

THE URBAN SATELLITE FIELD CONCEPT

The metropolitan plan draws from the urban field theory in that it envisions Accra as a “field of ever-lower density development, overlaid by a network of major roads into which activity nodes are connected” (Grava, 1999). Different land uses with functional integrity are located throughout the urbanized area, interconnected by various efficient and well-designed transportation systems along with innovative communication networks. Although the larger part of the Accra urban region will embody the urban field model of development and density, there will also be satellite cities located on the periphery, linked to the metropolitan core. These satellite cities encourage new development in designated and defined areas, and are not incompatible with the urban field concept.

The transportation networks form the framework for the urban field having many points that link up to a central node and then separate again to serve individual nodes that performing specific regional purposes. The central portion of the city that roughly corresponds with the boundary of the Accra Metropolitan Area (AMA) constitutes the majority of the inner urban field area.

In conceptualizing the Accra metropolitan region in light of the urban fields model, one may imagine a large space with urban characteristics comprised of a mosaic of multiple centers and districts with different specialized purposes. Culturally sensitive urban design for Accra maintains the preference for the lower density residential development

A constellation of largely self-sufficient satellite cities contained within the metropolitan plan are linked to the transportation networks in ways that facilitate easy access to other activity centers. Phase One of development of these satellite centers, as indicated on the map, includes two smaller satellite cities 5 km² in size, that accommodate 20,000 people per km, and allow for a maximum population of 100,000. A northeastern satellite city is 10 km² in size, allowing for a maximum population of 200,000. This larger satellite city will have more expanded entertainment, educational, commercial

services and amenities along with three transit stations on the original rail system. Later phases of the concept will continue in this pattern, with one large and five additional small satellite cities being developed, for a total of ten.

In order to encourage responsible growth patterns across the dispersed fabric of activity, a growth boundary will be set in place. The territory outside the boundary will be mainly comprised of large lot zoning limited to one or two hectares accompanied by some agricultural and recreational space. The large lot zoning will fulfill the demand for single-family homes, yet allow the land to appear green despite development. "Urban field refers to urbanization over a large space" and with careful planning and development can improve access between and within the nodes of activity (Grava, 1999). A key component of this metropolitan concept is that development is planned in a way so as to accommodate future growth and to provide the best possible standard of living for each resident. "Modern means of transport and communications provide accessibility to all points and loosen the constraints of location centered on a single focus" (Grava, 2003). The growth boundary will discourage haphazard development that may result in undifferentiated sprawl, which devours the landscape and results in very low-density development that is extremely difficult and expensive to service.

The specific land use plan will designate no build areas in order to preserve open space and prevent new construction within the floodplains. New built structures will conform to building codes and stricter zoning regulations, while older units will be gradually brought up to code as they are renovated. Mixed income and mixed-use development will be a key aspect of this concept, enabling greater fluidity between nodes. Residents will not face isolation, as existing cultural and social networks will be preserved and expanded upon. Furthermore, there will be an increase in public safety, an improvement in the overall living environment, combined with greater access to public space. Misguided placement of residences in areas subject to flood hazards or in ways that produce sprawl like patterns of development will be discouraged through enforced land use zoning and the greater provision of alternative attractive and suitable sites for settlement.

The decentralization of government, commercial, retail, cultural, and work facilities, alleviates strain on transportation, infrastructure, the environment and other resources. "Successful clusters of specialized activity" will aid in economic development of the region in a community-driven and flexible way that can adjust to current and future trends and needs (Grava, 1998). Most importantly, strategic planning and development practices within and beyond the urban fields can enable a better network of infrastructure and amenities necessary for improved drainage, sanitation, and solid waste management. Such key services can further promote productivity and raise the standard of living throughout the region.

The organized communal transportation systems will provide affordable, accessible, and reliable transportation options for residents to reach jobs and services. The special purpose nodes that are linked by transportation systems will "provide points of reference and destination" for residents, tourists, businesspeople etc. Skillful implementation of long-range transportation services, with movements in all directions, can reduce traffic and improve the quality of life for commuters who need to access different activities, which have different levels of demand for physical proximity to entry points on the networks (Grava, 1999).

"Virtual downtowns" have emerged around the world, and consist of "a cluster of entertainment/leisure based activities that offer a nostalgic replica of the traditional downtown" currently goes underutilized by residents and visitors alike (Grava, 1998). Accra's central business district, central government and cultural functions can be maintained, but entertainment and cultural amenities may be expanded to generate recreational and commercial activity. Because of the city's unique historical and cultural significance of Ghana, the historical core of Accra could preserve existing monumental structures while developing and promoting new eateries, cafés, bars, boutiques and other amenities.

All designated centers contain key services and facilities, each node having a specific theme. The potential for economic activity can be maximized through the establishment of nodes that focus on commercial and retail activity. Farmers' markets are an

important venue for community-based economic activity and also encourage social interaction between members of the community. In addition, continued development of the consumer strip on “Oxford Street” in Osu catering to both tourists and residents can provide much needed goods and services while hosting a tourist information center. Informal sector activity can also be afforded space, but the government should play a large role in encouraging more sustainable economic activity throughout the region. As mentioned previously, the downtown area can maintain its geographical size yet expand its entertainment and cultural amenities. A complementary node with a more elaborate framework for cultural, social, and entertainment activities could also stimulate the economy and increase Accra’s capacity to host larger festivals and events that may attract a worldwide audience.

Infrastructure for water, sanitation, and waste management needs will be crucial to increasing productivity and standards of living. This metropolitan concept advocates for the renovation and upgrading of existing structures with an emphasis on improvement, modernization and maintenance. The government will at the very least provide sites and services, ultimately working toward sustainable community development throughout the urban field. This metropolitan framework encourages connectivity through transportation and communication while actively promoting functional, economic, and social integration within specialized nodes. Development will occur in phases determined by financial constraints, technical considerations, and potential social and economic impacts on current residents. Public support will be key each level of conception, development, financing and upgrading. However, for any and all of the above to be successful there has to be communication and cooperation with in the government.

Transportation

The urban field concept for Accra relies heavily on the transportation layer for the metropolitan area. The transportation network, therefore, is a three-tiered approach that utilizes two networks: heavy rail access from beyond the immediate metropolitan area and public roads infrastructure within the metropolitan area. Where narrow roadways are not capable of withstanding the implementation of a Bus Rapid Transit

line, existing urban transport modes will be utilized. Such modes include existing *tro-tros* that service core areas within the city. *Tro-tros* will undergo government regulation in order to improve the quality of service. The Accra Metropolitan Transit Authority (AMTA), a newly incorporated authority standardizing the operations of *tro-tros* within the city, should regulate this and along with all other public transit services. Bus service will also be implemented along major and minor roads that have operating *tro-tro* service. The goal of the AMTA will be to implement a public transit service that eventually phases out all paratransit systems within the city. Job displacement for *tro-tro* and other paratransit operators will be mitigated through employment with the AMTA, either as workers or operators.

The traffic patterns utilizing the highways and rail network are shown on the Metropolitan Map. A key feature to the urban field transportation network is the creating of park-and-ride depots at the periphery of the metropolitan area. Drivers needing to get into the city will have access Bus Rapid Transit (BRT) lines from the metropolitan fringes. Allowing access from areas not serviced by rail or public transit lines is important to the sustainable growth of the metropolitan area.

Public Transit in Accra

Traffic congestion, central city decline, and air pollution are all problems associated with excessive dependence on automobiles. Increasing recognition of the need for high-quality transit service to alleviate these conditions has fueled growing demand for new transit services in developing countries. Accra faces the challenge of low-grade public transit systems. A reliable and efficient public transit system is essential.

President Kufour placed public transit at the top in his inaugural agenda. Accordingly, Accra, has undertaken transit modernization programs. Most recently, Accra has appealed to the Global Environmental Facility (GEF) and Institute for Transportation Development Policy (ITDP) for help in realizing modern Bus Rapid Transit (BRT) corridors and cycleways analogous to Curitiba, Brazil and Bogotá, Columbia. If Accra is successful in this endeavor, it will be the first such system in Africa. In light of this the urban field concept for Accra utilizes the BRT as the main mode of public transit.

Low-cost investments in infrastructure, equipment, operational improvements, and technology can provide the foundation for the Accra Bus Rapid Transit systems that is incorporated in our vision. Conceived as an integrated, well-defined system, Accra Bus Rapid Transit would provide for significantly higher operating speeds, greater service reliability, and increased convenience, matching the quality of rail transit when implemented in appropriate settings. Improved BRT service would give priority treatment to buses on urban roadways and would be expected to include some or all of the following features:

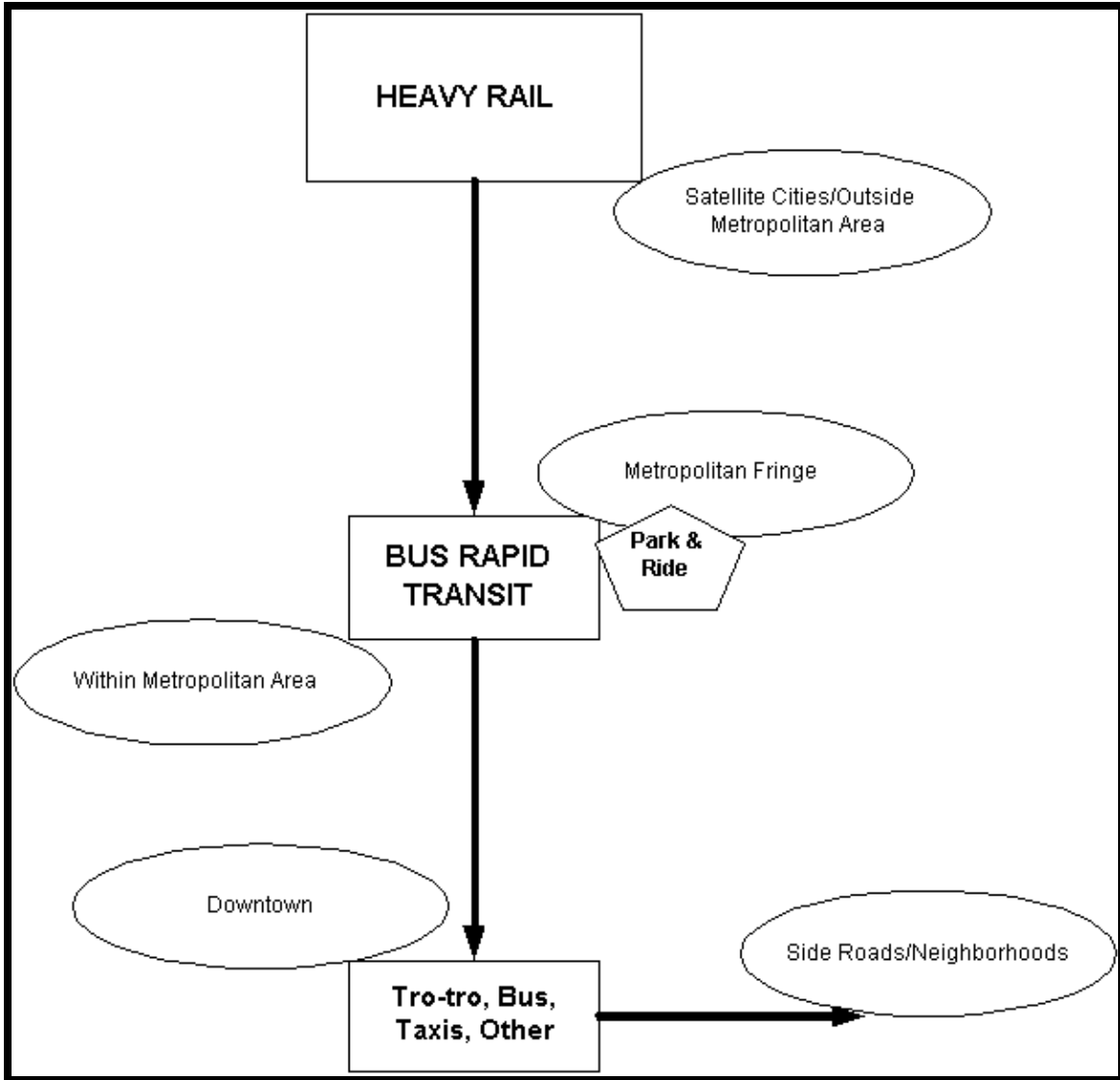
- *Bus lanes:* dedicated lanes on an urban arterial or city street reserved for the exclusive or near-exclusive use of buses
- *Bus signal preference and preemption:* preferential treatment of buses at intersections involving the extension of green time or actuation of the green light at signalized intersections upon detection of an approaching bus - particularly helpful when implemented in conjunction with bus lanes or streets, as general-purpose traffic does not intervene between buses and traffic signals
- *Faster boarding:* Conventional on-board collection of fares slows the boarding process, particularly when a variety of fares is collected for different destinations and/or classes of passengers. An alternative is the collection of fares within an enclosed bus station or shelter area prior to bus arrival, allowing boarding through all doors of stopped buses. A self-service or "proof-of-payment" system also allows this manner of boarding, but poses significant enforcement challenges. Prepaid "smart cards" providing for automated fare collection would speed fare transactions, but would require that boarding remain restricted to the front door of the bus. Changes in bus or platform design that could provide for level boarding through the use of low-floor buses, raised platforms, or some combination thereof could make boarding both faster and easier for all passengers.
- *Integration of transit development with land use policy:* BRT and compact, pedestrian-oriented land use developments are mutually supportive. The clustered development has the additional benefit of conserving land and promoting the vitality of neighborhoods and urban commercial centers. Bus

Rapid Transit can be most effective when integrated within a broader planning framework encompassing land use policies, zoning regulations and economic and community development.

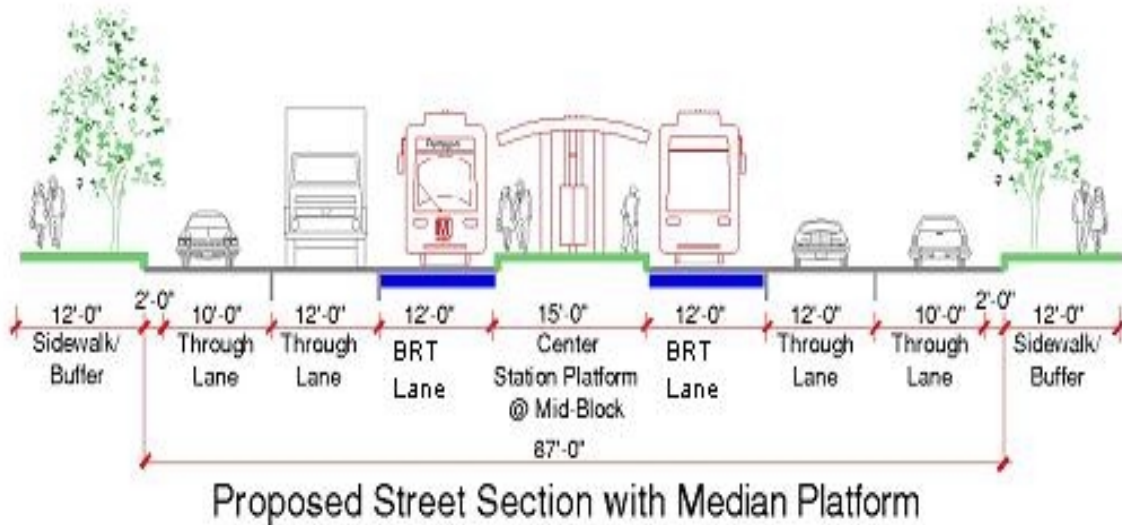
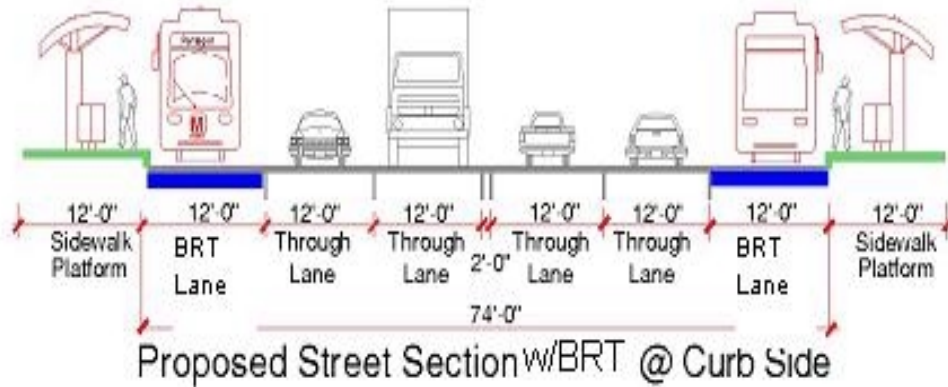


Schematic of transportation network (highways and heavy rail)

Lastly, implementation of Accra Bus Rapid Transit (see Cross-section of Accra roadway) poses a number of challenges, ranging from the need for adequate cross sections on city streets to provide separate rights-of-way for buses maintaining the quality of general-purpose traffic flow and minimizing local noise and air quality impacts. These challenges require detailed analysis in the context of specific local applications to identify appropriate solutions and to determine where BRT can offer the greatest benefit.



Urban field transportation network



(Parsons, 2000)

Cross-section of Accra roadway with BRT at curb and median

Land Use

As stated above, the urban field can be thought of as a mosaic of clearly represented nodes and districts. The nodes and districts represent a variety of diverse uses, predominated by mixed residential and commercial. Many buildings within the urban field are residential on the upper floors with street level commercial usage. However, there are small and large nodes of purely commercial development, with specific uses varying from node to node, but ranging from international business to retail and

shopping to cultural/recreational establishments such as museums and movie theaters. Land uses aside from residential and commercial are specifically designated to certain sections of the urban field, although it should be noted that these areas were chosen largely based upon the uses occurring in Accra already (see land use map).

Residential

As mentioned, residential land use rarely exists alone but rather in combination with commercial establishments. Residential densities within the mixed-use zones average approximately 84 people per acre, or 200 per hectare. This average figure is derived from a combination of tightly grouped one-story homes with communal open space and taller high-rise buildings, ranging from two to eight stories. In addition, there are two low-density (50 people per ha) residential zones, as indicated on the map.

Commercial

Commercial nodes (indicated on the map) have specialized uses. These are described in more detail in the Urban Field section but include centers of employment such as local and international business, information technology and light manufacturing. In addition, there are several cultural areas, which can also be distinguished from one another by museums, civic centers, recreational and historic uses.

The commercial land use that exists within the mixed-use zones such as food stores, restaurants, entertainment, and retail stores primarily meets daily residential needs. Also included here are the informal stands and kiosks that currently line many of Accra's residential streets.

Industrial

Proposed industrial zones within the urban field exist at the city's eastern and western ends. They include heavy industry, which is very similar to that which currently exists within Accra today, consisting mainly of manufacturing and warehouses including canning and cement and cocoa processing. Additionally, a light industrial area specializing in information technology is located in a strip just east of Nkrumah Circle and spans a significant strip of land moving eastward. Both heavy and light industry are essential elements of the urban field, as they will provide employment while contributing to the much-needed expansion of the city of Accra's economic base.

Open Space

Open space in the urban field is specifically designated along some rivers, and in other areas indicated on the map. This is for several reasons: open space is needed in Accra's floodplains, so as to eliminate the current dense development that occurs there in order to prevent the economic and social devastation during floods, as they are likely to do almost every year in the early summer. Secondly, open space provides an important refuge point in the case of disasters. In general, open space is necessary for the general health and well-being of the residents of any city. It provides a place for recreation, socialization, communal agriculture. With this in mind, there are small areas of open space within the urban field per 100 households. In addition, Accra's shoreline will be designated a public beach with a pedestrian/bicycle promenade. A greenbelt surrounding the urban field with extremely low-density housing (2 units per ha) and agriculture will preserve open space as well.

Civic and Cultural

Civic (a governmental sector) and cultural land uses exist within the center of the urban field at its southern end.

Institutional

Public institutions and educational facilities exist along several of the urban field's transportation corridors. The University of Ghana occupies a large tract of land in the northern edge of the developed area. Additionally, there are smaller educational facilities, which serve the urban field's extensive population, as designated on the map. Hospitals and smaller medical facilities exist not only within the node designated for health and Social Services, but in all residential neighborhoods as well.

Transportation

Transportation infrastructure constitutes an integral component of the urban field as it serves to connect the individual nodes and satellites. The specifics of the transportation system are further discussed in the transportation section, but this infrastructure occupies a significant portion of the total land use, as is indicated on the map. It should be noted that there is a significant marine port located off Tema, which will serve as the outlet for Accra's growing export business. The international airport is kept in its present position adjacent to Nkrumah Circle.

Military

All military/defense areas have been moved from the central city to the area north of Tema, as it is not necessary for such facilities to occupy waterfront and central city space. The designated defense area is indicated on the map and located in and around the Michel Camp.

Satellite Cities

The urban field concept for the Accra Metropolitan Area is complemented by the expansion of the city center through the establishment and development of satellite cities. These satellite cities will be largely self-sufficient cities with residential populations ranging from 100,000 to 200,000 persons. The cities will range from five to ten km², size being dictated by population. The satellite cities will develop around existing settlements, which can then be further developed to accommodate the needs of existing and future residents. To accommodate the growing population, Accra will need satellite cities in the future. The projections are to support one million residents through the development of eight to ten satellite cities. This development of each city will occur in a strategic multi-phase process.

In Phase One, the satellite cities concept will begin with two cities located to the northwest of Accra, located on the heavy rail line traveling toward Kumasi. From city center to satellite city center there is a range in distance from 25 to 40 km. The first satellite city, City #1, is located approximately 25 km from Accra's center commercial /government district. City #2 is located approximately 40 km from Accra's center commercial/government district. The third satellite city will be located due west of Accra in the direction of Cape Coast. City #3 is also located approximately 25 km from Accra's center commercial/government district. Cities #1 and #3 will be 5 km² with 100,000 people. City #2 will be double in size, at 10 km², and have a population of 200,000 people. Each city will have resources to sustain and support the projected populations. These three cities will have a diverse range of residential accommodations as well as commercial businesses. Local businesses will serve residents and provide jobs. Local businesses will include grocery and sundries, books stores, entertainment, clothing, hair

salons and other personal care services and public service entities (i.e., clinics, schools, etc).

Phase two of the satellite cities development project will occur to the northeast of Accra's city center. City #4 will be located approximately 30-35 km from Accra's center commercial/government district. Located within reasonable proximity to the airport and Tema, Ghanaians will find this a comfortable and convenient location for persons that work in the business, information technology and industrial markets. City #4 will include Michel Camp and be large in size, 10 km², 200,000 people. This second phase of development will be supported by the same amenities in the other satellite city locations, including sufficient transportation options. The success of Cities #1-4 will support the directional flow of development for phase three constructions.

The satellite cities of Accra will be located on both improved existing transportation routes and newly constructed ones. These cities will have quality residential housing that range from town homes and one level residences to four story walk-up apartments with the possibility of a few high rise apartment buildings. Not only will residential housing but also the development of a comprehensive mixed-use commercial core will exist in each city. All the necessary and convenient resources like shopping, schools, medical facilities, recreational facilities, transportation as well as commercial enterprises will be available. The smaller 5 km² satellite cities will be more like dormitory cities. These will be locations that are primarily residential and the residents will commute to in Accra to work place clusters each day for business. However, the large 10 km² satellite cities will attract some destination visitors and be possible locations for niche commercial activity development.

As the large satellite cities, Cities #2 and #4, expand toward other major existing cities the commercial activity may become an extension of the hub/major city. For example, as satellite cities develop along the route to Kumasi, perhaps businesses that support the arts and culture will flourish. Likewise, for the easterly city near Tema perhaps industrial support businesses will develop in the area. Strategic placement of housing and businesses, zoning and governmental regulations, and some bordering recreational

and green space will allow the integrity or configuration of these cities to remain set and in tact. These measures will have to be in place to prevent sprawl, unplanned growth and expansion of the satellite cities. These satellite city projects are an ideal opportunity to relieve the anticipated population congestion in Accra and provide locations that are mini-residential and commercial cities within short distances of the nation's capital.

Economic Development

Ghana will be required either to seek foreign loans or to create wealth internally in order to finance the modernization of Accra. In order to create local wealth, the government should encourage foreign investment and promote education. Historically, tourism and export processing zones have been successful in bringing foreign investment. The new jobs available to Ghanaians will increase the tax base and provide the government with the much-needed funds to implement this plan. The government will need to implement a tax collection program to facilitate in its effort to collect tax revenue.

The purpose of this plan is not to explore in detail the economic potential of Ghana. However, as part of a complete metropolitan plan, it is relevant to suggest types of investments that can reliably create meaningful, well-paying jobs in an environmentally and culturally sensitive manner.

Tourism

The Ghana Tourism Board has already drafted a 15-year development plan and has recognized that tourism is Ghana's third largest export earner after gold and cocoa. Doreen Owusu Fianko, Chief Executive of the Tourism Board, states that Ghana's "strength and security as a destination is commendable" and that there is guaranteed "peace, safety, security, and stability" (WINNE, 2003). Ghana has a tropical climate with moderate temperatures, constant breeze and clear, continuous sunshine most of the year. International promotion and marketing of travel to the Accra region for special interest, leisure, business, and ecotourism could generate much-needed revenue for the region as well as for the nation of Ghana.

As the gateway to Ghana, Accra has a unique opportunity to take advantage of all travelers to Ghana. Accra must develop appeal from all four tourism categories that will entice visitors to spend a few days in Accra even if their trip is to take them to other parts of the country. For this purpose, this plan recommends the creation of an Accra Tourism Promotion Board. Ghana can offer visitors four kinds of tourism:

- Beach tourism
- Ecotourism
- Cultural tourism
- Conference tourism

Shoreline Development

A *corniche*, a landscaped boulevard along the beach, will be developed with careful attention to preventing beach erosion as a result of coastal development. This area will provide much needed recreational space for both residents and tourists through water development activity that incorporates pedestrian promenades and bicycle pathways into potential tourism attractions and amenities. A historic seaport area can serve as a key tourist hub that hugs breathtaking coastal vistas and link to important educational resources related to the history of the slave trade and natural endowment sites of interest. The historic waterfront area can also host restaurants, pubs, cafes, shops, arts and crafts marts, performances, festivals and other celebratory elements. Accra can easily be the entertainment and culture capital of West Africa. Cruise ship and other boating excursions can be based at the docks of this coastal region and integrate ecological attractions into their itineraries. Pristine beaches which provide ideal setting for the development of niche resorts for the discerning non-mass tourists. There has already been much speculation about the value of developing various types of resorts in the Volta Lake Basin. The expansion of beach resorts along the coast can accommodate the growth of beach tourism in and around Accra. The promotion of scuba diving and other water related sports can also incorporate aspects of nature-based tourism.

Ecological Attractions

Overall, Ghana has varied flora and fauna ranging from the dense tropical rain forest in the Southwest through deciduous forest in the middle belt to dry savannah in the Northern Region, where Mole National Park and the Bui Game Reserve provide

sanctuary to antelope, monkeys, elephants, lions, kobs, leopards and other animals. Near Accra, virgin tropical rainforest game parks and wetlands offer opportunities for the promotion of nature-based tourism, which is on the increase worldwide. Lagoon systems are important habitats for birds and marine life, and lagoons located in the Accra region can provide an important ecological and recreational function.

In Accra, The Achimota Forest Reserve, which was recently opened to visitors, can provide opportunities for travelers to learn about Ghana's ecological and agricultural history. The Aburi Botanical Gardens, situated on the Akwapim ridge about 39 km north-east of Accra along the old Accra Koforidua road also serve as a site for the conservation and sustainable use of medicinal plants – such as the silk cotton tree. Areas of Ghana near Accra also offer interesting landscapes of tropical forest, savannah, wildlife parks, and cocoa farms. The Kakum National Park near Cape Coast is a tropical rain forest with a canopy walkway enabling panoramic views of area.

Culture and Heritage

Ghana has many culturally and historically significant sites that have been listed on UNESCO's World Heritage register. Such sites include European forts and castles that are remnants of Ghana's role in the triangular trade routes, infamous for bringing Africans to the Americas as slaves. The Portuguese, Swedes, Dutch, Danish and British initially built these monuments that include the nearby Elmina Castle. The nearby Cape Coast Castle, built by the Swedes in 1653, houses the West African Historical Museum. Also a short train ride away is the new National Cultural Center at Manhyia Palace Museum in Kumasi. In Accra, the Makola Market, the National Center for Art, and other spaces that showcase traditional crafts and culture set a backdrop for special events like the PANAFEST and the Emancipation Day Celebration.

Ghana's unique cultural heritage - notably the traditional festivals and artisanal heritage – makes it a treasure for ethnotourists. Theatre and music venues, such as the National Theatre, exist to offer abundant space for performances of all kind. The development of a theme park near or in Accra could also provide a space for tourist activity that could address the entertainment and leisure needs of families. Furthermore, casinos located near the beach could generate much-needed revenue

while providing another level of tourist activity. The nightlife scene in Accra is continuing to grow, however further bars, restaurants and nightclubs can be established and marketed to both tourists and residents.

Business

The convention center, parade grounds, theatre and sports arenas that currently exist in Accra maintain civic and business needs, and have the potential to serve as gathering areas for conferences and events on an international scale. The African American Conference held in Accra in 1993 was international in scope and attracted over 4,000 participants. The Accra region has the potential to greatly benefit increased participation in the tourism industry and its provision of services and amenities related to both business and pleasure travelers.

Ghana has modern telecommunication facilities as well as first-class seaports and a modernized international airport in Accra. Recent development of modern hotels, convention facilities and theatres has made Ghana Africa's newest tourist and convention destination with Europe and the United States as its biggest markets. Kotoka Airport in Accra seems set to become a significant hub linking flights between these areas with much of West, East and Southern Africa.

The government has incorporated tax concessions and incentives for tourism-related activity and can expand on its current investment incentives. Examples of such mechanisms recently put in place include:

- Corporate tax:
 - 25% reduction for hotels
 - 25% further rebate for tourism establishments located in regional capitals other than Accra-Tema
 - 50% for enterprises located outside regional capitals
- Other tax concessions: accelerated depreciation allowances
 - 50% per annum over two years on plant and machinery expenditures
 - 20% per annum for five years (loss carry-over of 5 years) on building expenditures

Export Processing Zone

An export processing zone (EPZ) will attract foreign capital to Ghana. The current government recognizes the importance of attracting foreign investment. Accra's efforts should be undertaken in conjunction with national and regional initiatives to ensure that they are most effective.

It is counterproductive to mandate exactly what investments can be made in EPZ, but Accra should ensure that all investments meet long-term sustainability, environmental respect, and social consciousness as basic criteria. In particular, Accra should seek to attract investment that will take advantage of Tema's port facilities. This is why this plan has placed industrial zones and EPZ near Tema.

Accra can seek to become a major transformation center for the goods produced in the rest of the country. Value-added transformation of export commodities has been a successful development mechanism. Accra can seek to attract capital for the following types of transformation industries:

1. Fruit processing – juicing and canning local fruit
2. Bicycle manufacturing – assembly in Ghana from imported parts and to be sold throughout Africa
3. Composting – composting Accra's mostly organic solid waste into high-value top soil
4. Medicinal plants – transforming Ghanaian plants with medicinal properties into lucrative alternative medicine products
5. Technology and services outsourcing – backoffice and customer service needs of other English-speaking countries at call centers
6. Bio-fuel production – leveraging Ghana's agricultural production to create fossil fuel substitutes (e.g., biodiesel, diester) for local production and export
7. Salt processing – capitalizing on Accra's local lagoons to produce high quality salt; salt ponds also draw birds and can spur ecotourism

8. Fish processing – export of fish products from the Gulf of Guinea
9. Beer production – following the example of Jamaica’s Red Stripe brand, the beer could be marketed internationally, and the brewery can be a tourist attraction
10. High-tech manufacturing – microchips and computer parts (dependent on the the skill level of laborers)

All investors should be required to provide basic health facilities for workers and their families, and to fund education programs relevant to their activity sectors. This will serve the dual purpose of improving the public health of Accra’s residents and in building local capacity for further economic development.

Education

Any economic development plan implemented in Accra will first require a strong educational foundation. As part of the urban field concept, space will be set aside for educational facilities targeting all levels. In light of the relatively extensive system of primary education already in place in Ghana, special emphasis will be placed on facilities offering varying levels of job training. This will include technical schools offering courses in both traditional technical areas (machine manufacturing and repair) and information technology. There will also be institutions specializing in preparation for fields such as office work and data entry. The University of Ghana provides an extensive non-vocational curriculum, and this should be expanded on with the development of smaller universities as well. A strong, diverse educational system in Accra will likewise provide support for a strong, diverse economy.

Risk Management

Accra faces significant risk from a variety of hazards. These include floods, fires, earthquakes, and disease. As residential neighborhoods are planned and constructed, they should be built to resist the hazards that unplanned communities might succumb to. Because an urban field with satellite cities distributes population in high-density neighborhoods, emergency response services can be focused effectively.

The guiding principle of risk assessment is the following equation:

$$\text{Risk} = \text{Hazard} * \text{Fragility} * \text{Assets}$$

This definition implies that - all other things remaining equal - as the value of assets rises, risk will invariably rise. Therefore, as Accra becomes more affluent, the government must establish effective risk-management strategies. Since limiting the value of assets is not a viable solution, government and community efforts can focus on reducing the fragility or the hazard facing a particular population, building, or institution.

Some hazards (fire, some floods, disease) can be reduced through human intervention but others (earthquake) cannot be impacted by human activity. When a hazard cannot be directly reduced, indirect measures (such as hazard-conscious land use maps) can be used to limit damages. Alternatively, the fragility of structures can be lessened through the enforcement of proper codes and zoning.

This metropolitan plan endeavors to mitigate the severity of all applicable hazards while offering an affordable means for reducing the fragility of infrastructures to earthquakes.

Flooding

Flooding in Accra is the result of several factors: 1) intense rainfall events, 2) haphazard low-density urbanization (sometimes in flood plains), and 3) garbage accumulation in engineered drains (Sam, 2002). Low-density urbanization increases the flooding hazard (related to the height of the flood) by increasing impervious surfaces and reducing vegetation cover. Rubbish accumulation in storm drains significantly reduces the conveyance of these drains and also leads to flooding.

While nothing can be done about the intensity of rainfall events, this metropolitan concept addresses the two other human factors through a regional effort of increasing density. As part of this plan, some residents currently living in floodplains will be able to relocate to safer areas.

In the urban satellite field concept, a significant proportion of the population lives in high-density areas. While some of the population lives in lower-density areas, the need for such neighborhoods will be smaller than at present. This reduces development pressure on the land, and allows government to reserve open space. This open space is

crucial in decreasing the severity of floods, and the frequency of extreme floods. Therefore, concentrating population at a regional scale will help to reduce both the flooding hazard and risk.

Garbage collection services can be provided effectively and affordably in high-density areas because of economies of scale. The pavement of new roads can make garbage collection accessible to the hard-to-reach areas. This can reduce the pressure on Accra's drainage network, and can significantly lower the flood hazard and risk.

Multi-story buildings comprise most of the habitat in a residential high-density area. These buildings can have empty ground floors (provided appropriate precautions are taken to mitigate earthquake risk) so that floods do not affect residents' belongings. This limits the fragility of the housing structure, and reduces the overall risk.

Clearly, no flood hazard reduction benefits will be achieved unless this plan is implemented as a whole. Small islands of high-density settlement cannot achieve the same result as a region-wide, integrated approach.

Fire

In this concept, high-density residential neighborhoods are served by local fire stations. Paved roads will provide access to these planned neighborhoods for fire engines. This will limit the fragility of the housing stock to the fire hazard. The proximity of fire stations to residential areas is crucial as early reaction can significantly reduce the loss of property. It is also important to ensure that adequate water pressure is available so that firefighters can effectively put out fires.

A fire code applying to all structures would also significantly reduce the fire risk in Accra. Regular inspections must enforce this code and fines should be levied against violators.

High-density housing structures can be spaced sufficiently far apart that fire cannot spread from one unit to the next. This limits the fire hazard as compared to high-density neighborhoods such as Alajo or Nima.

Public Health

If drainage is poor, flooding causes water to pond. Sewerage can reach houses or food and water supplies. Pools of water can become breeding ground for mosquitoes that transmit diseases such as malaria. Following a reduction in the flooding hazard, the disease hazard will also be reduced. Moreover, providing clean drinking water and piped sewers will significantly reduce human contact with waterborne contaminants.

The residents of high-density residential neighborhoods can combine their resources to ensure that they receive affordable access to clean water and sewers. At this time, water born diseases and malaria account for almost 80% of all illnesses in Accra. Adopting an integrated regional plan such as this metropolitan plan will significantly curb the prevalence of these diseases.

The concentration of population also provides an incentive to for health facilities to locate nearby, as they can be assured a customer base. The combination of these factors can significantly reduce the health hazard and fragility of a population living in a high-density environment.

As discussed above, garbage collection can be improved under this plan. This should have a direct positive impact on public health by decreasing vermin population in living areas.

The spine of the urban satellite field concept is the disaster-resilient public transit system, providing extensive rapid transit. This can reduce the dependence on the individual automobile, and on fossil fuels (as busses and trains can run on electricity), significantly reducing the air pollution of Accra. Since air pollution can cause asthma and other respiratory illnesses, improved air quality should lessen the disease risk for the population of metropolitan Accra.

Earthquakes

Unlike floods and fires, earthquakes cannot be stopped, but their effects can be compounded by human activity. Lowering the fragility of infrastructure and built

structures and limiting development in high hazard zones are the best ways to reduce earthquake risk. This requires strictly enforced building codes and zoning ordinances that are enforced at the regional scale.

Building codes must make clear the structural requirements of buildings in Accra while the zoning ordinances must indicate the areas that are unsafe for building (due to soft soils, for example).

Enforcement of building codes is easier in high-density neighborhoods since the number of structures to review and inspect is lower than in low-density neighborhoods. As more people live in high-density neighborhoods than in low-density zones, more people are protected from earthquakes by virtue of their carefully location of residence.

To reduce the earthquake risk for the metropolitan area, it is preferable that all elements be built to be earthquake resistant. It is especially important to have earthquake-resistant essential facilities such as the transportation and energy distribution infrastructure, lifeline buildings (hospitals, fire houses, emergency centers, schools, power plants and substations), and business districts.