

Overview of the Influence of Natural Resources and Population Distribution on Spatial Development in Ghana

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Abstract

The quality of spatial locations for the settlement of human populations depends on the ability to support livelihoods and improvements in the standard of living and quality of life. This is partly made possible by the availability, quality and quantity of natural resources distribution. The purpose of this study is therefore to present a picture to governments and other development practitioners on how theory could be used to explain the causes and solutions to unequal spatial development, in the context of natural resources and population distribution in Ghana. This study seeks to go beyond the mere examination of the distribution of natural resources and population to establish how the two influence each other in the coastal, forest and savannah belts of Ghana, and the resultant effects on the development of the regions and the country as a whole. It is basically the outcome of content analysis of secondary data, supported by primary data from informal conversations and observations. This involved the review of relevant literature from textbooks, articles and the internet, accidental sampling of participants and transect walks. The analysis was guided by a theoretical framework, with a blend of quantitative and qualitative methods. The results revealed that the distribution of the various resources over the various zones of Ghana is uneven. This has contributed to the disparities in the distribution of population and spatial development in the country. The coastal and forest belts have well exploited resources with active formal sector participation, as well as higher population densities than the savannah zone. Theoretical approaches like the growth pole, functional spatial integration and decentralized territorial development models provided explanations of the causes and solutions to the problem of spatial disparities in development among the regions of Ghana. It was concluded that natural resource availability did not only influence the emergence of growth poles, but also the level of spatial integration and the decentralization of functions. Also, population distribution, the centrality of cities and spatial development increased with increasing levels of natural resources, and hence the coastal and forest belts of Ghana are more favoured than the savannah belt.

Key words: Natural resources, Population, Spatial Development, Ghana.

1.0 Introduction

According to the Ghana Statistical Service (GSS) (2008) and CIA World Factbook (2013), Ghana is blessed with various natural resources such as gold, industrial diamonds, bauxite, manganese, silver, petroleum, limestone, salt, fish, hydropower, rubber and timber. The examination of the interrelationship between these and population and spatial development constitutes the basis of this study. In other words, the study seeks to examine how the use of the natural resources of Ghana influences the population distribution and spatial development of the various geographical belts in which they occur, and the country as a whole.

In 2010, Ghana had a population of 24,658,823, which was an increase of 30.4% over the 2000 population figure of 18,912,079, with a growth rate of 2.5% compared to 1.7% for 2000 (Ghana Statistical Service, 2012). Spatially, it occupies a total land area of around 238,536 square kilometres with Accra as its national capital. It is divided into ten administrative regions, which are also classified under three major belts based on some common environmental characteristics, namely Greater Accra, Central, Western and Volta Regions as the *Coastal Belt*; Ashanti, Brong-Ahafo and Eastern Regions as the *Forest Belt*; and Northern, Upper East and Upper West Regions as the *Savannah Belt* (Ramsay & Edge, 2004). These classifications are however, not absolute as there are cases of overlapping characteristics in some of the regions. Figure 1, is a map of Ghana showing the distribution of the ten regions of Ghana and their major cities over the three belts of the country.

One of the major challenges in the socio-economic development policies of various governments and private sector development actors comes from the realisation that the savannah belt has lagged far behind the coastal and forest belts in terms of spatial development, and how the gap could be bridged (Ghana Government, 2002-2004). The focus of mainstream literature on the cause of this situation has often been on the inadequacy of natural resources and poor climatic conditions of the savannah belt, such as the findings of Kendie (1992); Bekye (1998) and Seini (2002). While these contentions prove right, insufficient research has been done to examine the spatial development disparity in a theoretical context, which could guide explanations on how other factors such as colonial influences, the nature of spatial integration, and territorial decentralisation are responsible for the inequalities. This is the niche which this study attempts to occupy, through the execution of methodological approaches involving the identification and purposive selection of cities from the various belts

which do not only have natural resource influences, but also meet the requirements of the chosen theoretical framework (Figure 2).

The goal was to present a picture to governments and other development practitioners on how theory could be used to explain the causes and solutions to unequal spatial development in the context of natural resources and population distribution. It is hoped that the results of this study would inspire future research on how to address the development challenges of less resource endowed areas of a country. Also, questions on the causes of rural-urban disparities in development and the associated rural-urban migration could be generated from the findings of this study for further research.

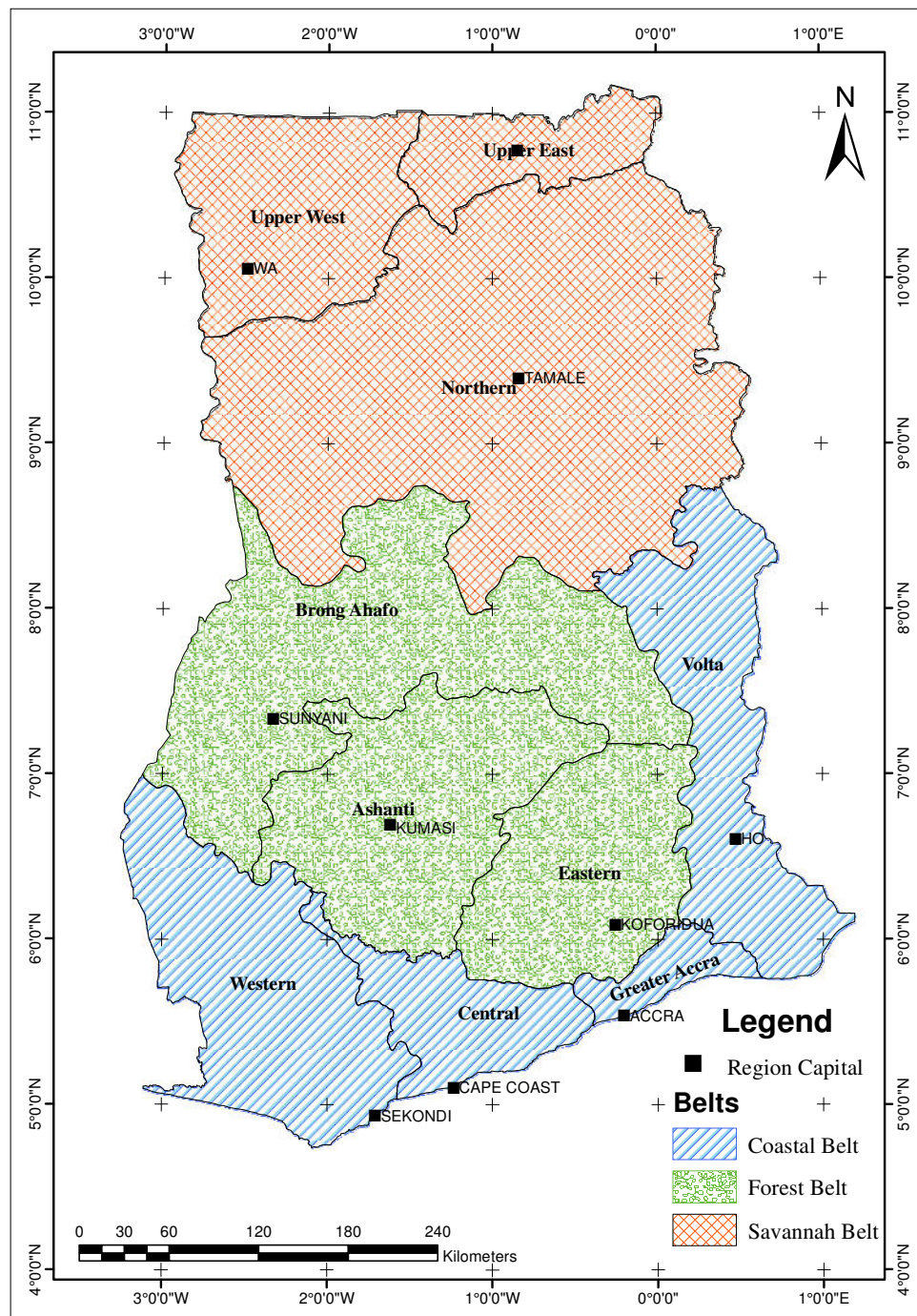


Figure 1: Regional distribution over the coastal, forest and savannah belts of Ghana

Source: Department of Environment and Resource Studies (2013)

1.2 Research question

The overarching research question that this study seeks to answer is: *How do natural resources and population distribution influence the spatial development of Ghana?*

2.0 Theoretical Framework

To facilitate the analysis of the relationship between natural resources, population and spatial development, some relevant theories in the framework in Figure 2 provided a guide.

2.1 The Growth Pole Theory

The Growth Pole Theory (GPT) was originally created by the British Economist, Sir William Petty (1623-1687) in the 17th century. He was fascinated by the rapid economic growth of London and hypothesised that strong urban economies are the backbone and motor of the wealth of nations (Petty, 1984). However, it was the French economist, Francois Perroux (1903-1987) who elaborated on the theory in 1949, adding that industrial development is concentrated in one or two major cities; and that development starts from the central cities and spreads out to the periphery (Perroux, 1949; cited in Darwent, 1969).

The major contextual limitation in the GPT is that it assumes that industries are located in cities and are the main cause of the growth of cities. However, the industrial revolution started in bigger towns already facing rapid population growth, primarily due to the availability and exploitation of natural resources, and the aim of industrialization was to provide efficient methods of production to meet urban demand (Getis, Getis & Fellmann, 2006). This implies that growth poles are characterised by both higher populations and concentration of industrial activities in response to natural resource availability.

Figure 2 shows the application of the GPT in relation to other theories in the Ghanaian context. It shows a connection of growth poles identified from the three main belts of the country, the *Coastal*, *Forest* and *Savannah* belts, as well as the major populated cities in each belt. The most influential city was picked from each of the three belts after ranking the cities from 1 to 3; 1 being the highest. The bases of ranking are the degree of centrality and population size under the influence of natural resources and the associated degree of industrial activities (see fourth stratum of Figure 2. NB: Tables 2 & 3 in a later section, provide detailed descriptions of the resources and population distribution). These include Accra¹ in the coastal belt (as it is national capital of Ghana and so has the highest order of administrative and socio-economic services, though with the second highest population); Kumasi² in the forest belt (as it is the most populous city in Ghana and with the second highest level of industrial activity); and Tamale³ in the savannah belt (as it is the fourth most populous city in Ghana with the highest level of industrial activity in the savannah belt).

Details of the ranking have been considered in the discussion section, where spatial development is explained by the influence of theory on natural resources, population and the spatial development of cities as growth poles. It also looks at how such development brings about a trickle-down effect in a centre-periphery-wise direction within and outside the main spatial belts of Ghana.

2.2 The Functional Spatial Integration Approach (FSIA)

According to De Boe and Hanquet (eds.) (1999), the concept of spatial integration was first used in a European Spatial Development Planning document in 1994, and the focus was on how lack of integration could undermine the European objective of social and economic coherence. In general, functional spatial integration refers to the various forms of institutional control over the social and technical aspects of the division of labour with respect to the corresponding geographical or spatial patterns of production (Kafkalas, 1987).

In this paper, attention was given to how differences in the spatial distribution of natural resources give rise to variations in location of productive activities and the associated influences on spatial integration through trade, geographical mobility of labour and service provision, as indicated by the directions of the horizontal double arrowed shapes between the boxes in Figure 2. The degree of influence of each growth pole city within or outside each belt on the others is also assumed to depend on its centrality, originally influenced by the natural resource base, and perhaps later augmented by other historical factors such as colonial influences. This is indicated internally by the top-down short arrows within the belts, and the numerical ranking described earlier. The overall development of Ghana is then explained from the spill-over effects of the central places through the integration process, especially how it promotes spatial equity in development, facilitates easy access to services and leads to decongestion and healthy spatial competition, through trade, exchange of services and labour. This is a narrower application of the FSIA, as the focus is on regions of the same country rather than between countries as in the European case.

2.3 The Decentralized Territorial Approach

The decentralised territorial approach, originated from the concept of decentralisation, which came into use in 1820, but was first found in the writings of Alexis de Tocqueville as early as the 1800s, when he wrote that the French revolution was moving towards decentralisation (Tocqueville, 2000). Territorial decentralisation in development is an approach that seeks to derive added value from locally under-used resources relative to current potential, integrate rural and urban activities in a territorial dimension centred on regional economic projects, and incorporate the rural poor into the employment and investment opportunities created by local growth (de Janvry & Sadoulet, 2004). The purpose of this approach is to explain the relationship between local development and territorial governance processes and practices (Nyindu, 2013).

This approach has been applied in this paper by combining aspects of the spill-over effects of the growth pole, with the institutional determinism of the spatial development process, through control over natural and man-made resource use and the pattern of spatial development through the interrelationships between higher and lower order service centres under the decentralization system in Ghana.

The vertical double arrowed shape in Figure 2 (extreme right) represents the direction of decentralized use of natural resources. This involves the exercise of political influence on spatial resource use, in a top-down approach. The central places are responsible for policy formulation as administrative centres that influence how natural resources should be exploited and used at the periphery (Pieterse, 2002). Here, the purpose of the study is to determine the reasons for disparity in decision-making regarding central investment in natural resource exploitation at the periphery, and how this influences local level development. In the bottom-up approach, the contribution of the periphery to the respective central location within a broader decentralised spatial entity such as a region, either in the form of labour supply, provision of market for industrial products or serving as areas for natural resource exploitation is also looked at. Figure 2 is a summary illustration of the theoretical issues discussed above.

The sections below present the results and discussions in the context of the theoretical framework in Figure 2.

3.0 Methodology

A mixed research design was adopted, with an analytical approach that made use of both quantitative (involving the use of absolute numbers, percentages, averages, means, tables and charts) and qualitative approaches (involving maps, verbal explanations, descriptions and narrations). Data was obtained from both secondary and primary sources. The secondary sources included textbooks, journals, newspapers and published national statistics, for both qualitative and quantitative data. The primary sources also included informal conversations, using a conversation guide with open-ended questions and observation by transect walk. These were to generate qualitative data.

The justification for restricting conversations and observations to qualitative data is that, issues of population distribution, natural resources and spatial development of a country are essential issues of national statistical interest and largely documented in mainstream development literature. As such, the inclusion of ordinary respondents was to incorporate only their observations about the situations in connection with the issues to support the analysis of the available empirical data. The study is therefore more of content analysis. The selection of respondents for the conversation was by accidental sampling along the same routes of transect walk in the cities of Accra, Kumasi and Tamale (See Table 1, for the transect walk routes). Researchers distributed themselves along longer routes in each city during the transect walk, and results were later combined, edited and salient responses and observations used in the analysis.

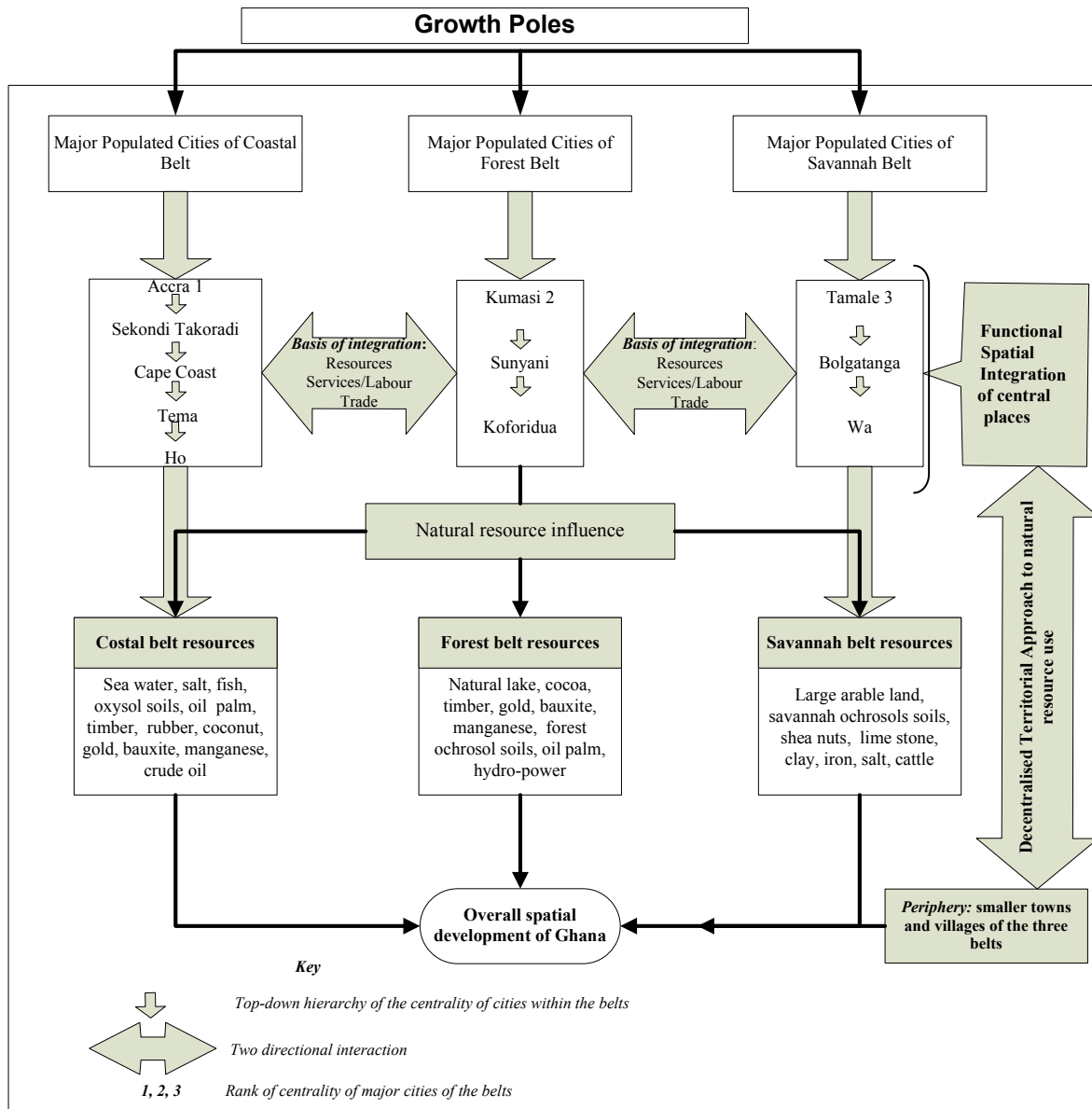


Figure 2 Framework of population, natural resources and spatial development in Ghana Source: Arthurs' own design

Table 1: Transect walk routes in the major cities of the spatial belts of Ghana

City	Transect Walk Route	Date
Accra (coastal belt)	From Kwame Nkrumah Circle to University of Ghana	27/12/ 2013
Kumasi (forest belt)	From Kejetia to Komfo Anochi Teaching Hospital	27/12/ 2013
Tamale (savannah belt)	From Regional Administration to Industrial Area	02/01/ 2014

Source: Own study, 2013

Relevant issues observed during the observation included evidences of population concentrations, such as building and traffic congestions, centrality of the cities in terms of institutions, types and distribution of services, economic activities, and types

of natural resources exploited. Conversation topics sought to generate qualitative data to answer the research question. Sub-themes included the identification of natural resources, the relationship between natural resources and population distribution, and how natural resources and population differences influence the development of the respective belts of the country.

A sample size of 384 participants was chosen, and the sample units included all adults of 18 years and above and were residents of the study locations. These were illegible for observation and informal conversation. The total sample size was selected using the formula:

$$n = t^2 * p(1-p)/m^2$$

Where n=required sample size; t= confidence level at 95% (standard value: 1.96); p= estimated prevalence of adult natives among the population found on the routes of transect (this was unknown, so best decision was to consider 50% (0.5)); and m= margin of error (at 0.05 standard value).

Thus, sample size chosen (n)= $1.96^2 * 0.5 (1 - 0.5)/ 0.05^2 = 384$

This was distributed across the three selected cities by proportional allocation, using the formula: number of respondents per city (pc) = population of the city (p)/ [Sum of the populations of all cities selected ($\sum p$)]* estimated sample size (n) (i.e. $pc=p/\sum p*n$) The results are shown in Table 2 below

Table 2: Propotional distribution of sample size across selected cities.

Belt	Major city	Population of major city (p)	$pc=p/\sum p*n$
Coastal	Accra	1,848,614	167
Forest	Kumasi	2,035,064	184
Savannah	Tamale	371,351	33
	Total	4255029	384

Source of data on populations of cities: GSS (2010)

The selected cities represent the largest settlements for the Coastal, Forest and Savannah belts of Ghana respectively, and were purposively selected as a result of this characteristic (Growth cities). It should be noted also, that the proportions presented in Table 2 do not represent a picture of population distribution across the respective belts, but only those of the selected cities. The adoption of both qualitative and quantitative approaches implies that philosophically, the study incorporated both the *objective* and *subjective* realities of the phenomena investigated.

4.0 Results and Discussions

The ensuing sections present and discuss the results of the study based on data from the sources indicated earlier, Findings are organised under themes largely derived from theories that constitute the adopted theoretical framework. Impliedly, the influencing factors that determine the impacts of natural resources and population on spatial development were directed by the theoretical framework. Due to space constraint, only relevant responses from the participants were captured for clarity of explanations to support existing empirical findings. Their background characteristics have not also been emphasised for the same reason. The discussions are therefore more inclined to content analysis.

4.1 The Development of Growth Poles under the Influence of Natural Resources in Ghana

In the *coastal belt* of Ghana, the sea serves as an important natural resource. Apart from fishing and salt mining, towns and villages along the coast interact by means of boats for trade, labour and passenger movements which feature in the explanation of *spatial integration approach* (see Figure 2), before the advent of the Europeans. The first arrival of the European Merchants at the shores of Ghana and the subsequent construction of castles and forts at Cape Coast and Elmina in the Central Region, Sekondi-Takoraha in the Western Region, Accra in the Greater Accra Region, and Keta in the Volta Region, among others, marked the beginning of the role of the coast of Ghana in its international relationship, not only for trade, religious and cultural exchanges and education, but also for the slave trade (Dickson & Benneh, 2001). The early development of Christianity and education in Cape Coast emanated from this contact, while the choice of Cape Coast as the headquarters of the Crown Colony System of administration and hence the first national capital of the Gold Coast (Ghana) until it was moved to Accra in 1877, were attributed to the possibility of ocean transport (McLaughlin & Owusu-Ansah, 1994; Dickson & Benneh, 2001).

Cape Coast and Accra thus became growth poles that had immediate influences on surrounding villages and towns in terms of trade, education and the spread of the Christian religion (especially Cape Coast in the latter two aspects). These former centres of the crown colony system had nationwide administrative influences, in which the Crown cities, including Sekondi-Takoradi, were ruled directly by the British Governors, while all others were ruled indirectly through traditional chiefs and Provincial Governors, hence, the beginning of a *decentralized territorial development approach in Ghana* (de Janvry & Sadoulet 2004; Ghanamma, 2008).

The rapid development of Tema and Takoradi is attributed to the creation of the Takoradi and Tema Ports in 1928 and 1962, respectively. Some of the ports were established in response to natural resource exploitation. For instance the Radi Port in the Western Region, which is the most endowed region in terms of minerals and other natural resources (Figure 2 and Table2), was established to promote gold exports from the Tarkwa Gold Mine. This is the oldest gold mine in Ghana, established in 1877 by a French mining company (Clark, 1994). Mineral resources and oil exploitation and the opportunities offered by the sea in the coastal belt did not only bring about the earliest road and railway constructions, but influenced the establishment of the Black Star Line in ocean transport and the location of the University of Mines and Technology (Tarkwa) in this belt. These, in addition to the Kotoka International Airport in Accra, facilitated internal and international transport for goods and people, and the nodality of Accra above the rest, especially in Ghana's links with other countries like the UK, USA, Canada, The Netherlands, France, China, Belgium and Nigeria (Centre for Economic Analysis, 2010; Indian Association of Ghana, 2010).

The Tema port is well known for its contribution to cocoa exports, while the Takoradi port specializes in timber (McLaughlin & Owusu-Ansah, 1994; Dickson & Benneh, 2001), mineral and now oil exports. In many other areas along the coast of Ghana, including Keta in the Volta Region, deep sea and lagoon fishing and salt mining activities are carried out, not only to meet domestic protein requirements, but also as a source of raw materials for the fishing and salt processing industries, particularly in Tema. In addition to the production of sugar cane, these influenced the establishment of the Komenda and Asutwari factories in the 1960s in the Western and Central Regions, respectively (Ghana News Agency, 2007). Transect walk results also revealed the agglomeration of various manufacturing industries (textiles, food processing and numerous service industries), constituting a further indication of spatial development in the coastal areas.

Additionally, the Tema oil refinery and the discovery and exploitation of crude oil at *Cape Three Points* near Axim in the Western Region of Ghana are avenues for the contribution of the coastline of Ghana to national development (Moss & Young, 2009). Table 3 indicates that significant quantities of oil production actually started in 1992 (Clark, 1994), producing 1.09 m³, while consumption was relatively very high.

Table 3: Production and consumption of oil in Ghana

Year	Production (m ³)	Consumption (m ³)
1986	.30	15.90
1992	1.09	22.44
1993	1.60	23.43
1994	1.40	25.81
2010	7.19	64.73
2011	76.51	64.00

Source: Index Mundi (2012)

In 2007, the oil field discovered at *Cape Three Points* was reported to contain up to 3 billion barrels (480,000,000 m³) of light oil. This led to capital inflow from the Chinese Government for the establishment of the Jubilee Oil field, and from 2010, there was a dramatic increase in both oil and gas production in Ghana, which caused the government to anticipate a budgeted oil revenue of more than \$650 million from the oil sector, while Tema Oil Refinery was also expected to generate about 4,800 to 5000 jobs for people (Bloomberg News Ghana, 2010). All these increased the centrality of the coastal cities, which is a reflection of the features of the *Growth Pole Theory* in this and other belts of Ghana, with Accra remaining the national capital; Takoradi as the Western Regional Capital; Cape Coast as the Central Regional Capital; Tema as one of the most important metropolitan cities in Ghana, and Ho as the Volta Regional Capital (in their hierarchical order of importance as shown in Figure 2).

The *forest belt* of Ghana, is well known for its central location, good temperature (greatly influenced by the thick forest vegetation), geology and fertile soils which make it a nerve centre for commercial business activities and support industrial

and agricultural ventures (Ghana News Agency, 2001). Other major natural resources in this belt are metallic mineral deposits (gold, diamond, manganese and bauxite), which are mined at Obuasi, Konongo and Bibiani, among others. The belt can also boast of the natural Lake Bosomtwi created by an ancient meteorite and which provides avenues for restricted fishing and a tourism attraction in the Ashanti Region (Anim, Li, Agadzi & Nkrumah, 2013).

The construction of the dam at Akosombo in the Eastern Region, about 80 kilometres upstream from the coast, and the associated 1020 megawatt hydroelectric project, is a significant contribution of the belt to the socio-economic development of the country in terms of domestic and foreign revenue generation through the sale of hydroelectric energy. The advantage of proximity to an adequate source of energy for industrial use has influenced the location of some of the nation's important industries, such as the Akosombo Textile and Aluminium Industries, Kumasi Brewery Ltd. and Neoplan Ghana –Kumasi. The Brong Ahafo Region of this belt, which was carved out of the Ashanti Region in April 1959, is also well known for its active involvement in three major industries directly dependent on primary natural resources, namely Agriculture/Forestry/Hunting, Manufacturing and Construction (Ghana News Agency, 2013).

The forest belt is also well resourced with fertile soils. For instance Enchi and Prestea have *forest oxysols*, while Kumasi, Tepa and Goasu are well stocked with forest *ochrosols* and *oxysols*. These soil types support the cultivation of important commercial crops such as cocoa, rubber, oil palm, cola nuts, pineapple and other agro-forest crops, with the Brong Ahafo Region being the leading producer of agricultural crops in the country (Obeng, 2000). Apart from agriculture, there are also opportunities of lumbering for timber; fishing in important rivers and lakes such as the Ankobra, Biaand Tano River and Lake Bosomtwi. The high rate of population immigration to these mining, fishing and agricultural towns of the forest belt has brought about a rapid rate of urbanization in leading towns such as Kumasi, the most populous city with very high level of business activities (GSS, 2012) and the Ashanti Regional Capital; Sunyani, the Brong Ahafo Regional Capital; and Koforidua, the Eastern Regional Capital, in their respective order of centrality.

In the *savannah belt* of Ghana, the most common natural resources are the vast stretches of arable land (it has the largest land area of Ghana) and Savannah vegetation. These, combined with the true tropical continental climatic conditions, favour the rearing of cattle and other small ruminants. This influenced the location of the Bolgatanga meat factory in the Upper East Region, (which collapsed due to mismanagement) as well as small-scale local leather industries. Most settlements in this zone are at places where they benefit from location advantages such as abundance of land for farming and residential purposes, proximity to rivers for fishing, transportation, irrigation and water for domestic use. Tamale is a typical example. It developed as a result of its central location in relation to Bolgatanga in the north, Wa in the north-west, Techiman in the south and Salaga in the east, mainly by road transport, and also due to its proximity to the Black Volta River at Yape. Its expansion was largely influenced by the vast stretch of land for human settlement, which facilitated the rapid agglomeration of nearby villages (Dickson & Benneh, 2001).

The soils in the savannah zone are largely the groundwater lateritic type which are associated with savannah vegetation and support the cultivation of cereals such as maize, millet, and sorghum as well as cotton and leguminous crops like groundnuts and beans (Center for Policy Analysis, 2000; Dickson & Benneh, 2001). Irrigation farming is an alternative way of solving the weather and poor soil problems. Generally, the crops cultivated in this belt are of low commercial value compared to cash crops like cocoa and pineapple in the forest and coastal belts, though sheanuts, largely grown in the savannah belt are now gaining recognition in local and foreign markets. They occur in large parts of the Upper East, Upper West and the Northern Region. Typical towns are Tamale, Bolgatanga, Wa, Buiepe, Damongo, Bawku and Tumu.

The savannah vegetation and grasslands provide habitats for wildlife in this belt, and the Mole National Park of Damongo is the largest of Ghana's National Parks and is situated in the heart of the Guinea savannah woodland ecosystem. Closely related to this is the Wechiau Community Hippo-sanctuary along the Black Volta River, in the Wa West District of the Upper West Region, which houses about 24 hippopotamus and over 200 species of birds (Department of Environment and Resource Studies, 2013). These contribute significantly to revenue generation from both local and foreign tourists, apart from the employment opportunities they create, as well as their influence on community infrastructural development.

The popular irrigation projects located at Tono in Navrongo and Via in Bolgatanga in the Upper East, Bontanga in the Northern and Busa in the Upper West Regions produce high quality vegetables in large quantities; these include tomatoes, carrots, salad and cabbage, as well as rice (Dickson & Benneh, 2001). The outputs of irrigation farming influenced the establishment of the Tomato Factory at Pwalugu and the Rice Mill at Bolgatanga and Tamale (in the Upper East and Northern Regions) for the processing of irrigated and other locally cultivated tomatoes and rice. The further development of agriculture through the establishment of the Upper Regional Agricultural Development Programme (URADep) from the 1980s to the 1990s in Bolgatanga, attracted more population to this zone which boosted trade within and outside the area.

Other important towns in the savannah belt, such as Bupe in the Central Gonja District, known for the location of the Savannah Cement Company, which depends on the area's limestone, a shea butter processing industry based on the shea nuts produced in the Northern Region, and its roles in river fishing and transport; Nangodi, near Bolgatanga in the Upper East Region, for its earlier role in gold mining and the identification of additional gold deposits yet to be extracted by *Abzu*; and the Sheini community of the Zabzugu-Tatale District of the Northern Region, known for the discovery of large deposits of iron ore, which are yet to be exploited.

While unfortunately most of the industries have collapsed and the mineral deposits of economic value in the savannah belt are either not given formal attention by the Minerals Commission of Ghana or left in the hands of small-scale illegal operators, the influence of the other natural resources within and around some towns have led to their development as Growth Poles. Thus, Tamale as the Regional capital of Northern Region, third largest and the fourth most populous city in Ghana; Bolgatanga as the Regional capital of the Upper East Region; and Wa as the capital of the Upper West Region, have gained increasing centrality in the areas of education, health, transport and commercial services (GSS, 2008).

4.2 The Relationship between Natural Resources and Population Distribution in Ghana

This section comprises a comparative presentation of the natural resources in the three belts of Ghana. The relationship between natural resource availability and population distribution is also established. Table 4 presents the major natural resources in each belt, as well as the category of their use.

Table 4: Most important natural resources in each belt

Belt	Major Natural Resources	Use category	Target market type
Coastal	<ul style="list-style-type: none"> • Salt • Fish • Oil Palm • Timber • Rubber • Coconut • Sugar cane • Gold • Bauxite • Manganese • Diamond • Iron ore • Glass sands • Limestone • Crude Oil 	Industrial/commercial Subsistence/industrial/commercial Subsistence/industrial/commercial Industrial/commercial Industrial Industrial/commercial Industrial/commercial Industrial Industrial Industrial Industrial Industrial Industrial Industrial Industrial Industrial Industrial	Domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic
Forest	<ul style="list-style-type: none"> • Timber • Cocoa • Oil Palm • Gold • Bauxite • Manganese • Clay • Fruits • Hydropower 	Industrial/commercial Industrial/commercial Subsistence/industrial/commercial Industrial Industrial Industrial Industrial Industrial Subsistence/industrial/commercial Industrial/commercial	Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Export/domestic Domestic Export/Domestic Export/Domestic
Savannah	<ul style="list-style-type: none"> • Shea Nuts • Rice • Lime Stone • Clay • Iron Deposits • Salt • Cattle 	Industrial/commercial Subsistence/industrial/commercial Industrial Industrial Commercial Commercial Commercial/industrial	Export/domestic Export/domestic Domestic Domestic Domestic Domestic Domestic

Source: GSS (2008); CIA World Factbook (2013) & Own study (2013).

Pech and Sunada (2006) provided a number of relationships between natural resources and population distribution, adding that areas with adequate natural resources are capable of supporting high levels of economic activity; people tend to be more dependent on natural resources wherever they are perceived to occur for their livelihoods; areas with higher concentrations of natural resources tend to have higher population growth rates, while the opposite is the case in those areas less endowed with natural resources.

In Accra and Kumasi of the coastal and forest belts, summaries of informal conversations on how natural resources influence population distribution in Ghana confirmed the literature above as follows:

Researcher: *“Is there any relationship between natural resources and population distribution in Ghana?”*

Response: *“Yes. Firstly by the initial choice of the indigenes to settle at where the resources occur, and secondly by people moving from other parts of the country, especially from the north (savannah belt) to the south (coastal and forest belts) to have access to fertile lands for their own farms, or work on other people’s plantations and the gold mines. These contribute to rapid population increase in southern Ghana”.* (27/12/2013).

Researcher: *“What caused you to migrate to Kumasi?”*

Response: *“At my hometown in the north, I was farming, but the unreliable pattern of the rainfall and poor soil fertility discouraged me. So I migrated to do farming in a village here. In the village, you find so many other different tribes who are either farming or doing illegal mining; you might have heard of even Chinese men in Ghana for this business”.* (27/12/2013).

The two responses have shown that population immigration is a major cause of the growth of population in the southern part of Ghana (forest and coastal belts). The main pull factor is natural resource endowment, and the majority of the migrants are from the savannah belt. This is consistent with the findings of Kendie (2002), that northern Ghana is the major source of labour for the extractive industries in the south. Statistically, Figure 3 shows a summation of the proportions of the populations of the regions of the three belts of Ghana made up of immigrants.

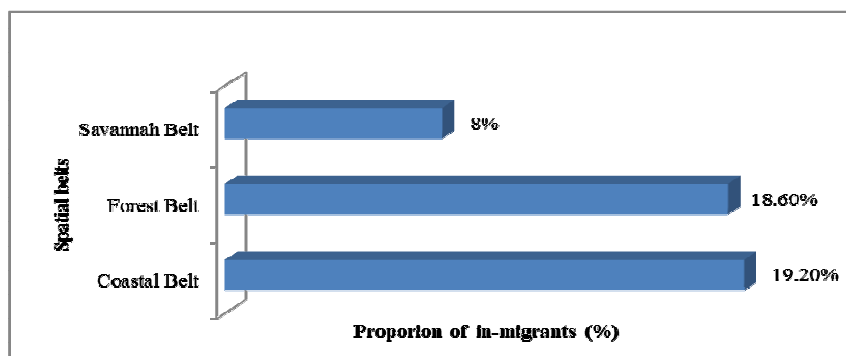


Figure 3: Percentage of immigrants of the total population of the three belts of Ghana. Source: Derived from GSS (2008).

After adding up the composition of immigrants of the regions of each belt and calculating the averages, Figure 3 indicates that an average of 19.20% of the population of the coastal, 18.60% of that of the forest and 8.0 % of the population of the savannah are immigrants from other parts of Ghana (GSS, 2008).

Further, from Table 4, it is observed that the coastal belt (with the highest proportion of immigrant population) has most of the important natural resources for industrial and commercial uses, and also of highest export value. It is followed by the forest and savannah belts, respectively. This has also influenced the distribution of population among the three belts differently as shown in Table 5.

It is apparent from Table 5 that the most populated is the coastal belt (43.42%), followed by the forest (39.43%) and the savannah belt (17.15%). It is further indicated that the coastal belt has the highest number of four regional capital cities, namely Accra, Sekondi-Takoradi, Cape Coast and Ho, which ranked 2nd, 3rd, 5th and 6th respectively in terms of population sizes. The forest belt also has Kumasi as the most populous city in Ghana as it ranked 1st, while its other two regional capitals of Sunyani and Koforidua rank 8th and 10th, respectively. The least populated and less resourced is the savannah belt, with

Tamale as its largest city in the belt ranked 4th, while Bolgatanga and Wa as the two other regional capitals of the belt ranked 7th and 9th, respectively.

Table 5: Population distribution of the various regions under the savannah, forest and coastal belts of Ghana

Region	Capital City	Belt	Region		Capital City	
			population	Rank	Population	Rank
Ashanti	Kumasi	Forest	4780380	1	2035064	1
Greater Accra	Accra	Coastal	4010054	2	1848614	2
Eastern	Koforidua	Forest	2633154	3	96266	10
Northern	Tamale	Savannah	2479461	4	371351	4
Western	Sekondi-Takoradi	Coastal	2376021	5	559548	3
Brong-Ahafo	Sunyani	Forest	2310983	6	129628	8
Central	Cape Coast	Coastal	2201863	7	169894	5
Volta	Ho	Coastal	2118252	8	271881	6
Upper East	Bolgatanga	Savannah	1046545	9	131550	7
Upper West	Wa	Savannah	702110	10	107214	9
Total			24658823		5721010	
Summary of Population according to Belts						
				%		%
		Coastal	10706190	43.42	2849937	49.8
		Forest	9724517	39.44	2260958	39.5
		Savannah	4228116	17.15	610115	10.7
		Total	24658823	100	5721010	100

Source: Ghana Statistical Service (2012).

In terms of theoretical reflections, it was established earlier that natural resources originally influenced the emergence of the major cities as *growth poles*. Furthermore, the concept of population distribution being influenced by natural resource exploitation finds explanation in the *functional spatial integration approach*. Again, according to the GSS (2008) most emigrants from their original places of residence consist of a rural majority, and the savannah belt of Ghana is the most rural. Accordingly, integration through natural resource use provides a way of incorporating the rural poor into the employment and investment opportunities created by local growth.

While accepting the fact that there is the adverse effect of depopulating less endowed regions such as the savannah belt due to the polarisation consequences of the growth pole in functional spatial integration theories, there is also a trickledown effect through such integration as discussed later in this paper.

3.3 Nature of Functional Spatial Integration and Decentralised Territorial Approaches to Spatial Development under the Influence of Natural Resources

With reference to the framework (Figure 2), the *functional spatial integration approach* implies that the various spatial units of the various belts should be integrating their activities in the use of natural resources and the sharing of benefits, which could influence further development within and outside the units. Accordingly, within each town, region or belt, as well as the country as a whole, the integration takes various forms. For instance it could be inter-sector; a case in point is financial support given by Newmont Ghana Ltd, which is engaged in *gold mining* in the Brong Ahafo Region in the forest belt, to small and medium scale farmers to promote *food crop production*. (Ntotroso (B/A) Nov. 24 ,GNA - The Ahafo project of Newmont Ghana Gold Limited at Kenyasi in Asutifi District of Brong-Ahafo, has since 2006 spent 10 million dollars in financial assistance, inputs and extension services to support 5000 farmers in the mine\'s host communities. The mining company offered the support through its Agricultural Improvement and Land Access Programme (AILAP) and the Ahafo-Agri-business Growth Initiative (A) This ensures food security and also increases household income and improved standards

of living of the farmers. The goal is to empower the indigenes economically, thereby preventing them from encroaching on the company's mining sites for illegal mining (Ghana News Agency, 2013).

Natural resource exploitation also draws in both skilled and unskilled labour from other parts of the region and the country at large for increased productivity, which does not only lead to the development of areas with such resources, but also brings about a spread of development as immigrants remit to relatives at home to address their needs. This constitutes the *trickledown* effect of the *growth pole*, the *functional spatial integration* and the *decentralised territorial approaches*. The *savannah belt* for instance supplies menial labour for the medium and large scale farms and other extractive industries of the *forest* and *coastal belts*, while skilled labour in tertiary services such as teachers for higher education, health experts and administrators are freely mobile among all the belts (Kafkalas, 1987; Kendie, 2002).

In terms of economic decentralisation for territorial development as explained by de Janvry & Sadoulet (2004) in the *decentralised territorial approach*, most of the large industries such as Uniliver Ghana Ltd. of Accra, the Donyma Steel Complex in Ashanti, Tema Oil Refinery, Jubilee Oil in Takoradi and Diamond Cement Industry at Bupe-Tamale, establish distribution agents in the smaller towns, as they expand from the bigger cities. This creates employment for the peripheral areas as well as increasing the consumption choices available for them, which, according to Perroux, (1949, cited in Darwent, 1969) is a spread effect of development from the *Growth Poles* to the *peripheries*.

In the savannah belt, the identification of vast stretches of arable land for agriculture at Damongo in the Northern Region of Ghana, and the increasing level of food insecurity in the then Upper Region (now divided into Upper East and Upper West) due to poor soil and climatic conditions in the 1960s, compelled the Government of Ghana to implement a resettlement scheme, in which some residents of the latter were moved to the former to benefit from fertile lands for farming and settlement purposes (Dickson & Benneh, 2001). This was another form of spatial integration, but under the influence of a top-down *decentralized territorial* decision making approach (de Janvry & Sadoulet 2004).

Besides these, the exploitation and benefits from the use of natural resources is promoted by inter sector integration in all spatial units of the country. For example banking services, transportation, marketing, advertising, insurance and communication (see second stratum of Figure 2), all offer functional roles not only to boost the activities of primary natural raw material production, but also to create further opportunities for the development of other sectors as a feature of the *functional spatial integration approach*. Areas which have more natural resources as well as access to higher qualities of such services obviously develop more than those that do not. Accordingly, the potential of cities to become national, regional, metropolitan, municipal and district capitals is largely influenced by natural resource endowment and hence the development of *growth poles*, especially in Africa. Jedwab (2013: 1) put it as follows:

“Africa has recently experienced dramatic urban growth. I argue that standard theories of structural transformation cannot account for this result, as it was not driven by a green revolution or an industrial revolution but by natural resource exports”.

The study provides evidence to support the view in the above literature in the Ghanaian context, as it accounts for more objective examples of the *spatial development* facet in the last stratum of the framework (Figure 2). To begin, Table 6 shows that the largest cities occur in the most natural-resource endowed belts of Ghana (refer to Table 4), in terms of the distribution of municipal and metropolitan cities.

The data reveals a competitive distribution of municipal and metropolitan cities over the two leading belts in terms of natural resources (the coastal and forest belts). While the sum of municipal and metropolitan cities in these belts is 20, the coastal belt however, has more metropolitan cities (4) than the forest (1) and the savannah (1). This implies that the coastal belt, which is the most resourced area of Ghana, is also more urbanised than the forest, with the savannah remaining the least urbanised. It is further proven that the savannah belt is far behind the rest of the country as it has only 4 municipal cities compared to the forest (19) and the coastal (16).

Table 6: Distribution of capital cities over the three belts of Ghana

Region	Belt	Number of Municipal cities	Number of Metropolitan Cities
Western	Coastal	1	1
Central	Coastal	6	1
Accra	Coastal	6	2
Volta	Coastal	3	0
Total coastal cities		16	4
Eastern	Forest	6	0
Ashanti	Forest	6	1
Brong Ahafo	Forest	7	0
Total forest cities		19	1
Northern	Savannah	1	1
Upper East	Savannah	2	0
Upper West	Savannah	1	0
Total savannah cities		4	1

Source: Ghana Statistical Service (2012).

Apart from the above, observations from *transect walks* (see Table 1) in three capital cities revealed that there were more taller and congested buildings of high quality materials, vehicular traffic congestion, larger market sizes, agglomeration of manufacturing and other non-farm enterprises, and the dominance of political and social administrative institutions in Accra in the coastal belt, Kumasi in the forest belt, and Tamale in the savannah belt, in a descending order of magnitude.

The aspect of dominant political institutions is in line with the last of the theories: the *decentralised territorial approach*. Political decentralisation in the context of this paper is related to the District/Municipal/Metropolitan Assembly concepts, in which the Assemblies define the areas of intervention available and allow the private sector to participate in such areas. This is particularly useful for areas with limited natural resources and capital constraints, and which therefore need external intervention for livelihood development, such as the savannah regions.

The above explains why numerous Non-Governmental Organizations (NGOs) operate for poverty alleviation through capacity building and economic empowerment projects, examples of which include the Catholic Relief Services (CRS), CARE International, Action Aid, SNV, SEND-Ghana and World Vision (Ziem, 2013). The apex of the political machinery is, however, located in Accra in the coastal belt, where the office of the President and the Parliament of Ghana are located; these are the highest decision-making authorities.

Informal conversation in the Tamale Metropolis yielded results that establish how peripheral areas could influence the development of central locations as follows:

Researcher: “*How do rural areas influence the development of cities in Ghana?*”

Response: “*What you are doing is just part of it. Several of you from the cities have been to the villages asking for information, but at the end it benefits you as research consultants or promotes the growth of businesses in the cities as they get information from rural clients. Also, the food crop farms, the gold mines and cattle ranches mostly occur in the rural areas, but the majority of consumers, manufacturers and exporters who gain the greatest advantages from these products are in the cities. So why won't they develop?*” (02/01/2014).

This response explains the bottom-up component of the *decentralised territorial approach*, indicated by the top part of the vertical double-headed shape in Figure 2. That is, the influence of smaller towns and villages on the cities as explained above.

The transect walk results provided earlier, serve as evidence of the views expressed by the respondent above. In summary, this information proves that in the *decentralised territorial approach*, *peripheral* areas specialise in raw material production and also serve as sources of information, while central *places* specialise in secondary industrial activities and the provision of larger markets for rural primary raw materials (de Janvry & Sadoulet).

3.4 Distribution of Health, Educational Facilities and Per Capita Expenditure/Income as Measures of Centrality in the belts

The findings in section 3.3 provide evidence that natural resource endowed regions of Ghana have more *central places* and hence more *growth pole* cities than the less resourced areas. Accordingly, the cities of the coastal belt have higher levels of spatial development and degrees of centrality, followed by the forest and savannah belts, respectively. A number of factors justify this claim, but for the purpose of simplicity, further examples are restricted to access to *health, education* and *per capita expenditure/income*. These are also the indicators of the degree of *human development* over space as considered by Amartya Sen (Sen, 1989, cited in Stanton, 2007). The scope of this paper does not, however, cover the computation of the associated indices.

In terms of access to health facilities, the four regions of the coastal belt have a total of 38 government hospitals, with an average of about 10 hospitals per region (which is equal to the national average per region) and 56% of the number of medical officers in Ghana. The forest belt has 54 hospitals, with the highest average of 18 per region and 40% of the number of medical officers, which falls below the coastal belt. The savannah belt however, has 16 government hospitals with an average of 5 hospitals per region. Woefully, only 4% of the number of medical officers is located in this belt (Ghana Health Service, 2008 & 2009). Similar patterns occur in the distribution of nurses and other health professionals and facilities.

It is clear that, the *centralities* of the cities of the coastal and forest belts in terms of access to better health services are higher than those of the savannah. In particular, of the three main *teaching hospitals* in Ghana, the most popular one (in terms of personnel, degree of services and health infrastructure), Kole Bu Teaching Hospital, is located in Accra in the coastal belt, followed by the Komfo Anokye Teaching Hospital in Kumasi in the forest belt, and then the Tamale Teaching Hospital in the savannah belt.

In the sphere of education, according to the Ghana Living Standards Survey Report of the Fifth Round, over 80% of children aged 6 to 11 are currently attending school in the southern part of Ghana (coastal and forest belts), but in the northern part (savannah belt) less than 70% are currently attending school. Among persons aged 19 to 25 years old the school attendance rate is 80% in the coastal and forest belts and 50% in the savannah (GSS, 2008). Furthermore, while more than 60% of adults in almost all the regions in the coastal and forest belts have previously been to school, only about 30% of adults in the savannah had done the same.

The same picture is portrayed for access to tertiary education among the spatial belts of Ghana. In terms of distribution, of the 8 national public universities in Ghana, 5 are located in the coastal belt, including two of the three main public universities (University of Ghana in the Greater Accra Region and the University of Cape Coast in the Central Region). The forest belt has two public universities, including the Kwame Nkrumah University of Science and Technology as one of the three main universities located in the Ashanti Region (Kumasi). The savannah belt can only boast one public university (University for Development Studies), which is a multi-campus institution with branches in all the three regions of the savannah belt (National Accreditation Board, 2011-2013).

Furthermore, Manuh et al. (2007: 82) argued that “*the most significant factor enhancing the chances of access to university in Ghana was the region (and indeed, location) of residence*”. About 70% of students in public universities were found to reside in only Greater Accra in the coastal belt, and Ashanti and Eastern Regions in the forest belt. This suggests that students from these regions have the best chances at gaining entry into university, compared to those in the savannah. It is also a reflection of better access to pre-university educational infrastructure and quality teaching and learning in the former regions than the latter.

The pattern of access to both health and educational services reveals a polarization effect of spatial development. The focus on the development of major growth pole cities as central places, which are concentrated in the coastal and forest belts, has brought about skewed distribution of social services. However, this is due to the fact that the natural resource endowment of the coastal and forest belts, and the resultant spatial integration as an aspect of the functional spatial integration approach, brought about a situation where public sector development planning gives more priority to areas of population agglomeration.

By linking the pattern of distribution of health and educational services to the population figures of the three belts discussed earlier, one could conclude that there is some logic in the spatial development planning and distribution of services. However, some quantitative analysis done earlier reveals that some adjustments are necessary for the development of the savannah belt (especially in the area of health), while access to tertiary education has been excessively skewed in favour of the coastal belt, compared to the forest.

A third basis of comparing spatial development in the three belts in Ghana is the distribution of expenditure/income, which measures level of affluence or economic wellbeing (Todaro & Smith, 2006). Figure 4 shows that per capita expenditure varies among the three belts of Ghana.

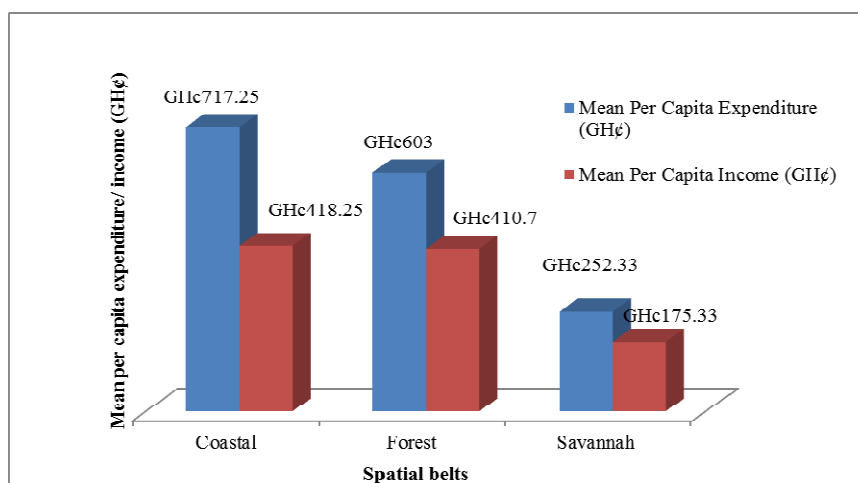


Figure 4: Mean annual per capita expenditure/income of the spatial belts (GH¢) Source: GSS (2008)

The data in Figure 4 was obtained by summing up the per capita expenditure and income figures for the respective regions of each belt (See Figure 2) and dividing by the number of regions per belt to obtain the mean values. It is observed that for the mean per capita expenditure and income values, the coastal belt is leading with GH¢717.25 and GH¢418.25 respectively, followed by the forest belt with GH¢603 and GH¢410.70 respectively, and the savannah with the lowest of GH¢ 252.33 and GH¢175.33 respectively (computed from GSS report, 2008). The data suggest a positive relationship between per capita expenditure and per capita income; higher expenditure patterns are associated with higher incomes. This also means that the standard of living and quality of life of households are highest in the coastal belt, followed by those of the forest and then the savannah. The access to education and health services between the belts discussed earlier gives evidence of this claim.

The policy implication of the income disparities between the spatial belts is that, areas with higher per capita income (coastal and forest belts) obviously generate much more tax revenue for the government than those of lower income levels (savannah belt) (Walter, 2004). Accordingly, public sector investments policies are mostly not only demand driven, but also priority is given to where more revenue is generated. Thus, public direct investments are high in sectors associated with higher revenue. Likewise, private sector activities also increase in areas of higher income and expenditure. Since all these have direct or indirect relationships with natural resource exploitation and population thresholds, the coastal belt of Ghana is of highest advantage, followed by the forest and savannah belts.

Conclusions

The results of this study show that the use of the growth pole theory, functional spatial integration and decentralised territorial approaches facilitate a better understanding of the relationship between natural resources, population and spatial development between the three spatial belts of Ghana (coastal, forest and savannah). There has been adequate evidence to support the adopted theoretical framework that the original factor responsible for the development of growth poles in Ghana was the availability of natural resources, which served as a population pull factor.

Different components of the framework eventually enable the discussion to emerge with multiple factors responsible for spatial disparities in development, such as population *in* and *out*-migration, the level of integration and decentralisation within and between the coastal, forest and savannah belts of Ghana. The findings emerged with a heavy inclination to the view that the coastal belt of Ghana is the most resourced, populated, industrialised, urbanised and so more spatially developed than the forest and savannah belts respectively.

There was, however, evidence of polarized development under the influence of the theoretical applications, as some aspects of development tended to be concentrated in the more natural resource endowed cities than others. This shows the need to ensure fairness in the application of the theories in spatial development planning processes in Ghana.

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