural tourism. Intense heat and cold increases pest and disease outbreak, leads to death of animals, hinders germination, and causes crop failures which increases the cost of running tourism particularly in *ex-situ* ecodestinations.

Tourism sites in Plateau State, particularly those under *in-situ* conservation should increase their financial budget and also increase their gate fee for tourism operations to be sustained. There should be consistent creation of awareness on climate change by tourism institutions. Dates for cultural festivals should not be permanently fixed. A new tourism time table that is subject to change can be drawn. Tourism managers should identify and domesticate drought foods as an alternative during crop failures.

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