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ARTICLES

Research

Full Length Research Paper

Dynamics of a third world city: Case of Niamey, Niger

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Urbanization is a landscape transformation process that is manifested by spatial expansion relative to human development. The present study aimed at the characterization of the spatio-temporal dynamics of Niamey city over the past 38 years (1975-2013) through a diachronic analysis of Lands at satellite images and application of landscape ecology principles. It sought to: (i) analyze the spatiotemporal pattern of land use land cover change of Niamey city and (ii) identify the driving forces for the land use land cover change in Niamey and their implications. Thirteen LULC classes were identified and grouped into three broad categories namely "Built-up area", "Agricultural zone" and "Vegetation area". The "Agricultural zone", more specifically the class "Rain-fed farmland" represent the landscape matrix (over 37% of the landscape) throughout the period considered for the study. "Built-up area" dominated by "suburb quarter" experienced its lowest expansion rate during the interim period T2 (1989-1999).Analysis of the landscape spatial structure and configuration revealed that the landscape is fragmentation and highly heterogeneous. In general, urbanization in Niamey could be characterized by progressive densification and sprawl along communication lines.

Key words: Urban dynamics, landscape indices, remote sensing, Niamey, land use land cover.

INTRODUCTION

Cities are growing worldwide with the highest growth recorded in Asia and Africa (Seto et al., 2012). This urbanization process involves the conversion of natural and/or rural land into a man-made structure favorable to human population development (Bürgi et al., 2004). It is a major modernization process characterized by a spatial expansion and demographic growth triggered by the political and administrative characters, and the concentration of socio-economic activities in these inhabited areas (Liu et al., 2003).The growth of urban areas results in substantial impacts on ecosystem, ranging from socio-economic inequalities to biological

(Clergeau et al., 2006) and environmental impacts (Alberti et al., 2003; Chen et al., 2011) at local and regional level. Indeed, urbanization involves landscape transformations; hence its importance in landscape ecology (Lambin et al., 2003; Wu and Hobbs, 2002).

In Niamey, a third world city which accommodates more than 39% of the Niger urban population, this modernization process is yet a degradation source of population living conditions (Motcho, 2004). In fact, since 1926, when it became the capital of Niger, Niamey has expanded as the result of the rapid population increase instigated by rural exodus and particularly the high birth rate of its population (Kessides, 2006; Maughan, 2012). However, the growth of this city and that of basic amenities provided by the government are desynchronized making the population's living conditions of poor quality, especially in popular and suburb quarters. The urban plans and strategies to accommodate this phenomenon were not implemented adequately. Indeed since independence, the urban planning process relied on urban plans of 1964 and 1967, urban master plan schema of 1984 and the reference urban plan of Niamey which was approved in 2010. Most of them were not effective; as for the latter, it went out of date even before it could be implemented. Moreover, the Niger government depends on external funding for its cities development plans and lacks an adequate and effective urban land use plan (Issaka, 2012). This deficiency leads to an urban development characterized by an "anarchic" spatial organization and inadequate basic amenities.

The spatio-temporal analysis of the land use land cover dynamics is a valuable, cost-effective tool for city planners as it gives a better picture of the urban growth. It could serve as an alternative for third world countries in the conception of sustainable city plan in the future. Several researches have proved the importance of LULC changes analysis in African cities (Abebe, 2013; Attua and Fisher, 2011; Ifeka and Akinbobola, 2015) but no detailed and updated analysis of urban LULC change is available in Nigeria. This lack of basic information has greatly impacted on the implementation and success of several urban projects regarding sanitation, environmental management, risk evaluation and management in Niamey. Understanding the mechanism of urbanization and land use dynamics is important for urban planning to enable better control over sprawl and urban environmental management.

This study is undertaken through a systematic approach in order to understand the urbanization process of Niamey in its structural and functional complexity. Hypothesizing that the urban landscape of Niamey has undergone significant changes over the past four decades, this study aims to: (i) analyze the spatiotemporal pattern of land use land cover change of Niamey city from 1975 to 2013 (ii) identify the driving forces for the land use land cover change in Niamey and their implications.

This assessment of the urban landscape dynamics is based on methods and analysis tools such as remote sensing, GIS operations and landscape metrics proven worldwide in the identification of indicators for urban development and ecological monitoring (Chen et al., 2011; Li et al., 2013; Liu et al., 2010; Ramachandra et al., 2012). These indicators will constitute an important decision support tool for the city growth planning and rational management of urban resources (Matsushita et al., 2006).

MATERIALS AND METHODS

Study site

The study was conducted in the city of Niamey, the administrative and political capital of the Niger Republic. This city has a total land area of 3933 hectares and is located in the western Niger (13°20'-13°35'N and 2°00'-2°15'E). It experiences a semi-arid climate characterized by a short rainy season that is followed by an eight months dry season. The mean annual temperature is 30.8°C with a relative humidity averaging 42.54% (Direction Nationale de la Météorologie, 2010).

The hydrographic network of Niamey consists essentially of the River Niger which stretches for about 15 km through the city, the dry valley of Gounti-Yéna (a temporary stream) and several temporary ponds (Figure 1). This river system is indeed the determinant factor of the heterogeneity of Niamey's vegetation. Indeed, vegetation is characterized by the development of irrigated crops around the ponds and in the valleys of the river and that of Gounti-Yéna, the establishment of a green belt around the city, and roadside trees. Furthermore, aside domestic plantations, public green spaces such as public gardens and parks have been created by the municipality to improve the living conditions of the urban population.

Nevertheless, relict of the natural vegetation is represented by thickets of Combretaceae's species on tropical ferruginous soil of plateaus and shrub-steppe on sandy terraces. This flora is composed of species such as *Guiera senegalensis (*J.F. Gmel.)*, Commiphora africana* (A. Rich.) Engl.*, Combretum micranthum (*G. Don.)*, Acacia macrostachya (*Reichenb. ex DC.)*, Lannea acida (*A. Rich.)*, Croton gratissimus (*Burch.)*, Acacia ataxacantha (*DC.)*, Combretum nigricans* (Lepr. ex Guill. et Perr)*, Boscia senegalensis* (Pers.) Lam. ex Poir.*, Boscia angustifolia* A. Rich. On the plateaus; and *Hyphaenethebaîca*(L.) Mart.*, Bauhinia rufescens* Lam.*, Annona senegalensis* Pers.*, Combretum glutinosum* Perr. ex DC.*, Faidherbia albida* (Del.) Chev., on the sandy terraces of dry valleys (Mahamane et al., 2009).

Cosmopolitan in nature, Niamey's population has increased from 218,366 inhabitants in 1975 to 1,011,277 inhabitants in 2012 (Institut National de la statistique, 2013). Its annual growth rate is 9.81% and has an overall density of 257 inhabitants/ha. Agriculture, residential husbandry and trade are the main activities of this population.

Satellite data acquisition and pre-processing

Remotely sensed imagery from Landsat MSS (Multi Spectral Scanner) (22-11-1975; spatial resolution = 57 m), Landsat TM/ETM+ (Thematic Mapper/Enhanced Thematic Mapper Plus) (20-11-1989/ 02-12-1999; spatial resolution = 30 m) and Lands at 8 OLI (Operational Land Imager) (30-11-2013; spatial resolution = 30 m) with a time step of 10 to 14 years were acquired from the Global Land Cover Facility (GLCF) and the U.S. Geological Survey (USGS)
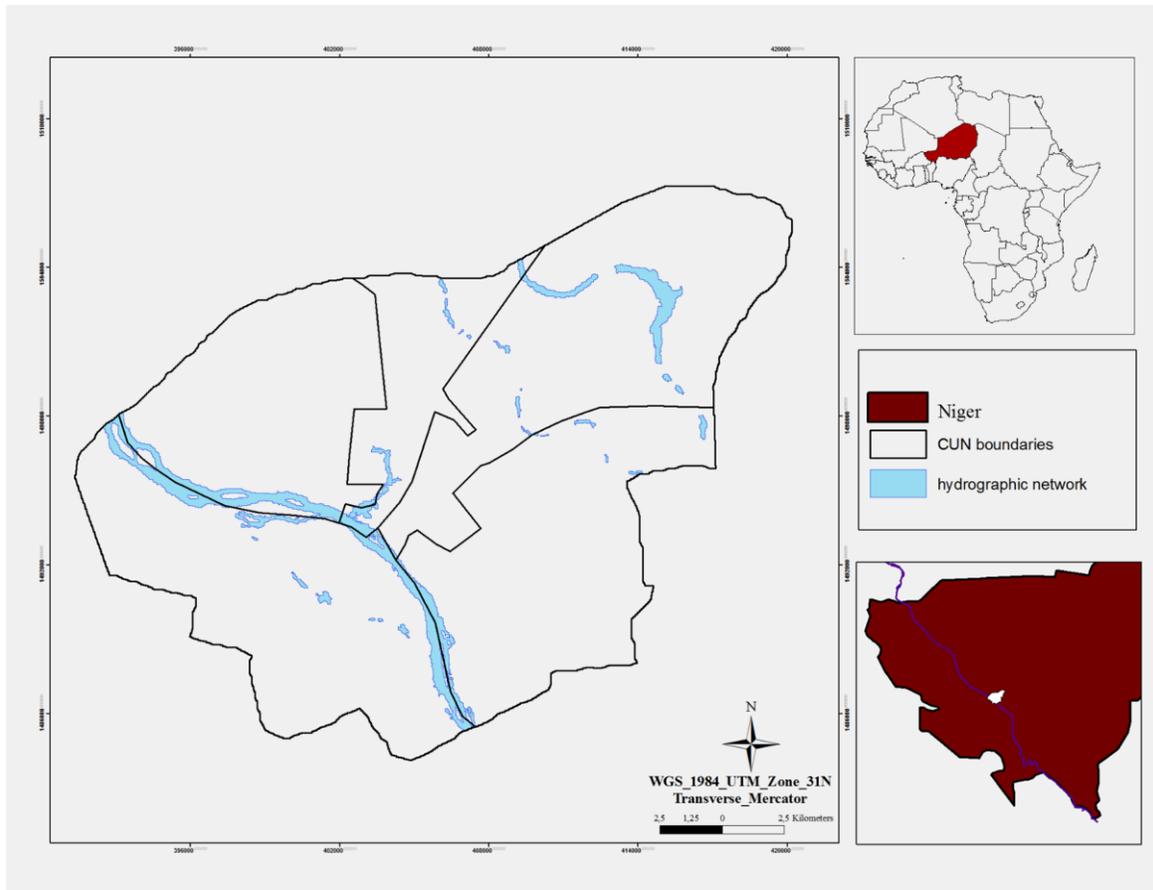
Figure 1. Localization of Niamey City.

archives. These scenes (Path 193 Row 51) covering the entire study site were taken during the dry season when the biomass reflectance values are the lowest.

Image radiometric correction and atmospheric calibration were done by their provider. Nevertheless, additional pre-processing operations were used under the software ENVI 4.7 in order to correct and/or improve images geometrically and radiometrically. They were georeferencing operations (World Geodesic System WGS 84; projection system Universal Transverse Mercator UTM, Zone 31), visual improvement (smoothing, linear adjustment of 2% contrasts), resampling using the nearest neighbor algorithm (from 57 m to 30 m resolution for the MSS scene) (Schowengerdt, 2007) and image editing (false color composite) to better differentiate vegetation classes (Bonn and Rochon, 1992). These operations facilitated their reading, visual interpretation on the screen, and prepared for the ground controls.

Image classification and accuracy assessment

The mixed classification approach was applied on the four images for an analytical and/or selective extraction of information. Its objective is to discriminate the different thematic LULC classes of the study area.

Firstly, the unsupervised classification was implemented on images. At this stage, the Ascendant Hierarchical Classification

method (AHC or Isodata) was used in order to group pixels of each scene in objective land cover classes based on their radiometric similarity (or reflectance value) (Barima, 2009). The resulting image was then a simplification of the spectral signature of the pixels, in that, it assigned the same value to pixels of the same class (Mas, 2000). Hence, without any a-priori knowledge of the terrain, 15 classes have been identified beforehand on the pre-processed images.

Secondly, to improve the classification and determine the land use classes, 30 control points were identified in each of the established Land Cover classes. The gathered information was then used to establish the training sites corresponding to objects recognized as representative of a class on the pre-processed image. The training sites represent the essential elements of the second classification phase. The supervised signature extraction with the maximum likelihood algorithm was employed to perform the classification of the satellite images. It used statistical training sites to calculate the probability of membership of each pixel to one of the classes (Bonn and Rochon, 1992).

Post-classification operations such as the application of a majority Kernel filter (window 3x3 pixels) to reduce the "salt and pepper" effect on the classified image, and the combination of some very close classes in connection with land use were applied.

Finally, in order to validate the classifications of the different images, a confusion matrix or contingency table was calculated. It was used to assess the quality of the classification with the Kappa

coefficient (K) and statistics on errors of commission and omission for each identified class (Barima, 2009).

Spatiotemporal analysis of LULC change from 1975 to 2013

GIS operations (ArcGIS 9.3 ©) such as vectorization of classified images, extraction and layout of the portion corresponding to the limits of the study area were used to develop LULC maps corresponding to the four selected dates (1975, 1989, 1999 and 2013). Hence:

LULC change detection was performed through a transition matrix. This cross-tabulation described the change status among LULC classes from a time T_0 to T_1 (Schlaepfer, 2002). The transformations in a given class are either against or in favor of another. On the diagonal are the proportions of classes that remained stable during the considered period. The resulting tabulations displayed quantitative data for the overall LULC change (1975-2013) and the intermediary changes (1975-1989; 1989-1999, 1999-2013). Besides the matrix, the annual average rate of spatial expansion (*T*) for "Built-up area" category was computed to determine its change rate.

$$T = \frac{(lnS_2 - lnS_1)}{tlne} x100$$

Accordingly, S_2 and S_1 represent the total area covered by the three "Built-up area" classes ("Residential", "Popular" and "Suburb" quarters) at time T_2 and T_1; *t* the number of years of evolution; *ln* the natural logarithm; and *lne*, the logarithm with base *e* equals to 2.71828.

Landscape structure analysis

Metrics are widely used in the study of a landscape composition and configuration (Bogaert and Mahamane, 2005; Lambin et al., 2003). They characterize and assess a landscape through the interrelationships between its structure, function and changes at the landscape level (Leitão et al., 2006). The landscape metrics selected in this study covered Patch Number (*NP*), Largest Patch Index (*LPI*), Contagion Index (*CONTAG*), Shannon Diversity Index (*SHDI*), and Shannon Evenness Index (*SHEI*). Fragstats software was used to compute these metrics at the landscape level and hence quantify changes landscape structural complexity of Niamey (McGarigal et al., 2002).

The number of patches (NP), a simple measurement of the landscape composition determines the degree of heterogeneity or fragmentation of that landscape. The more the number of patches, the more fragmented the landscape is.

The Largest Patch Index (*LPI*) is the proportion of the landscape area occupied by the largest patch*i* (max $_{(i)}$). It was calculated as follows:

$$LPI(\%) = \frac{max\ (i)}{A} \times 100$$

A is the total landscape area. The *LPI* values vary from $0 \leq LPI \leq 100$. It is even close to zero when the patch area becomes smaller. Thus, the greater the *LPI*, the less the landscape will be fragmented (McGarigal et al., 2002).

The Shannon Diversity Index (*SHDI*) is commonly used in landscape ecology (Lampin, 2004; Shi et al., 2008; Wu et al., 2011) and was computed by the following formula:

$$SHDI = -\sum_{i=1}^{N} (P_i * lnP_i)$$

With P_i the proportion of the landscape covered by a class*i*; *N,* the number of classes in the landscape. *SHDI* ≥ 0. *SHDI* is close to zero when the landscape is dominated by a single patch and increases with the number of different patch types and/or when the proportional distribution of area among patch types becomes more equitable.

The Shannon Evenness Index (*SHEI*) commonly known as Pielou index evaluates the distribution of patches per land use class in a landscape.

$$SHEI = \frac{-\sum_{i=1}^{N}(P_i * lnP_i)}{lnN}$$

Its value ranges from 0 to 1. The more randomly distributed the patches are, the higher the index.

Contagion index provides information concerning the landscape texture through an assessment of the degree of aggregation and dispersion of patches (Leitão et al., 2006). It was calculated as follows:

$$contagion = \left[1 + \frac{\sum_{i=1}^{N}\sum_{k=1}^{N}\left[(P_i)\langle\frac{g_{ik}}{\sum_{k=1}^{N}g_{ik}}\rangle\right] * \left[ln(P_i)\langle\frac{g_{ik}}{\sum_{k=1}^{N}g_{ik}}\rangle\right]}{2ln(N)}\right] x100$$

With *Pi* the proportion of the landscape occupied by class *i*; g_{ik} the number of adjacencies between pixels of classes *i* and *k* based on the double-count method; *N* the number of classes present in the landscape, including the landscape border if present. Its value ranges from 0 to 100 (0 <contagion ≦ 100). The contagion index is close to 0 when the patches are equidistant and disaggregated to the maximum; it is close to 100 when the landscape is composed of a single patch (McGarigal et al., 2002).

Land use land cover change driving forces analysis and implications

The increase in urban population has an impact on the urbanization pattern all over the world. Understanding how this increase relates to urban environment is therefore an asset in landscape planning. In this study, the Pearson correlation coefficient was used to determine the relationship between land use patterns and changes in the population size of Niamey. The correlation coefficient was calculated using the software R.

RESULTS

Land use land cover mapping

Image classification assessment determines its reliability (Chen and Stow, 2002). In this study the overall accuracy and the Kappa index ranging respectively from 90.58 to 94.33 % and 89 to 94% indicate a very good to excellent classification, according to Landis and Koch (1977). Nevertheless, LULC map of 1975 recorded the lowest values and the built-up classes had the highest level of commission and omission errors.

Thirteen LULC classes were identified for each date and grouped into three categories according to the associated activities and functions thereto: classes "Rain-fed farmland", "Irrigated farmland" and "Agroforestry park" constitute the "Agricultural zone" category; classes "Green belt", "Green space" and "Plateaus" up to the "Vegetation
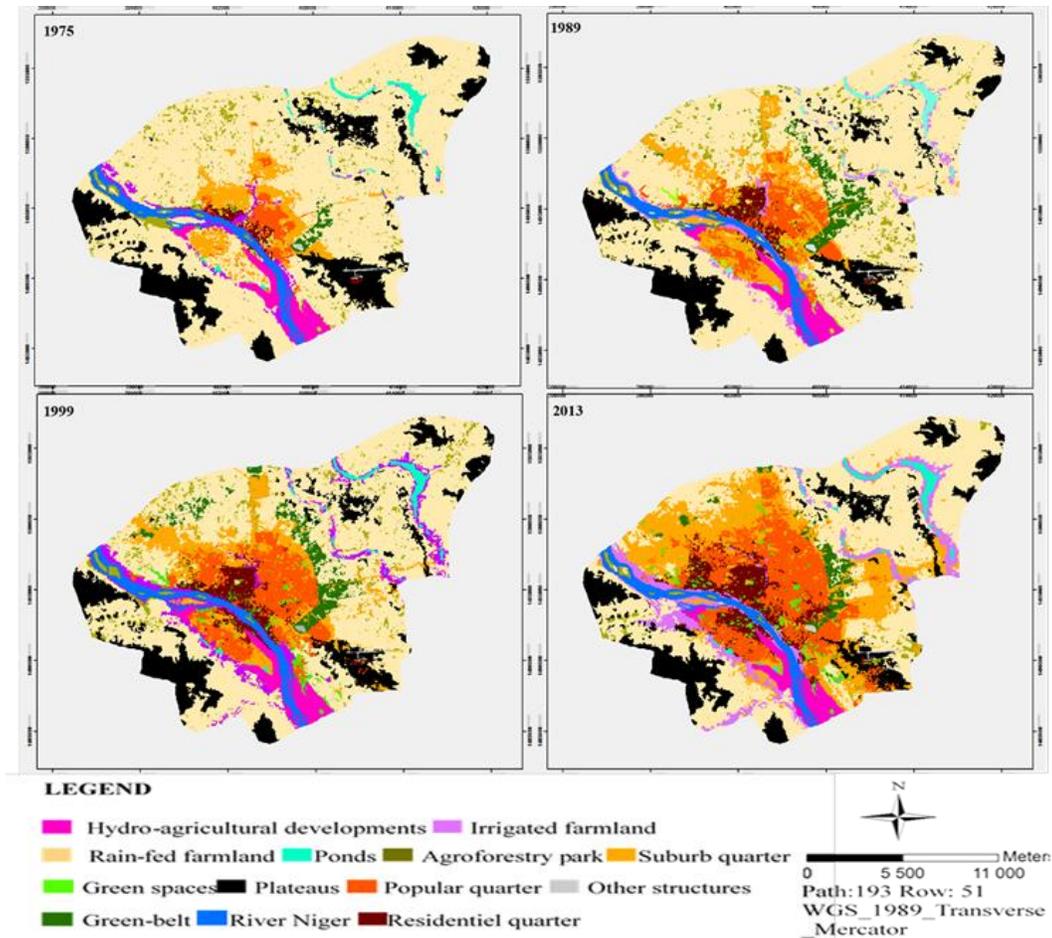
Figure 2. LULC maps of Niamey City from 1975-2013.

zone" category; and classes "Residential quarter", "Popular quarter", and "Suburb quarter" constitute the "Built-up areas" category.

The different quarters were differentiated based on their socio-economic and architecture characteristics. Thus, the "Residential quarter" represents areas with low population density living in large, high standing edifices (800 to 1200 m²). The "Popular quarters" are areas with high population density and where houses are small and made of clay/definite materials. As for the "Suburb quarter" or new neighborhoods, they represent the class with a relatively low population density and houses made of solid materials. The lot sizes vary between 200 and 400 m². The "Rain-fed farmland" are lands cultivated only during the rainy season while the "irrigated farmland" consist of vegetable croplands and gardens. The "Agroforestry Park" are equivalent to "Rain-fed farmland" but with a higher density of trees.

Other classes such as "River Niger", "Ponds", "Hydro-agricultural developments" and "Other structures" were also identified. The aim of this work being the study of the

LULC dynamics, they have been excluded from the analysis because of their relatively stable character in terms of temporal variability.

Land use land cover dynamics

The analysis of the four LULC maps (1975, 1989, 1999 and 2013) reveals that "Rain-fed farmland" class is the landscape matrix. It covers more than 37% of the total area, during the entire study period (1975-2013) (Figure 2). Figure 2 also displays two patterns of urban expansion: in a concentric manner and alongside roads development.

Land use land cover change analysis

The different LULC classes and categories identified in this study experienced several transformations characterized by changes in area (Figure 3), transition among
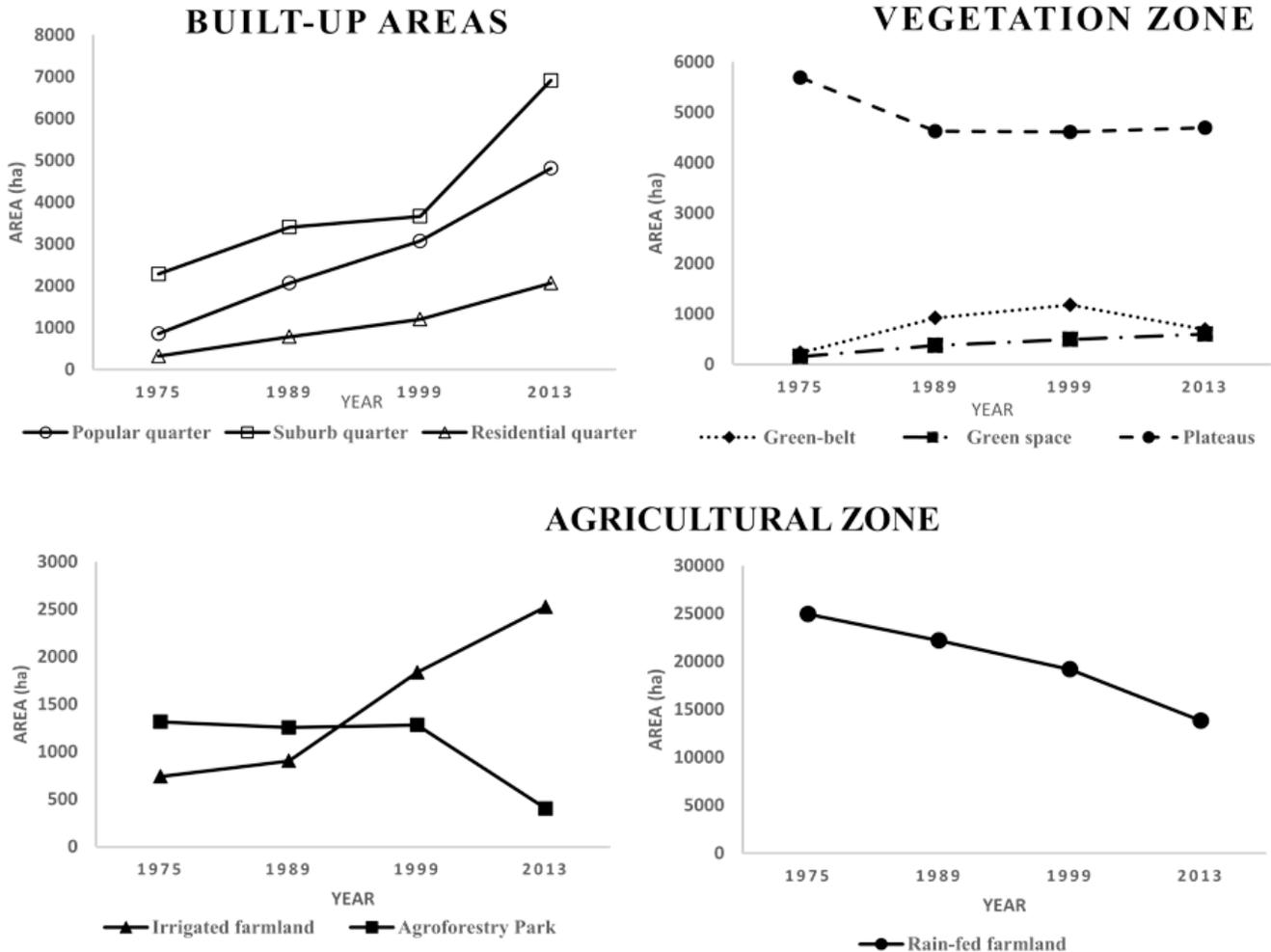
Figure 3. LULC change in area from 1975-2013.

Table 1. Global transition matrix (1975-2013) for the three land use categories.

	Agricultural zone	Vegetation zone	Built-up areas	Total
Agricultural zone	**42.59**	4.20	27.10	73.89
Vegetation zone	3.07	**11.67**	1.89	16.62
Built-up areas	0.22	0.51	**8.76**	9.49
Total	45.88	16.37	37.75	**100.00**

land use classes (Tables 1 and 2), and spatial structure and configuration (Table 3). Thus: The "Built-up area" classes increase continuously over the 38 years period. They are characterized by 28.26% of net increase in area (from 9.49% of the total area in 1975 to 37.75% in 2013). This increase is due to the conversion from "Agricultural zone" and "Vegetation zone" categories. In fact, the "Built-up area" classes gained 27.10% of "Agricultural zone" and lost 0.22% of its area in favor to the later: a net

gain of 26.88 %. "Built-up area" classes also recorded a net gain of 8.76% from "Vegetation zone" classes. It obtained 8.76 % of its area from the conversion of "Vegetation zone" category against 0.51 of it becoming "vegetation zone". Furthermore, the overall annual expansion rate of these "Built-up area" category varies considerably with the lowest rate of 2.38% recorded in T2 (1989-1999) (Table 3). During this period, the "Suburb quarter" class is the most abundant. An internal change

Table 2. Transition matrix of land use classes (%) between 1975, 1989, 1999 and 2013 after superposition of the two land maps (1975-1989; 1989-1999; and 1999-2013).

	IF	RF	GB	GS	Park	Plt	Pop	Sub	Res	Total
1975-1989										
IF	1.01	0.41	0.00	0.05	0.03	0.00	0.23	0.15	0.14	2.03
RF	1.26	53.08	1.87	0.45	2.72	1.37	1.61	5.61	0.28	68.26
GB	0.00	0.05	0.54	0.00	0.00	0.00	0.01	0.03	0.00	0.63
GS	0.01	0.01	0.00	0.16	0.00	0.00	0.03	0.04	0.17	0.43
Park	0.10	2.62	0.07	0.03	0.64	0.02	0.01	0.11	0.00	3.60
Plt	0.01	4.15	0.00	0.00	0.04	11.21	0.08	0.07	0.01	15.57
Pop	0.01	0.01	0.00	0.05	0.00	0.01	1.73	0.35	0.20	2.35
Sub	0.04	0.42	0.04	0.24	0.01	0.02	1.88	2.94	0.67	6.26
Res	0.03	0.00	0.00	0.05	0.00	0.02	0.09	0.02	0.69	0.89
Total	2.48	60.75	2.52	1.03	3.44	12.66	5.66	9.32	2.15	100.00
1989-1999										
IF	1.76	0.35	0.00	0.04	0.05	0.00	0.03	0.05	0.19	2.48
RF	2.40	47.83	1.29	0.30	2.39	2.02	0.62	3.82	0.09	60.75
GB	0.00	0.63	1.73	0.00	0.00	0.00	0.02	0.13	0.00	2.52
GS	0.06	0.05	0.00	0.41	0.00	0.00	0.07	0.12	0.32	1.03
Park	0.24	1.86	0.06	0.03	0.86	0.04	0.01	0.34	0.00	3.44
Plt	0.02	1.52	0.00	0.00	0.13	10.53	0.16	0.26	0.02	12.66
Pop	0.17	0.04	0.01	0.15	0.00	0.00	4.63	0.31	0.34	5.66
Sub	0.31	0.26	0.13	0.28	0.08	0.00	2.76	4.96	0.55	9.32
Res	0.06	0.00	0.00	0.15	0.00	0.01	0.12	0.03	1.78	2.15
Total	5.03	52.53	3.23	1.36	3.51	12.61	8.42	10.02	3.29	100.00
1999-2013										
IF	3.77	0.40	0.00	0.03	0.00	0.00	0.12	0.40	0.31	5.03
RF	2.40	33.85	0.52	0.29	0.52	1.84	1.33	11.59	0.19	52.53
GB	0.00	0.65	1.34	0.01	0.00	0.00	0.16	1.00	0.06	3.23
GS	0.05	0.02	0.00	0.49	0.00	0.00	0.24	0.26	0.30	1.36
Park	0.31	1.67	0.00	0.05	0.52	0.03	0.08	0.84	0.01	3.51
Plt	0.02	1.01	0.00	0.02	0.06	10.79	0.35	0.31	0.05	12.61
Pop	0.07	0.00	0.00	0.14	0.00	0.02	7.22	0.20	0.77	8.42
Sub	0.11	0.25	0.02	0.34	0.00	0.16	3.47	4.24	1.43	10.02
Res	0.19	0.00	0.00	0.27	0.00	0.00	0.22	0.07	2.54	3.29
Total	6.91	37.87	1.88	1.64	1.10	12.84	13.17	18.91	5.66	100.00

Land use land cover classes: Irrigated Farmland (IF), Rain-fed Farmland (RF), Green-belt (GB), Green space (GS), Agroforestry Park (Park), Plateaus (Plt), Popular quarter (Pop), suburb quarter (Sub), Residential quarter (Res).

Table 3. Values of some landscape indices calculated for the study period.

Indices	1975	1989	1999	2013
Patch Number (NP)	1701	2071	2674	2348
Contagion (%)	67.88	61.5415	56.6485	53.80
Largest Patch Index (%)	47.27	38.1190	21.64	9.94
Shannon Wiener diversity	1.3635	1.6149	1.8098	1.96
Shannon Evenness	0.5316	0.6296	0.7056	0.77

Table 4. Correlation (Pearson's product-moment correlation) between population size and land use categories (P-value).

	Built-up areas	Agricultural zone	Vegetation zone	Population size
Built-up areas	1.000			
Agricultural zone	-0.999$^{(0.0007)}$	1.000		
Vegetation zone	-0.137$^{(0.86)}$	0.101$^{(0.90)}$	1.000	
Population size	0.995$^{(0.005)}$	-0.998$^{(0.002)}$	-0.034$^{(0.97)}$	1.000

among "Built-up area" classes was recorded. It consists of a mutation among quarters that is more important in the "suburb quarter" class. It becomes either "popular quarter" (3.44 %) or "residential quarter" (1.78 %).

With regard to the "Vegetation zone" classes, "Green space" demonstrates an increase in area over the study period. "Green-belt" class increases from 1975 to 1999 and decreases from 1999 to 2013 while "Plateaus" class shows the opposite trend. The increase in "Green space" resulted mostly from the conversion of "Built-up area" and "Rain-fed farmland" classes while the areal gains in "Green-belt" class are mainly caused by the conversion of "Rain-fed farmland" and "Agroforestry Park" classes. During the recent period, part of "Green-belt" classes is transformed into "Built-up" areas (1.22%) and "Rain-fed farmlands" (0.65%). The "Plateaus" class is converted into farmlands during T1 (1975-1989) and T2 (1989-1999), meanwhile during T3 (1999-2013); it gained area from "Rain-fed farmland" class.

The agricultural zone lost 28% of its total area to all other land use categories. Nevertheless, two evolutionary trends are observable in the area; namely an increase in the size of the class "Irrigated farmland" and a reduction of those of "Agroforestry Park" and "Rain-fed farmland" (Figure 3). The loss in "Rain-fed farmland", "Agro forestry Park" and "Built-up" classes contributed to the increase of "irrigated farmland" class. As for the class "Rain-fed farmland" and "Agroforestry Park" classes, they lost respectively 34.96 and 69.44% of their area for all other land use classes. They are the main distributor in the area for the whole study period (Table 2).

Landscape structure analysis

The analysis of the landscape structural dynamics was done using the calculated indices at the landscape level (Table 3). Two trends are observed in the landscape composition: an increase in NP from 1975 to 1999 and a decrease from 1999 to 2013. This suggests an increasing fragmentation of landscape from 1975 to 1999 followed by an aggregation of patches in 2013.

Moreover, values obtained for Shannon Diversity and Evenness Indices increase throughout the study while that of the Largest Patch and Contagion indices decrease

(Table 3). These suggest that the landscape patches vary in shape and become increasingly small, equidistant and disaggregated in the landscape.

Vectors of land use land cover change and implications

Urbanization is a phenomenon of demographic and spatial expansion. The assessment of the interrelationship between the population size, "Built-up area", "Agricultural zone", and "plantation zone" was carried out through Pearson correlation analysis; hence, strong correlations are identified between land use categories/classes and population (Table 4). Thus, a strong positive correlation of about 0.99 (*P value = 0.005*) is found between populations and "Built-up" areas while there is a strong negative correlation (*R = -0.997 P = 0.0023*) between population size and "Agricultural zone". However, there is a strong positive correlation(*R = 0.9762 (P= 0.024)*) between "irrigated farmland" and populations.

DISCUSSION

The Kappa values above 81% obtained during the study showed that the mixed classification method is reliable and statistically acceptable (Landis and Koch, 1977). The lower resolution of the Landsat MSS sensor relative to that of TM, ETM+ and OLI sensors impacted on kappa and overall accuracy values recorded for the 1975 map. With regards to land use land cover classes, "Built-up" classes such as "Popular quarter" and "Residential quarter" were those with higher percentage of commission and omission errors as compared to other classes. Indeed, they were sometimes difficult to delineate although their typology is known, hence the high error percentage.

The city of Niamey is subject to urbanization like other Sahelian cities (Kessides, 2006). This phenomenon characterized by an increase in "Built-up" area at varying expansion rate is a response to the growing spatial demand by a burgeoning population and the annexation of outlying villages (Motcho, 2004; Institut National de la Statistique, 2013). Of the three periods of this study,

namely T1 (1975-1989), T2 (1989-1999) and T3 (1999-2013), the period T2 recorded the lowest rate of built-up expansion. This could be explained by the new urban planning policy and the economic crisis of 1990/2000 (Urbaplan, 2009). Indeed, with the advent of multipartite democracy in the early 90s, Niamey has experienced a significant increase in the number of new lots. But the economic crisis at that time, in synergy with the non-servicing of lots has greatly limited the urban development. In addition, an urban policy for the reduction in lot size was adopted to reduce the impact of buildings on the horizontal space in order to meet the growing demand for housing by the burgeoning population and promote constructions in height. Thus, the reduction in the size of new lots by developers and the economic crisis have significantly impacted not only on the "suburb quarter" expansion rate between 1989 and 1999 but also the density of homes in "popular quarter" and "suburb quarters" (Issaka, 2013). Nevertheless, it should be noted that period T2 span is the shortest of the three periods and the northeast limit of the city, the green belt was achieved by 1989 (Urbaplan, 2009): these could have contributed to the reduction in the expansion rate between 1989 and 1999.

Two main growth modes could be defined from the dynamics of the Niamey urban landscape: (i) a concentric development around the historic town center and (ii) an extension along the roads. This corroborates the findings of Urbaplan (2009), suggesting that the city of Niamey is structured in five main radials of national and international importance and that the urban area is characterized by a concentration of houses and densification of the population in the quarters, especially popular ones. This sprawl contributes to geographical differences in wealth and quality of life among the "Residential", "Popular", and "Suburb" quarters and thus becomes a social segregation factor that accentuates the urban divides and reduce urban mobility (Ravalet, 2009). The growth mode of Niamey city is consistent with the theory of Dietzel et al. (2005) which states that urbanization process is generally performed by alternation between two phases: diffusion and coalescence. Diffusion is the expansion of urban areas from existing centers while coalescence is distinguished by the formation of new nuclei and filling in the gaps in existing spaces. This type of development is observable in many cities of the world (Deng et al., 2009).

Urban expansion leads to a change in the structure and function of the landscape (Park, 2013). The landscape indices analysis carried out in this study revealed that the landscape is highly fragmented and heterogeneous. Indeed, according to Shi et al. (2008), increase in diversity and Shannon evenness indices could be used as indicators of fragmentation and heterogeneity of an ecosystem under intense exploitation and reconstruction. The same indices have allowed Wu et al. (2011) to highlight increasing urbanization in Phoenix and Las Vegas cities (United States of America) with their consequent landscape fragmentation and patch distribution. In general, the observed fragmentation and heterogeneity of Niamey landscape patches are typical of urban ecosystem as suggested by many authors worldwide (Deng et al., 2009; Wu et al., 2011; Abebe, 2013; Ramachandra et al., 2012).

Urbanization characterized by a spatial expansion and a demographic growth is the main driving force of land use land cover change pattern in Niamey. It has impacted on agricultural activities through a significant conversion of agricultural land, mainly "Rain-fed farmlands" and "Agroforestry Park" into "Built-up" areas. However, recurrent droughts and the urban firewood supply have also contributed to the reduction in "Agroforestry class" size. Even though urbanization has significantly reduced the agricultural lands, it has also favored the development of "irrigated farmland" as a response to the growing urban food demand (Andres, 2012); hence the significant positive correlation found between the increase in built-up areas and that of "irrigated farmlands". As the urban population increases, many development programs have been implemented by government and its technical partners and even private initiatives in order to develop wetlands and irrigated farmlands for the reduction of food insecurity crises in Niamey city and its environs.

Another impact of the urbanization observed during this study is the depletion of the "Green belt" of Niamey. This "Green belt" originally designed to improve the living environment of the urban population and to protect the city against the dust, experienced strong reduction in its area over the last 13 years as a consequence of increase in "Built-up area" with no respect of laws and regulations. In fact, the increase in area of the "Green-belt" class observed during periods T1 and T2 is the expression of tree planting processes for the creation of the "Green belt" which started in1965 and ended in 1993. During the last period T3 (1999-2013), a depletion was observed. This could be attributed to uncontrolled urbanization, garbage dumps, excessive cutting of trees, illegal occupants. They contributed significantly to the "Green belt" depletion process observed in T3. Despite the existence of laws and regulations concerning the management of green areas in Niger, 14 lots occupying 603.71 ha (28%) of the original area of the green belt have emerged by 2010 (Comité interministériel, 2010).

Conclusion

Remote sensing and landscape metrics are adequate and reliable tools to understand the spatial and temporal changes of urban landscape. They contribute effectively in urban planning.

This study allowed one to characterize the landscape of the capital of Niger and assess the impacts of

urbanization on the structure and evolution of the latter. Indeed, three main land use land cover categories were identified. The result shows that urbanization is the main driven force for Niamey landscape change pattern. It involves the increase in "Built-up area" alongside a conversion in cultivation system ("Irrigated farmland" become more privileged). The "built-up area" increases through a densification of the habitations and a sprawl along communication lines. "Rain-fed farmland" and "Agroforestry park" classes are the principal distributors in area.

This study gives a better picture of the urban growth in Niamey and is cost-effective. Niger is the poorest country of the world and relies greatly on partners and stakeholders for the conception and implementation of urban plans. The availability of updated and cost-effective data on urban development is an asset and an alternative towards the conception of sustainable city plan in the future. The findings of this study represent a valuable tool for city planners in that it is the basis for understanding the dynamics of Niamey city and the foundation for a sound decision making process. More studies are however needed in urban ecosystems of Niger in general and Niamey in particular in order to move towards a sustainable city and improve the population's living conditions.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Dimensions of spatial inequalities in Ghanaian cities

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In many African countries, spatial inequalities in the provision and distribution of social services can be explained by a myriad of factors including the development approaches adopted in their colonial history. This paper explores the spatial inequality among cities in Northern and Southern Ghana as evident in the availability of infrastructural facilities such as health, education, telecommunication, and potable water. Using secondary data from various government documents, the paper sought to explain the contours of spatial inequality among six major and strategically located cities in Ghana- three each in northern and southern parts of the country. The paper uses Lorenz curve as the main technique in establishing spatial inequalities among the selected cities. The paper reveals that provision of and access to schools, hospitals and other social services tend to favour the southern parts of the country hence influencing the spatial distribution of population. This dichotomy took its roots from the colonial administration, which favoured the development of the mineral rich parts of Ghana to serve the interests of their metropolitan markets. Unfortunately, this skewed spatial development approach has been perpetuated by all post-independence governments due to their subtle but continuous dependence on their colonial masters. The paper recommended investments in intermediate settlements in the three northern regions to serve as service centres to stimulate the development of Northern Ghana.

Key words: Spatial inequalities, disparities, infrastructural facilities, cities.

INTRODUCTION

UNDERSTANDING THE NATURE OF SPATIAL INEQUALITY

Spatial inequality refers to a "condition in which different spatial or geographical units are at different levels on some variable of interest, usually (average) income" (Lall and Chakravorty, 2004). Spatial inequalities can also be defined as the uneven distribution of economic and social indicators of human wellbeing within or among geographical units such as countries, cities, rural/urban areas, and regions (Aryeetey et al., 2009). Aryeetey et al. (2009)'s definition of spatial inequality relates more to the socio-economic states of wellbeing and condition pertaining to a geographical unit and not the mere measurement and comparison of the indicators depicting those states. However, spatial inequality in this sense requires a deeper understanding and explanation of the concept of space and spatial differentiation.

The concept of space began to feature in the study of inequality in limited ways (DeVerteuil, 2007; Gotham, 2003; Lobao, 1990; Lobao et al., 2008; Tickamyer, 2000). The various theories of economic geography provide different causal explanations for spatial inequality and elicit different policy responses to combat inequality. In general, spatial inequality is the net result of the balance of forces of concentration and dispersion. For example, location and landscape features shape the distribution of infrastructure and public goods, which leads to spatial inequalities between regions (Escobal and Torero, 2005). Kim (2008) argues that spatial inequality is fundamentally determined by the location decisions of the state. Kim's assertion reflects the case in most African countries where most locational decisions are spearheaded by state and responded to by private individuals, households and businesses. He argues that firms choose locations to maximize profits whereas households do so to maximize job market outcomes and utility (Kim, 2008).

Spatial inequalities are multidimensional. This is because aside the traditional forms of inequalities, new forms of inequalities have emerged. The traditional forms range from different levels of human capabilities and opportunities, participation in political life, consumption, and income, to disparities in living standards and access to resources, basic services and utilities (UN-HABITAT, 2008a). The newly emerged forms of inequalities according to the UN-HABITAT (2008a) include disparities in access to communication technologies and skills, which have led to "digital exclusion" resulting in the marginalization of regions within a globalizing economy. Overlapping reasons such as historical and cultural development, differential endowments in natural resources, human capital and local political economy have all been identified as contributory factors for the existence of intranational spatial inequality. These could be broadly grouped into socio-cultural, economic and political factors of inequalities among spatial units.

Socio-cultural factors such as values and traditions either encourage or discourage innovation and entrepreneurship, and social and economic mobility leading to inequalities (United Nations Economic and Social Council, 2001). For instance many rural regions and communities offer only agricultural and primary opportunities that limit the productive capacities of their people. Within these poorly endowed rural regions limited socio-economic opportunities and traditional methods of production lead to continuous stagnation or retrogression of the local economy. Residents of these deprived rural areas are therefore forced to depend on well-endowed urban regions for support. Since most rural families are engaged in agriculture, climatic conditions largely affect their income levels. These families therefore constantly keep contacts with their extended families to reduce vulnerability and spread the economic risk. With its larger population size, urban society is characterized by more diversified but less personal relationships leading to

people living and working together without developing their level of sentimental and emotional ties characterized in rural areas (United Nations Economic and Social Council, 2001). However, social values and norms change and can be changed over time due to the fact that population sizes of rural areas usually increase with time resulting in a more urbanized society.

Political factors may also account for inequalities among spatial units particularly between rural and urban areas. Policies formulated and implemented in urban areas usually have far-reaching ramifications on rural areas. Continuous investments in urban areas, usually by governments in developing countries, widen the development gap between rural and urban regions. The impacts of such urban-biased development approaches have dire consequence for rural areas which always lag behind fast developing urban areas. This political factor of spatial inequality also presents a development paradox in many developing countries. Thus, while governments in these countries always stress the importance of developing the agricultural sector and improving the living conditions in the rural areas, the still direct most of their investments to the urban areas due to their potentials for rapid growth (United Nations Economic and Social Council, 2001). This results in the concentration of infrastructural facilities and services in urban areas, which ultimately lead to improved access to social and economic services and opportunities. As a result, rural areas become less endowed leading to the widening gap of inequality. Even though urban areas are generally known to be better developed than rural communities, there are higher income inequalities in cities. This implies that inequalities at the country level therefore do not necessarily reflect the nature and extent of inequalities across cities and between rural and urban areas. For example, income inequality in Maputo is significantly higher than the national average, making it the most unequal city in Mozambique (UN-HABITAT, 2008b).

The next major factor of spatial inequalities is economic, manifested in trade and the movement of people, goods and services. According to Kim (2008), unless regions and their cities have identical exposure to trade and similar comparative advantage, foreign trade is likely to increase spatial inequality. More likely, regions and cities that have natural resources for exports or natural advantages such as proximity to rivers, coasts, and transportation networks are likely to benefit from external trade whereas those in remote areas are not (Kim, 2008). Inequalities resulting from natural factors such as natural resource endowments are largely invariable and therefore much more difficult to address.

Although a boom in trading activities could translate into economic growth and thus lead to inequalities, recent evidence suggests that economic growth does not necessarily lead to spatial inequalities but rather the inability on the part of government and relevant actors to implement the appropriate development interventions. In

this regard, lessons can be picked from China and India, which both regard export and service-oriented activities in their cities as the sources of their fast growing economies. China, which had extremely low levels of inequality in the 1980s and 1990s, was able to lift more than 500 million people out of $1-a-day poverty between 1981 and 2004 (UN-HABITAT, 2008b). On the contrary, India, which had higher levels of inequality during this period, only managed to raise 60 million people above the poverty line between 1983 and 2000 (UN-HABITAT, 2008b). This situation can be attributable to the fact that in India, there is a bias for the implementation of industrial development policies at the expense of the provision of public goods whereas in China attention is paid to both, particularly in urban areas (UN-HABITAT, 2008b).

Spatial inequalities also exist in Ghana, often reflected in disparities in the distribution of infrastructural facilities among rural and urban areas and between the North and South. Using data from the 1960, 1970, 1984 and 2000 census, the paper analyses the dimensions of spatial inequalities that exist in Ghanaian cities. According to Songsore (1989), colonial dependency is at the root of the inequalities so evident in the Ghanaian space economy. He argues that during the colonial era, Ghana was developed as a satellite nation to export food and raw materials to Britain and to consume manufactured products from the latter (Songsore, 1979). Hence, prior to the 1980s, differential policies were pursued in the North (Northern, Upper-East and Upper-West Regions) and the South (the rest of Ghana) to ensure labour flows from the former to facilitate the export industry in the South. Songsore (1989) argued that dependency and capitalist penetration, which under colonialism shaped the internal structure to fit the needs of the colonial metropolis, continue under neo-colonialism to distort the internal patterns of production, and the spatial organization of economic and social activity. His sentiment underlies most studies undertaken on spatial inequality in Ghana.

The above discussions provide the basis for the paper. The paper explores spatial inequalities in terms of access to social services between cities in northern and southern Ghana. It aims at establishing the nature of inequalities in the provision and distribution of educational, tele-communication and health services among selected cities in northern and southern Ghana.

Trends and causes of spatial inequalities in Africa

Spatial inequalities in the provision and distribution social services present significant economic and political challenges for the governments of many developing countries, especially in Africa.The manifestation of this phenomenon has been seen in rural-urban and regional disparities in social and economic indicators.   For instance, Venables (2005) argues that for 50% of African countries, the percentage of people lacking access to basic facilities in rural areas is double that of urban areas. According to Kim (2008), this trend seems to increase with economic growth and development. On regional basis, Latin America and Africa continue to experience higher levels of inequalities with about just 5% of the population receiving a quarter of all national income, compared to South-eastern Asian and Western developed countries, where the wealthiest 5% receive 16 and 13%, respectively (UN-HABITAT, 2008b). In Africa, inequalities are more pronounced in Sub-sahara Africa than in North Africa. For instance, access to basic social services among urban areas in North African countries is higher than in Sub-saharan African countries. For example, urban access to potable water level in Sudan and Mauritania was 78 and 59% for respectively, which is very substantial compared to the 29 and 21% levels recorded in Guinea Bissau and Sierra Leone respectively (UN-HABITAT, 2008b).

Spatial inequalities in Africa vary among sub regions, countries, cities, and rural and urban areas as can be seen in Table 1. From Table 1, the highest level of inequality in rural and urban areas of Africa was recorded in rural areas of Namibia with the incidence being more pronounced in urban areas than in rural areas. The available economic opportunities in urban areas and the already high urban population sizes have led to high in-migration rates and natural population increases which further translate into high population growth rates. With limited available resources to satisfy the needs of the growing population in terms of health, education, potable water supply and adequate shelter among others, the phenomenon assumes an alarming proportion.

High economic growth rates are not the only factors, which account for rising inequalities in Africa but also inability of national governments to develop pro-poor policies to alleviate inequalities. Countries such as Ghana, Mozambique and Tanzania, which have been experiencing rapid economic growth in recent years as well as countries experiencing slow growth, such as Cameroon and Côte d'Ivoire, have all recorded rising spatial inequality in terms of access to social services (UN-HABITAT, 2008b). According to the UN-HABITAT (2008b), inequalities in African cities can be traced to their colonial past, but are also reinforced by post-colonial institutions, which are characterized by corruption, fragile and ineffective local governments, poor governance and monopolized access to assets, particularly land, which is often in the hands of the political and economic elite. It is therefore not surprising that measures, which have been taken by governments to address inequalities, have usually proven futile. Structural Adjustment Programmes (SAP) aimed at alleviating poverty and subsequently inequalities especially in urban areas have rather aggravated urban poverty and inequalities as they took off subsidies for basic services. In urban Kenya, for instance, the gini coefficient rose from 0.47 in the 1980s

Table 1. Urban and rural Gini coefficients for selected African countries.

Country	Urban	Rural
Algeria	0.35	0.36
Egypt	0.39	0.32
Morocco	0.38	0.32
Benin	0.45	0.34
Botswana	0.54	0.41
Cote d'Ivoire	0.49	0.48
Kenya	0.45	0.38
Mozambique	0.48	0.37
Namibia	0.62	0.66
Rwanda	0.52	0.44
Sierra Leone	0.33	0.36
Tanzania	0.36	0.33
Uganda	0.48	0.36
Zimbabwe	0.6	0.58

Source: UN-HABITAT, 2008b.

to 0.575 in the 1990s largely as a result of SAPs, poor governance and other factors that adversely affected the urban poor (UN-HABITAT, 2008b).

The foregoing underlies the patterns of movements on the continent and continuous widening of the poverty gap between economically endowed cities/regions and less endowed ones. African governments continue to consolidate investments in economically active cities to the neglect of intermediate towns and rural areas. This state induced spatial inequalities between cities and regional areas in Africa sets the context for this paper.

APPROACH AND METHODOLOGY

The main technique used in this paper is the Lorenz curve and Gini coefficient analysis of access to social services among the six selected cities in southern and northern Ghana. According to the UN-HABITAT (2008b), the Gini co-efficient analytic is the most commonly used means of assessing inequalities in terms of incomes, provision and distribution of socio-economic facilities. The Gini ratio largely depends on the Lorenz curve, an analytic which explains the various proportions of the population that control the various proportions of incomes, resources as well as having access to which proportions of social services. Ideally the Gini ratio is expressed as an index or a percentage. As an index the Gini ratio ranges between 0 and 1; while as a percentage it ranges between 0 and 100%. There is perfect equality in a society/community where the Gini co-efficient is 0 and perfect inequality when it is 1 or 100%. Thus the closer the Gini co-efficient is to 0, the more egalitarian an area/region is and the closer it is to 1 (100%), then the more unequal income and resources are distributed among the various sections of society.

Again this study is based on documentary review of existing statistics on the distribution of social services among the major cities in Ghana. Hence the paper is based on a review of secondary data from the various censuses conducted in the country since 1960. In doing this six out of the ten regional capitals (3 each

in the south and north of the country) were purposively selected namely: Accra, Sekondi-Takoradi, Kumasi in the south; and Tamale, Wa and Bolgatanga in the Northern part of Ghana (Figure 1). The selection of these cities was based on the levels of investments and socio-economic activities they have received in the recent past. Accra is the national capital and has received and continues to receive the highest economic and social investments since independence. Kumasi is the second largest city, centrally located and known to be the main traditional and commercial hub of Ghana. Sekondi-Takoradi was Ghana's first port and habour city and currently the oil production city of the country. Contrary to these southern cities, Tamale, Wa and Bolgatanga have received very little in terms of social and economic investments (Ghana Statistical Service, 2005a).

Using the six cities as cases, data on the demographic characteristics, availability and access to social facilities such as health, education, sanitation and water, among others was analysed to establish the dimension and extent of spatial inequality in Ghanaian cities. Analysis of the data is generally qualitative and deductive depicting the trend and dimensions of inequalities among Ghanaian cities. Lorenz curves have been used to show the extent of disparity as far as access to basic services is concerned. The analysis also helps explain the economic, historical, and political factors, which account for the disparities in population distribution, employment opportunities, and accessibility to basic services among the six major Ghanaian cities.

Dimensions of spatial inequality among Ghanaian Cities

Demographic characteristics

Table 2 presents the population sizes and the annual growth rates recorded in the study communities since 1960. From the table, it can be seen that the population of all the six cities increased from 1960 to 1970, at a decreasing rate. However, between 1984 and 2000, Kumasi and Accra experienced an increase in an increasing rate. The decline in the rate of increase recorded in almost all the study cities could be attributed to the harsh economic conditions experienced from 1970 to 1984, resulting in some people migrating to other African countries in search of greener pastures. In addition, the decline in the rate of population increased in the three Northern cities of Tamale, Wa and Bolgatanga from 1984 to 2000 can be explained by the droughts and bush fires which occurred in Ghana in the mid 1980s. These three cities experienced intense magnitude of the drought and bush fires due to the vegetation, which is grass, and dry. This resulted in the working population of these cities migrating to the Southern cities of Accra and Kumasi (Ghana Statistical Service, 2005a).

The uneven distribution of population among these six cities is accounted for by the colonial government's spatial development policy of the creation and development of ports and harbours, good road network and infrastructural facilities in the mineral-rich areas and forest belts to facilitate raw material production for feeding industries in the United Kingdom (Ghana Statistical Service, 2005a). This led to the triangular network of railroad linking Kumasi to Accra -Tema and to Sekondi-Takoradi. Although this network is largely not efficient now, the location still accommodates the bulk of Ghana's trade and exchange activities as well as providing the highest of social and economic services. The unintended consequence of such a policy was that the southern and middle half of Ghana, principally around Accra-Tema, Kumasi and Sekondi-Takoradi, became more developed and, hence, attracted high population concentrations relative to the northern section of the country (Ghana Statistical Service, 2005b). Unfortunately, not much has been achieved to reverse this situation in the post-independence era even though successive governments have
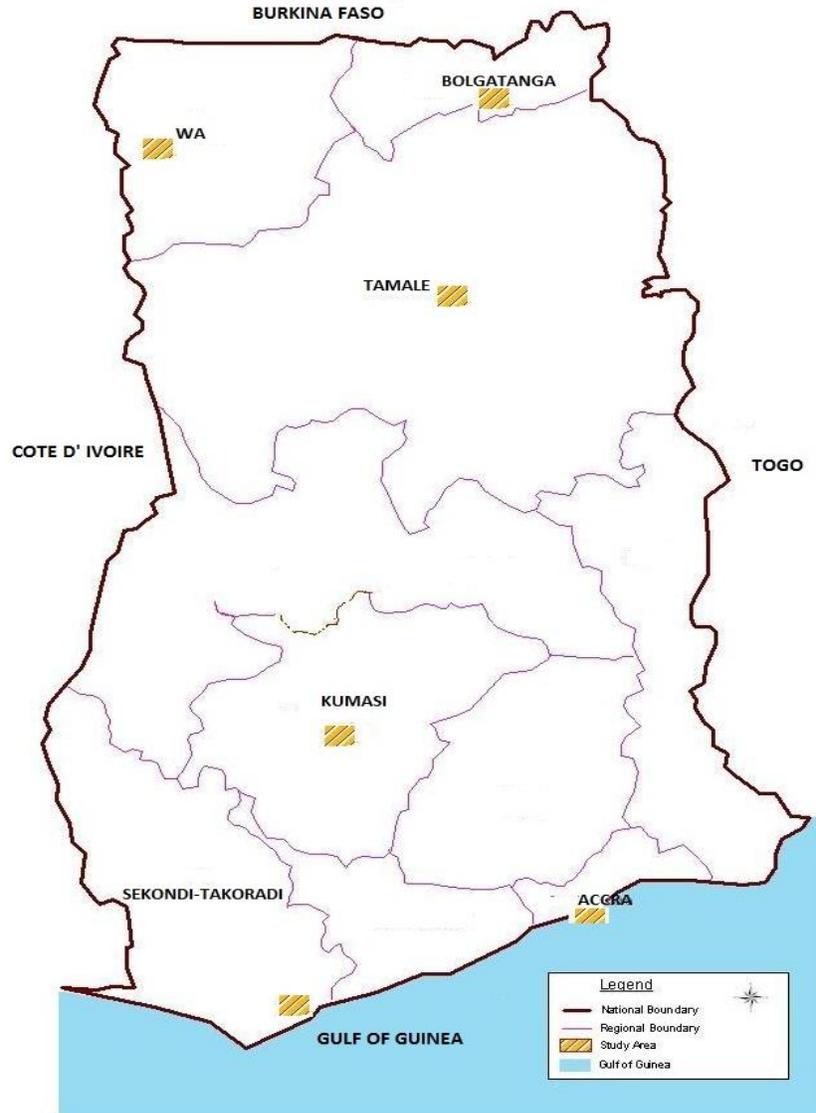
Figure 1. Map of Ghana showing the studies cities. *Source:* Department of Geography and Rural Development, KNUST, 2008.

Table 2. Population size and annual growth rate, 1960-2010.

City	Census Year					Inter-censal Growth Rate			
	1960	1970	1984	2000	2010	1960 - 1970	1970 – 1984	1984 - 2000	2000 - 2010
Accra	388,396	624,091	969,195	1,658,937	1,848,614	4.7	4.4	5.4	2.5
Kumasi	218,172	346,336	496,628	1,170,270	2,035,064	4.6	3.6	8.6	2.7
Tamale	58,183	83,653	135,952	202,317	371,351	3.6	4.9	4.0	2.9
Sekondi-Takoradi	123,313	143,982	188,203	289,593	559,548	1.5	2.7	4.3	2.0
Wa	*	13,740	36,067	66,664	107,214	*	9.6	6.1	1.9
Bolgatanga	*	18,896	32,495	49,162	131,550	*	5.4	4.2	1.2
Total	788,064	1,230,690	1,858,540	3,436,923	5,053,341				

Source: Ghana Statistical Service, 2005; 2012. *-Figures not available.

Table 3. Availability and distances to nearest health facilities (2000).

Cities	Clinic (Distances in Km)					Hospital (Distances in Km)				
	Within locality	1-10	11-20	21-30	31+	Within locality	1-10	11-20	21-30	31+
Accra	98.9	1.1	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Kumasi	100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Tamale	20.0	55.0	18.6	5.7	0.7	12.9	52.8	27.9	5	1.4
Sekondi-Takoradi	36.0	46.9	17.1	0.0	0.0	35.4	18.3	21.2	16.5	*8.6*
Wa	7.3	44.9	27.3	11.8	8.8	1.0	14.6	14	25.3	45.1
Bolgatanga	5.3	65.4	18.6	8.1	2.8	0.6	34.3	32.5	20.4	12.1

Source: Ghana Statistical Service, 2005.
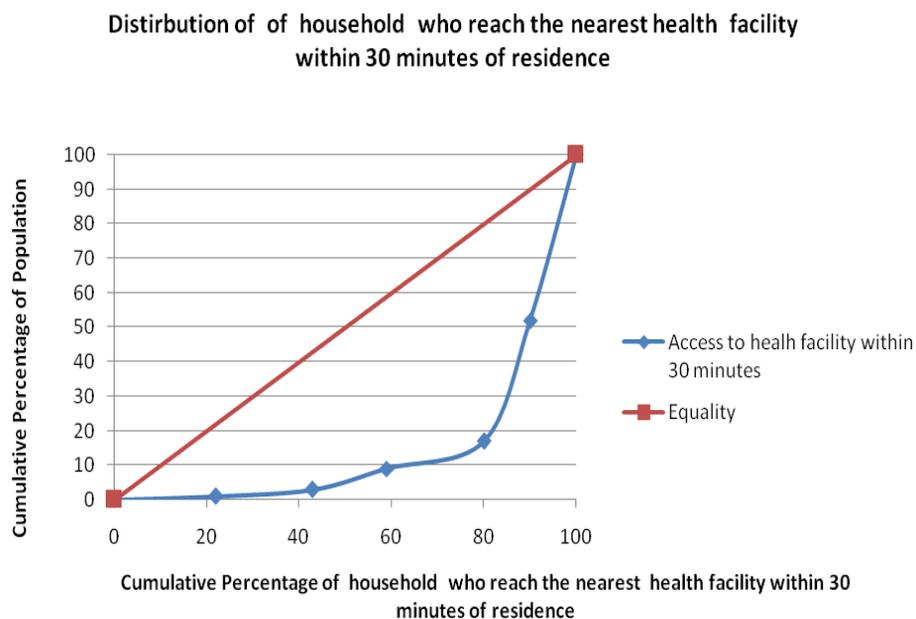
Figure 2. Access to Health Facility within 30 minutes of residence. Gini Co-efficient= 0.83.

made various attempts. Since infrastructure provision is primarily influenced by population size, it suggests that the cities of Kumasi, Accra, and Sekondi – Takoradi have and will continue to enjoy a larger share of investment in infrastructure and services. In an attempt to reverse this emerging trend, the Government of Ghana has instituted the Savannah Accelerated Development Authority (SADA) Act 805 to consciously develop the three Northern Regions and parts of the Brong Ahafo region, which it hopes will help bridge the gap between the north and south of the country. Under the Savannah Accelerated Development program, the government intends to invest a total of US$ 1 billion over a period of 5 years. These investments will be channelled into the development of a comprehensive regional and ecological strategy, modernise agriculture, develop strategic infrastructure, create strong linkage between Northern Savanna and the Sahelian countries, and promotion of a vigorous private sector initiative that strengthen existing private operators. A number of preliminary activities are being undertaken under the program but their impacts in terms of bridging the spatial inequality gap is yet to be felt. The various indicators used to present spatial inequality of access to social services have been discussed below.

Distribution and access to social services

Health

Physical accessibility to health facilities is an important indicator of socio-economic wellbeing. Thus, physical access to health facilities motivates sick people to seek medical treatment whereas low physical access serves as a disincentive to seeking for medical care. Again, health facilities in highly accessible areas facilitate health sensitization exercises as health practitioners are able to reach out easily to the target beneficiaries. Using distance covered to access health facilities in the various cities as an indicator of spatial inequality, the study revealed a high level of bias towards cities in southern Ghana (Table 3 and Figure 2).

Table 3 indicates that accessibility to clinics, which is a lower order health facility, was very high in Accra and Kumasi but very low in Tamale, Wa and Bolgatanga. In these three northern cities,
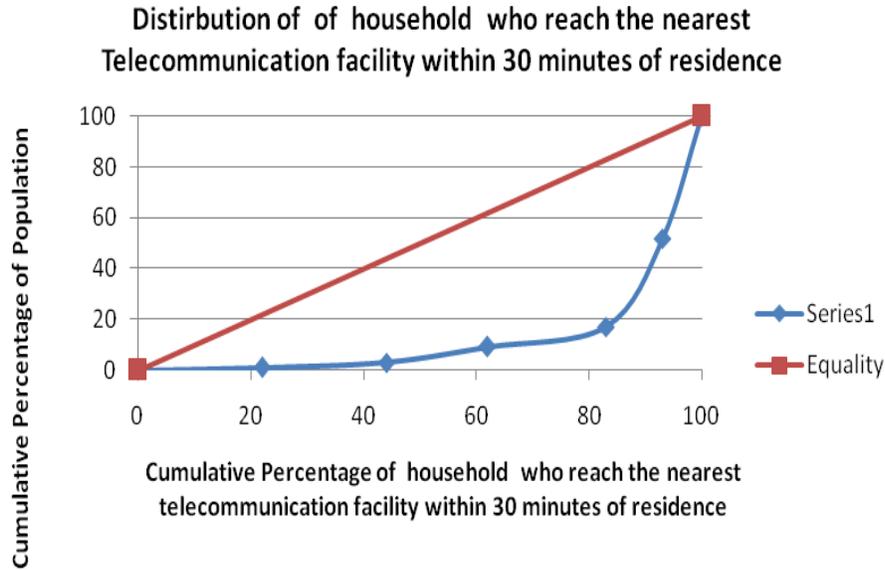
Distirbution of of household who reach the nearest
Telecommunication facility within 30 minutes of residence

Figure 3. Access to telecommunication facilities. Gini Co-efficient= 0.85.

Table 4. Availability and distances to nearest telephone services (2000).

Cities	Telephone (Distances in Km)				
	Within locality	1-10	11-20	21-30	31+
Accra	100.0	0.0	0.0	0.0	0.0
Kumasi	100.0	0.0	0.0	0.0	0.0
Tamale	14.3	52.8	26.4	5	1.4
Sekondi -Takoradi	3.7	43.8	33.7	10.7	8.0
Wa	1.3	17.3	16.3	25.0	40.1
Bolgatanga	0.3	34.3	30.6	23.2	11.5

Source: Ghana Statistical Service, 2005.

20, 7.3 and 5.3% of the localities in Tamale, Wa and Bolgatanga respectively had access to clinics within their localities; whereas over 98.9, 100 and 36% of the localities in Accra, Kumasi and Sekondi-Takoradi respectively had clinics in their localities. In addition, while all residents of Accra and Kumasi have access to hospitals within their localities and 35.4% in Sekondi- Takoradi, Tamale, Bolgatanga and Wa have 12.9, 0.6 and 1% respectively of their residents accessing hospitals within their localities. This has also been depicted with the Lorenz curve in Figure 2.

The access situation to health facilities goes a long way to show the wide disparity among cities in Ghana, especially between those in the south and the north of the country. With gini co-efficient of 0.83, the access to health facilities within 30 min is skewed towards perfect inequality between cities in southern and northern Ghana (Figure 2). The foregoing situation has been largely caused by inadequate health facilities in the northern regions coupled with the dispersed nature of the settlements in that part of the country. The result of this situation has been that of very low health personnel-patient ratios, over-crowding and pressure on the few health facilities in the northern regions and general deterioration of such facilities.

Telephone Facilities and Services

There are also disparities in accessibility to telecommunication facilities including public telephone among the cities as can be seen in Figure 3 and Table 4. From Table 5, Kumasi and Accra have public telephones in each locality whereas Wa recorded the least access with 65.1% of its residents travelling over 20 km to access a public telephone. It must however be noted that with the advent of several mobile phone companies in the country, the impact of this indicator in the socio-spatial disparity in the country is gradually diminishing.

This notwithstanding, Figure 3 also depicts disparity with access to telecommunication facilities in the cities. Showing a gini concentration ratio of 0.85 on the Lorenz curve, there is almost total inequality in the spatial distribution of public telephone facilities within the cities selected for the study (Figure 3). As has been indicated earlier the impact of this on the overall development can be said to be minimal. However, due to the use of post offices as payment point for public utility services and money transfer, there is the need to help address the imbalances in the provision of post office facilities (Ghana Statistical Service, 2005b).

Table 5. Availability and distances to nearest educational facilities (2000).

Cities	JHS (Distances in Km)					SHS (Distances in Km)				
	Within locality	1-10	11-20	21-30	31+	Within locality	1-10	11-20	21-30	31+
Accra	100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Kumasi	100.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0	0.0	0.0
Tamale	21.4	68.6	6.5	2.1	1.4	9.3	61.4	25	2.8	1.4
Sekondi-Takoradi	43.4	49.7	6.8	0.0	0.0	32.6	32.6	23.5	10.2	1.1
Wa	17.0	63.9	14.8	2.3	2.0	0.5	20.6	20.3	25.0	33.6
Bolgatanga	27.6	64.1	7.8	0.6	0.0	2.5	56.6	22.3	11.5	7.1

Source: Ghana Statistical Service, 2005.
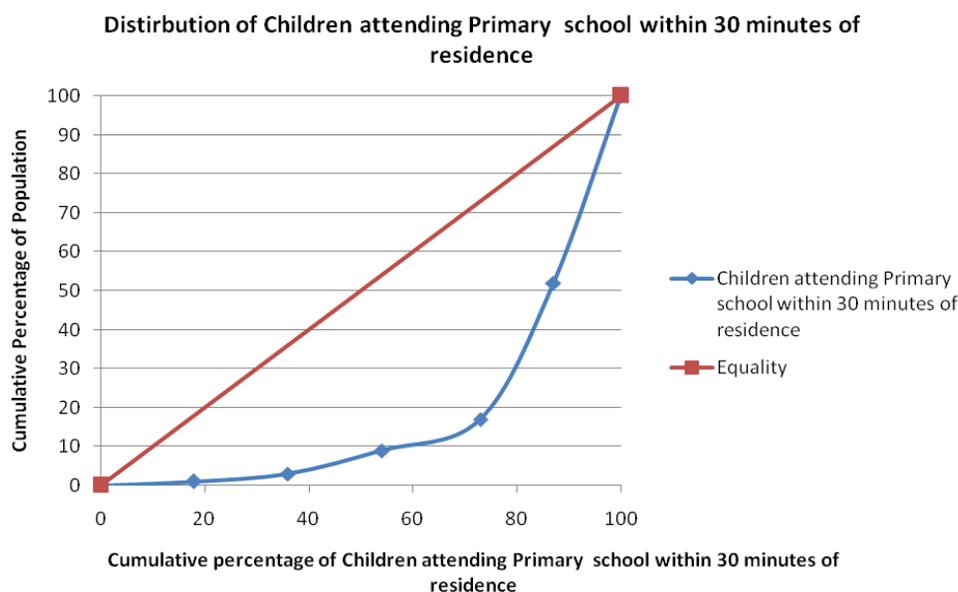
Figure 4. Access to primary school. Gini Co-efficient= 0.76.

Education

Human resource development essentially relates to formal education, training and utilization of human potentials for social and economic progress and according to the Ghana Statistical Service (2005a), the five components of human resource development are education, health and nutrition, the environment, employment and political and economic freedom. These components are inter-dependent. However, education serves as the basis for the other four because it is an essential factor in the improvement of health and nutrition, for maintaining a high-quality environment, for expanding and improving labour pools, and for sustaining political and economic responsibility (Ghana Statistical Service, 2005b). The Government of Ghana recognizing the key role education can play in development has implemented several programmes to improve particularly basic education. These include the Free Compulsory Universal Basic Education, the Capitation Grant and School Feeding programmes.

In spite of this however, there is inequality in the distribution of educational facilities among the six study cities resulting in varied level of accessibility. From Figure 4, it can be deduced that access to primary schools by children in the cities is unfairly distributed. At a gini co-efficient of 0.77, it can be said that the spatial distribution and access to basic school as an indicator of equal spatial development among Ghanaian cities leaves much to be desired. This also results in disparities in the performance of pupils at the basic level. Again, basic schools in these deprived areas lack basic teaching and learning materials as well as teachers for the effective delivery of basic education.

Following from this, basic school pupils in Kumasi, Accra and Sekondi Takoradi have enhanced access to quality basic education in their localities compared to those in Tamale, Wa and Bolgatanga. This has affected the number of children in school in these cities as well as literacy levels (Table 6).

From Table 6, it can also be seen that the cities of Accra and Kumasi recorded the highest level of accessibility to Junior High Schools (JHS) among the six cities as each locality in these cities had a JHS facility. From the Table, it can further be seen that in the northern cities of Wa, Tamale and Bolgatanga, each had less than a third of its localities having a JHS, implying longer distances to

Table 6. Literacy rates in study cities.

Cities	Sex						Overall Literacy rate
	Male			Female			
	Sample size (N)	Literate	Not Literate	Sample size (N)	Literate	Not Literate	
Accra	819	92.6	7.4	931	85.5	14.5	88.8
Kumasi	858	91.1	8.9	961	80.6	19.4	85.5
Tamale	177	71.7	28.3	146	55.9	44.1	64.6
Sekondi - Takoradi	532	90.0	10.0	510	79.9	20.1	85.1
Wa	151	50.1	49.9	117	50.2	49.8	50.1
Bolgatanga	183	58.8	41.2	187	46.6	53.4	52.7

Source: Ghana Statistical Service, 2005.

Table 7. Households access to drinking water by source (2000).

Type Cities	Pipe-borne	Tanker supply	Well	Bore-hole	Spring / rain water	River / stream	Dugout	Other
Accra	90.6	3.1	4.4	0.2	1.0	0.1	0.3	0.3
Kumasi	82.5	0.8	11.5	1.8	1.0	1.5	0.5	0.3
Tamale	88.4	5.3	2.0	0.6	0.1	0.3	2.6	0.8
Sekondi-Takoradi	90.6	0.8	6.3	0.3	1.1	0.3	0.3	0.4
Wa	53.4	2.1	21.2	16.1	4.5	1.4	1.1	0.2
Bolgatanga	69.8	0.8	10.5	11.4	5.6	0.7	0.5	0.7

Source: Ghana Statistical Service, 2005.

Table 8. Household access to toilet facilities (2000).

Cities / Toilet Facility	Sekondi-Takoradi	Accra	Kumasi	Tamale	Bolgatanga	Wa
WC	28.2	23.2	27.8	8.5	15.2	9.0
Pit Latrine	6.3	6.1	12.0	1.6	2.4	4.6
KVIP	4.8	11.7	9.3	6.3	2.7	8.4
Bucket/Pan	2.7	12.7	5.3	8.4	2.9	2.5
Facility, another house	5.9	9.3	5.6	1.8	4.5	8.0
Public Toilet	46.0	32.7	36.8	54.0	32.2	39.3
No Facility	6.0	4.1	2.9	19.3	39.8	28.0
Other	0.1	0.2	0.2	0.2	0.3	0.4

Source: Ghana Statistical Service, 2005.

access a JHS. This is a major disincentive to the pursuit of basic education in the three northern regions especially among female children who are supposed to do various house chores in the morning before going to school. This situation also has adverse implication for literacy rates among women in the cities of northern Ghana (Table 7).

The situation is even worse in relation to Senior High Schools (SHS) with 0.5%, 0.25% and 9.3% of localities in Wa, Bolgatanga and Tamale respectively having the facility. The cities of Accra and Kumasi on the other hand had SHSs in all their localities as can be seen in Table 6. It can be deduced from Table 6 that there is an unconscious bias in the distribution of educational facilities among

the six major cities in Ghana, a phenomenon that is contributing to the widening gap of inequality among the Northern and Southern cities.

Water and sanitation

Tables 7 and 8 present the various sources of drinking water and sanitary facilities available to household members living in the six study cities. Table 7 indicates that with the exception of Wa, all the other cities are well served with potable water facilities as over two thirds of their respective populations rely on pipe borne water

Distirbution of of household who reach the nearest water source within 30 minutes of residence
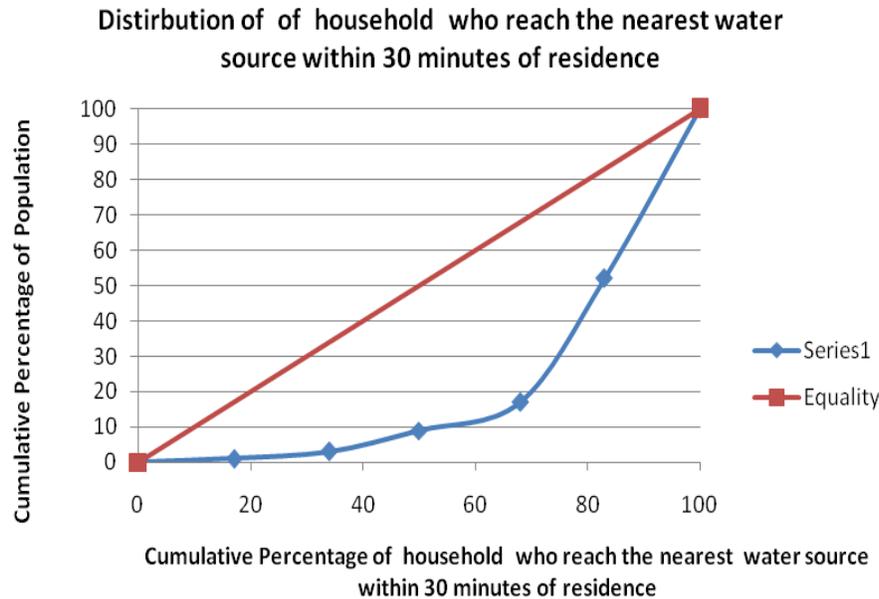
Figure 5. Access to potable sources of water. Gini Co-efficient= 0.56.

sources. In spite of this positive trend, 4.5 and 5.6% of households in the northern cities of Wa and Bolgatanga respectively rely on rain water for domestic use. This situation gives much concern due to the erratic rainfall pattern in the northern part of Ghana. This presupposes that, access to water to these households is unreliable and may expose them to unhygienic water sources with their attendant health risk. This inference is given a pictorial view in the Lorenz curve presented in Figure 5. Depicting a gini concentration ratio of 0.56, it appears to be the only indicator considered this far with some nearness to spatial equality; though still skewed. This has been the result of the activities of government and non-governmental organization working to provide potable sources of water over the last decade. Again, the outbreak of various water related diseases in the three northern regions has created the awareness for more water intervention in the area.

Table 8 shows the households access to toilet facilities in the study cities. A key observation is the proportion of households in the three northern cities without access to toilet facilities. From the Table, it can be seen that 19.3, 39.8 and 28% of households in Tamale, Bolgatanga and Wa respectively had no toilet facility. Another observation is the proportion of households with access to water closet. From the table, it can be seen that a greater proportion of households in the cities of Accra, Kumasi and Takoradi have access to improved toilet facilities than their counterparts in Tamale, Wa and Bolgatanga.

KEY FINDINGS

From the analysis of information gathered thus far, the following can be inferred:

1. Socio-spatial inequality between cities in southern and northern Ghana is apparent from the data analysed from the year 2000 population and housing census. The dimensions of the inequality are manifested in the location

advantages and importance, spatial distribution and access to basic social services in the cities studied. While the disparities in the distributions and access to health, basic education and telecommunication services appear to be very conspicuous, that of water and sanitation is reduced from the data available under the study. This has been explained by the number of water and sanitation intervention projects implemented over the last decade in the three northern regions including the study cities.

2. It therefore follows that the interventions in health and basic education in northern Ghana are not achieving the needed impacts in terms of bringing quality education and health delivery to the local people as well as bridging the spatial equality gap between the north and south of Ghana. The apparent lack of governmental urgency to provide telecommunication services in northern Ghana might have been exacerbated by the upsurge of mobile telecommunication companies in Ghana hence the high levels of disparities.

3. The dispersed and scattered spatial development of cities in the north may have played a key role in the spatial inequality analysis since this phenomenon makes the location of social services in localities with few residents uneconomical. This notwithstanding, it could be argued that most northern communities lack these facilities. And where these facilities are located, they operate below their intended capacities due to lack of qualified personnel, equipment and other operational logistics.

4. It appears that the release of the 2010 population and housing census may not significantly change the current spatial inequality scenarios. This is because the current

spatial development trend seems to have towed the line of historical spatial development left behind by the colonialists reflecting the dualism in Ghana's spatial economy (Songsore, 1989). Again, the initial summary of the population figures released in February 2011 did not provide any significant shift in the spatial distribution of populations and socio-economic services.

5. Spatial distribution and access to social services in the study cities appear to have a positive relationship with the spatial distribution of population among these cities. Thus, there appears to be better access to services in cities with higher populations. This could be related to the different functional hierarchies and level of services given to the various cities. For example, a teaching hospital in Kumasi will have wider spatial influence than a regional hospital in Wa or Bolgatanga.

6. The foregoing notwithstanding, the study shows a marked improvement in the spatial distribution of services from the colonial era through to the previous census results in 1970 and 1984 (GSS, 2005b). For instance, the establishment the University for Development Studies (UDS) in the mid 1990s and current upgrading of Tamale regional hospital to a teaching Hospital are examples of landmark infrastructural development in Ghana. In addition to this the improvement of Kintampo-Tamale and Wenchi-Bole-Bamboi roads which are the major linkages from the southern Ghana to the north have, to some extent, improved spatial development in the latter.

Conclusion

One major problem African governments face is the limited nature of available resources to satisfy the ever-increasing needs of their growing population. Govern-ments are usually torn between investing in developed areas such as cities and towns, which provide security of higher returns on infrastructure investment, and investing in less developed areas such as rural areas, which cannot guarantee higher returns on investments. This has contributed to the disparities in income levels and the lopsided nature of infrastructure supply on the African continent. The paper has highlighted the issue of inequality among the six major cities in Ghana with the skewness being against cities in the Northern part of the country. This has happened because of past colonial policies and more importantly, the presence of the bulk of Ghana's natural resources being concentrated in the South of the country. The dichotomy between cities in the Northern and Southern parts of Ghana is evident in surface accessibility to social infrastructural services such as health, education, water and sanitation facilities, among others. The effects of this disparity are enormous with the immediate effect being the attraction of more migrants from the northern part of Ghana to the south. The net effect of this high migrant population is that more pressure is exerted on available infrastructure and economic opportunities at the south.

RECOMMENDATIONS

As was indicated earlier in the study, it is revealed that past efforts, over the last two and half decades, at bridging the spatial inequality gap between the northern and southern Ghana have not yielded the needed impact since there still exists a marked development gap between the two areas. This thus calls for the design, planning and implementation of future development programmes to take into consideration this apparent north-south dichotomy. It must however be stated that the Savanna Accelerated Development (SADA) programme is in the right direction as a result recommendations made in this study is only to make an intellectual inputs to the discourse towards bridging the development gap.

From the foregoing, the paper recommends the provision of physical access and spatial connectivity in the form of providing transportation network to the northern cities. This will open up these cities and facilitate the transfer of other investment opportunities which will generate wealth. In doing so, the government of Ghana must make conscious efforts to provide social and economic infrastructure such as schools, hospitals, and telecommunication services in the northern parts of the country. This is likely to help stem the migration to the southern part of the country in search of better opportunities.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Problems and prospects of tourism industry in Manipur

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Tourism has emerged as a large service-sector industry in the modern world which has become a global instrument of economic, cultural and social development. India has plenty of natural beauty and resources like cultural heritage, archaeological remains, historical ruins, bio-diversity, heritage site etc for tourism promotions. Manipur, "the Land of Jewels" is one of the smallest and easternmost states in India having a geographical area of 22,327 sq.km with salubrious climate, exotic greenery and rich flora besides its rich culture. Moreover, wildlife sanctuaries and floating national parks of the state can attract tourists all over the world. The state has over 50 tourists' spots. It is the treasure house of various economic resources. Tourism has the greatest potential for generating income and employment opportunities in the state because Manipur is not only characterized by the blending of floras and faunas; it is also exceptionally rich in bio-diversity. Because of her natural assets, ethnic diversity and the societal ethos of hosts, tourism holds high potential in the state. This paper is mainly focussed on the problems and challenges of the state as well as the pitfalls in the tourism development in Manipur.

Key words: Tourism industry, tourists, socio-economic development, infrastructures.

INTRODUCTION

In the arena of globalization, tourism has acquired an important utmost position in the field of geographical research for bringing prosperity and sustainable of socio-economic development in the country, India. At a global level the phenomenon of tourism since 1950 has been remarkable in terms of growth, spread and diversification; its fast growth and spread not only resulted in the globalization of people's movements as never before but also contributed in creating a vibrant industry and opportunities for millions of people. Tourism is the world's largest and fastest-growing industry (Das, 2013). Traveling and tourism has been an integral part of Indian Culture and Tradition (Leena and Sapna, 2012). Tourism industry today is the most vibrant tertiary activity and a

multibillion industry in India (Patel, 2012). Tourism is an ever expanding service industry with latent vast growth potential and has, therefore, become one of the crucial concerns of not only the country but also of international community as a whole. For many developing countries like India, tourism has become one of the major contributors to social and economic development but it is the prime source of foreign exchange revenue in other developed countries (Nayak and Mishra 2013). The growth rate of 8.9% in tourist arrivals in India was almost double the growth of 4.4% in tourist arrivals worldwide in 2011. The tourism sector in India, therefore, has fared quite well vis-à-vis the world.

Foreign Exchange Earnings (FEE) from tourism in India

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during 2011 were $16.56 billion as compared to $ 14.19 billion in 2010, showing a growth of 16.7%.[1] Tourism plays a key role in socio-economic progress through the creation of jobs, enterprises, and revenue earnings in India; and the Planning Commission has identified tourism as the second largest sector in the country in providing employment opportunities for low-skilled workers.[2] In the country, Manipur is well-blessed state by Nature and it is considered to be one of the richest bio-geographic areas in the world. Because of the God gifted beauties of the state many great scholars gave different names to the state "Manipur". Indian first Prime Minister, Jawaharlal Nehru gave Manipur as "The Land of Jewels" in the extreme north-eastern border of India.[3] Manipur is also named as "A Little Paradise on Earth and Switzerland of India" by Lord Irwin and certain Japanese soldiers had known the name of the state as "A Flower on Lofty Heights".[4] Manipur has rich cultural and ethnic diversities that can easily make it a tourist destination.

Objectives

The objective of the present paper is:

1. To identify the potential areas for the development of tourism.
2. To assess and examine the problems and challenges of the development of the state through tourism industry.

DATA BASE AND METHODOLOGY

The present study is based on secondary data collection which was obtained from the published literature, legal documents, official statistics, reports, articles, publications and other documents, reports of self-government bodies and organizations websites. The findings were discussed and analysed through the published literature and portrait in the form of maps and graphs.

North east India

North East India comprises seven states: Assam; Manipur; Meghalaya; Mizoram; Nagaland; Tripura and Arunachal Pradesh, which is strategically important for its international borders with Bangladesh, Bhutan, China and Myanmar. These states are collectively known as the "Seven Sisters" due to their unity in diversity. Hundreds of

dialects are spoken in these regions. Seven Sisters has a rich unique cultural and ethnic heritage that can easily make it a tourist-spot. Tourism has the greatest potential for generating income and employment opportunities in North-East Indian states because NE India is not only characterized by the blending of flora and fauna it is also exceptionally rich in bio-diversity. The mighty Himalayas, Brahmaputra River, one-horned rhinos, rain-fed forests, pristine environment, wildlife sanctuaries, Bihu dance and many more embodiments of the region are just manifestations of this richness that attract tourists from all over the world. Further, tea tourism and golf tourism of NE India also attract tourists. The region has immense potential for ecotourism and sustainable development.

Profile of the study area: Manipur

Manipur, the Land of Jewels, is one of the states in North-eastern India having a geographical area of 22,327sq.kms which constitutes 0.7 percent of the total land surface of India; Imphal city is the capital of the state. 90 percent of the total geographical area of the state i.e. 20, 089sq.kms is covered by nine hill ranges, the remaining area is a small and beautiful oval shaped valley at the centre covering only 2,238sq.kms and accounting for only one-tenth of the total area of the state. Geographically, it falls into the Southeast Asia region. It is an isolated state stretching between $92^0 58'$E to $94^0 45'$E longitudes and $23^0 50'$N to $25^0 42'$N latitudes. [5]According to 2011 census, Manipur has a total population of 2,855,794 comprising 1,438,586 males and 1,417,208 females (0.21 percent of the total population of India). Of these, 58.9% of people live in the valley region and the remaining 41.1% live in the hilly region. Most of the population (2,021,640 people) live in rural areas and 8, 34,154 live in urban areas. The state has immense scope for the promotion of tourism with moderate climate making it a tourists' heaven. Its rich culture extends into many areas e.g. martial arts, dance, theatre and sculpture.

Tourist attractions in Manipur

Manipur is one of the loveliest spots with her charming physical features, tradition and history. It is encircled by nine hill ranges with a small central valley. Manipur scores low in terms of security and infrastructure but has the potential to show a turnaround if proper efforts are put in this regard. In fact both the hill ranges and valley region of Manipur are the abode of Nature's Gift. The major hill ranges of Manipur have a great power of tourist's attraction with consisting of various scenic

[1] Annual Report 2011-12; Ministry of Tourism: Govt. of India
[2] http://shodhganga.inflibnet.ac.in/bitstream/10603/31187/1/10.%20chapter%20 1.pdf
[3] Arun's Manipur General Knowledge; G.M. Publications, Imphal- 2011
[4] The Sangai Express – Manipuri's Largest Circulated Newspaper in Manipuri & English; 18th March, 2011, Friday

[5] Economic Survey Manipur 2012-13, Directorate of Economics & Statistics, Government of Manipur, Imphal

Table 1. District-wise name of Tourist place of Manipur for the year 2011-12.

Sl.No.	District	No of Tourist place	Name of tourists place
1	Imphal West	8	Manipur State Museum, SaheedMinar, Manipur Zoological Garden, KhonghampatOrchidarium, Langthabal Old Palace, Ima Market, RKCS Art Gallery, NupiLal Complex
2	Imphal East	12	ShriGovindajee Temple, Kangla Fort, RamjeePrabhu Temple, Hanuman Thakur Temple, Dewlahland War Cemetery, Hatta War Cemetery, KhumanLampak Sports Complex, Minuthong MMTA, Keirao MAASI, Kaina, Jiribam, Mutua Museum
3	Bishnupur	8	Vishnu Temple, NingthoukhongLoktak Project, Loktak lake &Sendra islands, Phubala, KeibulLamjao National Park, MoirangINA Memorial Complex, Loukoipat, Red Hill
4	Thoubal	4	Khongjom War Memorial, ThongamMondumMahadev, Waithou lake, Serou
5	Senapati	4	Mao, TadubiMakhel Cave, SaduChiru(Leimaram) Waterfalls, Willong Megalith
6	Tamenglong	3	Zailad lake, Tharon Cave, Barak waterfalls
7	Churachandpur	6	New Churachandpur, Tonglon Cave, Cheklaphai, Behiang, Kaiham Hill Range, Tipaimukh
8	Chandel	2	Moreh, Tengnoupal
9	Ukhrul	3	Khangkhui Cave, Shiroi Hill, Nungbi

Source: Directorate of Tourism, Manipur.

beauty of the region like blue-green mountains of high elevation viz. Tenipu (2,994m), Siroi Hill (2568m), Koubru (2561.54m); waterfalls viz. Khayang waterfall and numerous Barak waterfalls, etc. Good and mild climate of the region plays a vital factor for the fulfilment of tourist's visits. Overall the climate of these ranges is salubrious and mild ranging tropical to temperate due to its elevation. Like the hilly region, the central valley is also occupied with lots of scenic beauty with various species of floras and faunas. The region of great potentiality of tourism with bad and dull climatic activity always discourages tourists' inflow. Then the sub-tropical monsoon climate of the valley offers made it a tourist's heaven. In the part of valley region, there are various small blue & green hill ranges and various small waterfalls viz. Nongmaijing hill, Red Hill, Twin waterfall of Nambol, Artificial waterfall of Singda dam, etc. The World's unique floating Loktak Lake and Sendra islands and KeibulLamjao National Park play a major role for the fulfilment of visitors.

In spite of these potentialities in Manipur, the handlooms and handicrafts items are sought after souvenirs for tourists. It is an indispensable aspect of the socio-economic life. There is a saying that every woman of Manipur is a born weaver. The more than 33 different communities in the State have imprinted upon their handloom products, exquisite designs peculiar to their communities. Manipur pottery is crafted without a potter's wheel. It is an enthralling experience to witness the potters of Andro, Thongjao and Nungbi deftly moulding

an unbelievable range of earthenware. Beautiful pieces of art made of cane and bamboo form an important part of handicrafts. Tourists would like to take home a lifan, phak (weed mat), phiruk, Manipuri Dolls and a host of other beautiful carvings from various rare and exotic varieties of timber. To the Manipuris, festivals are the symbols of their culture, social, ethnic and religious aspirations.

DISCUSSION

At present, Manipur has around 50 tourist spots with various historical, cultural, archaeological sites and Gifts of Nature. From the findings the capital of the state, Imphal city holds high potential for tourism as shown in Table 1.

In Figure 1, Imphal-East district has highest potential for tourism amongst the other districts of Manipur. Mostly the hilly districts like Tamenglong, Senapati, Ukhrul, and Chandel districts and Thoubal district are having less potential for tourism. On the other hand, Imphal-West, Bishnupur and Churachandpur are grouped under the medium potentiality for tourist spots. Table 2 shows the number of tourist's arrivals in Manipur with increasing number of tourist's arrivals both domestic and foreign in 2011-12 as compared to the previous years. But the trend of tourist arrivals in the state is fluctuating due to mainly political instability and then disturbance to travel by strikes, bandhs and blockades as shown in Figure 2.
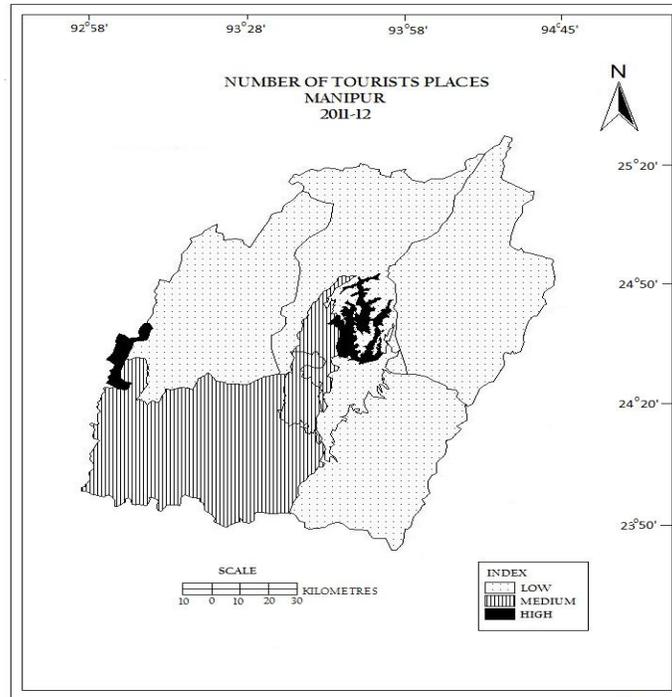
Figure 1. Number of Tourists Places in Manipur.

Table 2. Pattern of Tourist arrivals in Manipur.

Years	No. of foreign tourists	No. of domestic tourists	Total No. of tourists
2006-07	263	120572	120835
2007-08	460	101000	101460
2008-09	271	115300	115571
2009-10	405	127524	127929
2010-11	431	116652	117083
2011-12	602	133224	133826

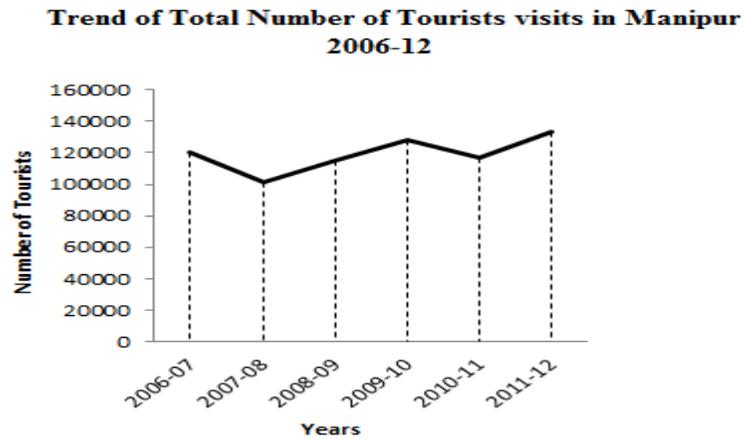Source: Directorate of Tourism, Manipur.

Figure 2. Pattern of total number of Tourists visits in Manipur.

Table 3. District-wise patterns of Tourist arrivals in Manipur for the year 2011-12.

Sl.No.	District	No. of Domestic Tourist	No. of Foreign Tourist	Total No. of Tourist
1	Imphal West	92398	569	92967
2	Imphal East	16804	33	16837
3	Bishnupur	-	-	-
4	Thoubal	-	-	-
5	Senapati	1181	-	1181
6	Tamenglong	2697	-	2697
7	Churachandpur	5372	-	5372
8	Chandel	8653	-	8653
9	Ukhrul	6119	-	6119
Total		133224	602	133826

Source: Directorate of Tourism, Manipur.
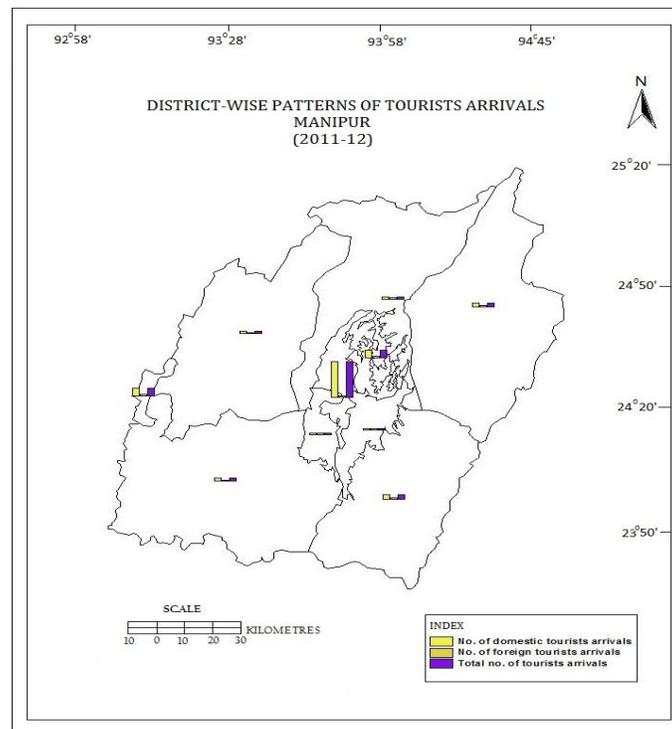
Figure 3. District-wise patterns of tourist arrivals in Manipur (2011-12).

Then the trend of this tourist inflow in the state is very slow. Table 3 reveals the pattern of both domestic and foreign tourists visits in every districts of Manipur. With having the potentiality of tourism development Bishnupur and Thoubal districts have no records of tourist's visits (overnight visitors). This is due to mainly the inadequate facilities of accommodation and other tourism infra-structures. But, both the number of foreign tourists and domestic tourists attracts more in the city due to its better connectivity and communication with other states which is mainly of business and religious perspective as shown in Figure 3. Besides the Imphal city tourists are discouraged to travel the other region of the state because of lack of infrastructures, political instability and various problems as discussed below in details.

Constraints of tourism development in Manipur

Despite all its potentialities, the tourism industry in

Manipur is not able to develop to the desired extent because of many associated problems. Lack of co-ordination among private companies and the State government involved in tourism is also a major problem. As such infrastructure is inadequate for large scale tourism. The state has neither railways nor navigable waterways and the transport system is synonymous with road communication and airways connection. Highways/ Roads are regarded as arteries and veins of a state which are essential for its overall growth. The main arteries of communication for the state are 325kms long National Highway No.39and 225kms long National Highway No.53 which connects the Imphal city with Dimapur (Nagaland) and Silchar (Assam) via Jiribam respectively. There have been a lot of hindrances to travel along these routes for the lack of political stability and of the rugged topography of the region. Kidnapping and ransoms have become a norm in these routes during night. Due to its poor communication facility and insurgency problems tourists are being discouraged to travel. In fact tourist spots are not properly developed yet. Infrastructure at tourist sites in terms of accommodation, transport, communication, banking facilities including credit card use, drinking water, sanitation facilities is either lacking or not developed or sometimes being deplorable. Over and above of all these, tourists do not receive any helpful or welcoming attitude from the local public. They are not familiar with Hindi language because of which tourists face problem while communicating with the local people. Above all, the main constraints that discourage tourist's arrivals and development of tourism industry in the state can be identified as:

1. Lack of infrastructure
2. Communication bottlenecks
3. Geographical isolation
4. Political instability and insurgency
5. Lack of fund
6. Indifferent attitude of Central and State Government
7. Lack of a proper tourism development policy of the government
8. Lack of people's co-operation and consciousness

SWOT analysis of Manipur tourism

A SWOT analysis provides gross understanding of the tourism, its Strength, Weakness, Opportunities and Threats.

A. STRENGTHS

1. Unique floating Loktak Lake and KeibulLamjao National Park.
2. Offers a cultural treat through the Manipuri dance forms and an adventure treat through avenues for sports.

B. WEAKNESSES

1. Security and internal conflicts – both in terms of perception and reality.
2. Limited tourism infrastructure facilities like transport, accommodation, market, etc. particularly in terms of quality, experience and site services.
3. Many projects are delayed in implementation and done only on the official paper causing development lags.

C. OPPORTUNITIES

1. Presence of border town like Moreh and the international boundary with Myanmar has been looked as an opportunity to develop border markets.
2. Opening up of Railway line up toImphal connecting through all the states and country.

D. THREATS

1. Instability and perception of lack of security in the region with potential to affect tourism movement.
2. The continuous fear of unstable environment can make the tourism investment climate unattractive.

Suggestions

In spite of many hindrances as in the discussion, Manipur has a bright prospect of the economic development through tourism industry. This process would be a slow one but ultimately it will bring good results. When the adequate infrastructure will flow in, when people will get jobs, insurgency will be gradually lost and political-economic and social stability will usher in. Therefore some immediate and long term measures should be adopted as the following:

1. A strong political will is of excessive need for the restoration of peace and political stability in the area. Government should need to tie with various insurgent groups working in Manipur within the framework of Indian constitution in a democratic manner.
2. Government should make huge investments to break the geographical isolation and to remove the communication bottlenecks from the state.
3. Plan efforts should be made by the Government to build the required tourism infrastructures such as accommodation, markets, banking facilities, etc.
4. Planned, sustained and well-thought long term efforts of the Government are needed to improve the socio-economic and political set up of Manipur.
5. Proper tourism development policy is the need of the hour.
6. Above all, people's awareness to develop their own area through the development of tourism-industry is a great need of the hour.

Conclusion

There is no denying the possibility that tourism can blossom as a most prosperous smokeless and silent industry in the 21st century because it will never be a threat to ecology. The development of the tourism industry also contributes to changes in the quality of life, social structure and social organization of local residents. As tourism supports the creation of community facilities and services that otherwise might not have been developed, it can bring higher living standards to a destination. Manipur has unlimited potential of tourism which could attract tourists from all over the world but it could not develop due to the lots of constraints in the tourism development. Thus from the above findings; the development of tourism industry in Manipur directly depends upon the formulation of a proper tourism development policy and people's co-operation and consciousness. As compared to the previous years, the number of foreign and domestic tourist arrivals is relatively increased in the state in 2011-12. Government should increase the number of hotels, restaurants, cafeterias, etc. and try to supply proper and good electricity, drinking water and sanitation for the fulfilment of tourist's demands. In this paper we tried to find out the prospects of tourism development to fulfilling the inadequate facilities for tourism infrastructures. In fact, the development of tourism leads to a well-developed society.

Conflict of Interests

The authors have not declared any conflict of interests.

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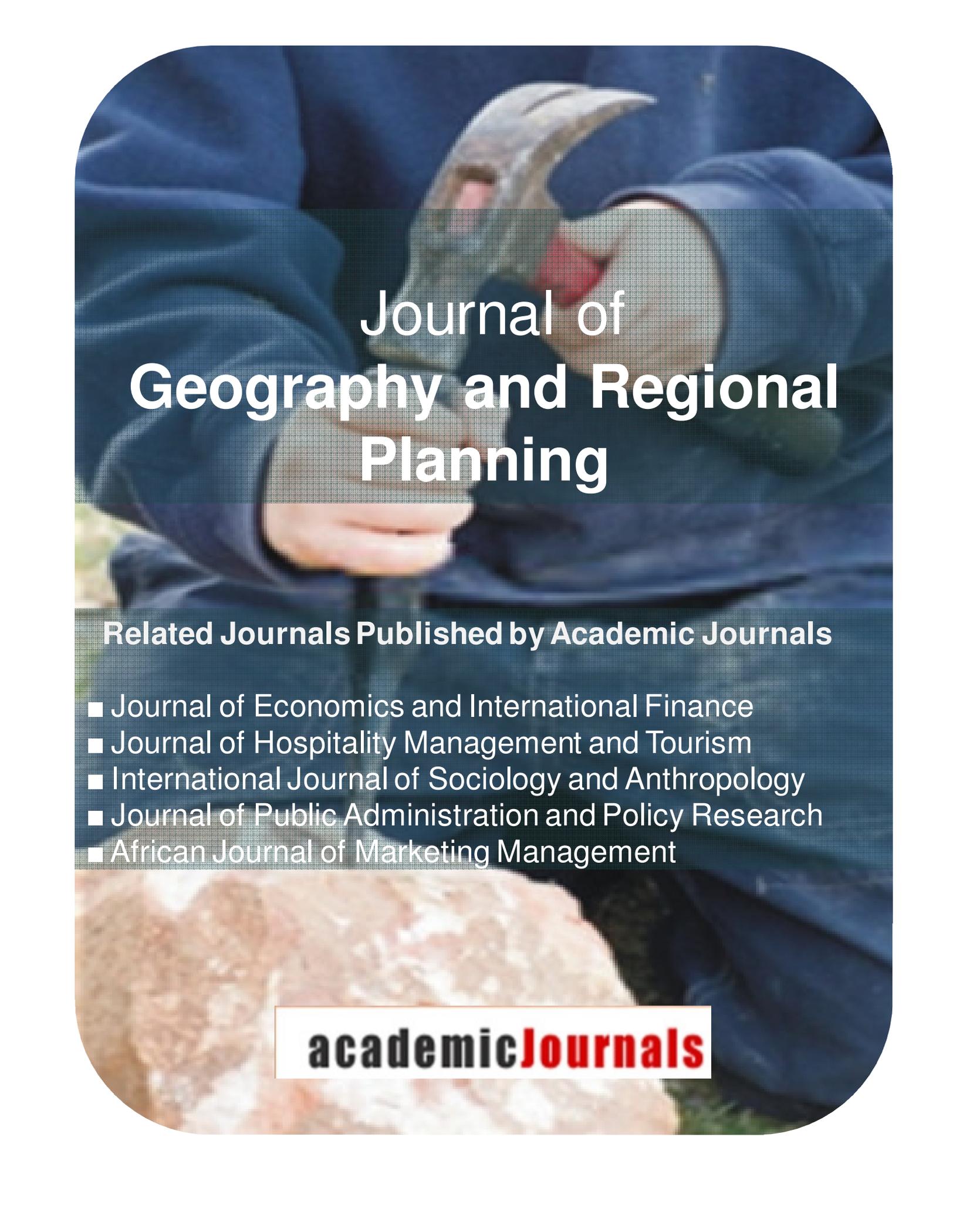
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