J Hum Ecol, 59(2-3): 100-107 (2017)
DOI:10.31901/24566608.2017/59.2-3.05

Influence of Weather Condition on the Recreational Use of Wild Life Park

N. T. Anye[1], E. T. Iortyom[2] and O. A. Adelabu[3*]

[1]Department of Arts and Social Sciences, Vaatia College, Makurdi, Benue State
[2]Department of Geography and Environmental Sciences, University of Fort Hare, South Africa
[3]Faculty of Science and Agriculture, University of Fort Hare, South Africa

KEYWORDS Outdoor Recreation. Weather. Recreationists. Patronage Levels. Wildlife Park

ABSTRACT The study investigates the influence of weather conditions on the recreational use of Jos Wildlife Park in Nigeria. Archival data were collected on some selected meteorological parameters; maximum and minimum temperatures (°C); rainfall amount (mm); sunshine (hrs.); wind speed (km/h) and relative humidity (%) and the number of recreationists were obtained for the period 1996 to 2010. Weather records were obtained from the University of Jos Weather Station and subjected to Multiple Linear Regression Analysis and Correlation Analysis to investigate the correlations between weather and patronage levels using version 17 of the SPSS. The overall regression model explained ($P<0.05$) the variance in patronage levels. The result study revealed that annual mean minimum temperature (-0.818) and amounts of rainfall annually (-0.622) exhibited a negative correlation significantly with patronage levels, only annual mean relative humidity (0.663) had a significant positive correlation, annual mean maximum temperature (-0.035) had a weak negative correlation with patronage levels while annual mean sunshine hour (0.125) and annual mean wind speed (0.404) had weak positive correlations with patronage levels.

INTRODUCTION

Outdoor recreation is a way of investing relaxation energy, that is, it is a specific action which is accomplished for beguilement and happiness. Many types of outside recreational exercises are identified with the open air climate. Genuine climate conditions are one of the primary factors that limit recreational activities outdoors. They influence the type of recreational activities that are done outdoor, its term and also its adequacy (Blazejczyk 2001; Brice et al. 2016). In evaluation of bioclimatic recreational potential not just precipitation and others meteorological wonders for instance, hazes, storms and so forth are critical yet in addition warm conditions (force of warm/frosty anxiety, day by day sufficiency) (de Freitas 1985, 1990; Matzarakis and Mayer 1998; Tomczyk et al. 2016).

Research indicates that an individual is twice as prone to participate in outdoor entertainment activity if he or she has the opportunity to access outdoor recreational options (Little 1990; Lovelock et al. 2016). Along these lines, it is essential to comprehend the components in charge of regular variety in outdoor recreation activity as it might help in the design and promotion of opportunities in outdoor recreation. In any case, inspite of simple get to give by scenic routes and different areas (example, parks, school play areas, and so forth) for outdoor recreation activity, people have an assortment of potential hindrances to being physically dynamic in the outdoor environment. One of the boundaries to overcome is climate, including both hot and cold temperature extremes, precipitation, wind, and mugginess (Dotson et al. 2017).

Recreation in Nigeria is not new. It is additionally considered as a standout amongst the most gainful businesses with maybe one of the least conceivable venture. The recreation business in Nigeria is still fairly developed when contrasted with those found in different nations of both developed and developing world. Recreation has turned into an effective vehicle of financial development which has added to the financial improvement of most nations of the world particularly nations like Switzerland, Brazil, Tunisia, Kenya, South Africa and Thailand among others where diversion is the pillar of their economy (Aniah et al. 2009; Douglass 2016).

According to Odjugo and Atedhor (2005), several factors affect the economic fortunes of the business worldwide of which recreation is not an exception. These factors include socio-cultural, psychological and environmental factors (Etim 1994). An aspect of the environmental factors which is, weather in many instances, affect commercial activities either directly or indirectly, negatively or positively (Ahmed 2000). Woodhart (1996) revealed in his work that in the temperate region, hot dry season increases profitable exercises in attire, footwear, beverages and tobacco businesses, yet diminishes exercises in earthenware, glass and utility.

Despite the vital role played by weather on man's economic life, little consideration has been given to applied climatology in Nigeria. Although, few studies on econoclimatology have been conducted which include that of Adebayo (1989), Opkara (1994), and Etim (1994), in Ibadan, Imo State and Owerri respectively. Apart from Adebayo's work that is empirical, others are qualitative and generalized. The qualitative and generalized approach conflicts with the use of data, which largely form the basis for drawing logical conclusions (Song 2001).

Statement of Problem

With a height of 4, 062 feet (1217 meters) above sea level, the Jos Plateau appreciates a more calm climate than a significant part of the rest parts of Nigeria (monthly average temperatures are from 21°C to 25°C or 70°F to 77°F) (Ijeomah and Aiyeloja 2009). These cooler temperatures have implied that from frontier times until present day, Jos is a choice location for holiday for both recreationists and expatriate based in Nigeria. But it is worth noting here that, the weather of the Jos Plateau is not as consistent as other parts of Nigeria, it is subject to frequent variations and changes in its occurrence, because of its high altitude. The unpredictable nature of the Jos weather may tend to hinder recreational activities taking place at different outdoor recreation resorts and in particular the Jos Wild Life Park (JWLP).

Recreationists who go to Jos and in particular Jos Wild Life Park (JWLP) for recreational activities may experience problems and challenges, as they may not be familiar or prepared for the unpredictable changes in the weather conditions and since they often have little or no information about the weather conditions of the Jos Plateau, their recreational activities, satisfaction and experiences are likely to be affected. But little is said to be known about which adverse weather conditions are most important, suitable and the extent to which it contributes to decreases in recreational activities in general (Hobbs 1980; Matzarakis and Mayer 1998; de Freitas 2001; Brandenburg and Amberger 2001) and on the Jos Plateau and the JWLP in particular, it is on this premise that this study is designed to critically appraise the influence of some selected weather elements on the patronage of JLWP for outdoor recreation activities.

Study Area

Plateau state is bordering Kaduna state toward the west, Bauchi state toward the north, Taraba state to southeast and Nasarawa state toward the south west. The City of Jos is located at the northern edge of an upland known as the Jos Plateau. This upland extends approximately 104km, from north to south, and 80km from east to west, covering a zone of around 8,600km^2 or 860,000 hectares, described by noteworthy edges and segregated rough slopes isolated by broad fields, the level displays an assortment of land shapes which give magnificent excursion resorts. A few waterways and hillocks are inter-spread among the highlands giving the scene a striking landscape. It keeps up a normal height of 1,200m (4,000ft) above sea level and reaches its crest in the sphere slopes where it stands at 1,766m (5,829ft) (Gontul et al. 2007; Plateau State 2009).

The study area is located four kilometres east of Jos City, along Jos-Miango Road, off Yakubu Gowon Way. Jos Wildlife Park is bounded in the East by Tudunwada Community, in the West by Dong community and Federal low cost housing estate in the South by *Sabon* Community. It is located between latitudes 8°25' to 9°20' north of the equator and on longitudes 6°45' to 7°39' east of the Greenwich Meridian. The Jos Wild Life Park covers an area of about 8 square kilometres, enclosing hills, streams and varied uplands, vegetation with about 43km network of Safari track. The state is characterized by highlands rising between 1200m at a peak of 1829m above sea level. The study area is known for its uniqueness and home for some animals, children play-

ground and attractive for excursions in the pine woods (Jos City 2009; Gontul et al. 2007).

The JWLP is divided into five (5) sections namely; Elephants Section with wild animals like African savanna Elephants, derby eland and dwarf cattle; Carnivorous Section with lions, crocodiles, Tortoise (hard shell), python, hyenas and jackals; Pine Valley Paddock Section with gazelles, kobs, desert tortoise, porcupines, grim duikers, red duikers and donkeys, Bird Section with birds like ostriches, peacock, crane crown, black kites, Marabou stork, Kestrel, Marshal Eagle and lastly the Primate Section with primates like chimpanzees, baboons and monkeys.

The climate of Plateau State is cool due to its high altitude (Ijeomah and Aiyeloja 2009). The Jos is predominantly influenced by its relatively high altitude and position along the passage of the Inter-Tropical Convergence Zone (ITCZ), and the JWLP is located on the Jos Plateau which attains an average height of about 1250m above sea level. This substantial height has so much moderated the temperature of Jos. The height also influences rainfall, air pressure, wind velocity, and humidity of the Jos Plateau (Gontul et al. 2007).

Climatic records show that mean maximum temperature of Jos is about 26°C and mean minimum temperature is about 18°C, while the annual average temperature is about 22°C. Jos is therefore, described as the coldest state capital in Nigeria. Even though the temperature appears highest between the months of March and April, the Jos plateau remains the coldest and this weather conditions accounts for the concentration of expatriates in the State as compared to other states of the Federation.

Jos experiences seasonal climate, with dry and wet climates which are mainly influenced by the ITCZ. From April when the ITCZ moves northward, the Plateau is dominated by the wet south west trade wind which brings rains up to October. From November to March, however, the ITCZ moves southward and the north-east wind (Harmattan) dominates the area which is characterized by dry, cool and dusty conditions (Gontul et al. 2007). The mean annual rainfall differs from 131.75cm (52 inches) in the southern part to 146cm (57 inches) on the Plateau. The most noteworthy rainfall is recorded during the wet season which stretches from July to August. The mild temperature of Plateau State has driven a decreased frequency of some tropical disease like Malaria. The Jos Plateau is the wellspring of numerous streams in northern Nigeria including the Kaduna, Gongola, Hedejia and Yobe rivers (Gontul et al. 2007).

METHODOLOGY

Quantitative approach was used and archival data was collected on selected meteorological parameters (independent variable); minimum temperature (°C), maximum temperature (°C), sunshine (hours), relative humidity (%), wind speed (Km) and rainfall amount (mm) from the University of Jos weather station with those of recreationists (dependent variable) from the Information Post in Jos Wild Life Park for the period of 1996-2010 and subjected to Multiple Linear Regression analysis and Correlation analysis statistical test using version 17 of the SPSS in order to identify the relationship between the selected meteorological parameters and the number of recreationists. The regression model for the study used the equation:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_n x_n + e \quad (1)$$

Where Y is the value of the dependent variable (number of recreationists), a = Y intercept, b_1, b_2, b_3, b_4... b_n are regression coefficients. Each b represents the amount of change in Y, for one unit of change in the corresponding x-value when the other x values are held constant. X_1, X_2, X_3, X_4, X_5 and X_6 are the independent variables (that is, rainfall amount, temperature (max and min), sunshine hours, relative humidity and wind speed respectively) and e = the error of estimate or residuals of the regression.

The coefficient of multiple determinations (R^2) which is a measure of the explanatory variables of the model is expressed in patronage. This is jointly explained by the contribution of the selected meteorological parameters.

RESULTS

Relationship between Meteorological Parameters and the Patronage Levels

To determine the relationship between each of the meteorological parameters and patronage levels, correlation technique was used and a summary of the meteorological parameters and numbers of recreationists is presented in Table 1. Partial correlation technique was used to test the strength and weakness of the selected mete-

Table 1: Summary of meteorological parameters and number of recreationists

Years	*X1*	*X2*	*X3*	*X4*	*X5*	*X6*	*Y*
1996	29	19	1613.4	6.1	53	2.3	23107
1997	29	19	1006.3	6.4	22.5	1.8	29512
1998	29	21	1302.8	5.8	21.5	1.9	33260
1999	29	17	900.8	6.4	50.2	2.1	101900
2000	29	20	1409.5	6.6	54.5	1.3	65823
2001	26	18	1206.5	6.2	54.0	1.9	84654
2002	30	19	1226.3	6.0	56.0	2.0	58736
2003	30	18	1297.4	6.1	56.5	2.2	90978
2004	31	17	1368.4	5.7	52.5	2.5	105087
2005	30	17	1025.6	6.0	28.0	2.6	105394
2006	30	20	1838.5	6.1	42.5	1.0	3244
2007	30	20	1766.4	6.0	48.5	1.2	3391
2008	31	20	1694.2	5.8	21.5	1.0	3493
2009	31	18	1438.9	6.0	53.0	1.9	96759
2010	31	17	1680.1	7.4	63.5	2.9	70447

Source: Researchers' compilation 2012

orological parameters in relation to patronage levels as shown in Table 2.

In the multiple correlation analysis the variables were identified as follows:

Annual number of recreationists and visitors =Y

Annual Mean Maximum Temperature = X_1
Annual Mean Minimum Temperature = X_2
Annual Rainfall Amount = X_3
Annual Mean Sunshine hour= X_4
Annual Mean Wind Speed= X_5
Annual Mean Relative Humidity= X_6.

Researchers' Computation 2012

Table 2 shows the correlation between the meteorological parameters and patronage levels in the study area. The result shows that minimum temperature (-0.818) and rainfall amounts (-0.622) had strong (significant) negative correlation with patronage levels, only relative humidity (0.663) had strong (significant) positive correlation, maximum temperature (-0.035) had a weak negative correlation with patronage levels while sunshine hour (0.125) and wind speed (0.404) had weak positive correlations with patronage levels. This implies that only variation in relative humidity significantly accounts for the highest significant variation in patronage levels, thus, the high the relative humidity the high the patronage level. Minimum temperature and rainfall amounts inversely correlates with patronage levels, thus, the high the rainfall amount and low temperature, the low the patronage levels.

Determinants of Patronage Levels in the Study Area

The impact of the meteorological parameters on support to the study area was determined using the Multiple Linear Regression expository method. The reasons for performing relapse investigation were to identify independent factors that essentially influence variation in support levels in JWLP, to quantify the relative sig-

Table 2: Correlation matrix of meteorological parameters and patronage levels

Variables		*Y*	*X1*	*X2*	*X3*	*X4*	*X5*	*X6*
Pearson Correlation	Y	1.000						
	X1	-.035	1.000					
	X2	-.818*	-.110	1.000				
	X3	-.622*	.392	.431	1.000			
	X4	.125	-.044	-.297	.039	1.000		
	X5	.404	-.005	-.429	.179	.416	1.000	
	X6	.663*	.084	-.763	-.394	.320	.319	1.000

* Coefficient is significant at 0.05 confidence level (2-tailed)

nificance of each of the independent factors in clarifying patronage levels, to decide the aggregate extent of fluctuation (R2) represented by every single meteorological parameter and to build up a model for anticipating patronage levels. The formula is stated thus:

$$Y = a + b_1x_1 + b_2x_2 + b_3x_3 + b_4x_4 + b_5x_5 + b_6x_6 \pm e \quad (1)$$

Where Y = Annual number of recreationists and visitors

a = intercept (or constant) where line of best fit intercepts Y at zero point of X

b_1, b_2, b_3, b_4, b_5, b_5 are regression coefficients. Each b represents the amount of change in Y. for one unit of change in the corresponding x-value when the other x values are held constant. The independent variables are as follows:

X_1 = Annual Mean Maximum Temperature
X_2 = Annual Mean Minimum Temperature
X_3 = Annual Rainfall Amount
X_4 = Annual Mean Sunshine hour
X_5 = Annual Mean Wind Speed
X_6 = Annual Mean Relative Humidity
e = the error of estimate or residuals of the regression

The regression model developed uses the annual number of recreationists as the dependent variable and meteorological parameters such as annual mean maximum and minimum temperature, annual mean rainfall amount, annual sunshine hour, annual mean wind speed, and annual mean relative humidity as independent variables.

On the whole, these meteorological parameters can therefore be taken into consideration in order to improve the patronage levels and to boost the economic status of the study area. From the regression analysis as shown in Table 3, the regression equation or prediction model was stated thus:

$$Y = 272947.179 + 5509.691X_1 + 7850.141X_2 + 30.494X_3 + 15570.603X_4 + 5\,37.676X_5 + 15620.391\,X_6 + e \quad (2)$$

Where, Y = Predicted patronage levels in the study area

Y = Estimated patronage in the study area

Table 3 depicts the extent to which the meteorological parameters determine the patronage levels to the study area. The table shows the form in which the variables used in explaining patronage levels to the study area were entered. It shows that six (6) independent variables: annual mean of maximum temperature, annual mean of minimum temperature, annual rainfall amount, annual mean of sunshine, annual mean of wind speed and annual mean of relative humidity were regressed on patronage levels – the dependent variable Y. The result gave a coefficient of determination (R^2) of 0.912 which is computed to be 91.2 percent. This means that 91.2 percent of the variations in the patronage levels for the past 15 years in the study area can be jointly explained by the variations in the six identified meteorological parameters. The remaining variation of 8.8 percent in the patronage levels can be as a result of other unexplained factors such as political stability, day of the week, economic conditions, family structure, facilities and infrastructure, seasons, accessibility, working conditions.

Table 4 shows the unstandardized and standardized coefficients, the t-values and the level of significance for each the parameters. This implies that among the meteorological parameters used, wind speed has accounted the highest value of 1.789 for the variation of patronage in the study area indicating that the patronage levels to JWLP is higher when wind speed is high. This is followed by maximum temperature, meaning that there was high patronage level under years with high Temperature more than those with low amount. In addition, this confirms the t-test analysis which shows that among the meteorological parameters only annual mean maximum temperature (X_1) and annual mean wind speed (X_5) are significant in influencing patronage levels at 0.05 confidence level as their calculated t-test values (0.610 and 1.789) are greater than their table values (0.558 and 0.111) re-

Table 3: Summary of regression analysis

Model	*R*	*R square*	*Adjusted R square estimate*	*Std. error of the change*	*R square change*	*Change statistics*				*Durbin-watson*
						F	*df1*	*df2*	*Sig. F change*	
1	.912[a]	.831	.705	21286.238	.831	6.574	6	8	.009	2.040

a. Predictors: (Constant), X6, X1, X5, X4, X3, X2
b. Dependent Variable: Y
Source: Researchers' computation 2012

Table 4: Coefficients of the regression analysis

Model		*Unstandardized coefficients*		*Standardized coefficients*	*t*	*Sig.*
		B	*Std. error*	*Beta*		
1	(Constant)	325019.046	272947.179		1.191	.268
	X1	3363.555	5509.691	.111	.610	.558
	X2	-12704.753	7850.141	-.436	-1.618	.144
	X3	-69.847	30.494	-.515	-2.291	.051
	X4	-13367.187	15570.603	-.142	-.858	.416
	X5	961.637	537.676	.353	1.789	.111
	X6	3417.439	15620.391	.051	.219	.832

*Coefficient is significant at 0.05 confidence level
Source: Researchers' computation 2012

spectively. Thus, the distributions of annual maximum temperature and annual wind speed have been the major determinant of patronage of JWLP. But it is worth noting that calculated values (0.219) of annual mean relative humidity is more than the table value (0.832), yet its (3147.439) value is very high.

Since separate scales of measurement of the meteorological parameters (that is, degrees centigrade (°C) for most extreme and least temperature, millimeters for precipitation, hours for daylight, km/ph for wind speed and rate (%) for relative mugginess) were used for the independents factors, correlations of the relative significance of parameter assessments couldn't be influenced. Pedhazur (1982) takes note of that examinations of parameter gauges in view of information with divergent scales can be deceiving. A negative relationship between the dependent factors and least temperature, amount of rainfall, relative moisture and daylight hours recommends that recreationists by and large don't support high support levels amid good climate conditions as might be anticipated.

From the regression equation model, this therefore explains that given a unit change in any of the meteorological parameters while others are constant, the highest change in patronage will be accounted for by relative humidity (3417.439 recreationists), followed by maximum temperature (3363.585 recreationists), wind speed (961.637 recreationists), annual rainfall amount (-69.847 recreationists), minimum temperature (-12704.753 recreationists) and the least change in patronage level will come from sunshine hour (-13367.187 recreationists).

In order to test for the significant effect of the meteorological parameters (maximum temperature, minimum temperature, annual rainfall amount, sunshine hours, wind speed and relative humidity) on levels of patronage, a significance test was carried out. Table 5 shows the result of the analysis.

From Table 5, it can be seen that the F-value = 6.574 and the P-value = 0.0090 for level of patronage at $P<0.05$. The result in Table 5 shows that the calculated value (6.574) is higher than the significance table value (0.009) at the confidence level of 0.05. Therefore, since the calculated F value of 6.574 is far greater than the table value of 0.009, this shows that the selected meteorological parameters jointly have significant effect on levels of patronage in Jos Wildlife Park of Plateau State.

DISCUSSION

Recreationists are expected to be highly adaptable to a warmer climate by shifting to dif-

Table 5: Influence of selected meteorological parameters in JWLP

Model		*Sum of squares*	*Df*	*Mean square*	*F*	*Sig.*
1	Regression	1.787E10	6	2.979E9	6.574	**.009**[a*]
	Residual	3.625E9	8	4.531E8		
	Total	2.150E10	14			

Source: Researchers' computation 2012
a. Predictors: X6, X1, X5, X4, X3, X2
b. Dependent Variable: Y

ferent activities and different locations. However, the coefficients of the regression analysis of the study conforms with the recent findings of Wolff and Fitzhugh (2011) that maximum temperature and wind speed contributed significantly to daily outdoor recreation activity in an Urban Greenway in the United States. Also, Green (1967), Wikle (1992) and Fisichelli et al. (2015) all in the United States observed that maximum temperature and wind speed can affect outdoor recreational comfort and as such has a strong influence on recreation patronage levels. The level of contributions of annual mean of maximum temperature and annual mean of wind speed were followed by those of annual mean of minimum temperature, annual rainfall amount, annual relative humidity, and annual mean sunshine hour having insignificant coefficients, though.

The study also confirms that the high the relative humidity, the high the patronage level. Minimum temperature and rainfall amounts inversely correlates with patronage levels, thus, the high the rainfall amount and low temperature, the low the patronage levels. This is also in agreement with Kilungu et al. (2017) who observed a great reduction in diversity of tourist attractions and park's attractiveness in Tanzania.

CONCLUSION

In conclusion, changes in weather conditions generally influenced outdoor recreation activities in JWLP and this is exhibited in the high fluctuations in annual patronage levels of domestic and international recreationists for the period 1996 to 2010 when related to weather. Annual mean minimum temperature (-0.818) and annual amounts of rainfall (-0.622) exhibited a significant negative correlation with patronage levels, only annual mean relative humidity (0.663) had strong (significant) correlation, annual mean maximum temperature (-0.035) had a weak negative correlation with patronage levels while annual mean sunshine hour (0.125) and annual mean wind speed (0.404) had weak positive correlations with patronage levels. This shows that recreationists are fully aware of influences of weather conditions in JWLP and as such most recreationists preferred favorable weather condition for outdoor recreation activity.

RECOMMENDATIONS

The following recommendations are put forward:

1. Recreational facilities and centers should be encouraged to take advantage of the services rendered by The Nigerian Meteorological Agency (NIMET) on the daily forecasts of meteorological elements.
2. The government of Plateau State should setup a state-of-the-art meteorological station in the JWLP and qualified meteorologists should be employed to man it for on-site weather information generation for outdoor recreation purposes.
3. The Management of JWLP should also adopt the recreation-meteorological information and advisory services of NIMET for early warning purposes since weather is critical to outdoor recreation.
4. The Management of JWLP should also adopt advanced scientific methods of collecting and storing records of recreationists, such as planting of digital cameras, digital counting devices at strategic parts of the Park, the use of computers for storing the collected data and internet services for making available on-site weather information for potential recreationists.
5. The provision of tour vehicles/buses to help carry recreationists around the study area would also be of great relevance.

REFERENCES

Adebayo CD 1989. *The Impact of Climate on Economic Activities in Ibadan*. MSc Thesis Submitted to the Department of Geography. Nigeria: University of Ibadan.

Aniah EJ, Eja EI, Otu JE, Ushie MA 2009. Patronage of ecotourism potentials as a strategy for sustainable tourism development in Cross River State, Nigeria. *Journal of Geography and Geology,* 1(2): 20.

Aniah EJ, Eja EI, Otu JE, Ushie MA 2009. Resort potentials as a strategy for sustainable development in Plateau State, Nigeria. *Journal of Sustainable Development,* 2(2): 73.

Blazejczyk K 2001. Assessment of recreational potential of bioclimate based on the human heat balance. In: A Matzarakis, CR de Freitas (Eds.): *Proceedings of the First Intrnational Workshop on Climate, Tourism and Recreation,* International Society of Biometeorology, Commission on Climate, Tourism and Recreation, 5-10 October, Greece, pp. 133-152.

Brandenburg C, Amberger A 2001. The Influence of the Weather Upon Recreation Activities. In: A Matzarakis, CR de Freitas (Eds.): *Proceedings of the First International Workshop on Climate, Tourism and Recreation,* International Society of Biometeorology, Commission on Climate, Tourism and Recreation, pp. 123-132.

Brice B, Fullerton C, Hawkes KL, Mills-Novoa M, O'Neill BF, Pawlowski WM 2017. The impacts of climate change on natural areas recreation: A multi-

region snapshot and agency comparison. *Natural Areas Journal,* 37(1): 86-97.

de Freitas CR 1985. Assessment of human bioclimate based on thermal response. *International Journal of Biometeorology,* 29: 97-119.

De Freitas CR 1990. Recreation climate assessment. *International Journal of Climatology,* 10: 89-103.

De Freitas CR 2001. Theory, Concepts and Methods in Tourism, Climate Research. In: A Matzarakis, CR de Freitas (Eds.): *Proceedings of the First International Workshop on Climate, Tourism and Recreation, International Society of Biometeorology, Commission on Climate, Tourism and Recreation,* pp. 3-20.

Douglass RW 2016. *Forest Recreation.* USA: Elsevier Permagon Press, Ohio State University.

Dotson E, Hibbler DK, Scott L 2017. Culture of Learning Cities: Connecting Leisure and Health for Lifelong Learning Communities. In: *Public Health and Welfare: Concepts, Methodologies, Tools, and Applications.* USA: IGI Global, pp. 755-778.

Etim IG 1994. Environmental and socio-economic factors influencing business fortune in rivers State, Nigeria. *Environment and Economic Journal,* 8(2): 112-130.

Fisichelli NA, Schuurman GW, Monahan WB, Ziesler PS 2015. Protected area tourism in a changing climate: Will visitation at US national parks warm up or overheat? *PloS One,* 10(6): e0128226.

Gontul KT, Oche YC, Daloeng MH 2007. An investigation of climatic attractiveness of Jos Town as a tourist destination in Nigeria. *Journal of Geography and Planning Sciences,* 2(1): 23-31.

Green JS 1967. Holiday meteorological: Reflections on weather and outdoor comfort. *Weather Journal,* 22: 128-131.

Hobbs JE 1980. *Studies in Physical Geography: Applied Climatology: A Study of Atmospheric Resources*. London, Boston: Butterworths.

Ijeomah HM, Aiyeloja AA 2009. Impact of climate change on sustainable tourism management in Plateau State. *Nigeria Journal of Sustainable Development in Africa,* 11(1): 149-175.

Jos City 2009. Wikipedia Information about Jos City. From <http://en.wikipedia.org/wiki/Jos> (Retrieved on 18 June 2009).

Little C 1990. *Greenways of America*. Baltimore, MD, USA: John Hopkins University Press.

Kilungu H, Leemans R, Munishi PK, Amelung B 2017. Climate change threatens major tourist attractions and tourism in Serengeti National Park, Tanzania. In: *Climate Change Adaptation in Africa*. Hamburg, Germany: Springer International Publishing, pp. 375-392.

Lovelock B, Jellum C, Carr A 2016. Pulling the pin on active outdoor leisure: Building an understanding of leisure abandonment from the narratives of outdoor recreationists. *Leisure Sciences,* 1-17. http://dx. doi. org/10.1080/01490400. 2016. 122 9640 .

Matzarakis A, Mayer H 1998. Investigations of Urban Climate's Thermal Component in Freiburg, Germany. *Preprints Second Urban Environment Symposium - 13th Conference on Biometeorology and Aerobiology,* 2-6 November, Albuquergue, USA. USA: American Meteorological Society, pp. 140-143.

Odjugo PAO, Atedhor GO 2005. The effects of climate on commercial activities in Southern Nigeria. *Global Journal of Social Sciences,* 4(1, 2): 43-47.

Pedhazur EJ 1982. *Multiple Regression in Behavioural Research*. NY: Holt, Rinehart and Wilson.

Plateau State 2009. From <http://www. plateaustategov. org/history/geo-info.html> (Retrieved on 18 June 2009).

Song D 2001. *Research Methods in Social Sciences*. Jos: Lafia Publishers.

Tomczyk AM, White PC, Ewertowski MW 2016. Effects of extreme natural events on the provision of ecosystem services in a mountain environment: The importance of trail design in delivering system resilience and ecosystem service co-benefits. *Journal of Environmental Management,* 166: 156-167.

Wikle TA 1992. Environmental determinants of demand for river recreation. *Proceedings of the Oklahoma Academy of Science,* 72: 57-62.

Wolff D, Fitzgugh EC 2011. The relationship between weather-related factors and daily outdoor physical activity counts on an urban greenway. *Journal of Environmental Resources Public Health,* 8: 579-589.

Woodhart HK 1996. Climate and commerce in the temperate region. *Bollic Bulletin,* 4: 16-18.

Paper received for publication on October 2016
Paper accepted for publication on December 2016