Coping With Environmental Challenges in the Medium Size Town of Ahero in Nyanza Province, Kenya

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Abstract
Emerging environmental planning issues in medium size towns in Kenya have received little attention. The study examined the urban growth of Ahero town with respect to the status of the town’s environment and its planning and environmental problems, as well as the town’s planning and environmental challenges. The methods used in data collection included survey questionnaires administered to 199 respondents in Ahero town, field observation, key informant interviews, photography, analysis of topographical map of scale 1:50,000 and Ahero Town Physical Development Plan dated 1966. Data analysis involved both quantitative and qualitative techniques. Quantitative data was entered and analyzed in SPSS and Excel while qualitative data was thematically analyzed. The proposed development plan was developed using Geographical Information System techniques. The study findings indicated that there are a number of environmental problems in Ahero town including: poor housing, poor solid waste management, poor sanitation evidenced by lack of a sewer system and inadequate water supply to meet the needs of the expanding urban population. Given these findings, the study recommends the institutionalization of housing improvement programmes, privatization of the solid waste management system and the development of a proper sewer system to cater for liquid wastes. This study is significant in that it reveals the existence of environmental concerns in the town and provides awareness to the council and residents about these problems. The recommendations and data generated by the study can be used by the council to control environmental problems within its jurisdiction. Further, this knowledge can be used by scholars to carry out further enquiry into the provision of adequate housing, enforcement of environmental policies and planning for water provision in the area.

Keywords: challenges, environmental planning, medium size town, Ahero, Nyanza Province, Kenya

INTRODUCTION
Urban centres attract people from rural areas seeking employment and better services such as access to better health facilities, water, housing, and generally improved living conditions. Unfortunately, these human settlements referred to as urban areas, make heavy demands on resources available and generate huge amounts of waste that adversely affect the health and cause deterioration/degradation of environmental integrity. Kiplagat (1999) explains that the process of production takes place in various stages and so does consumption, and so not all goods are consumed; some wastes are generated. The wastes so generated cause environmental problems if not correctly managed. He further espouses that the rapid growth in urban settlements have serious challenges for planners and local authorities to an extent that provision of services such as housing, health, sewage disposal, water and sanitation, which are addressed in this study are seriously inadequate.

However, urbanization is not necessarily a disaster; rather it can be viewed as a challenge to environmental planning and management. The process cannot be stopped either. Therefore, this realization compels policy makers and enforcers to ensure that urban settlements are well planned with environmental issues taken into consideration. In the absence of environmental planning and management of urban centres, environmental problems are likely to occur which may stretch beyond the boundaries of their urban areas, thus degrading ecosystems and rural livelihoods (UN-Habitat, 1990). Other studies carried out in Brazil emphasize the need to integrate local community in urban management and development. Involving the citizens in participatory decision-making in environmental management and physical planning and encouraging the planning authorities, will achieve better results in the institutions (Rualdo, 2002). It is against this background that this paper examines the emerging problems of environmental planning in small but fast growing urban areas represented herein by Ahero Town.
Need for Environmental Planning in Ahero Town

Ahero town is one of the medium size towns in Kenya with a population of 34,834 people. It is one of the big urban centres in Nyando District. Like most urban areas in Kenya, the town’s development has not been guided by planning principles. This has resulted into serious problems. The activities in the town generate a significant quantity of liquid and solid wastes, which normally find their way into the nearby River Nyando causing heavy contamination. The activities in the town generate a significant quantity of liquid and solid wastes, which normally find their way into the River causing heavy contamination. The ever-increasing numbers of people that settle in the town every year produce such waste whose disposal is poor. The town lacks a formal waste management system, which affects even its peri-urban areas. Thus, with further development and expansion in form of unplanned built up areas and industrial sites, waste accumulation and disposal problems in Ahero town is set to increase.

Uncontrolled and unplanned expansion of built-up areas to marginal and environmental sensitive land such as banks of river Nyando has led to heavy pollution and poor quality of river water. This has caused degeneration of river reaches and led to heavy siltation into the river and nearby Nyando River wetlands. This situation, coupled with the topography of the area, has escalated drainage problems in the town and made it more vulnerable to flooding when it rains.

Without sufficient environmental studies and/or adequate environmental planning and management, development control, poor development in Ahero town will continue to pose serious challenges to the town council and nearby rural residents. Severe environmental challenges such as inadequate housing, pollution of River Nyando waters, inadequate and poorly managed sanitation systems and poor solid waste management, which need urgent attention, will be difficult to manage. There is need for scientific data that will inform the town’s capacity to prepare a comprehensive long term physical and environmental plan and implement it.

Urban Development and Provision of Essential Services

Urban areas as centres of population and human activities consume water and many other resources and generate environmental problems over spatial scales (Hardoy et al., 1993, 2001). Such environmental problems at home in work places and neighbourhoods may be poor quality and overcrowded housing, inadequate and contaminated water and occupational health hazards among others. A high proportion of third world’s urban population lives and works in very poor conditions (UN-Habitat, 1996).

Urban Waste Management Services

Kiplagat (1999) regards solid waste as any substance discarded as worthless which is neither liquid nor gas. Solid waste according to World Bank/METAP (2000) consists of domestic garbage and other discarded materials such as waste swept up from the streets and unwanted items and materials of many kinds from commercial and industrial enterprises. UN–Habitat (2010) describes solid waste as unwanted material that is not discharged through a pipe. It explains that solid wastes can cause long term pollution of land, air and water and that large area of land in or near many urban centres receive large quantities of dumped solid waste of different sorts from various sources, thus making them unusable.

Household wastes, according to UN-Habitat (2010), are a composition of kitchen wastes with the remaining balances composed of sweepings, rags, paper, cardboards, plastics, rubber, leather, bone and metals. In poor neighbourhoods, the report continues to say the traditional cooking produce ash and where sanitation facilities are limited, the waste might also include faecal matter and in wealthy areas discarded furniture, used appliances and garden wastes may be found. The report by UN-Habitat (2010) further outlines markets as principal sources of commercial waste in developing countries most of which are organic matter. Other sources include modern stores, offices, restaurants, warehouses and hotels. Institutional sources include wastes from schools, government offices, hospitals and religious buildings where paper is the predominant waste. The report says that street sweepings generate sand, stones, litter, household refuse, drainage wastes, human and animal faecal matter while construction debris generated by construction and demolition activities adds significantly to quantities of waste. Industrial wastes emanate from processing and non-processing industries and utilities that produce packaging materials, food wastes, discarded metal, plastic, textiles, fuel burning residuals and spent processing chemicals.

It is reported by UN Habitat (1990) that housing near past and active disposal sites have been threatened by explosive gases that are generated by decomposing wastes and water sources are contaminated by leachate from solid waste. Similarly, urban air is polluted by smoke from burning of refuse and even toxins produced from large refuse incinerators especially when plastics are burned. Labourers and scavengers who have close contact with wastes run risks of cuts, infections and infestation by parasites (Kiplagat, 1999). While organic and inorganic piles of refuse encourage indiscriminate defecation in urban areas, Daskalopolos et al. (1999) regrets that tonnes of these useful materials are dumped or buried as refuse daily much of which could be
reprocessed into useful products and even rid urban settlements of such menace.

There are various approaches to deal with the problem of solid wastes apart from the throw away practice which is limited, hazardous and even escalates the solid waste problem. Miller (1994) emphasizes that the throw away practice only serves to remove waste from one part of the environment to another. Land-fill is the other approach to solid waste management which is self-defeating and short term since sooner or later, it is realized that even the best designed landfills leak wastes into water aquifers. However, Miller (1994) explains that correctly constructed land-fills are advantageous because they can be put into operation quickly, has low operation costs, can handle huge amount of wastes and later, can be turned into parks, golf courses, athletic fields, wildlife areas or recreation sites. Low waste approach, based upon increasing recycling, reuse, and waste reduction is the other approach to solid waste management. Turner (1992) says the advantages of recycling are that it saves in refuse collection and disposal costs, reduces pollution impact and when recycled materials are reused as raw materials savings is realized in the production process.

Re-use as a way of waste management depicts a situation where a product is used again in its original form as in the case of beverage bottles, which can be collected, washed and refilled by local bottling companies. Miller (1994) recommends re-use for waste management and suggests that it reduces energy use and pollution more than recycling. However, the most fundamental way to reduce waste is to prevent it from ever becoming waste in the first place. Reducing waste generally saves more energy and virgin resources and reduces the environmental impacts. Composting of urban solid waste is another attempt to solve the ever-increasing waste volume. Tchobanoglous and Burton (1972) describe it as a process in which organic material undergoes biological degradation to a stable end product.

Poor urban waste management has a close association with the existing laws on urban solid waste. Kramer (1992) indicates that despite the fact that the past 20 years did see tremendous quantity of waste legislation no single country can claim to have resolved its waste problem. The challenges of waste legislation Kramer (1992) points are attributed to the ever-increasing quantity of new products, many of which are bio-accumulative, toxic or present a potential threat to the environment.

**Ahero Town and its Environment**

Ahero town is located in Nyando District of Nyanza Province. Nyando District lies between latitude 00° 23’ south and 0° 50’ south, longitude 34° 4’ 34”E. It has a total land area of 1168.4 square kilometres and borders Kisuim District to the west, Nandi District to the north, Kericho District to the east and Rachuonyo District to the south. Nyando district has five administrative divisions, namely, Upper Nyakach, Lower Nyakach, Nyando, Miwani, and Muhoroni. Ahero town is located in Nyando District situated 30 kilometres east of Kisumu City along Kisumu-Kericho road and it is one of the urban centres of Nyando Division. It lies between latitudes 0° 4’ 45” and 0° 10’ 30” south and longitudes 35° 55’ 20” and 34° 54’ 20” east of Greenwich Meridian.

Nyando District which houses Ahero town lies in the Eastern part of large lowland surrounding the Nyanza gulls much of it in Kano plains. The district has three major land formations, which are the Nandi Hills, the Nyabondo Plateau and the Kano Plains. Ahero town therefore is in the Kano Plains, which rise to an altitude of 1,100m above the sea level.

The Kano Plains comprise predominantly black cotton clay soils with moderate fertility and poor drainage. The Plain is characterized by a gentle terrain that permits water infiltration and leaching. The land is nearly level, with slopes ranging up to 3% and with slight depressions that rise every few yards. The deep subsoil is mottled red, grey and brown blocky clay that becomes increasingly plastic and sticky below a depth of about 30 inches. The soil has fairly good physical properties; however, crops may be adversely affected by impeded drainage during wet periods. This soil is largely used for growing sugarcane and other subsistence crops such as maize. Nyando district has Nyando and Sondu Miriu Rivers and a shoreline of 11 kilometers long. Nyando River drains from Nandi Hills and passes through Ahero town.

Ahero Town has a total population of 130,607. Ahero urban council alone has 34,834 persons. The growth rate of the district from the 1999 population census was 3.4% per annum. The mean annual temperature is about 29.8°C; with mean monthly minimum temperature ranging between 15.0°C to 18.7°C and mean monthly maximum temperature is over 35°C. Nyando basin experiences seasonal contrasts in rainfall. The region is characterized by a bimodal rainfall distribution pattern with the long rains occurring in March to May while the short rains occur in September to November. The mean annual down pour during the short rains ranges between 450mm-600mm while that during the long rains ranges between 1100mm-1630mm. Data obtained from Ahero meteorological station the town has recorded an annual average rainfall of 1260mm in the district plan period of 2000 to 2008.

These amounts of rain recorded vary with altitude and the proximity of Nandi and Tinderet escarpments. Water passes through the soils during
the rainy season, but is largely exhausted by evaporation and transpiration about as fast as it falls during the rest of the year. The evaporation rate is 156mm per month. From a few small patches of open forest scattered along the bases of the Nandi Escarpment and the Tinderet mountains, it seems almost certain that much of this region carried a forest cover of varying degrees of density before land was densely settled. People in this region keep cattle, goats and sheep region and at the same time practice agriculture. Methods of farming include cut-and-burn, which have depleted the original natural vegetation. The result is scrub of fire-resistant growth and scattered trees, with a dense grass cover.

LIMITATION OF THE STUDY
The study confined itself to the spatial extent of the boundaries of the town as laid out by the demarcation of the Ahero town council boundaries. The study findings were also bound within the dates in between which the study was conducted which were between September 2005 and March 2006. The authors note that the circumstances could have changed with respect to environmental challenges in the town. The inadequacy of finance was a major limiting factor towards expanding the size of the sample size and efficiency and duration it took to in conducting the research. Despite these limitations, the study provides a framework for identifying environmental challenges, their impact and recommending ways to improve the living conditions of both urban and suburban dwellers.

MATERIALS AND METHODS
In each development, the main criterion for inclusion in the sample was being resident or non-resident of Ahero town with knowledge of the town and its environment based on experience gathered out of daily life activities or residential history. Ahero town was divided into 4 geographical areas dissected by the highway from Kisumu towards Kericho (West-East) and by River Nyando (North-South), forming 4 quadrants. Fifty questionnaires were administered randomly in each quadrant.

A combination of random, systematic, and purposive sampling techniques were adopted in selecting the respondents. Simple random sampling was used to identify the first interview point after which systematic sampling was used to identify the next interview point. An interview interval of 10 was used. Purposive sampling was used to bring into fore the opinions of key people in the management and administration of the town. For such respondents, key informant interviews were administered. The town clerk was one of the key persons interviewed.

A structured questionnaire was the primary mode of data collection used to interview the respondents for the study. Eight key informant interviews were administered to eight key persons purposively identified based on their role in the town’s administration, management, and influence. These were: the Ahero Town Council clerk, Ahero town Public Health Enforcement Officer, Ahero town administrative officer, Ahero town Works and Planning officer, and Social work officer. Others were the Water technician from the Catholic Church water supply, a non-governmental organization working around the town (VIRED International) and one wholesale trader with the largest business capacity was interviewed.

Some of the environmental issues under study required physical and direct observation to enable triangulation and visual authentication of facts as reported by the respondents. Transect walks around the town using an observation guide was conducted during the study. Some of the areas visited included the condition of Nyando River banks and other solid waste dumpsites, storm drainage sites, built up/construction sites, polluted water wells, among others. Some of the scenes observed in the sites were captured digitally using a Kodak KB-10 35 mm still camera. The scenes that appeared to sufficiently represent such phenomenon to add to the visual weight and comprehension as to the magnitude and severity of some of the issues and findings were captured. To identify planning problems in the study area, physical development plan produced by the colonial government in 1966 was used to identify built up areas, which do not conform to the physical development plan. Clarification was sought from the town council to establish their authorization through interviewing Ahero town council authorities. Further in-depth interviews were used to obtain information about solid waste management, sanitation, adequate water supply and housing through zoning and designation for such from Ahero town council officials on existence of development control policy at town council level and responses recorded by the researcher and his assistants.

An existing proposed boundary map for Ahero town was obtained from the provincial Physical Development offices. A plastic transparent film material was laid on the boundary plan and pinned together using a masking tape. Boundaries, roads and other features were drawn. Pen and ink was used to draw while a measuring scale rule was used to establish the size of plots to be drawn in each neighbourhood. Location of land uses was done in accordance with the planning principles established by the Ministry of Planning and National Development. Control points were evenly selected guided by the principle of even distribution of the points on the face of the manuscript and that the points should be able to enclose the whole manuscript. For ease of identification, the points were
located at the intersection of sets of easting and northing co-ordinates.

The drawn manuscript was then pinned on the digitizing board using masking tape. Control points, which were already identified randomly and marked on the face of the manuscript, were digitized to register them in the system and an acceptable level of accuracy for digitizing was obtained. The data on the manuscript were digitized and edited using catalinx computer program then exported to Map Info program for further analysis.

Combinations of qualitative and quantitative techniques were employed during analysis; however, the study was largely quantitative. Quantitative analysis was simplified using the SPSS, which enabled the running of frequencies, comparisons, percentages, deviations and correlations in the data stream. The qualitative information mainly arising from the open-ended questions were analyzed thematically. The data was organized by questions to look across respondents and their answers in order to identify consistencies and differences.

RESULTS AND DISCUSSION
The Status of the Town’s Environment
The status of the general environment was assessed bearing in mind the extent to which it was degraded. The signs the author looked for included the existence of natural features, natural vegetation and the topography which may act as causal factors to enhance degradation. In and around the town, it was observed that negligible natural vegetation existed; however, there was some initiative by Ahero Town Council to plant exotic tree species around their offices compound but with a deplorable state of management. It was found that River Nyando, a permanent river that straddles the town was turbid due to heavy silt loading indicating high rate of upstream erosion. It was also observed that all of the town's wastes end up in the river further causing heavy pollution and suffocating the nearby downstream wetlands and water life within it as evidenced in Plate 1 below, which equally indicate the scanty remaining natural vegetation along the river bank.

EMERGING ENVIRONMENTAL CHALLENGES IN AHERO TOWN
Solid Waste
Solid waste in the study referred to any refuse not in liquid or gas form generated by households, business premises and factories. These include plastics, food remains, bottles, papers and other such refuse. Polythene paper material, food remains and specific wastes common to some areas such as cigarette filters around shops, formed 46.7% of the respondents interviewed. Some 11.1% of respondents indicated that they generated polythene, paper and food remains only. The rest of respondents gave different combinations of wastes generated both in households and business premises and these formed a total of 42.2 %. Out of the people interviewed, 71.8% estimated that they generated between 0.5 and 1kg of solid waste on a daily basis, 16.6% said they produced between 1 to 4 kg and 11.6 % said they produced 4 to 10kgs of solid wastes. Furthermore, 40% of respondents indicated that they dump their solid waste in open dumps and 11% said they dispose their solid waste in bins, 5% disposed of solid waste anywhere they found.

The analysis showed that 10% burnt their solid waste while 20% disposed of waste in other places different from those already indicated and 14% of respondents dispose their waste in a combination of the open dumb, bins anywhere available, burn and other places.

On the provision of garbage bins, 83.9% of the residents in Ahero Town indicated that Ahero Town council does not provide waste bins while 16.1% said that they do. The author sought to know whether any one interviewed or a member of his family had suffered from diseases that are likely to be caused by lack of waste management such as diarrhoea, dysentery, malaria, and 62% of respondents indicated that indeed one of the family members had suffered from especially diarrhoea and malaria.

Plate 1: Solid Waste dumped on River Nyando Banks

Plate 2: Solid Waste dumped in the narrow streets of Ahero Town
Plates 2 and 3 confirm the fact that wastes are dumped anywhere within the neighbourhood where residents can reach. A random transect observation indicated that there were refuse and litter of all types scattered within the town’s environment which is a potential environmental hazard with far reaching implications.

Environmental Planning Problems
It was established that the existing plan was ignored in some areas as indicated in the plan prepared in the 1960s, such that buildings were erected on spaces left out at the bank of River Nyando. It was for instance noted that a slaughter house was constructed at the bank of River Nyando. The author personally observed the waste resulting from the activities of the slaughter house being disposed of in the river. Surprisingly, the public health meat inspector who was present did not raise objection to this act. The Ahero town council has not allocated land for informal and light industries; therefore, the author found Jua Kali light industries activities along the main Kisumu-Nairobi highway as shown in the Plates 4 and 5 below.

These activities included metal fabrications for steel doors and windows, carpentry works for furniture and wooden doors. It was found that no bicycle route was provided for by the planning authority. Therefore, famous bicycle transport known as ‘boda boda’ were found operating next to the main Kisumu-Nairobi highway (Plate 5), blocking pedestrians and endangering themselves in case of motorists losing control of their vehicles.

In addition, the author observed that insufficient parking and bus park was provided for in Ahero town. Therefore, matatu (passenger service vehicles) operators were found doing their business at a petrol station and along the road exiting from the town. These activities cause congestion for motorists in and out of Ahero.

It is worth noting that many development plans remain unimplemented since most of these plans were produced on a top-down basis. The old plan for Ahero town was produced in the 1960s and, just like many of the cities in the south (developing countries), did not take into account the requirements for economic development, political priorities and the weak role of the planner to enforce the plan. In developing countries, traditional planning approaches have been rendered completely inappropriate to meeting the needs of many urban settlements which since the 1960s have been characterized by rapid growth of low income population, which have overwhelmed the financial, human and institutional resources of the government.

The net effect of such inadequacies is that the majority of urban growth has long taken place outside the planning rules. Informal residential and business premises and developments increasingly dominate new urban areas, where half or more of the city’s population and many of its economic activities are located in illegal or informal settlements (UN-Habitat, 1996).
CONCLUSION AND RECOMMENDATIONS
From the results of the study, it is apparent that the state of Ahero town’s environment is poor. Therefore, regarding the state of environment in the town, it is recommended that Ahero town council strives to create green areas within the town to improve on the environmental outlook. To make the town appealing, it is recommended that ninety percent of the town’s roads be lined with appropriate trees and shrubs. The town council needs to put efforts to stop liquid waste that end up polluting River Nyando.

It was established that solid waste management is inappropriate. It is, therefore, recommended that efforts be made by the town council to establish and enforce solid waste management policy, which have been established in their by-laws. The available avenue to ensure efficient management of solid waste would be to privatize the services. The community needs to be given environmental education so that they can manage their wastes. Most residents of Ahero town more often than not use water whose quality is not ascertained. The author recommends an urgent alternative supply source, which is reliable to minimize cases of occurrence of water borne diseases in the town.

It was also noted that the Ministry of Public Works and Housing has guide lines on the sizes of dwelling units. Therefore, the Council needs to work with the Ministry to give guidance in determining and enforcing the type of houses to be constructed, which are suitable for healthy habitation. The study also revealed that there is no system in place to safely dispose of sludge and waste water. Therefore, urgent and concerted efforts are required to establish an efficient and a working sanitation system.

The study established that there is only one fairly reliable source of water supply, although it has quite some shortcomings. With already ever increasing demand for water, it is prudent to seek other private institutions willing to assist in enhancing water supply in the town. Ahero Town Council has put in place sufficient environmental policies which if enforced will make the town a healthy and pleasant environment to live in. However, enforcement officers need to be protected from the political elite so they may carry out their work efficiently without interference from elected leaders for the good of all residents of Ahero town.

REFERENCES


